Dust Bowls Down Under:

An Environmental History of Wind Erosion in the South-East of Australia, 1929–1945/46

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Abbreviations

ACT	Australian Capital Territory
ALP	Australian Labor Party
ANA	Australian Natives' Association
ANZAAS	Australian and New Zealand Association for the Advancement of Science
ANZAC	Australian and New Zealand Army Corps
BoM	Commonwealth Bureau of Meteorology
CCC	(US) Civilian Conservation Corps
CSIR	Council of Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FAO	Food and Agriculture Organization (UNO)
LCL	Liberal and Country League
NSW	New South Wales
NRCM	National Rural Catholic Movement
RRC	Rural Reconstruction Commission
SCS	Soil Conservation Service
SRWSC	State Rivers and Water Supply Commission (Victoria)
UAP	United Australia Party
UNO	United Nations Organisation
WMO	World Meteorological Organization

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Introduction

In the 1930s to the mid-1940s, Australians identified a serious threat to their society, one that exacerbated their already difficult economic and political situation. Newspapers reported about a "cancer"[1] that would eat out "the heart of the continent"[2] and about "a more formidable menace to Australia than an enemy fleet would be outside Sydney Heads",[3] a menace that was described as being "worse than guns".[4] Some Australians even considered that they were facing "a destroyer more deadly than all the Hitlers of history"[5] or "a greater enemy to Australia than even the Japanese".[6] This menace that Australians feared was the phenomenon of soil erosion, and especially wind erosion. The public debate on the threatening character of soil erosion did not always differentiate between the various kinds of soil erosion, and sometimes subsumed water and wind erosion in the same category. The fear of wind erosion had, however, most of the time a quite distinct colouring: As wind erosion was – contrary to water erosion – linked to periods of drought, it conjured long-standing fears of aridity and encroaching deserts.[7] Moreover, it was epitomised by large dust storms that rolled over the parched countryside and from time to time engulfed the states' capitals.[8]

Dust storms are but the most visible form of wind erosion, i.e. the detachment of soil particles from the soil surface and their transport by the forces of wind.[9] They therefore help to make visible the usually slow and imperceptible processes of land degradation that often pass unnoticed by the human eye.[10] Depending on the size of soil particles and the forces of

[1] 'Soil Erosion. The Cancer of the Earth', *The (Adelaide) Mail*, 11 September 1937.
[2] Jock H. Pick (1942): Australia's Dying Heart, Soil Erosion in the Inland, Melbourne, Melbourne University Press, p. 48.
[3] 'Erosion Menace Worse than Guns', *The (Sydney) Daily Telegraph*, 9 June 1936.
[4] Ibid.
[5] Pick, Australia's Dying Heart, p. 89.
[6] Hon. A. E. McDonald: "Like a foreign army advancing across the country, the sand is coming nearer and nearer to the sea, and valuable land is being lost because we will not face up to the evil of wind erosion", in: Parliamentary Debates (PD), Legislative Council Victoria, 27 June 1944, p. 15.
[7] Roslynn D. Haynes (1998): Seeking the Centre. The Australian Desert in Literature, Art and Film, Cambridge [et al.], Cambridge University Press, pp. 26-32.
[8] James C. Foley (1957): Droughts in Australia: Review of Records from Earliest Years of Settlement to 1955, Melbourne, Bureau of Meteorology, p. 28; Grant McTainsh/John Leys (1993): Soil Erosion by Wind. In: Grant McTainsh/Walter C. Boughton (eds.), Land Degradation Processes in Australia, Melbourne, Longman Cheshire, pp. 188-233, here p. 199; Cameron Muir (2014): The Broken Promise of Agricultural Progress. An Environmental History, New York [et al.], Routledge, pp. 128-131.
[9] Ann Young/Robert Young (2001): Soils in the Australian Landscape, South Melbourne, Vic., Oxford University Press, pp. 112-113; McTainsh/Leys, Soil Erosion by Wind, pp. 200-214.
[10] World Meteorological Organization (WMO) (2005) (ed.): Climate and Land Degradation [WMO No. 989], p. 9.

the wind, wind erosion occurs in the form of surface creep, saltation, and suspension.[11] In the latter case, when soil particles are suspended in the air, one speaks of dust events that are further classified according to their form and visibility. The Australian Bureau of Meteorology uses four definitions of dust events, which conforms to the worldwide standards of the World Meteorological Organization (WMO).[12] Only if turbulent winds raise large quantities of dust into the air reducing visibility to less than 1,000 metres does one speak of a dust storm.[13]

Wind erosion depends on a large variety of climatic, geological, and ecological factors such as wind velocity, the erodibility of the soils, the soil moisture and the vegetative cover.[14] It is a natural process that occurs especially around the world's drylands.[15] Accordingly, Australia, as the driest inhabited continent on earth, is especially liable to it.[16] Most of today's scientists emphasise that wind erosion is mainly caused by climatic factors, namely wind and drought;[17] when wind erosion rates are above the level explained by climatic variations, one speaks of accelerated or anthropogenic wind erosion.[18] Australian wind erosion expert Grant McTainsh and his co-workers at Griffith University have calculated an index of potential wind erosion, which takes account of the wind velocity and soil moisture.[19] When the actual erosion rate is higher than suggested by the index, they presume accelerated erosion through human activity.[20]

Together with water erosion and salinisation, wind erosion is among the most important symptoms and causes of land degradation.[21] Wind erosion is also closely linked to

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[11] Young/Young, Soils in the Australian Landscape, pp. 112-113; McTainsh/Leys, Soil Erosion by Wind, pp. 200-214.
[12] WMO, Climate and Land Degradation, p. 23.
[13] Conventionally, the terms 'sand' and 'dust' are used the following way: 'Sand' for particles that are 0.6-1mm in size, and 'dust' for particles that are <0.6mm. In practice, only particles below 0.1mm can be transported by wind in suspension, cf.: Victor R. Squires (2002): Dust and Sandstorms: An Early Warning of an Impending Disaster. In: UNCCD (ed.) (2002), Global Alarm: Dust and Sandstorms from the World's Drylands, London, Stationery Office Books, pp. 15-28, here p. 17; WMO, Climate and Land Degradation, p. 23.
[14] Young/Young, Soils in the Australian Landscape, pp. 112-113; McTainsh/Leys, Soil Erosion by Wind, pp. 200-214.
[15] Ibid.
[16] Many dust events in Australia are natural, see Richard S. Greene et al. (2009): Role of Eolian Dust Deposits in Landscape Development and Soil Degradation in Southeastern Australia. In: *Australian Journal of Earth Sciences* 56, pp. 55-65.
[17] Grant McTainsh et al. (2011): Wind Erosion and Land Management in Australia during 1940-1949 and 2000-2009. Report prepared for the Australian Government Department of Sustainability, Environment, Water, Population and Communities on behalf of the State of the Environment 2011 Committee, Canberra, p. 1; John Leys (1989): Blow or Grow? A Soil Conservationist's View to Cropping Mallee Soils. In: James C. Noble/Ross A. Bradstock (eds.), Mediterranean Landscapes in Australia – Mallee Ecosystems and their Management, East Melbourne, Vic., CSIRO, pp. 280-286, here p. 280; Young/Young, Soils in the Australian Landscape, p. 99.
[18] Ibid.
[19] Young/Young, Soils in the Australian Landscape, p. 113.
[20] Ibid.
[21] WMO, Climate and Land Degradation, p. 8.

processes of desertification,[22] defined by the United Nations Convention to Combat Desertification (NCCD) as "land degradation in the arid, semi-arid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities".[23] Among the *a prima facie* natural factors contributing to wind erosion, drought appears as the major cause, as it reduces the vegetative cover and dries out the soil surface.[24] Since the 1980s, it is well established that some of the major droughts in Australia's history have been caused by the effects of the El Niño-Southern Oscillation (ENSO).[25] In regard to anthropogenic factors contributing to wind erosion, human land management practices stand out as the chief reason for the acceleration of wind erosion processes. These involve mainly the removal of vegetation by methods of tillage and by overgrazing.[26] In the last two decades, concerns have forcefully arisen that climate change might increase periods of extreme drought, resulting in increased of wind erosion in Australia as well as around the globe.[27] As scientists link human action with climate change and with increasingly frequent drought periods, it becomes even more difficult to differentiate between natural and anthropogenic factors contributing to wind erosion.

No matter what their underlying cause, wind erosion and dust storms can induce major physical damage, not only in the areas where the soil is picked up (on-site wind erosion), but also in the areas of transition and deposition (off-site wind erosion).[28] Where wind erosion originates, the winds strip off the finer and more fertile soil particles, thus reducing the soils nutrient content and its water holding-capacity, which in turn adversely affect its long term

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[22] Richard A. Shakesby (2014): Desertification. In: John A. Matthews (ed.), Encyclopedia of Environmental Change, Vol.1, London [et al.] SAGE Publications, pp. 269-273. The term 'desertification' is of French origin and was first used in 1927 by Louis Lavauden and later popularised by French scientist André Aubréville in 1949, cf. Diana K. Davis (2014): Deserts. In: Andrew C. Isenberg (ed.), The Oxford Handbook of Environmental History, Oxford [et al.], Oxford University Press, pp. 108-132, here p. 117.

[23] WMO, Climate and Land Degradation, p. 6. For the difficulties to define the vague concept of desertification, see: Nicholas J. Middleton/David S. Thomas (1994): Desertification: Exploding the Myth, Chichester [et al.], John Wiley & Sons Ltd., p. 10.

[24] Nicholas J. Middleton (1990): Wind Erosion and Dust-storm Control. In: Andrew S. Goudie (ed.), Techniques for Desert Reclamation, Chichester [et al.], Wiley, pp. 87-108, here p. 91; J. K. Marshall (1973): Drought, Land Use and Soil Erosion. In: John V. Lovett (ed.), The Environmental, Economic and Social Significance of Drought, Sydney, Angus&Robertson, pp. 55-77, here p. 69.

[25] Neville Nicholls (2005): Climatic Outlooks: From Revolutionary Science to Orthodoxy. In: Tim Sherratt/Tom Griffith/Libby Robin (eds.), A Change in the Weather: Climate and Culture in Australia, Canberra, National Museum of Australia Press, pp. 18-29; Id. (2005): Climate and Culture Connections in Australia. In: *Aust. Met. Mag.* 54, pp. 309-319. See also: Donald Garden (2009): Droughts, Floods and Cyclones: El Niños that Shaped our Colonial Past, North Melbourne, Vic., Australian Scholarly Publishing.

[26] McTainsh et al., Wind Erosion and Land Management, p. 1; Leys, Blow or Grow?, p. 280; Young/Young, Soils in the Australian Landscape, pp. 99, 113.

[27] Grant McTainsh et al. (2005): The 23rd October 2002 Dust Storm in Eastern Australia: Characteristics and Meteorological Conditions. In: *Atmospheric Environment* 39, pp. 1227-1236, here p. 1235; Andrew S. Goudie (2009): Dust storms: Recent developments. In: *Journal of Environmental Management* 90 (1), pp. 89-94, here p. 92.

[28] McTainsh et al., Wind Erosion and Land Management, p. 9.

productivity.[29] When strong winds blow over a longer period, they absorb additional soil particles, and build dust storms that can move forward like an overwhelming wall of black dust. Such big dust storms rolled over Australia's south-east in the 1940s, but also in the decades afterwards: In February 1983, a huge dust storm engulfed Melbourne,[30] in May 1994, one rolled over Adelaide,[31] and in 2002 and 2009, large dust storms hit Sydney, each of them carrying several tons of dust.[32] Where they roll over, dust storms can cause damage to plants, animals and humans alike, obstruct traffic and everyday life routines, and pollute the air.[33] On those sites where the soil particles are finally deposited, often in thick layers of sand, the sediments can bury crops and farmlands, fill up irrigation canals and rivers, cover roads, railways, and other central infrastructural constructions.[34] Wind erosion is, therefore, considered to be a cause of major agricultural and environmental problems in many parts of the world.[35]

This thesis focuses on the phenomenon of wind erosion in the three south-eastern states of New South Wales, Victoria, and South Australia in the period from roughly 1929 to 1945/46. Several considerations and assumptions have guided this specific geographical and time period layout. The timeframe of the thesis has been suggested by the emergence of a public and scientific debate on wind erosion found in contemporary sources: In the late 1920s, the first serious concerns about wind erosion appeared in public and scientific debates, and that concern grew during the 1930s and first half of the 1940s. The public debate on the problem of erosion was sustained by domestic experiences with wind erosion and drought in several of Australia's pastoral and agricultural areas and by an international debate on soil erosion, fuelled by the news of the US Dust Bowl. In Australia, the public debate crested in the dust storm summers of 1944 to 46, whereupon it petered out, as the drought ceased and wind erosion decreased. As the opening quotes from contemporary sources demonstrate, the public debate on wind erosion was characterised by being emotionally charged and displaying a high sense of urgency. Of course, concern about wind erosion predates and postdates this rather narrow period, but never before or afterwards in Australian history does wind erosion reach such a prominent place within the Australian society. As the thesis will show, large

[29] WMO, Climate and Land Degradation, p. 21; Young/Young, Soils in the Australian Landscape, p. 114.
[30] Commonwealth of Australia, Bureau of Meteorology: The Melbourne dust-storm of February 1983. Online: http://www.bom.gov.au/lam/climate/levelthree/c20thc/storm7.htm [Accessed 30 March, 2016].
[31] P.R. Butler/W.J. Davies/J. F. Leys (1995): Dust Storms in South Australia on 24-25th May 1994, Technical Report No. 243, Adelaide, Primary Industries South Australia, p. 5.
[32] McTainsh et al., The 23rd October 2002 Dust Storm, p. 1234; McTainsh et al., Wind Erosion and Land Management, p. 1
[33] WMO, Climate and Land Degradation, p. 21.
[34] Ibid.
[35] Ibid.

parts of Australia's population were deeply concerned about the erosion problem and participated in multiples way in the public debate on the problem. The concerns about soil erosion were of such intensity that the period shows features of a veritable public crisis. The thesis therefore largely focuses on this period, but includes preceding debates in passing; it also points to later developments that had their beginnings during the 1930s and first half of the 1940s.

The heuristic decision to choose the public debate on the phenomenon of wind erosion as point of departure for the analysis is largely based on the research design suggested by the Collaborative Research Centre 923 'Threatened Orders. Societies under Stress' at the Eberhard Karls University of Tübingen, Germany, under whose umbrella the thesis has been conceived.[36] The CRC analyses societies or social groups that perceive themselves as being threatened in an existential way.[37] The process of classifying such a moment when a society is under elevated, even existential stress, starts by identifying a public debate on the respective menace.[38] Typically, the participants of that public debate agree about the current status quo, they project a future scenario and suggest ways to act in the face of the perceived threat.[39] The perspective taken is, therefore, first that of the historical actor who is taken seriously. In this way, periods or events come into the focus of the historical analysis that might have been otherwise judged as unimportant and, consequently, overlooked by the historian. The CRC's approach, however, does not end here: Once the perspective of the historical actor has been established, it is supplemented by the historian's analytical perspective. By contrasting the historical and analytical perspectives, the approach allows for the classification of a large variety of relations between contemporary perceptions and later assessments – ranging from absolute congruency to discrepancy. The historian can then trace where congruencies or discrepancies occur, and can identify different variables responsible for the historically contingent perceived threat. The CRC's theoretical approach subsumes that societal structures, often imperceptible in regular situations, become visible when they seem under

[36] https://www.uni-tuebingen.de/forschung/forschungsschwerpunkte/sonderforschungsbereiche/sfb-923/ueberblick.html [Accessed 9 February, 2016]. Many thanks to the German Research Foundation and the CRC for supporting this project. Special thanks to Ewald Frie, Klaus Gestwa, Susanne Stein, Graeme Davison, Tom Griffiths, Libby Robin, Cameron Muir, as well as to all my colleagues of the CRC.

[37] Ibid.

[38] Ewald Frie (2013): 'Bedrohte Ordnungen' zwischen Vormoderne und Moderne. Überlegungen zu einem Forschungsprojekt. In: Klaus Ridder/Steffen Patzold (eds.), Die Aktualität der Vormoderne. Epochenentwürfe zwischen Alterität und Kontinuität. Europa im Mittelalter 23, Berlin, Akademie Verlag 2013, pp. 99-109, here p. 104.

[39] Fabian Fechner et al. (2014): 'We are gambling with our survival'. Bedrohungskommunikation als Indikator für bedrohte Ordnungen. In: Ewald Frie/Mischa Meier (eds.), Aufruhr – Katastrophe – Konkurrenz – Zerfall. Bedrohte Ordnungen als Thema der Kulturwissenschaften (SFB 923 Bedrohte Ordnungen), Tübingen, Mohr Siebeck, pp. 141-173, here pp. 161-162.

threat. Analysing societies in situations when they feel threatened, consequently, allows historians to get a deeper insight into how past societies worked.

The decision to start from the public debate rather than the actual phenomenon of wind erosion is also due to the fact that there is a lack of reliable data on the physical occurrence of wind erosion for this early period. It was only in the late 1930s and early 1940s, in the wake of the erosion crisis, and as a result of the newly emerged public and scientific interest in the phenomenon, that Australian meteorologists started to systemically collect data on dust events. The Dust Event Database (DEDB), established at Griffith University by Grant McTainsh and J. R. Pitblado, contains records of 15 stations that date back to 1941.[40] Before that date, no reliable quantitative data for measuring wind erosion is available.[41] However, unsystematic records, for example newspaper articles and diary entries, leave no doubt that dust storms were frequent in the 1930s and first half of the 1940s, and that wind erosion posed serious problems for Australians. While contemporary sources suggest that wind erosion events were especially frequent in the period from ca. 1929-1946, probably with a special intensity during the drought years 1937-1945/46, it is also certain that wind erosion posed problems for European settlers from at least the mid-19th century, and that severe dust storms occurred in the early 1920s as well as after 1946, which marks the end of the period chosen here.

As reliable data is lacking, it is not possible to assert with certainty whether the increase of public concern about wind erosion during this period was linked to a rise in the actual occurrence of wind erosion, or whether it was the result of the advancement of settlement into the marginal areas naturally more prone to wind erosion. It is even possible that the public debate here under consideration is in large parts the result of an increased awareness of the problem, linked to external events, for example the publicity of wind erosion problems in certain areas of the United States of America, the 'Dust Bowl' region. The contemporary opinions are likewise ambiguous in this regard: Botanist Noel C. Beadle from the Soil Conservation Service of New South Wales, responsible for the Western Division of the state, found in the mid-1940s that there was "little doubt that the intensity and frequency of dust storms [were] increasing".[42] Around the same time, however, James MacDonald Holmes, Professor for Geography at the University of Sydney, stated that older residents in

[40] Grant McTainsh/Kenn Tews (2007): Soil Erosion by Wind – Dust Storm Index (DSI): National Monitoring and Evaluation Framework, prepared for the National Land&Water Resources Audit, Canberra, National Land&Water Resources Audit, p. 8.
[41] McTainsh et al., Wind Erosion and Land Management, p. 4.
[42] Noel C. Beadle (1945): Dust Storms. In: *Journal of Soil Conservation NSW* 1 (2), pp. 53-55, here p. 53.

the same region reported a decrease in frequency since earlier times.[43] Most likely a series of factors combined to raise the public communication on the menace of soil erosion. Another highly controversial question is that of humans' responsibility for the erosion crisis: Although today's experts largely agree that the wind erosion of the 1930s and 1940s in Australia was accelerated through human land management methods, the actual part played by humans in this ecological disaster remains controversial.[44]

The geographical scope chosen here, namely the focus on the three south-eastern states, also comes with some methodical strings attached: Australia's wind erosion crisis was not only temporally, but also geographically dispersed. The historical sources suggest that wind erosion predominantly affected the three south-eastern states, which are therefore in the focus of this study. The south-eastern states also show certain common characteristics in regard to land settlement and climate. Maps showing the occurrence of soil erosion in Australia were published starting in the late 1930s. They indicate that wind erosion was especially acute in the pastoral areas of South Australia and western New South Wales, as well as in the agricultural areas of the south-eastern wheat belt that spreads across the three south-eastern states. Especially the Mallee region, situated where the three south-eastern states join their borders, was severely affected, and has therefore come into the focus of the thesis. Today, the Mallee is still one of the regions in Australia with the highest occurrence of wind erosion.[45] The first extensive meteorological study on Australian dust storms by Fritz Loewe, dating from 1943, also locates the area with the highest frequency of dust storm activity in this region.[46] But still, the data is not entirely reliable, as the findings differ from more recent observations that locate the highest dust storm frequency in the arid central parts of the continent, and point to the fact that most dust storms occur outside the main agricultural and pastoral lands.[47] Again, the uncertainty of data for the early period does not allow for a confident conclusion; but even if the dust storm activity was not highest in this area, there is no doubt that wind erosion in the highly populated south-eastern part of Australia affected more people than in other parts of the continent.

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[43] James Macdonald Holmes (1946): Soil Erosion in Australia and New Zealand, Sydney, Angus&Robertson, p. 175.
[44] McTainsh et al., Wind Erosion and Land Management, p. 1.
[45] McTainsh et al., The 23rd October 2002 Dust Storm, p. 1232; Jonathan Hopley et al. (2013): Wind Erosion Threat and Agricultural Land Cover in the Mallee: Technical Report, DEPI, Mallee Catchment Management Authority, Mildura.
[46] Fritz Loewe (1943): Duststorms in Australia. Bureau of Meteorology, Bulletin No. 28, Melbourne, Commonwealth of Australia, p. 7.
[47] Young/Young, Soils in the Australian Landscape, p. 113; Nicholas J. Middleton (1984): Dust Storms in Australia: Frequency, Distribution and Seasonality. In: *Search* 15, pp. 46-47.

The topic of the thesis – wind erosion – leads directly to the controversial aspect of human responsibility for land degradation and consequently opens the crucial question that is at the base of every environmental history: the intricate interactions between societies and their environments.[48] Moreover, as the soil represents the main source of food and, therefore, is the basis for all human living, the topic illustrates the tension that emerges from human attempts to exploit the soil, while being deeply dependent on it. In this way, it exemplifies the fundamental dialectic of the interrelationship between humans and nature.[49]

In regard to interactions of humans with their natural world, the Australian case is especially interesting, as the continent was biogeographically isolated for much of its history, so that the sudden encounter of humans with the unknown ecosystem is likely to show processes of interactions in fast motion: The arrival of the first humans from south-east Asia on the Australian continent some 50,000 years ago was the first sudden encounter of humans with the Australian ecosystem.[50] This swift collision was repeated in a second and even more drastic way with the arrival of the first European fleet at Botany Bay in 1788. The particular Australian climate, which is highly erratic and prone to series of natural disasters like droughts, floods and bushfires, is a special challenge to all living beings on the continent.[51] As a result, questions about how these sudden encounters have changed the ecosystems of the continent and how Aboriginal and settler societies have adapted to their natural environment are important in Australian environmental histories.[52]

The thesis acknowledges that environmental history is always anthropocentric to a certain degree, as methods and questions posed by the historian are of necessity human-centered.[53] It subscribes to the basic assumption that there exists a natural environment independent from humans, a material and physical element, that is not static but always in a process of change.[54] Based on the ecological conception of nature that has been fundamental for the emergence of the discipline of environmental history, the thesis further subscribes to the assumption that humans are part of this natural environment and fundamentally dependent

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[48] Cf. Wolfram Siemann/Nils Freytag (2003): Umwelt – eine geschichtswissenschaftliche Grundkategorie. In: Wolfram Siemann (ed.), Umweltgeschichte. Themen und Perspektiven, München, Beck, pp. 7-19, here p. 8.
[49] Frank Uekoetter (2007): Umweltgeschichte im 19. und 20. Jahrhundert, München, Oldenbourg, p. 6.
[50] Donald Garden (2005): Australia, New Zealand, and the Pacific: An Environmental History, Santa Barbara Calif., Oxford ABC-CLIO, p. 7.
[51] Libby Robin/Mike Smith (2008): Australian Environmental History: Ten Years on. In: *Environment and History* 14 (2), pp. 135-143, here p. 136.
[52] Ibid.
[53] Joachim Radkau (2008): Nature and Power: A Global History of the Environment, Washington, D.C., German Historical Institute, pp. 3-5.
[54] Ellen Stroud (2003): Does Nature Always Matter? Following Dirt Throughout History. In: *History and Theory* 42, pp. 75-81, here p. 80; John R. McNeill (2003): Observations on the Nature and Culture of Environmental History. In: *History and Theory* 42, pp. 5-43, here p. 6.

on it.[55] At the same time, the thesis acknowledges that the way humans conceive their natural environment is always subject to social and cultural constructions.[56] In regard to the soil, this means, as environmental historians John McNeill and Verena Winiwarter have emphasised, that "the human histories of soil are both material and intellectual".[57] The challenge of writing the history of the soil is, consequently, to see how the social and cultural constructions relate to the material aspects, and vice-versa.[58] This theoretical assumption has informed the research design of the thesis and is consequently reflected in its structure.

Despite the crucial part played by the soil in the existence of humans, it has not gained a lot of attention from environmental historians in the past.[59] This is surprising, as the US soil erosion crisis of the 1930s, the infamous 'Dust Bowl', is among the foundational works of the discipline of environmental history.[60] In his cultural history of the soil, geologist David Montgomery has emphasised that more historical research is needed in order to illustrate that social orders "rely as much on soil conservation and stewardship as on technological innovations".[61] Lately, some new studies have filled out some of the academic void, most recently a special issue of *Global Environment* that has taken an explicit international approach to the crucial topic of land degradation.[62]

The general lack of historical research on questions of soil in general, and land degradation in particular, is also true for the Australian case, and this despite the fact that environmental history in Australia has generally a strong focus on the land, in opposition to the sea.[63] The general lack of interest in the soil as a topic for environmental historians is probably linked to the fact that the topic is not high on the public or environmental agenda in general. As the Australian sociologists Stewart Lockie and Frank Vanclay have observed,

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[55] McNeill, Observations, p. 6.
[56] Stroud, Does Nature Always Matter?, p. 80.
[57] John R. McNeill/Verena Winiwarter (2006): Soils, Soil Knowledge and Environmental History. An Introduction. In: Eid. (eds.), Soils and Societies: Perspectives from Environmental History, Isle of Harris, White Horse Press, pp. 1-6, here p. 3.
[58] Stroud, Does Nature Always Matter?, p. 80.
[59] McNeill/Winiwarter, Soils, Soil Knowledge and Environmental History, p. 6.
[60] Donald Worster (1979): Dust Bowl. The Southern Plains in the 1930s. Oxford, Oxford University Press.
[61] David R. Montgomery (2007): Dirt. The Erosion of Civilizations, Berkeley [et al.], University of California Press, p. 6.
[62] Susanne Stein/Klaus Gestwa (2015): Gone With the Wind. Dust Storms and the Globalisation of Anti-Wind Erosion Measures in the Twentieth Century. In: *Global Environment* 8 (2), pp. 234-258. For further recent studies see: John R. McNeill/Verena Winiwarter (eds.) (2006): Soils and Societies: Perspectives from Environmental History, Isle of Harris, White Horse Press; Benno P. Warkentin (ed.) (2006): Footprints in the Soil. People and Ideas in Soil History, Amsterdam [et al.], Elsevier; Frank Uekoetter (2010): Die Wahrheit liegt auf dem Feld: Eine Wissensgeschichte der deutschen Landwirtschaft, Göttingen, Vandenhoeck& Ruprecht; David Moon (2013): The Plough that Broke the Steppes. Agriculture and Environment on Russia's Grasslands, 1700-1914, Oxford, Oxford University Press.
[63] Robin/Smith, Australian Environmental History, p. 139.

> Rural land degradation has never enjoyed the status, attention and emotive appeal of other environmental issues. Next to rainforest destruction, reef development and koala disease, the problems of soil erosion, salinity and acidification simply haven't been 'sexy' enough to capture the public or political consciousness.[64]

This is certainly true for the time after the Second World War, but – as the thesis will demonstrate – there was a time when soil erosion was by far the most important environmental issue in Australia. In this way, the quote also pointedly reflects the general obliviousness of Australians to their soil erosion crisis of the 1930s and the first half of the 1940s.

Some conjectures can be put forward for the striking neglect of the topic of wind erosion by historians so far: First, the fact that among the most important techniques of soil conservation that have been developed since the Second World War are methods of minimum or zero tillage, which reduce the disturbance of the ground cover. These methods are only possible with the application of large amounts of herbicides and pesticides.[65] For the modern environmental movement, which has been largely informed by Rachel Carson's *Silent Spring* (1962), such methods seem as a thorn in the flesh. Approaching the difficult question of wind erosion and soil conservation is, therefore, highly unpopular among environmental activists, an uneasiness that might have spread to environmental historians. Another reason for the circumstance that the early soil conservation movement has largely sunken into oblivion could be the fact that Australian modern environmentalism, as it emerged in the 1960s and 1970s, broke with the earlier conservation movement that had largely been socialised during the erosion crisis.[66] The conflict of generations went along with an ideological clash, as the modern green activists accused earlier conservationists of having pursued a utilitarian philosophy.[67] It is likely that their endeavour to distance themselves from earlier conservationists went along with a tendency to downplay past efforts and contributed to putting the period as a whole out of mind.

The occasional historical works on land degradation in Australia have focused on the period since European settlement, and the thesis follows this trend. This is no surprise, as the

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[64] Stewart Lockie/Frank Vanclay (2000): Critical Landcare: Introduction. In: Eid. (eds.), Critical Landcare, Wagga Wagga, N.S.W., Centre for Rural Social Research, Charles Sturt University, pp. 1-7, here p. 1.
[65] Middleton, Wind Erosion and Dust-storm Control, p. 101; Neil F. Barr/John W. Cary (1992): Greening a Brown Land: The Australian Search for Sustainable Land Use, South Melbourne, Macmillan, pp. 137-138.
[66] Libby Robin (1993): Of Desert and Watershed: The Rise of Ecological Consciousness in Victoria, Australia. In: Michael Shortland (ed.), Science and Nature: Essays in the History of the Environmental Sciences, Stanford in the Vale, British Society for the History of Science, pp. 115-149, here pp. 125-145; Thomas Dunlap (1999): Nature and the English Diaspora: Environment and History in the United States, Canada, Australia and New Zealand, Cambridge, Cambridge University Press, p. 288.
[67] Ibid.

Aborigines' lifestyle as hunter and gatherers is much less dependent on the exploitation of the soils, even though the land plays a significant role for the Aboriginal culture and belief system.[68] Also, land degradation in Australia is largely seen as a result of white settlement.[69] It is by now well established that the Aboriginal ways of living had likewise important influences on the ecosystem, and probably caused land degradation to a certain degree.[70] Still, most experts agree that the current problems of land degradation on the continent – even if its actual extent is controversial – result in large parts from the land management practices applied since European settlement.[71]

Reflections on land degradation in Australia have so far had a regular seat in most general environmental histories that have analysed how European settlement impacted the Australian ecosystem.[72] In some cases, this impact on the natural environment as a whole has been judged by and large in negative terms, and the Anglo-Australian settlement has been considered as largely destructive towards the resource land. The history of Australian soil use has consequently been depicted in terms of a narrative that considers European Australians as unable to create a sustainable relationship with this natural resource.[73] As historian William Cronon has illustrated for the case of the US, such a narrative of colonial settlement in terms of destruction is highly dependent on the chosen time frame and place and should not be followed unquestioned.[74]

Most historians and historical geographers who have written about land degradation have seen the phenomenon in a more balanced way as a reciprocal process, and have pointed to the fact that land degradation problems could induce Australians to readjust their attitudes and behaviour in regard to their soil resource. They have identified the aspect of fear as a powerful factor in this process. In this regard, their work presents a valuable connection point

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[68] Ronald M. Berndt/Catherine H. Berndt (1977): The World of the First Australians, Sydney, Ure Smith 1977, pp. 136-138.
[69] Lance E. Woods (1984): Land Degradation in Australia, Canberra, Australian Government Publishing Service, p. 30; Barr/Cary, Greening a Brown Land, pp. 8-9.
[70] Rhys Jones (1969): Fire-Stick Farming. In: *Australian Natural History* 16, pp. 224-228; Hughes Sullivan (1981): Aboriginal Burning and Late Holocene Geomorphic Events. In: *Search* 12, pp. 277-278; James Kohen (1995): Aboriginal Environmental Impacts, Sydney, University of N.S.W. Press, pp. 98-99; Barr/Cary, Greening a Brown Land, p. 8.
[71] See for example: Barr/Cary, Greening a Brown Land, pp. 1-4.
[72] Cf. Geoffrey Bolton (1981): Spoils and Spoilers, A History of Australians Shaping their Environment, Sydney, Allen&Unwin; Garden, Australia, New Zealand, and the Pacific.
[73] Barr and Cary point to the fact that the concept of 'sustainability' is fluent and time-bound, see: Eid., Greening a Brown Land, p. 2.
[74] William Cronon (1992): A Place for Stories: Nature, History and Narrative. In: *The Journal of American History* 78 (4), pp. 1347-1376.

to the theoretical framework of the CRC 'Threatened Orders' that focuses on moments of perceived threat. In such moments, the CRC assumes, time seems to run out and action to counter the menace becomes pressing, so societies typically construct discourses which are characterised by urgency and emotionality.[75] As wind erosion thwarted expectations into the productivity of the land, which in turn was considered as the basis for progress and civilization, the drifting sands appeared as a genuine menace and led partly to readjustments of land policies. Such processes have been emphasised by historical geographer Ronald L. Heathcote and more recently by environmental historian James Beattie.[76] Beattie has applied Richard Grove's concept of 'environmental anxiety' to describe those concerns of colonials that resulted from the fact that their natural environment did not answer in as productive a way as their European preconceptions expected it to do, or when the colonization process itself caused a series of unintended environmental consequences that threatened the foundations of colonial societies.[77] As Beattie has shown, these anxieties triggered early concerns for resource conservation and sometimes impelled efforts of more efficient exploitation through science.[78]

Despite such important preliminary studies, the wind erosion disaster of the 1930s to mid-1940s has not engendered major historical interest in the past. This lack of attention is linked to the general negligence of the first half of the 20th century in Australian environmental history: Research focuses on the 19th century, namely on the questions of first reactions and adaptations of European settlers to the Australian environment, and on the second part of the 20th century. Especially the period of the 1960s and afterwards has engendered much historical interest, particularly concerning the rise of the new environmentalism and emergence of green politics, developments that made Australia highly visible on the international scene.[79] The period in between, however, has not drawn much attention, with the exception of a few works on the progressive conservation of the interwar period.[80] Still, some historians have suggested that the period is probably much more

[75] Frie, 'Bedrohte Ordnungen' zwischen Vormoderne und Moderne, p. 104.
[76] Ronald L. Heathcote (1987): Images of a Desert? Perceptions of Arid Australia. In: *Australian Geographical Studies* 25 (1), pp. 3-25, here p. 10; James Beattie (2011): Empire and Environmental Anxiety. Health, Science, Art and Conservation in South Asia and Australia. 1800-1920, Houndmills [et al.], Palgrave Macmillan, pp. 191-192.
[77] Beattie, Empire and Environmental Anxiety, pp. 1, 9-10.
[78] Ibid.
[79] Martin Mulligan/Stuart Hill (2001): Ecological Pioneers: A Social History of Australian Ecological Thought and Action, Cambridge [et al.], Cambridge University Press, p. 12; Verena Winiwarter/Martin Knoll (2007): Umweltgeschichte: Eine Einführung, Köln [et al.], Bühlau, p. 34.
[80] Michael Roe (1984): Nine Australian Progressives: Vitalism in Bourgeois Social Thought, 1890-1960, St. Lucia, Qld., University of Queensland Press, pp. 68-70; Tom Griffiths (1996): Hunters and Collectors: The Antiquarian Imagination in Australia. Cambridge Eng. [et al.], Cambridge University Press, p. 156.

important than has so far been acknowledged, and have noted changes during this period in how Australians saw their natural environment. However, they have not yet linked these changes explicitly to the events of the soil erosion crisis.[81]

The historical works that have analysed the soil erosion crisis of the 1930s and 1940s to any extent are few: Historical geographer Joseph M. Powell has written on the details of the soil erosion crisis in Victoria, focusing mainly on the political side of the phenomenon.[82] In her analysis of the close interrelationships between nature and science in Australia, Libby Robin has identified the soil erosion crisis of the 1930s and 1940s as a significant period that induced scientists to adopt an ecological vision of the land.[83] Most recently, Cameron Muir has shed light on the erosion crisis as part of his broader approach to analysing ecological disorders that resulted from European Australians agricultural land use, also focusing largely on political responses.[84] Additionally, two PhD dissertations have put Australia's soil erosion crisis in a transnational perspective: Stephen Powell's unpublished PhD dissertation *Mothering, Husbandry and the State. Conservation in the United States and Australia, 1912–1945* (2000) follows largely a comparative perspective. Still, he has highlighted important US influences on Australia in matters of scientific expertise and soil conservation legislation. In her PhD thesis *A Transnational Environmental idea: Reception, Interpretation and Employment of US Dust Bowl Imagery in World War Two and Post-War Australia* (2014), Janette Bailey has taken a stronger cultural approach, and asked about how the transnational idea of the 'dust bowl' passed from the US to Australia and how it transmuted and adapted on its way.[85]

So far, the Australian wind erosion in the 1930s and first half of the 1940s has not been studied in its entirety, as a phenomenon of the natural world with which Australian society had to interact, both in a material as well as an intellectual way.[86] This thesis sets out to fill this research lack. Starting from the observation that a public communication about the

[81] Namely David R. Walker (1999): Anxious Nation: Australia and the Rise of Asia, 1850-1939, St. Lucia, Qld, University of Queensland Press, pp. 154, 164 and Warwick Frost (2004): Australia Unlimited? Environmental Debate in the Age of Catastrophe, 1910-1939. In: *Environment and History* 10 (3), pp. 285-307, here p. 287.
[82] For example: Joseph M. Powell (1989): Watering the Garden State: Water, Land and Community in Victoria, 1834-1988, Sydney, Allen&Unwin; Id. (1993): The Emergence of Bioregionalism in the Murray-Darling Basin, Canberra, Murray-Darling Basin Commission.
[83] Libby Robin (2007): How a Continent Created a Nation, Sydney, University of NSW Press, pp. 68-69; ead. (1997): Ecology: A Science of Empire. In: Ead./Tom Griffith (eds.): Ecology and Empire: Environmental History of Settler Societies, Edinburgh, Keele University Press, pp. 63-86, here p. 70.
[84] Muir, The Broken Promise, pp. 109-138.
[85] Janette Bailey (2014): A Transnational Environmental Idea: Reception, Interpretation and Employment of US Dust Bowl Imagery in World War Two and Post-War Australia. Unpublished Ph.D. thesis, Sydney, University of NSW.
[86] Cf. Siemann/ Freytag, Umwelt – eine geschichtswissenschaftliche Grundkategorie, p. 8; McNeill/Winiwarter, Soils, Soil Knowledge and Environmental History, p. 3.

menacing nature of soil erosion occurred in the period from ca. 1930-1945, the thesis addresses the multilevel relations between Australians and their soil in the period under consideration. The thesis puts forward a set of interrelated hypotheses that will be tested: Firstly, the thesis claims that the wind erosion crisis of the period ca. 1930-1945 was relevant to the Australian society and induced important immediate reactions and long-standing changes. To understand this impact it is necessary to consider both the material and the intellectual side of the wind erosion phenomenon and to correlate them. The thesis claims, furthermore, that among the induced results was the diffusion of ecological thought within the wider Australian society, which presents a crucial step in the emergence of modern Australian environmentalism.

In order to test these hypotheses, the thesis focuses on four domains that have been considered as crucial for the complex relation between Australians and their soil. The first section, *Living*, focuses on the material side of the erosion phenomenon, namely on the occurrence of wind erosion in Australia's south-east and on the immediate effects wind erosion had on those who lived there. The second and third sections focus on the intellectual side, as they both ask about how Australians conceptualised the erosion phenomenon, presuming that the physical experience played a crucial part in these cultural constructions. While *Understanding* focuses on the scientific concepts on wind erosion, *Conceptualising* traces in a more general way popular concepts of the phenomenon. Finally, the fourth part, *Responding*, analyses the political responses Australians formulated to the erosion crisis. In it I suggest that physical experience along with scientific and popular concepts on wind erosion all were crucial for how these responses took shape.[87] As every subdivision, this choice is to a certain degree artificial and deficient. It would be naive to assume that a clear distinction between the physical and the intellectual side of the wind erosion phenomenon can be made. The arrangement of the four parts is, likewise, to a certain degree arbitrary, as the narration suggests a chronology that was in reality not given. The four sections should, therefore, not be seen as pure categories which are set in stone, but rather as accentuations with permeable borders. In all of these sections, the emphasis is put on the perpetual process of interaction between humans and their natural environment, which is reflected in the progressive form of the sections' titles.

The chosen theoretical approach and structure of the thesis come with a series of challenges, many of them inherent to the discipline of environmental history, which is *per se*

[87] Ibid.

extremely fluid:[88] The different accentuations chosen require different sources and methods, as well as different analytical scales.

In regard to the sources that have been analysed, the broad approach taken in the thesis requires a large variety of material. Also, different corpora of sources require different kinds of methods to interpret them. For a study that takes as its heuristic point of departure public discourses on a certain phenomenon, it is of course crucial to analyse those sources that principally sustained this public communication. For the period under consideration, this was mainly the print media and the radio. Newspapers were an important medium for public communication in the period under consideration, even though they had already passed their zenith of influence after the mid-1920s.[89] The radio was rising in importance for people's lives on a continent of long distances during the 1920s, and this development culminated in the establishment of the Australian Broadcasting Commission in 1932.[90] Accordingly, city and rural newspaper articles have been used as important sources in all of the four sections, while radio broadcasts have been included in cases where scripts of the transmission have been found.

The first part of the thesis, *Living*, is interested in the lived reality of the people affected by wind erosion, and consequently resorts to sources that allow to access to these experiences, namely ego documents like diaries and oral history interviews along with methods such as those suggested by history of everyday life. The second part of the thesis, *Understanding*, follows an approach of history of science, and mainly uses scientific publications along with archival information that provides insight into the social context of knowledge production. The third section, *Conceptualising*, which examines the broader cultural perceptions of wind erosion, uses a large variety of sources. In addition to writings of experts and lay people, literary texts and Art paintings have been analysed. The last part of the thesis, *Responding*, uses more traditional historical sources such as legislative texts, parliamentary debates and political speeches.

As environmental history, the thesis is fundamentally interdisciplinarian, as it largely draws on findings from the natural sciences. Again, the plurality of methods that results from this specificity contains some important challenges.[91] For this thesis, recent research by soil

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[88] Winiwarter/Knoll, Umweltgeschichte, pp. 71-75; Uekoetter, Umweltgeschichte, p. 3.
[89] Harry Mayer (1964): The Press in Australia, London, Angus&Robertson, pp. 27-44.
[90] Lesley Johnson (1981): Radio and Everyday Life. The Early Years of Broadcasting in Australia, 1922-1945. In: *Media Culture Society* 3, pp. 167-178; Robert R. Walker (1973): The Magic Spark: The Story of the First 50 Years of Radio in Australia, Melbourne, Hawthorne Press, pp. 31-39.
[91] Eric Pawson/Stephen Dovers (2003): Environmental History and the Challenge of Interdisciplinarity: An Antipodean Perspective. In: *Environment and History* 9, pp. 53-75, here pp. 54-55; Winiwarter/Knoll, Umweltgeschichte, pp. 71-75; Uekoetter, Umweltgeschichte, p. 3.

conservationists and meteorologists on wind erosion processes has been consulted and integrated into the study. This method has engendered a series of problems: first of all, as many classically trained historians, I lack the professional training in natural sciences. It has, consequently, been difficult to navigate through the more than complex set of often opposing scientific opinions in regard to present and past wind erosion phenomenon. Additionally, the constructivist turn in the field of science history has rendered more clearly than ever before that modern science is the contingent product of historical processes, ready to be changed by a scientific revolution. To simply take actual scientific opinions as the point of reference for one's own evaluations of the past would, therefore, be grossly negligent; on the other hand, a thorough historical analysis of all the scientific fundamentals used for the study would require a temporary and intellectual effort far beyond the possibilities of this thesis. This problem, common to most environmental histories, becomes particularly evident in this thesis, which is – as are all modern environmental histories – based on ecological assumptions.[92] The thesis starts from the ecological understanding that European land use had consequences on the ecosystem of the Australian continent, and at the same time, the thesis aims at historicising the emergence of ecological ideas in science and society. There is no way out of this dilemma, if not by thorough self-reflection regarding the problem and by attempting to handle these difficulties in the most transparent way possible.

A further challenge that results from the chosen approach is the different scales that come together in this thesis, as the accentuations of the four sections require various analytical levels. An approach to the material side of wind erosion has to take account of soils, climate, vegetation, as well as specific land use practices – all factors that differ from region to region, sometimes even locally. The logical level for such an analysis is, consequently, the bioregion.[93] On the other hand, Australia's "default scale for environmental policy-makers" is the state level.[94] At time of Federation, authority on land matters had remained in the hands of the states, so political decisions about land settlement, etc. were dependent on the states, whose borders largely ignore the natural bio-geographic regions.[95] Consequently, as soon as actual settlement patterns and land management comes into the view – and this is likewise an

[92] Tom Griffiths (1997): Ecology and Empire: Towards an Australian History of the World. In: Id./Robin, Libby (eds.), Ecology and Empire: Environmental History of Settler Societies, Edinburgh, Keele University Press, pp. 1-13, here pp. 11-12.
[93] Libby Robin (2012): Australia in Global Environmental History. In: John R. McNeill/ Erin S. Mauldin (eds.), A Companion to Global Environmental History, Chicester [et al.], Wiley-Blackwell, pp. 182-195, here p. 183.
[94] Ibid.
[95] Ibid.

important element of the material part – these political-administrative entities become relevant.[96]

For the first section of the thesis, which emphasises the material element of the wind erosion phenomenon, the Mallee region has been chosen as the most appropriate scale, as it was among the eco-regions most affected by wind erosion. In order to take account of the human factor in the phenomenon, the thesis has focused on that part of the region administered by the state of Victoria, which is only one part of the bio-region of the Mallee. When it comes to the intellectual side of the phenomenon as in the second section of the thesis, other levels emerge as important: The production of scientific concepts with respect to the phenomenon of wind erosion was largely bound to scientific institutions, which are in Australia largely determined by the states. Here, politico-administrative levels come into focus, as well as questions of a scientific research web that operated independently from such institutional bounds. In the third section, yet another scale has emerged as relevant. When looking at the construction of popular concepts, this can be analysed through a multitude of sources on different scales. However, the content analysis of the public debates has shown that the Australian nationhood emerged as a crucial reference point in Australians' concerns about soil erosion. Consequently, the level of choice for this part would be the national one. As a result of the temporal restrictions of writing the thesis, the sources used in this part are limited to Australia's south-east, but they generally contain national references. For the last section of the thesis, the political levels of the states and the Commonwealth become again the focus of interest.

The international level is also included to a certain degree in the thesis, even if it does not follow explicitly an international or transnational approach. It has often been stated that environmental history in general, and especially in Australia, requires the global, or at least supra-national scale, as the major forces that have shaped Australia's modern history are part of global processes.[97] The European settlement of the fifth continent in the eighteenth century was part of a worldwide migration movement from Europe to the Americas, Australia, South Africa and other countries.[98] As environmental historian John McNeill recognises, this population shift went along with the opening up of semi-arid lands for agricultural production, thus accelerating erosion processes and causing "a second global surge in soil erosion".[99] The

[96] Ibid.
[97] Griffiths, Ecology and Empire: Towards an Australian History of the World, p. 12.
[98] John R. McNeill (2000): Something New Under the Sun. An Environmental History of the Twentieth-Century World, New York [et al.], W.W. Norton & Company, pp. 38-43.
[99] Ibid., p. 38.

history of the wind erosion disasters that befell Australia in the first half of the twentieth century has, therefore, a strong transnational character.[100]

The thesis focuses on Australia for several reasons. First and most importantly is the fact that the wind erosion crisis in Australia has not been researched in any depth so far, as is true for many other countries of the world. The thesis, therefore, aims at establishing the specifics of Australia's wind erosion crisis and the responses to it in order to provide a reliable basis for further studies that might then choose an international or transnational framework. For the moment, it seems that supra-national approaches, if they do not want to be superficial, have to rely on fruitful collaborative works, such as the recent Special Issue of *Global Environment*. This does not mean that the thesis ignores developments relevant to the erosion crisis beyond the rim of the Australian continent. Quite the contrary, Australian erosion debates were themselves firmly embedded in international debates about soil erosion, and these influences have been acknowledge and analysed.

Thus, the thesis operates on four different levels of scale, all set in relation to each other: the regional level, the state level, the national and the international level. The sources available have not always allowed matching the different levels of scale in an ideal way. Much of the literary and art production on wind erosion analysed in the third section of the thesis stems, for example, from states other than Victoria, whose Mallee region was at the focus of the first part of the thesis. These incongruities are, however, limited and only minor; all in all, the advantages brought about by the combination of the various sources, methods and scales outweigh by far any disadvantages.

[100] The transnational dimension has been followed in: Sabine Sauter (2015): Australia's Dust Bowl: Transnational Influences in Soil Conservation and the Spread of Ecological Thought. In: *Australian Journal for Politics and History* 61 (3), pp. 352-365; Ead. (2015): Lessons from the US: Australia's Response to Wind Erosion (1935-1945). In: *Global Environment* 8 (2), pp. 293-319.

I Living

The first section of the thesis examines the immediate, tangible effects of the phenomenon of wind erosion on Australians. This is important when it comes to evaluating the role that the actual experience of wind erosion had for how Australians thought about erosion, and how they responded to it. By colonising a continent with a naturally high risk of wind erosion, European settlers exposed themselves to this phenomenon. Some knowledge of the continent's geological evolution is important for understanding some of the basic factors contributing to wind erosion in Australia, in particular the character of its soils, climate and vegetation. Thus, we can say that the story of the dust storms begins with the formation of the Australian continent 200 million years ago. But within this wider geological context, there are more recent events and processes that are important. As stated in the introduction, scientists today agree that the introduced pastoral and agricultural land use methods lead to a significant degree of anthropogenic wind erosion. The pioneering and settlement of the continent, namely the expansion of pastoralism in the arid regions and the pushing of the wheat frontier into the marginal lands, were therefore important factors contributing to the creation of the Australian 'dust bowls'. Consequently, the following analysis focuses on the history since the arrival of the first European fleet.

As the first part places special emphasis on the physical aspect of wind erosion, its chosen scale is that of the region, namely the Mallee region in Victoria's north-west, which was among the areas most affected by wind erosion during the 1930s and first half of the 1940s. With regard to the other sections of the thesis, which will operate on a larger scale than the regional one, the perspective has been systematically opened to cursorily include other affected regions, namely the marginal wheat growing areas of South Australia and New South Wales, as well as the pastoral areas of South Australia and New South Wales.

1 Prelude: Pioneering, Settlement and the Occurrence of Wind Erosion

The history of Australia as a continent begins about 200 million years ago when the supercontinent Gondwana started to break up in several stages.[1] When Australia rifted from Antarctica some 100 million years ago, the continent drifted north, a process that had major

[1] Young/Young, Soils in the Australian Landscape, p. 3.

implications for its land formation and climate.[2] For more than 55 million years now, Australia has been a distinctive land mass, isolated, with the exception of a short period of low sea level, from other great land masses.[3] As far as its soils are concerned, it is significant that Australia's mainland has been widely unaffected by Pleistocene glaciations because of its drift to relatively mild latitudes.[4] Furthermore, it is situated in the centre of a large continental plate, bringing about high tectonic stability.[5] In this way its land surfaces have been largely preserved and its soils have, consequently, been strongly weathered.[6] The Australian continent can be divided into three land form regions: first, the Western Plateau that roughly covers the western half of the continent; second, the Easter Uplands extending like a band along the eastern fringe of the continent incorporating Tasmania; and third, the Interior Lowlands in between.[7] As far as the climate is concerned, the continent's northward drift into the tropics led to a general rise in temperatures, even if this long-term trend has been punctuated with cooler periods.[8] As a result, large parts of Australia now lie in the sphere of high pressure cells that reduce rainfall and have been responsible for the general aridity since the mid-Tertiary age.[9] The climate in the Pleistocene era has been marked by changes from warm and wet interglacial periods to cold and dry glacial periods. In the Holocene era, this alteration ended and since then, the climate has generally been warmer and drier.[10]

Australia's large size provides for a great variety of climatic conditions: In the north the climate can be described as equatorial and tropical, merging into a subtropical climate in the north-east coast region.[11] The inland is classified as desert, surrounded by a zone of semi-arid grasslands. Finally the south-east and south-west coastal regions of the continent and Tasmania enjoy a temperate climate.[12] As far as short-term climatic variability is concerned, the ocean-atmosphere phenomenon of the El Niño-Southern Oscillation (ENSO), i.e. the passing from phases of El Niño to La Niña events, has a large impact on Australia.[13] During an El Niño period, the warming of the central and eastern tropical Pacific Ocean leads to atmospheric pressure that often results in a decrease of rain over Australia, thereby causing

[2] Young/Young, Soils in the Australian Landscape, p. 8.
[3] Ibid., p. 3.
[4] Neil McKenzie et al. (2004): Australian Soils and Landscapes. An illustrated compendium, CSIRO Publishing, Collingwood, p. 52.
[5] Young/Young, Soils in the Australian Landscape, pp. 6-7.
[6] McKenzie et al., Australian Soils and Landscapes, p. 51.
[7] Figure 1.1. Physiographic regions of Australia. In: Young/Young, Soils in the Australian Landscape, p. 5.
[8] Ibid., p. 8.
[9] Ibid., p. 12.
[10] Ibid., pp. 14-15.
[11] Australian Bureau of Meteorology (2008): Climate of Australia, Melbourne, p. 13.
[12] Ibid.
[13] Ibid., pp. 52-54.

drought. Those periods change with La Niña phases, when the sea surface is cooler than average, which often results in an above average rainfall in Australia.[14] The geological and climatic evolution has also shaped the flora of the continent. When Australia became more arid in the mid-Tertiary age, rainforest retreated and eucalypt forest and woodland expanded, now dominating the flora of the continent.[15]

The 'Mallee' is a larger bio-geographic region that extends over parts of southwestern New South Wales, large areas of north-western Victoria, over South Australia, and reaches across the Nullarbor Plain to eastern Western Australia.[16] It is characterised by widespread shrublands extending across the semi-arid region in southern Australia that is considered as the typical mallee landscape.[17] The eucalypt is so characteristic in the Mallee region that the whole region has been named after the mallee eucalypt.[18] The Victorian Mallee is located in the lower Murray Basin, which has a common geological evolution that led to its characteristic landscape formation.[19] Geologically, the soils of the Murray Basin are relatively young, as they are mainly of the Tertiary age.[20] A determining factor of the formation of the soils in this area is the inundation of the lower Murray Basin (as well as some other southern parts of the continent) by the sea during the Tertiary and Quaternary ages. As a result, extensive plains now extend over the Murray Basin with mostly calcareous soils, often limestone, and numerous sand dunes.[21] The calcareous, light-textured character of the Mallee soils renders them highly erodible.[22] The Mallee region lies in an area of semi-arid climate and receives only about 250 to 300 mm of rainfall per year, most of which falls during winter and spring.[23]

The first humans arrived from South-east Asia on the Australian continent some 50,000 years ago.[24] The arrival of the Aboriginals brought about major changes to the continent's ecosystem through their land management method of firestick farming.[25] Several

[14] Australian Bureau of Meteorology, Climate of Australia, pp. 52-54.
[15] Young/Young, Soils in the Australian Landscape, p. 10.
[16] D. M. Parkes/D. C. Cheal (1990): Perceptions of Mallee Vegetation. In: James C. Noble et al. (eds.), The Mallee Lands. A Conservation Perspective. Proceedings of the National Mallee Conference, Adelaide, April 1989: CSIRO Publications, pp. 3-7, here pp. 3-4.
[17] Ibid., p. 5.
[18] Young/Young, Soils in the Australian Landscape, pp. 142-143.
[19] Ibid., p. 4.
[20] Ibid., p. 5.
[21] Ibid.
[22] Ibid., pp. 142-143.
[23] Australian Bureau of Meteorology, Climate of Australia, p. 25.
[24] C. R. Harris (1990): The History of Mallee Land Use: Aboriginal and European. In: James C. Noble et al. (eds.), The Mallee Lands. A Conservation Perspective. Proceedings of the National Mallee Conference, Adelaide, April 1989: CSIRO Publications, pp. 147-151, here p. 147; Garden, Australia, New Zealand, and the Pacific, p. 7.
[25] Jones, 'Fire-Stick Farming', pp. 224-228.

experts link this method of firestick farming to increased soil erosion which seems to appear with the arrival of the Aborigines.[26] The study here, however, focuses on the story of the European migrants transforming the natural environment of the Australian continent in a much more drastic way, and accelerating the natural erosion processes of the soil through their land use practices. Even though the European settlers are thereby put into the focus of this study, it is by no means intended to disregard the Aborigines as the traditional owners of the land or to deny their historical agency.

1.1 Pastoral and Agricultural Pioneering in the 19th Century

When the first fleet arrived in Botany Bay in 1788, it carried sheep among its cargo; however, it was the Merino sheep, introduced by John Macarthur in 1797, that would allow for Australia's successful 'ride on the sheep's back'.[27] Shortly after the initial settlement, flocks grazed on the lands around the coast, and before long stockmen spread out in the search for green pastures and illegally 'squatted' on the best lands, without the colonial authorities being able to stop them.[28] Between 1830 and 1845, sheep-raising expanded rapidly, driven by the demand for Australian wool by the British textile industry.[29] Settlement quickly reached out from the area around Sydney along the coast. To the north, it had reached the Liverpool Plains by 1830 and ten years later, stockmen traversed the boundary of what would later become Queensland.[30] To the south, sheep crossed the Murray River during the 1830s and pastoralists settled the hinterland of what is now Victoria.[31] The movement was also directed towards the interior: By 1850, pastoralists had occupied the eastern third of the colony of New South Wales as well as significant stretches towards the inland along the rivers.[32]

In Victoria, sheep-raising interests had been at the origin of the settlement at Portland in 1834, and by 1837 the plains around Melbourne were fully stocked to a distance of roughly

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[26] Sullivan, Aboriginal Burning, pp. 277-278; Kohen, Aboriginal Environmental Impacts, pp. 98-99; Barr/Cary, Greening a Brown Land, p. 8. For a more extensive debate about the impact of Aborigines on the soils see the third section of the thesis 'Conceptualising'.

[27] Samuel Wadham/Kent Wilson/Joyce Wood (1964): Land Utilization in Australia, Parkville Vic., Melbourne University Press, pp. 10-11.

[28] Ibid., pp. 10-12.

[29] Beth Gott/Nicholas S. William/Mark Antos (2015): Humans and Grasslands - A Social History. In: Nicholas S. Williams et al. (eds.), Land of Sweeping Plains: Managing and Restoring the Native Grasslands of South-eastern Australia, Clayton South, Viv., CSIRO Publishing, pp. 5-26, here pp. 16-17.

[30] Wadham et al. (1964), Land Utilization in Australia, p. 12; Ted Henzell (2007): Australian Agriculture: Its History and Challenges, Collingwood, Vic., CSIRO Publishing, pp. 60-61.

[31] Ibid.

[32] Henzell, Australian Agriculture, pp. 60-61. For Western Australia, which is not covered in this thesis, see: Ruth A. Morgan (2014): Farming on the Fringe: Agriculture and Climate Variability in the Western Australian Wheat Belt, 1890s to 1980s. In: James Beattie et al. (eds.), Climate, Science, and Colonization: Histories from Australia and New Zealand, Houndmills [et al.], Palgrave Macmillan, pp. 159-176.

40 km from the coast.[33] By the end of the 1830s the grasslands of western Victoria were being occupied, and by 1851 most of the colony was settled with pastoralists, with the exception of the northern Wimmera and the Mallee, the high country of the north-east and the Otway ranges as well as the forests of Gippsland.[34] In South Australia, soon after the colonists had landed near Adelaide in 1836, sheep grazed on the Fleurieu Peninsula and on the plains around Adelaide.[35] After only a decade, squatters had moved more than 200 km further north up to the Flinders ranges and spread to the south-east as well as to parts of Eyre Peninsula.[36] During this process of pastoral settlement, the squatters recklessly disposed the Aborigines of their hunting-grounds, thus destroying their traditional culture as well as their basis of life.[37]

In Australia, the premise in regard to land is that all of the continent's land belongs to the Crown.[38] Landholders can acquire land from the Crown in form of tenure, a process called 'alienation', either as freehold (free grants or purchased grants without time limit) or leasehold (on fixed term or as perpetual lease).[39] The occupation of the land by pastoralists had therefore been illegally at first. From 1836 onwards, the British government then legalised the occupation of the squatters, enabling them to take up leases in unsettled areas.[40] When the British parliament enacted the constitutions of New South Wales, Tasmania, and Victoria in 1855, the former colonies gained self-government and hence control of all domestic policy, including control of Crown land.[41] The same became true for South Australia in 1856 and for Queensland when it was separated from New South Wales in 1859.[42] From this moment on, the land was the responsibility of the colonies, and this would lead to major

[33] Henzell, Australian Agriculture, p. 60; Gott et al., Humans and Grasslands, p. 17.
[34] Ibid.
[35] Michael Williams (1974): The Making of the South Australian Landscape, London [et al.], Academic Press, pp. 25-26.
[36] Henzell, Australian Agriculture, p. 60.
[37] Bain Attwood (2003): Rights for Aborigines, Crows Nest, N.S.W., Allen&Unwin, p. 6; Id. (1989): The Making of the Aborigines, Sydney [et al.], Allen&Unwin, p. 2; Land Conservation Council, Victoria (ed.) (1987): Report on the Mallee Area Review, Melbourne, Land Conservation Council, p. 28.
[38] John Bradsen/Robert Fowler (1986): Land Degradation: Legal Issues and Institutional Constraints. In Anthony H. Chisholm/Robert G. Dumsday (eds.), Land Degradation: Problems and Politics, Melbourne [et al.], Cambridge University Press, pp. 129-167, here pp. 135-136.
[39] Ibid.
[40] Henzell, Australian Agriculture, p. 60; Edwyna Harris (2014): Property Rights Regimes and their Environmental Impacts. In: Simon Ville/Glenn Withers (eds.), The Cambridge Economic History of Australia, Cambridge [et al.], Cambridge University Press, pp. 511-529, here pp. 513-514.
[41] Stuart Macintyre (2009): A Concise History of Australia, Cambridge Eng. [et al.], Cambridge University Press, p. 92; Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 35.
[42] Macintyre, A Concise History, p. 92.

regional differences on how the land was managed.[43] This fact would endure beyond Federation in 1901, when the states stood firm on maintaining their rights to the land.[44]

The second half of the 19th century saw a significant expansion of agricultural settlement in all of the colonies. The introduction of universal male suffrage in the 1850s in the colonies was paralleled by the demand to 'unlock' the land.[45] As a result of the public pressure, the various colonies passed a series of Land Selection Acts between 1860 and the mid-1880s to promote the settlement of small-scale farmers.[46] Wheat growing thus gradually advanced from the coast towards the marginal lands of the interior. As Australian soils had been characterised by a relatively low fertility from the beginning, and the selectors made no efforts to maintain the original fertility by using manure, soils were rapidly worn out.[47] The majority of selectors then migrated to new lands towards the interior, while a few remaining settlers took over the exhausted land and transformed it to grazing properties.[48] At the end of the 19th century, declining yields clearly indicated that this strategy could no longer continue.

In New South Wales, the process of opening up land for farming was slower than in the other south-eastern states, despite the fact that it had markedly more land suitable for wheat growing.[49] One reason was the unfavourable distribution of these lands, which made the transport of goods difficult.[50] More importantly, however, was the firm grip that pastoralists had held on the best lands since the early days of squatting. The government's attempts to foster agriculture by providing land for small landholders through legislation from 1860 to the mid-1880s failed on the whole, largely because of the pastoralists' resistance.[51] In 1880, the area under crop in New South Wales was only a quarter of that in Victoria and an eighth of that in South Australia.[52] Instead, large freehold pastoral properties were created on the best lands, and by 1890 sheep had basically reached the peripheries of the colony.[53] In 1895, another and more effective Land Act was established in order to subdivide pastoral

[43] Joseph M. Powell (1988): Patrimony of the People: The Role of Government in Land Settlement. In: Ronald L. Heathcote (ed.), The Australian Experience, Essays in Australian Land Settlement and Resource Management, Melbourne, Longman Cheshire, pp. 14-24, here pp. 16-19.
[44] Ibid., p. 19.
[45] Harris, Property Rights Regimes, p. 521.
[46] Ibid., pp. 521-522; Powell, Watering the Garden State, p. 62.
[47] Barr/Cary, Greening a Brown Land, p. 126.
[48] Ibid.
[49] John Andrews (1966): The Emergence of the Wheat Belt in Southeastern Australia to 1930. In: Id. (ed.), Frontiers and Men, A Volume in Memory of Griffith Taylor (1880-1963), Melbourne, F. W. Cheshire, p. 39.
[50] Andrews, The Emergence of the Wheat Belt, pp. 39-41.
[51] Ibid.
[52] Ibid.
[53] Ibid.; Henzell, Australian Agriculture, pp. 60-61.

holdings for closer settlement. It gave an important impetus for agricultural settlement that resulted in a significant surge of the wheat acreage up to 1900.[54]

In contrast to the other south-eastern colonies, South Australia was from the beginning established as an agricultural province in the spirit of Edward Gibbon Wakefield.[55] This colony benefited not only from a favourable climate for wheat growing, but also from a large and compact area of suitable agricultural land on the Adelaide Plains in proximity to a port.[56] It was in the agricultural colony of South Australia that wheat farming consequently developed most rapidly.[57] By 1855, the Adelaide Plains were settled by farmers, and until the end of the decade, settlement spread further northwards and westwards, and also into the south-eastern parts of the Eyre Peninsula.[58]

The drought of 1864-1866 brought massive economic distress to the colony's farmers and pastoralists and prompted the government to instruct Surveyor-General George W. Goyder to investigate the extent of the regions affected.[59] The result of his survey was the so-called 'Goyder's line', the most lasting geographical concept in South Australia's history.[60] The line ran from the base of York Peninsula northwards, forming a loop reaching the southern Flinders Ranges (the highest point northward being around the 33rd degree of latitude) before moving sharply southwards.[61] It separated the colony into two parts: outside the line, Goyder thought the climate suitable for pastoral use only; inside of the line, the land and climate was supposed to be mainly, but by no means completely, suited for agricultural use.[62]

The pastoralists quickly recovered from the back fall of the drought in 1864-1866 and in the years up to 1890 occupied much of the more arid regions of South Australia in an extraordinary rush, extending settlement to the north-east border of the colony, the south-eastern corner, and along the coastal strip to the Western Australian border, sparing only the

[54] Andrews, The Emergence of the Wheat Belt, p. 44.
[55] Wadham et al. (1964), Land Utilization in Australia, p. 12; Andrews, The Emergence of the Wheat Belt, p. 7.
[56] Wadham et al. (1964), Land Utilization in Australia, p. 15; Andrews, The Emergence of the Wheat Belt, p. 6; Williams, The Making of the South Australian Landscape, pp. 25-26.
[57] Wadham, et al. (1964), Land Utilization in Australia, pp. 13-15, 107; Andrews, The Emergence of the Wheat Belt, pp. 5-7.
[58] Williams, The Making of the South Australian Landscape, pp. 30-33, 36-37.
[59] Donald W. Meinig (2005): Goyder's Line of Rainfall: the Role of a Geographic Concept in South Australian Land Policy and Agricultural Settlement. In: *South Australian Geographical Journal* 104, pp. 105-114, here p. 105; Andrews, The Emergence of the Wheat Belt, p. 9.
[60] Ibid.
[61] See Figure 1 'Goyder's Line', in: Meinig, Goyder's Line of Rainfall, p. 106; cf. also: Heathcote, Images of a Desert, p. 10.
[62] Meinig, Goyder's Line of Rainfall, pp. 106-107.

regions around the Simpson Desert and the Great Victoria Desert.[63] Far from being impressed by Goyder's line of rainfall, prospective farmers urged the government to open up the more arid areas north of the line for cereal cultivation.[64] Thus, the period from 1869 to 1880 saw a spectacular expansion of colonization: during the mid and late 1870s, the marginal areas in the Flinders region and in the vicinity of Cowell were subdivided for wheat cultivation and closer settlement, as were the mallee plains west of the River Murray (Murray Mallee) and on Yorke Peninsula.[65] The clearing of the dense mallee vegetation was much facilitated thanks to two South Australian inventions: the 'mulleniser' or 'mallee roller' and the stump jump plough.[66] The first pioneers had toiled hard to remove the mallee scrub as the roots had to be dug out one by one if one wanted to prevent them from regrowing. Even burning did not help, as the mallee trees are perfectly adapted to fire and regenerate quickly after burning.[67] The technique of the 'mulleniser' or 'mallee roller' consisted of knocking down the scrub using a roller that was drawn by a horse or bullock.[68] Once the scrub was snapped off from its roots, it was left there to dry and then, after a few months of parching in the open-air, was burned.[69] The same piece of land had to be burned several consecutive years before the mallee roots would finally die off, but still, this was a far easier, quicker, and cheaper way to get rid of the roots than by grubbing them out.[70] Until the land was completely clear of mallee stumps, a new method of ploughing had to be invented that allowed cultivating the land with the roots still in the ground.[71] The second tool that would revolutionise the land settlement in the Mallee was hence the stump-jump plough, invented in 1876 by the South Australian Smith Brothers.[72] It was a special machine on which the ploughshares were fixed in such a way that they sprang out of the ground when hitting a larger obstacle, flew over it and then penetrated

[63] Williams, The Making of the South Australian Landscape, pp. 39-43; Meinig, 'Goyder's Line of Rainfall, pp. 108-110; Andrews, The Emergence of the Wheat Belt, pp. 9-13.
[64] Ibid.
[65] South Australia (1948): Report of the Pastoral and Marginal Agricultural Areas Enquiry Committee South Australia (Department of Agriculture South Australia), p. 5; Andrews, The Emergence of the Wheat Belt, pp. 9-13.
[66] Williams, The Making of the South Australian Landscape, p. 43; Harris, The History of Mallee Land Use, p. 149; Gary B. Magee (2014): Technological Change. In: Simon Ville/Glenn Withers (eds.): The Cambridge Economic History of Australia, pp. 125-149, here pp. 127-128.
[67] Land Conservation Council, Victoria, Mallee Area review, p. 37; Williams, The Making of the South Australian Landscape, p. 144.
[68] Ibid.
[69] Ibid.
[70] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 38.
[71] Ibid.; Williams, The Making of the South Australian Landscape, p. 147.
[72] Henry J. Sims/Colin G. Webb (1982): Mallee Sand to Gold. The Mallee Research Station Walpeup, 1932-82, Melbourne, Victorian Government Printing Office, p. 3; Victor A. Edgeloe (1984): The Waite Agricultural Research Institute: the First Fifty Years 1924-1974, Glen Osmond, S. Aus., Waite Agricultural Research Institute, p. 2; Williams, The Making of the South Australian Landscape, pp. 147-149; Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 38.

the soil again once the obstruction was passed, thus enabling the ground to be prepared for wheat seed.[73] The third major technique that allowed for a rapid expansion of wheat growing in the mallee areas was the wheat-stripper, another South Australian invention by John Ridley in 1843.[74] The wheat-stripper harvested the grain but left the stubble on the soil, which was the essential combustible component necessary for the burning process on the field.[75]

Agricultural expansion had a setback in the 1880s, when the economic depression hit South Australia almost ten years earlier than the other colonies, and translated into a fall in wheat prices. At the same time, the drought of 1880-1883 damaged the yields.[76] Once the worst crisis was over, the even less attractive lands of the Pinnaroo district, as well as parts of the northern areas of Eyre Peninsula, came into focus and were opened up for wheat farming around the turn of the century.[77] Victoria likewise saw a rapid expansion of agricultural settlement. In the wake of the gold rushes following the discovery of gold in 1851, a wave of immigrants came to the colony to seek their fortune. Those who could not realise their golden dreams looked for other sources of wealth and increasingly laid their eyes on the 'wide empty lands'.[78] Miners, supported by urban middle-class representatives, began to press the government to 'unlock the land'.[79] The government answered this social demand with a land reform in the 1860s which was aimed at opening up public lands for small-scale farming.[80] Several land acts were passed during the 1860s to foster agricultural settlement, and new areas were accordingly opened for wheat farming, especially in the Wimmera and parts of the north-central and north-eastern districts.[81]

In the Mallee region, which required too much effort to clear, very little land was taken up for agricultural purposes, and instead, pastoral occupation expanded even further.[82] By 1865 almost the entire Mallee area was occupied by squatters in the form of huge pastoral estates, and the stock numbers in the Mallee rose from 151,000 sheep in 1853 to 425,000

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[73] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 38; Williams, The Making of the South Australian Landscape, pp. 149-150.
[74] Edgeloe, The Waite Agricultural Research Institute, p. 2; Williams, The Making of the South Australian Landscape, pp. 28, 272.
[75] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 38.
[76] Williams, The Making of the South Australian Landscape, pp. 48-49; Andrews, The Emergence of the Wheat Belt, pp. 12-13.
[77] South Australia, Report the Pastoral and Marginal Agricultural Areas Enquiry Committee, p. 5; Andrews, The Emergence of the Wheat Belt, pp. 16-21.
[78] Powell, Watering the Garden State, p. 62. The classic book on early land settlement in Victoria still is: Joseph M. Powell (1970): The Public Lands of Australia Felix. Settlement and Land Appraisal in Victoria 1834-91, Melbourne [et al.], Oxford University Press.
[79] Powell, Watering the Garden State, p. 62; Id., Patrimony of the People, p. 16.
[80] Powell, Watering the Garden State, pp. 62-64.
[81] Powell, Watering the Garden State, p. 64; Land Conservation Council, Victoria, Report on the Mallee Area Review, pp. 35-36.
[82] Ibid.

sheep in 1871.[83] After the spectacular boom, there followed a phase of drawback from the region that was largely due to the period of drought from 1876 to 1888.[84] The number of sheep in the Mallee drastically declined to only 70,000 or 80,000 in 1883.[85]

After the drought broke in 1888, new optimism emerged in the Victorian government to push the wheat frontier towards the drier interior, an optimism carried by favourable climatic conditions, the utilization of new farming techniques and an enthusiasm for irrigation by the Victorian government. At the beginning of the 1880s, more than a third of Victoria's land had passed into private hands or was in the process of doing so.[86] Other than diverse patches of mostly inaccessible or unproductive land, the Mallee and the Eastern Highlands were the only large tracts of land still available for settlement.[87] Much of this Crown property was still held under traditional pastoral licences.[88] The Victorian government sought to subdivide these lands for agricultural settlement. In the period of 1883-93[89] approximately half a million hectares of land was released, and by the turn of the century nearly 1.6 million hectares had been subdivided by the government and private holders.[90]

In the eyes of Victorian politicians, the Mallee region seemed more and more attractive, and a series of legislative acts began in the 1880s that aimed at facilitating the closer settlement of the Mallee region.[91] The government encouraged the process through infrastructural projects: roads, towns, and railways were constructed, and, most importantly, an irrigation system to assure the water supply was installed.[92] The adoption of South Australian techniques such as the wheat stripper, the 'mallee roller', and the stump-jump plough allowed for rapid clearing of the dense vegetation.[93] Thus, the prospects of the region seemed to be full of promise and the result was swift agricultural development in the 1880s and 1890s.

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[83] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 35; Sims/Webb, Mallee Sand to Gold, p. 3.
[84] Foley, Droughts in Australia, pp. 19-20. On the effects of the drought on the people, see also Michael McKernan (2005): Drought: The Red Marauder, Crows Nest, N.S.W., Allen&Unwin, pp. 32-33.
[85] Powell, Watering the Garden State, p. 96.
[86] About 8.1 million hectares of Victoria's (variously estimated) 22.7 million hectares. Cf. Powell, Watering the Garden State, pp. 94-95.
[87] Ibid.
[88] Ibid.
[89] Harris, The History of Mallee Land Use, p. 149.
[90] Sims/Webb, Mallee Sand to Gold, p. 4.
[91] Powell, Watering the Garden State, pp. 95-97; Land Conservation Council, Victoria, Report on the Mallee Area Review, pp. 35-36; Sims/Webb, Mallee Sand to Gold, pp. 3-4.
[92] Harris, The History of Mallee Land Use, p. 149; Powell, Watering the Garden State, pp. 95-98.
[93] Sims/Webb, Mallee Sand to Gold, p. 3; Harris, The History of Mallee Land Use, p. 149; Land Conservation Council, Victoria, Report on the Mallee Area Review, pp. 37-38.

But a period of regression followed the time of thriving progress. From 1895 to 1903, the so-called 'Federation drought' extended over most of the south-eastern part of Australia.[94] This, combined with the economic depression of the 1890s, severely hit the rural sector.[95] The wool industry was badly impaired by the depression and the combined effects of low prices and drought reduced the flocks: between 1891 and 1902 sheep numbers in Australia were halved.[96] Average wheat yields, which had constantly declined in the preceding decades due to continual cropping without fertilizers and expansion into less fertile lands, now dropped to the lowest levels on record in Victoria and South Australia.[97] Parts of the newly settled fringes of South Australia's northern wheat lands were abandoned.[98] In the Victorian Mallee, heavy losses of stock occurred and the whole region seemed to be at the edge of collapse.[99]

The rapid expansion of pastoralism and agriculture after the initial settlement showed its ecological costs. The introduction of non-native animals and plants had upset the ecosystem.[100] The large numbers of ovine and human occupants of the land put huge pressure on the natural environment.[101] The settlers cleared or burned the indigenous vegetation and the hundreds of thousands of sheep grazed it thoroughly.[102] While native fauna like the marsupials were frugal eaters, the sheep were much more aggressive, permanently destroying the vegetative cover.[103] The scattered green patches overlooked by the sheep were eaten by the rabbits. The introduction of the rabbit is probably Australia's most infamous ecological blunder.[104] Imported by Thomas Austin near Geelong in 1859, they had become a veritable pest by 1880.[105] The rapid rate of pastoral expansion had been paralleled by a constant tendency to overstock, especially in times of drought.[106] Only thirty years after the first

[94] Foley, Droughts in Australia, pp. 20-24. For a historical analysis, see also Geoffrey Blainey (1983): A Land Half Won, Melbourne, Sun Books, pp. 348-361.
[95] Macintyre, A Concise History, pp. 129-130.
[96] Samuel M. Wadham (1967): Australian Farming 1788-1965, Melbourne, Cheshire, p. 18; Macintyre, A Concise History, pp. 129-130; Wadham et al. (1964), Land Utilization in Australia, pp. 62-63.
[97] Foley, Droughts in Australia, p. 20; Williams, The Making of the South Australian Landscape, p. 50; Edgars Dunsdorfs (1956): The Australian Wheat-growing Industry: 1788-1948, Melbourne, Melbourne University Press, p. 114.
[98] Williams, The Making of the South Australian Landscape, p. 50.
[99] Foley, Droughts in Australia, p. 21.
[100] Gott et al., Humans and Grasslands, pp. 17-18; Harris, Property Rights Regimes, pp. 515-516, 523; James C. Noble/D. J. Tongway (1986): Pastoral Settlement in Arid and Semi-Arid Rangelands. In: John S. Russell/Raymond F. Isbell (eds.), Australian Soils: The Human Impact, St. Lucia, Qld., University of Queensland Press, pp. 217-242, here pp. 217-218, 223-225.
[101] Harris, The History of Mallee Land Use, p. 149.
[102] Ibid.
[103] Barr/Cary, Greening a Brown Land, p. 13.
[104] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 36.
[105] The story of the rabbit in Australia has been extensively described by Eric Rolls, see: Id., They All Ran Wild: The Story of Pests on the Land in Australia, Sydney, Angus&Robertson, pp. 3-205; Barr/Cary, Greening a Brown Land, pp. 24-27.
[106] Wadham et al. (1964), Land Utilization in Australia, p. 14.

squatters had settled, the original grassland was largely destroyed.[107] The native grasslands had been perennial and deep rooted and in this way perfectly adapted to the soil and climate.[108] When they were destroyed, the binding element of the soil disappeared, leaving it vulnerable to wind erosion.[109] Furthermore, the hard hooves of the sheep additionally degraded the soil. While marsupials have soft feet and stride over large areas, sheep have cloven hooves that compact the soil.[110] As sheep cannot travel far away from water, they concentrate around water sources, where they damage the soil heavily.[111] The overstocking and clearing of native vegetation were most likely partly responsible for serious wind erosion problems.[112] The first records of sand drift in the Victorian Mallee date from 1878, and in 1892 the *Victorian Naturalist* reported about fields that had been cleared by settlers and were now engulfed by drifting sand.[113] The Federation Drought exacerbated the problem of wind erosion. In South Australia, public concerns that overgrazing would cause sand drift became prominent around the turn of the century.[114] Sand drift was also a problem on the farming lands, for example in the Murray Mallee around Pinnaroo. By 1899 the Minister of Agriculture was promoting tree-planting as a means of drift control and even contemplated legislation to mitigate the problem.[115] As sand drift covered roads in some areas, suggestions were advanced to prohibit fallowing within 60 metres from roads.[116]

Sand drift also became a major concern in the 'Western Division' of New South Wales, which is the semi-arid and arid western third of the state.[117] A Royal Commission, established in 1901 as a reaction to public concern, came to the conclusion that the combination of low rainfall, rabbits, and overstocking had "immensely depreciated" the western country, causing "calamitous sandstorms" which had converted hundreds of thousands of acres of country into "windswept barren wastes".[118] The findings of the Royal

[107] Barr/Cary, Greening a Brown Land, pp. 13-14; Sims/Webb, Mallee Sand to Gold, p. 3; Gott et al., Humans and Grasslands, pp. 17-18.
[108] Ibid.
[109] Ibid.
[110] Ibid.
[111] Ibid.
[112] Bolton, Spoils and Spoilers, p. 138; Barr/Cary, Greening a Brown Land, p. 25.
[113] Bolton, Spoils and Spoilers, pp. 138-139.
[114] Wadham, Australian Farming 1788-1965, p. 18.
[115] Williams, The Making of the South Australian Landscape, p. 303.
[116] Ibid.
[117] The 'Western Division' was the western third of NSW, officially divided from the eastern two thirds by the Crown Land Act 1884, cf. Figure1: 'Location map of the Western Division of New South Wales', in: Michael Quinn (1997): Committed to Conserve: The Western Lands Act, 1901, and the Management of the Public Estate of the Western Division of New South Wales. In: *Australian Geographical Studies* 35 (2), pp. 183-194, here pp. 185-186.
[118] There were also photographs of wind eroded land published by the Royal Commission into conditions in western NSW, two of them are reprinted by Bonyhady, see: Tim Bonyhady (2000): The Colonial Earth, Carlton,

Commission led to the Western Land Act of 1901, which put the western part of the state under a separate administration and extended the leases for pastoral use.[119] It was not only the pastoral areas that suffered from wind erosion, but also the newly opened agricultural areas in the marginal regions. In Victoria, agricultural societies started to complain about problems with sand drift in the 1890s.[120] During the Federation Drought, the Mallee experienced its first big 'blackout' dust storms.[121] The dust storm that occurred on the 12 November, 1902 was so bad that the Mallee settlers named it "Black Thursday".[122] The drought and dust storms challenged the basic concept of settlement in the area – at least for the time-being. In January 1903, the *Pyramid Hill Advertiser* reported about "another violent duststorm" in the Mallee and posed the question of whether the Mallee was "worth saving". It concluded that "Nature seems to be replying in her own way. She certainly thinks it's worth shifting".[123] The dust storms covered larger areas of Victoria and some of the dust was deposited in rain over Tasmania.[124] Some of Australia's soil was even carried across the Tasman Sea as far as New Zealand.[125] At the end of the 19th century, Australia's rural industries seemed to be in a somewhat hopeless position: The native pastures had largely been destroyed and sheep numbers would never again reach the pre-drought figures.[126] In the farming districts, soils were exhausted and drifting away, and the frontiers of wheat cultivation had seemingly been reached.[127]

1.2 Expansion of Agricultural Settlement in the 20th Century

In the early 20th century, the rural sector recovered as wheat prices increased.[128] Even the droughts of 1914 and 1918 could not break the general faith in the golden grain.[129] Also,

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Vic., Melbourne University Press, p. 307; Ronald L. Heathcote (1965): Back of Bourke: A Study of Land Appraisal and Settlement in Semi-arid Australia, Carlton Vic., Melbourne University Press, pp. 28-29; C. J. King (1957): The Western Lands Act, 1901. In: *Review of Marketing and Agricultural Economics* 25 (3), pp. 163-186, here p. 166.

[119] King, The Western Lands Act, p. 171.

[120] Barr/Cary, Greening a Brown Land, p. 132.

[121] Tony Dingle (1984): Settling. The Victorians, McMahons Point, N.S.W., Fairfax, Syme&Weldon Associates, p. 188; 'Dust Storm', *Pyramid Hill Advertiser*, 24 January 1902; 'Remarkable Dust Storm', *Pyramid Hill Advertiser*, 14 November 1902.

[122] 'Violent Dust Storm', *Pyramid Hill Advertiser*, 9 January 1903.

[123] Ibid.

[124] H. Stuart Dove (1903): Recent Dust Storms in Australia. In: *Nature* 67 (1731), p. 203.

[125] Will A. Dixon (1903): Recent Dust Storms in Australia. In: *Nature* 67 (1731), p. 203.

[126] Wadham et al. (1964), Land Utilization in Australia, p. 62.

[127] Barr/Cary, Greening a Brown Land, p. 128.

[128] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 39; Jack A. Mabbutt (ed.) (1982): Threats to Mallee in New South Wales: A Report Prepared for the Department of Environment and Planning, Sydney, p. 2.

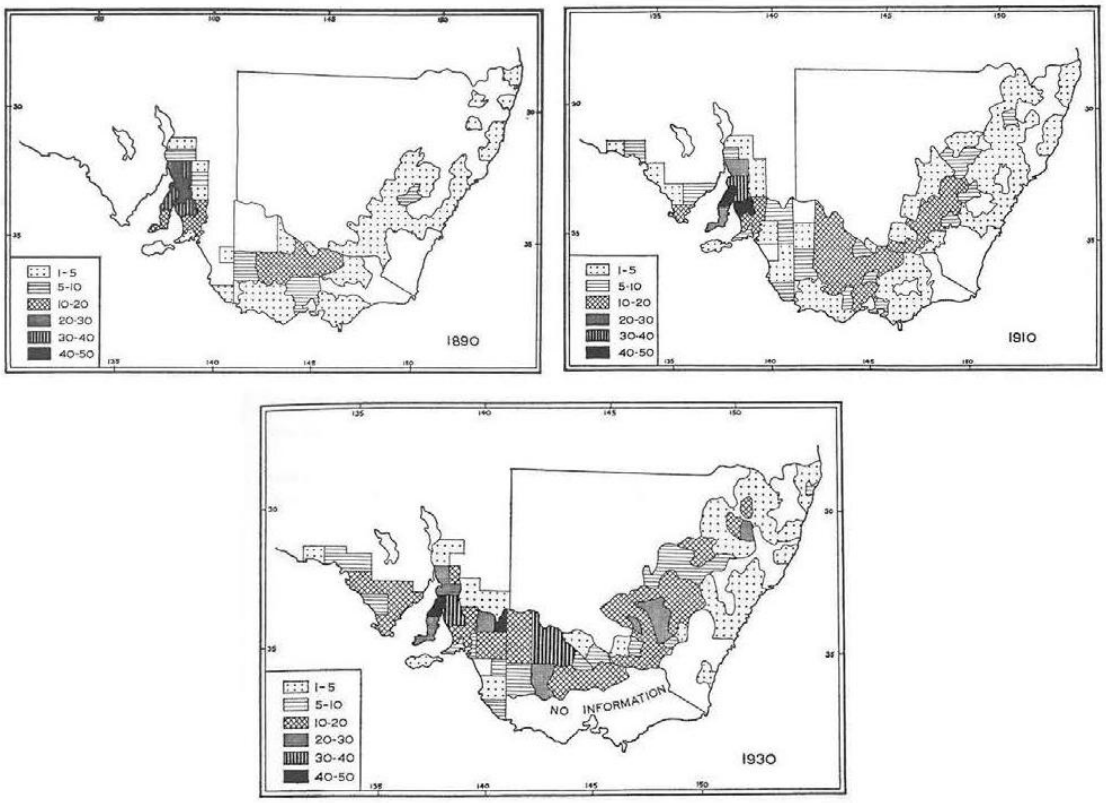
[129] Williams, The Making of the South Australian Landscape, p. 297.

Australians developed new agricultural methods that were still better adapted to the challenges of the soils and climate. New types of wheat were introduced, notably the drought and rust resistant 'Federation'.[130] The use of superphosphate, which was drilled in with the seed, increased and it led to record-breaking wheat yields.[131] New record yields were likewise obtained with the technique of 'dry farming', which was adopted in south-eastern Australia in the first decade of the 20th century and lead to a widespread optimism in agricultural progress among all of the state governments.[132] 'Dry farming' was an American invention, largely promoted by Great Plains farmer H.W. Campbell in the 1890s.[133] At the heart of this method was the technique of 'bare fallowing', under which the fallow was kept free of vegetation in order to maximise moisture in the soil.[134] The normal cultivation rhythm in southern Australia is to sow seed in autumn (usually in April/May) and to harvest in summer (usually in December/ January), thus making the best use out of the rains that occur most frequently in winter and spring.[135] The regular fallow system as it had been practiced in Europe for hundreds of years intended that after harvest the paddock would rest for a year before a new crop would be planted again.[136] The *bare* following, however, required the paddock to be kept clean of weeds, as the assumption was that the weeds would otherwise consume the moisture. The general idea was that if the paddock lay bare, the rain would trickle down into the lower soil zone where it would be saved for the following crop.[137] Also, the theory asserted that the ground was infiltrated with a network of capillary tubes which lifted the moisture to the surface where it evaporated. Frequent cultivation and deep ploughing were, consequently, considered as techniques to break these tubes and increase moisture in the soil.[138] Bare fallow was also advised for its property of increasing the process of nitrification, augmenting the soil nutrients and facilitating weed control.[139] The technique actually resulted in much better yields, even though the working mechanisms were not understood at the time. Spurred by this

[130] Barr/Cary, Greening a Brown Land, p. 129; Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 39; Mabbutt, Threats to Mallee, p. 2.
[131] Ibid.
[132] Williams, The Making of the South Australian Landscape, p. 297; Barr/Cary, Greening a Brown Land, pp. 128-131, 292-296.
[133] Williams, The Making of the South Australian Landscape, p. 292.
[134] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 38.
[135] Barr/Cary, Greening a Brown Land, p. 129.
[136] Ibid.
[137] Ibid.
[138] Williams, The Making of South Australian Landscape, pp. 292-293.
[139] Arnold E. Richardson (1924): Wheat and its Cultivation. In: *Journal of Agriculture of Victoria* 22, pp. 65-76, 129-139, 271-281, 385-395, here p. 276; cf. also Barr/Cary, Greening a Brown Land, pp. 129-130.

confidence, the wheat frontier was pushed even further towards the marginal lands in all of the south-eastern states and in parts of Western Australia.[140]

Fig. 1: The expansion of agricultural land use in south-eastern Australia, 1890, 1910 and 1930.
The numbers of the key indicate the percentage of the total area of each statistical division that is under cultivation.
[Andrews (1966): The Emergence of the Wheat Belt in Southeastern Australia to 1930, pp. 10-11.]



In the long run, however, this system would increase the soil's vulnerability to erosion.[141] In New South Wales, the wheat frontier advanced westwards towards the marginal areas between 1902 and 1933, reaching in 1933 the eastern boundary of the Western Division.[142] As part of this movement, the South-West Mallee of New South Wales – situated roughly at the centre of the state, with the cities of Hilston and Cargelligo as its hub[143] – was

[140] In Western Australia, the 1920s saw likewise a rush into the marginal areas for wheat growing, again strongly supported by the state government, see: Rosemary Jasper (1984): An Historical Perspective. In: Australian Conservation Foundation (ed.), Diversity or Dust: A Review of the Impact of Agricultural Land-clearance Programmes in south west Australia, Hawthorn, Vic., pp. 7-15, here pp. 7-9; Dunsdorfs, The Australian Wheat-growing Industry, pp. 304-305.
[141] Williams, The Making of the South Australian Landscape, pp. 297-299; Powell, Watering the Garden State, p. 66.
[142] Andrews, The Emergence of the Wheat Belt, p. 42.
[143] Ibid., p. 57.

more closely settled.[144] In South Australia, the only big stretches of land left for closer settlement were the mallee lands in the regions of Eyre Peninsula, the Murray Mallee, and along the west coast.[145] The low rainfall, the light and sandy soils, and the dense scrub were no longer considered a hindrance for successful wheat cultivation, and most of these marginal areas were settled between 1913 and 1930, supported by a massive governmental railway building program.[146] In the period from 1906 to 1908 alone, ca. 650,000 hectares (1.6 million acres) of land were cleared in the dry areas of the Murray Mallee and Eyre Peninsula.[147] A fresh water supply was also a condition *sine qua non*, so the settlement went along with the construction of dams, drillings for underground water, and the establishment of irrigation schemes.[148]

In Victoria, a new wave of agricultural settlement had been pushing into the Mallee region since 1905, and elevated the region to the symbol for 'triumphant settlement' of rural Australia.[149] The government supported its rapid colonization in several ways: changes to the Land Act facilitated agricultural settlement, and in 1911 the maximum size of selections was increased to ca. 650 hectares (1,600 acres).[150] The public authorities also provided for basic infrastructure. For the first time, railway lines and domestic and stock water supplies were constructed before the settlers arrived, and a huge irrigation system was put in place.[151] In this way the central Mallee was opened in 1908, with wheat-growing reaching Ouyen and Murrayville by 1910.[152] It is true that the idea of closer settlement in general, and more specifically in the Mallee, was temporarily hamstrung by the drought that hit Victoria from 1913 to 1916, which resulted in declining wheat yields.[153] Yet, the ideal of closer settlement through small-scale farming remained powerful and would gain a thriving dynamic under the auspices of the First World War. As Tom Griffith observed, the word "Mallee" itself became "synonymous for heroic, even bloody-minded settlement".[154]

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[144] Ibid., pp. 57-59.
[145] Ibid., pp. 51, 296-297; Ronald Gibbs (1999): A History of South Australia. From Colonial Days to the Present, Mitcham, S. Aus., Southern Heritage, pp. 221-222; Heathcote, Images of a Desert, p. 10.
[146] Williams, The Making of the South Australian Landscape, p. 51; Gibbs, A History of South Australia, pp. 223-224; South Australia, Report of the Pastoral and Marginal Agricultural Areas Enquiry Committee, p. 5.
[147] Williams, The Making of the South Australian Landscape, pp. 294-297.
[148] Gibbs, A History of South Australia, pp. 224-225.
[149] Tom Griffiths (1994): Mallee Roots: A Brief History of Victoria's Northwest. In: *Park Watch* 178, pp. 21-23, here p. 22; Mabbutt, Threats to Mallee, p. 2.
[150] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 39.
[151] Mabbutt, Threats to Mallee, p. 2; Sims/Webb, Mallee Sand to Gold, p. 4; Powell, Watering the Garden State, pp. 150-153.
[152] Sims/Webb, Mallee Sand to Gold, p. 4; Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 39; Foley, Droughts in Australia, p. 24.
[153] Foley, Droughts in Australia, pp. 25-26.
[154] Griffiths, Mallee Roots, p. 21.

During the First World War, the idea of closer settlement transmuted: all Australian States pursued a plan to settle the returned soldiers on the land.[155] While Australia's soldiers were fighting in the Middle East and Europe, public authorities back home planned the appropriate steps for the time of peace when the soldiers would return. The reintegration of the veterans into civilian and working life was a big challenge in all of the belligerent countries, exacerbated through structural difficulties in passing from a war to a peace economy.[156] The proposal was that putting the men on the land could solve this problem and at the same time recompense the courageous volunteers for their duty to the nation.[157] Initial plans for settling soldiers on the land came from the Commonwealth government in 1915, and the State governments quickly took the lead in preparing for soldier settlement along the lines of existing closer settlement schemes.[158]

In her study on the soldier settlement in Victoria, historian Marilyn Lake was startled by the fact that after the repeated failures of settlement schemes, the idea of soldier settlement could become so prominent and influential during the First World War.[159] This seemed even more astonishing as in 1915 a Royal Commission appointed to inquire into the working of Closer Settlement Acts in Victoria had established beyond doubt that the settlement under those acts had been largely uneconomical.[160] In the search for an explanation, Lake lists three main causes for the fact that the opposition vis-à-vis a new settlement scheme dispersed.[161] Firstly, the revival of the yeoman dreams due to the conviction that a large number of small scale farmers would ensure Australia's strength and security. Secondly, the immediate political and social situation of the years 1915-1916: From mid-1915 on, returning soldiers seemed to represent a threat to the social order if not swiftly integrated into civilian life.[162] Federal and state governments alike were concerned about the explosive social potential of unemployed veterans in the cities.[163] Furthermore, and perhaps most importantly, it was essential to display generosity and gratitude to the returned soldiers and to make bountiful promises to those still willing to voluntarily enlist in order to assure a steady recruitment

[155] Dingle, Settling, p. 180.
[156] Ibid.
[157] This was not limited to Australia, but the idea had first originated in New Zealand, see ibid.
[158] Marilyn Lake (1987): The Limits of Hope. Soldier Settlement in Victoria, 1915–1938, Melbourne [et al.], Oxford University Press, pp. 27-29; Clem Lloyd/Jacqui Rees (1994): The Last Shilling. A History of Repatriation in Australia, Carlton Vic., Melbourne University Press, p. 45; Kent Fedorowich (1995): Unfit for Heroes: Reconstruction and Soldier Settlement in the Empire between the Wars, Manchester, Manchester University Press, pp. 146-148.
[159] Lake, The Limits of Hope, pp. 3-9.
[160] Ibid.
[161] Ibid., p. 25.
[162] Ibid., pp. 25, 32, 36.
[163] Lloyd/Rees, The Last Shilling, pp. 48-49.

process.[164] As the public slogan proclaimed, the nation owed a 'debt of honour' to its ex-servicemen.[165] Thirdly, settlement on the land was all important for plans to promote Australia's primary industry, which in turn was a fundamental requirement of the empire.[166] Jacqueline Templeton has with good reason complemented the list by including the important role played by the 'zeitgeist' of the generation, characterised by an unlimited and unprecedented optimism and faith in the yeoman ideal and in 'Australia Unlimited', i.e. the belief in the capacity of the 'vast empty spaces' of the continent to absorb settlers.[167] The pre-war conviction that the future of the nation lay in agricultural production and export was commonplace.[168] This was combined with general optimism as far as the future development and role of the agricultural sector was concerned.[169] As a matter of fact, Australia's rural industry enjoyed a period of prosperity immediately after the war. As agriculture in Europe needed some time to rebound from wartime economy, Australian agricultural products were in high demand.[170] This created optimism that the rural sector would offer prosperity for a large part of Australia's growing population.[171]

The federal and state governments agreed to a cooperative settlement scheme under which the financial burden would be shared between the states and the Commonwealth.[172] The sometimes problematic division of responsibilities was the following: Scrupulously watching over their land rights, the states insisted on providing for the land and on organising and administrating the schemes.[173] The Commonwealth would arrange for the funding by giving loans to the states for advances to the settlers.[174] Under the diverse provisions of Discharged Soldiers Settlement Acts passed by the states in 1916 and 1917, nearly 40,000 people were settled on the land.[175]

In Victoria, despite some scepticism regarding the economic viability of the scheme among many of its members, the Parliament passed the Discharged Soldier Settlement Act in late 1917.[176] Of the 78,000 soldiers who were expected to return home, 21,000 had expressed

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[164] Lake, The Limits of Hope, pp. 25, 50; Fedorowich, Unfit for Heroes, p. 147.
[165] Powell, Patrimony of the People, p. 20.
[166] Lake, The Limits of Hope, p. 11.
[167] Ibid., p. 24; Jacqueline Templeton (1988): Set up to Fail? Soldier Settlers in Victoria. In: *Victorian Historical Journal* 59, pp. 42-50, here p. 44.
[168] Lake, The Limits of Hope, pp. 21-22, 34; Dingle, Settling, p. 180.
[169] Dingle, Settling, p. 180.
[170] Ibid., p. 183.
[171] Ibid.
[172] Lake, The Limits of Hope, p. 7.
[173] Ibid., p. 36; Fedorowich, Unfit for Heroes, pp. 158-166; Dingle, Settling, p. 185.
[174] Lake, The Limits of Hope, p. 36.
[175] Ibid., p. xviii.
[176] Ibid., pp. 38, 41-43; Dingle, Settling, p. 180.

interest in the proposal, and more than half of these finally became farmers.[177] As a legacy of its historical development, in 1918 Victoria had the highest percentage of Crown land that had been alienated (sold into private ownership) or was in process of being alienated, meaning that much of the best agricultural land had already passed into private hands as freehold.[178] In its search for suitable farmland, the Victorian government turned towards those regions where land was still available, notably the marginal areas of the Mallee.[179] Alfred S. Kenyon prominently advertised the region's prospects for a soldier settlement scheme,[180] asserting in November 1915 "with absolute confidence [...] that wheat can be grown at a greater profit in the mallee soils than in any other part of Australia or of the world".[181] The excellent crops that were grown in the Mallee in 1915 and 1916 seemed to confirm this optimism, as illustrated in the newspaper article of the *Australasian* on 18 November 1916:

> Fifteen years ago we were debating whether the Mallee was worth saving. Last year the whole of the Mallee produced $18^{3/4}$ million bushels of wheat. With its present rate of progress and the adoption of systematic farming methods, the Mallee was destined to become a granary of the State.[182]

As there was little Crown land left, the government resumed some Crown land, mainly in form of pastoral properties that had been held up to this date under a grazing lease.[183] As the ideal was the creation of small self-supporting farms, the so-called 'home maintenance areas', those large properties were then subdivided into smaller blocks.[184] A number of already existing farms on private lands were also bought by the government.[185] As the Minister for Lands wanted to avoid paying too much for the land, a mistake that had been criticised with respect to earlier closer settlement schemes, a maximum value of £2,500 for each block of land was fixed, with the instruction to spend less if possible.[186] With this limit of expenditure in mind, the question whether the blocks then offered to the soldiers were of a sufficient size to be economically sound was neglected.[187] In this way the selection of the land

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[177] Dingle, Settling, pp. 180, 185.
[178] Joseph M. Powell (1978): The Mapping of Soldier Settlement: A Note for Victoria, 1917-1929. In: *Journal of Australian Studies* 3, pp. 44-51, here p. 44. In 1901, Victoria had already 35.7% of its land alienated, and in 1980/81 the number mounted to 61.1%, being each time the highest percentage of all states, see: Table 2.1. 'Australian land tenure, 1901', and Table 2.3 'Australian land tenure, 1980-81', in: Powell, Patrimony of the People, pp. 19, 23.
[179] Dingle, Settling, p. 185.
[180] Powell, Watering the Garden State, p. 170.
[181] Evidence of Alfred Stephen Kenyon, November 1915. In: [Public Record Office Victoria (PROV), VA 723 State Rivers and Water Supply Commission, VPRS 11186/P1, Historical Collection (Library Series), Unit 4, Mallee settlement].
[182] Quoted in: Sims/Webb, Mallee Sand to Gold, p. 5. One bushel equals roughly 28 kg.
[183] Lake, The Limits of Hope, pp. 65-67; Dingle, Settling, p. 185.
[184] Ibid.
[185] Ibid.
[186] Ibid.
[187] Ibid.

was dominated by political decisions that ignored the specificities of the land.[188] Altogether, 11,000 people were settled in Victoria under the soldier settlement scheme, which was the largest number of all the states.[189] The conditions under which these service men and women were put on the land were extremely generous and practical considerations were often left aside: lack of capital should not become an obstacle for the returning men, so provisions were made that ex-soldiers could buy land from the state on terms spread over 36.5 years at a low rate of interest.[190] Additionally, there were no payments due for the first three years in order to give the veterans enough time to make their land productive.[191] In order to furnish the new settlers with the means to purchase equipment and stock, a further grant of credit of £500 was given to each of them, an amount that was increased two years later to £625 and later to even £1,000 for those men and women who were settled in the Mallee.[192] These generous terms reflect the general commitment of the Australian society to repay the 'debt of honour' towards their soldiers.[193]

These plans to settle people on the land were not restricted by the Australian borders but extended to included people from the British Empire: Australia was anxious to attract British capital and to obtain a higher population density through white migrants, preferably Anglo-Saxons.[194] Britain would profit from the higher production of raw material and an increasing demand for its manufactured goods, but it would also get a chance to decrease its population, which was considered a potential factor for social unrest.[195] The British Empire Settlement Act of 1922 framed the cooperation of the British and Dominion governments to organise the migration of British men to the Dominions.[196] A series of agreements followed between the British, Australian, and several state governments to specify the details of the migration schemes. Victoria was one of the states which were particularly anxious to increase its population through English migrants.[197] It would supply the land at reasonable prices, allocate credits of up to £500 to the British settlers, and offer training and supervision for the migrants, who were not required to have previous farming experiences.[198] In sum, 464 British

[188] Ibid.
[189] Lake, The Limits of Hope, p. xviii.
[190] Dingle, Settling, p. 185.
[191] Ibid.
[192] Lake, The Limits of Hope, p. 41; Dingle, Settling, p. 185.
[193] Fedorowich, Unfit for Heroes, pp. 146-147.
[194] Dingle, Settling, p. 182.
[195] Lake, The Limits of Hope, p. 31; Michael Roe (1995): Australia, Britain and Migration, 1915-1940. A Study of Desperate Hopes, Cambridge [et al.], Cambridge University Press, p. 1.
[196] Roe, Australia, Britain and Migration, pp. 30-31.
[197] Sandra R. McDonald (1978): Victoria's Immigration Scandal of the Thirties. In: *Victorian Historical Journal* 49, pp. 228-237, here p. 230.
[198] Roe, Australia, Britain and Migration, pp. 42-43; McDonald, Victoria's Immigration Scandal, p. 230.

migrants (family heads) would finally be settled on the land in Victoria under the various agreements.[199] While this number fell well short of the 10,000 migrants from the British Islands that the Victorian government had planned to settle on the land in 1921,[200] it was hard to find suitable land even for this small number of settlers. As most of Victoria's Crownland had already been given away, the settlement scheme targeted the areas of the Mallee, Gippsland, Maffra-Sale, and Katandra.[201]

At the same time as the British migrant and the soldier settlement schemes were being put into effect, Victoria also initiated another closer settlement scheme aimed at civilians.[202] The civilian settlers received less advantageous terms than their military counterparts, and had to provide the initial capital and pay higher rates of interest.[203] By 1930, the Victorian government had acquired more than 404,000 hectares for civilian closer settlement and one million hectares for soldier settlement.[204] Much of this land was in the Mallee, more precisely the region of the 'New Mallee', which is what people named the Mallee's more arid north-western and northern sections, including the Parish of Berrock in the Sunset Country, Wennga and Conga Wonga west of Patchewollock in the Big Desert as well as the Millewa in the extreme north-west corner of Victoria.[205] The Mallee district saw a large increase of its population under those schemes. Its population grew from 41,763 in 1921 to 63,404 in 1933.[206] With a growth rate of 51.82 per cent, it was the district with the highest proportional increase in population in the whole of Victoria.[207] Some of the settlers were put on irrigation blocks along the Murray. The communities of Red Cliffs, Merbein, Swan Hill, Maffra, Nyah, Sale, and Robinvale were only some of the newly founded or enlarged communities for irrigated farming established in those years.[208] Most of the settlers, however, were put on 'dry farming' blocks that were viable thanks to an adequate domestic and stock water supply. These blocks were generally drafted along the 640 acres scale, and, as Powell has calculated, the de-facto average size was even a little larger.[209] While this was already a concession to the physical environment of the region and more than double the size of the average soldier block

[199] McDonald, Victoria's Immigration Scandal, p. 231.
[200] Roe, Australia, Britain and Migration, p. 172; Victoria (1933): Report of the Royal Commission on Migrant Land Settlement, p. 2.
[201] McDonald, Victoria's Immigration Scandal, p. 230.
[202] Dingle, Settling, p. 185.
[203] Ibid.
[204] Ibid., p. 186.
[205] Sims/Webb, Mallee Sand to Gold, p. 4; Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 39.
[206] Victorian Year Book, 1932-33, pp. 270-275.
[207] Ibid.
[208] Dingle, Settling, pp. 185-186.
[209] Powell, The Mapping of Soldier Settlement, p. 47.

distributed under the scheme in other dry farming areas, it would still prove to be too small.[210] The settlement was accompanied by a large expansion of the irrigation channel network and the construction of supplementary water storage facilities and pumps.[211] From 1906 to 1932 there was an increase in the total length of water channels in the north-west from about 2,100 to 16,000 km, which translated into an increase of the area covered from approximately 8,550 km^2 to 28,500 km^2, while the total population served by the channel system almost quadrupled.[212]

Similar settlement policies were adopted in New South Wales and South Australia, where soldier and closer settlement schemes likewise opened up the marginal lands for wheat production. In New South Wales, the South-West Mallee experienced another period of bustling settlement policy complemented by official soldier settlement programs after the First World War.[213] The model of the apparently successful scheme of the Victorian Mallee encouraged the New South Wales government to promote the settlement through surveying, subdivision of the land, and railway construction.[214] New towns like Weethalle, Erigolia, Tullibigeal, and Merriwagga sprang out of the ground like mushrooms in the 1920s, earmarking the new pioneer fringe of the New South Wales wheat belt.[215] In South Australia, the opening of the Mallee land in the early decades of the 20th century was, likewise, paralleled by a soldier settlement scheme that put more than 1,100 returning soldiers on irrigated blocks along the River Murray and some 3,000 on dry land blocks, many of them in marginal areas.[216]

1.3 The Development of Australia's Dust Bowls

The rush into the marginal areas of south-eastern Australia was paralleled by a new land use method, namely an adaptation of the earlier and apparently successful method of 'dry farming'.[217] Around 1920, the American trend to further lengthen the period of fallow was adopted by Australian agriculturists. The key idea was summarised by South Australian agricultural scientists Arnold E. Richardson, who thought it "obvious that the sooner fallowing is commenced, the more the moisture that can be conserved, and the better the

[210] The numbers given by Powell are about 127 hectares for the average Victorian block and 284 hectares for the Mallee, cf.: Powell, The Mapping of Soldier Settlement, p. 47.
[211] Dingle, Settling, pp. 185-186.
[212] Powell, Watering the Garden State, p. 172.
[213] Andrews, The Emergence of the Wheat Belt, pp. 57-60.
[214] Ibid., p. 60.
[215] Ibid.
[216] Gibbs, A History of South Australia, p. 194.
[217] Barr/Cary, Greening a Brown Land, p. 129.

ultimate prospects of success".[218] When applying this technique of 'long bare fallow', also called 'summer fallow', the stubble on the paddock had to be burned as soon as possible after the harvest and then ploughed.[219] Thus, the fallow land would rest bare for around 15 months before being sown again, during which period the soil had to be ploughed regularly. It was for a good reason, Richardson exhorted, that there was "an old saying that 'tillage is the best manure'".[220] In order to ensure the productivity of the land, the farmer had to create loose and shallow surface mulch on the soil.[221] Thus, a clean paddock with superfine mulch became the pride of every farmer who thought of himself (and wanted to appear to others) as respectable and hardworking.[222] The rise of wheat acreage and wheat yields in the first three decades of the 20th century seemed to justify the optimism that governments and farmers alike had displayed.[223]

During the dry years of the 1920s, early signs became apparent that the soils suffered severely from the land utilization and that the pastoral and wheat frontiers had been pushed too far towards the dry interior. In South Australia, the damage by wind erosion on infrastructure induced the government to introduce legislative steps with the Sand Drift Act in 1924.[224] As far as the Victorian Mallee is concerned, signs of sand drift were also more and more visible, which prompted Alfred James Ewart, professor for botany and plant physiology at Melbourne University, to warn that the removal of vegetation might create serious wind erosion:

> It is no exaggeration to say that a completely deforested Mallee might easily in time give rise to dust and sand storms so violent in character as to overwhelm neighbouring settlements. […] The question therefore arises whether it is possible to suggest a remedy to prevent what is rapidly taking place, namely, to prevent the Mallee being left without a stick of timber, ultimately reverting in a few generations to a sandy desert.[225]

Despite such warnings, a Land Bill was passed in 1923 that provided for the removal of windbreaks in the Mallee.[226]

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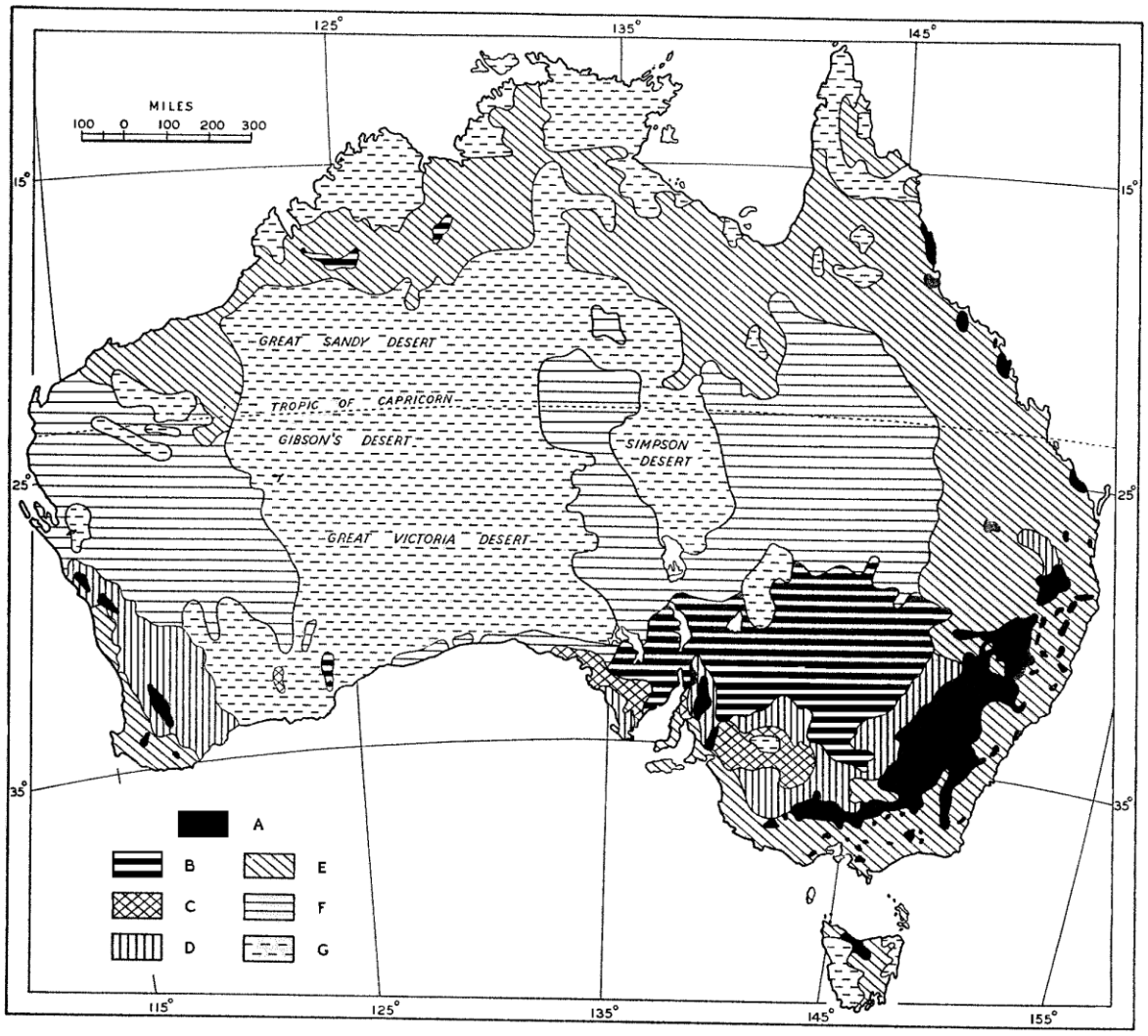
[218] Arnold E. Richardson (1925): Wheat and its Cultivation. In: *Journal of Agriculture of Victoria* 23, pp. 193-204, here p. 195.
[219] Richardson (1924), Wheat and its Cultivation, p. 386.
[220] Richardson (1925), Wheat and its Cultivation, p. 196; cf. also Barr/Cary, Greening a Brown Land, pp. 130-131.
[221] Ibid.
[222] Barr/Cary, Greening a Brown Land, p. 131. The wind erosion years later created awareness that the fine mulch was rendering the soils vulnerable to erosion, see: R. G. Thomas (1946): Fundamentals of Soil Conservation. In: *Journal of Agriculture of Victoria* 44, pp. 141-147, here p. 144.
[223] Barr/Cary, Greening a Brown Land, p. 131.
[224] Beattie, Empire and Environmental Anxiety, p. 209.
[225] Alfred J. Ewart (1922): A Serious Danger. Mallee Denuded of trees. In: *The Australian Forestry Journal* 5 (9), pp. 240-242.
[226] 'Soil Erosion. Great Mallee Problem', *The (Melbourne) Argus*, 15 June 1929.

Fig. 2: Map showing distribution of soil erosion in Australia, 1946.
[Macdonald Holmes (1946), Soil Erosion in Australia and New Zealand, p. 28].



DISTRIBUTION OF THE SERIOUSNESS OF SOIL-EROSION IN AUSTRALIA

This map was reconstructed chiefly from information obtained from "Conserve Your Soil" (a bulletin from the Bank of New South Wales), the *Regional Boundaries Committee Report*, Victoria, 1944, and the *Commonwealth Rural Reconstruction Commission's Third Report*, 1944. The categories A to G give only a very general picture, and where erosion does occur, it is of the type indicated.

A. Greatest erosion by water, in sheet erosion and gullying.
B. Much serious wind erosion in pastoral areas, often with hillside gullying.
C. Wind erosion serious under cultivaton.
D. Some erosion by wind or water on cultivated and over-grazed land, generally not as serious as in A, B and C.
E. Generally not eroded seriously except in small local areas. Minor depreciation of fodder plants in some sections.
F. Soil-erosion affects relatively small areas though depreciation of perennial fodder plants is widespread.
G. Soil-erosion is not a consideration, though dust-storms are prevalent. The greater part of this area consists of parallel sand ridges.

The use of dry farming techniques, including the fine tillage of the soils and long periods of fallowing, had disastrous effects on the vegetative cover and soil structure.[227] Combined with the effects of the economic depression of 1929, this led to a drift of the

[227] Williams, The Making of the South Australian Landscape, pp. 297-299.

population from the marginal areas and to a social breakdown of the regions.[228] The period from 1937 to 1945, marked by three consecutive droughts, further accelerated ongoing land degradation and drove home to Australians that several of their regions were turning into *dust bowls*.[229]

As a matter of fact, contrary to the US Dust Bowl, Australia's wind erosion crisis was less confined, geographically as well as temporally, with various parts of the continent being accustomed to recurrent periods of low rainfall and wind erosion during the 1920s, 1930s and first half of the 1940s.[230] The map from 1946 shows that wind erosion especially affected the pastoral areas of South Australia and New South Wales, as well as some agricultural lands of Victoria and South Australia.[231] As we have seen, wind erosion in the pastoral areas of South Australia and New South Wales had caused problems at the latest since at least the end of the 19th century. In the dry 1920s and drought years of the 1930s to the mid 1940s, the problems were further accentuated, triggering scientific and governmental reactions. In New South Wales, the pastoral areas of the Western Division suffered from severe wind erosion and reduced pastures brought about by drought and overstocking.[232] G. D. Ross, from the Department of Agriculture, emphasised in 1935 that these pastoral inland areas were "so important to the Sheep Industry [that] an effort should be made to ensure their preservation".[233] In 1944, the New South Wales Soil Conservation Service calculated that 70 per cent of the Western Division was affected by wind erosion.[234] In South Australia, reports about sand drift in the pastoral areas created more and more official concern during the 1930s, which resulted in the appointment of British biologist Francis Ratcliffe to undertake a research trip in these areas.[235] He found that in the South Australian sheep grazing regions with less than 250 mm annual average rainfall per year, the main cause for sand drift was the destruction of the vegetative cover through drought and overstocking.[236] During his trip,

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[228] South Australia, Report of the Pastoral and Marginal Agricultural Areas Enquiry Committee, p. 7.
[229] Foley, Droughts in Australia, p. 28; Australian Bureau of Meteorology/Bill Wright (2004): Drought, Dust and Deluge. A Century of Climate Extremes in Australia, Melbourne, p. 34.
[230] Muir, The Broken Promise, pp. 128-31.
[231] Macdonald Holmes, Soil Erosion in Australia and New Zealand, p. 28.
[232] Eric S. Clayton, 'Menace of Soil Erosion in Western Division. Pests and Overstocking Blamed', *The Farmer and Settler*, 22 December 1941, p. 7.
[233] Letter on soil erosion of G. D. Ross, Department of Agriculture, NSW to David Rivett, 22 February 1935, in: [National Archives of Australia (NAA): A9778, C30/5/148, Miscell (Miscellaneous) 2, soil erosion, to end 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[234] The Western Division comprises a total area of about 357,400 km^2, cf. Commonwealth of Australia, Rural Reconstruction Commission (RRC) (1944): Land Utilization and Farm Settlement: The Commission's Third Report, p. 56.
[235] Francis N. Ratcliffe (1936): Soil Drift in the Arid Pastoral Areas of South Australia: CSIR Pamphlet No. 64, Melbourne, CSIR, Government Printer.
[236] Ibid., pp. 20-21.

Ratcliffe met scenes of desolation, where "scores and even hundreds of sheep will be buried alive. Often when not buried or smothered, their fleeces will collect so much sand that they cannot rise, and they will die of starvation unless they are discovered in time".[237] A governmental report in 1938 warned that station homesteads and watering places in the state's grazing areas were threatened by sand drift, and that some inland towns like Farina and Parachilna were close to abandonment as they were "gradually submerged by sand".[238]

In the south-eastern marginal wheat-growing areas, wind erosion was to a large part accelerated by the rapid 'opening up' in the previous decades, which resulted in the clearing of scrub and thus the removal of natural vegetative cover from the soil surface. The use of dry farming techniques, including the fine tillage of the soils and long periods of fallowing, had disastrous effects on the vegetation cover and soil structure.[239] These specific land management methods combined with a series of dry years from the 1920s to mid-1940s rendered the soils particularly prone to erosion. As Michael Williams put it for the case of South Australia, "the official policy up to the mid 1920s was leading to a drastic deterioration of the physical environment through erosion".[240] Combined with the economic depression of the early 1930s, this led to a retreat of the population from the marginal areas.[241]

Especially the south-eastern Mallee lands, whose soils were naturally liable to erosion, were affected by wind erosion.[242] In South Australia, the agricultural regions most affected were the marginal areas of the Murray Mallee (and especially the Loxton district), the north of Yorke Peninsula (mainly the Port Pirie district) and the north-west farming districts of central Eyre Peninsula.[243] In 1936, R. L. Griffiths, the Agricultural Instructor of the Murray Mallee, pointed to the fact that many of the more recently developed agricultural lands, having low rainfall and sandy soils, were rapidly deteriorating.[244] He warned about the harmful effects of wind erosion on the soil fertility and the region's infrastructure, namely the farm buildings, roads, and railways.[245] In New South Wales, G. D. Ross of the Department of Agriculture stated in 1935 that next to the pastoral areas of the Western Division, it was "mainly the

[237] Francis N. Ratcliffe (1951/1st ed. 1938): Flying Fox and Drifting Sand: The Adventures of a Biologist in Australia, Sydney [et al.], Angus&Robertson, p. 206.
[238] South Australia (1938): Report of the Soil Conservation Committee of South Australia, Adelaide, p. 10; quote on p. 15.
[239] Williams, The Making of the South Australian Landscape, pp. 297-299.
[240] Ibid.
[241] South Australia, Report of the Pastoral and Marginal Agricultural Areas Enquiry Committee, p. 7.
[242] Young/Young, Soils in the Australian Landscape, pp. 5, 142-143.
[243] Report of the Soil Conservation Committee of South Australia, 1938, pp. 16-17.
[244] R. L. Griffiths (1936): Wind Erosion of Soils in the Agricultural Areas. In: *Journal of Agriculture of South Australia* 40, pp. 25-40, here p. 25.
[245] Ibid.

cleared Mallee country" that was strongly affected by sand drift.[246] In Victoria, the region most affected was likewise the Mallee region. So bad was wind erosion there that it became notoriously known as Australia's dust bowl.

As the first chapter has shown, the encroachment of pastoral and agricultural settlement towards the interior fringe country had induced changes in the natural environment, which had most likely accelerated natural wind erosion processes. Thus, by the 1930s, wind erosion affected a number of Australian regions, especially the light and sandy soils of Australia's south-eastern mallee. The second chapter will ask the question of how the settlers of the affected regions experienced the erosion years. While the Victorian Mallee will be the major focus of interest, the other regions of Australia's south-east which were likewise affected by wind erosion will also be referred to from time to time.[247]

2 Living through Drought, Dust, and Depression in the Victorian Mallee

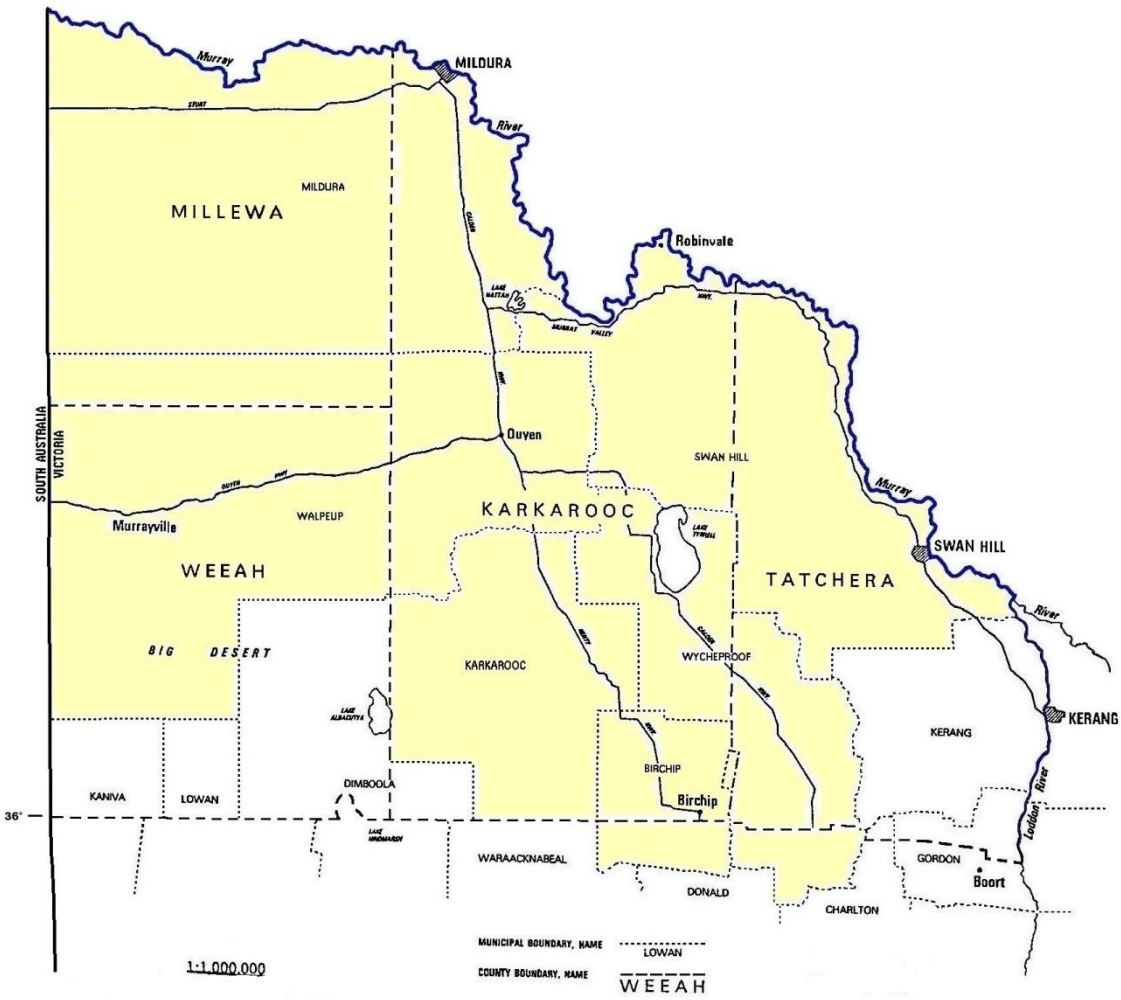
This chapter is at the centre of the section. Viewing wind erosion as a tangible phenomenon of the physical world, it analyses how the wind erosion disaster was experienced by settlers of one particular region, namely the Victorian Mallee. The Victorian Mallee covers 45,000 km^2, an area about half the size of Tasmania or a little larger than Switzerland.[248]
During the period under consideration, the politico-administrative entities of the district 'Mallee' in the state of Victoria contained the four counties of Millewa, Weeah, Karkarooc and Tatchera. In regard to the smaller entities of the local government areas, the Victorian Yearbook of the first half of the 20th century counted the entities of Mildura City, Mildura Shire, Birchip Shire, Karkarooc Shire, Swan Hill Shire, Walpeup Shire, and Wycheproof Shire as belonging to the Mallee district.[249] In the census of 1933, the Victorian Mallee had a population of 63,404.[250] These people and the question of how they were affected by the wind erosion is the interest of this chapter. In order to access the individual experience of such

[246] Letter on soil erosion of G. D. Ross, Department of Agriculture, NSW to David Rivett, 22. February 1935, in: [NAA: A9778, C30/5/148, Miscell (Miscellaneous) 2, soil erosion, to end 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[247] Wind erosion also affected Western Australia, cf. L. J. Teakle (1936): Soil Erosion and Soil Conservation. In: *Journal of Agriculture of Western Australia* 13, pp. 273-284, here pp. 282-283; Soil Conservation Committee WA (1940): Soil Erosion. In: *Journal of Agriculture of Western Australia* 17, pp. 153-159, here p. 153.
[248] Powell, Watering the Garden State, p. 170.
[249] Victorian Year Book, 1932-33, pp. 270-275.
[250] Ibid.

"everyday, ordinary people"[251] and to construct their social praxis, contexts of experiences, and the world they lived in, the analysis relies to a considerable extent on autobiographical sources. These sources allow the researcher to approach the historical actors as persons who "feel, perceive, suffer and act" and to get insight into the way they understood, processed, interpreted, and constructed their environment.[252]

Fig. 3: Map of the Victorian Mallee.

[Modified map after 'Figure 1. 1 Mallee region – Study area', in: Andrew C. Ward et al. (1986): Mallee Area Review: Study of Historic Sites, Land Conservation Council Victoria, n.p.].



[251] Alf Lüdtke (1995): Introduction. What is the History of Everyday Life and who are its Practitioners?', in: Id. (ed.), The History of Everyday Life, Princeton N.J., Princeton University Press, pp. 3-40, here p. 3.
[252] Winfried Schulze (1996): Ego-Dokumente: Annäherung an den Menschen in der Geschichte? In: Id. (ed.), Ego-Dokumente. Annäherung an den Menschen in der Geschichte, Berlin, Akademie Verlag, pp. 11-30, here p. 13.

Fortunately, a range of valuable sources could be found and accessed for the Victorian Mallee, including a range of oral history interviews, diaries, and a series of published books based on autobiographic experiences. These private testimonies give valuable insights into the way wind erosion was experienced by the settlers. They have been complemented by public expressions of the settlers in newspapers and by observations of a social survey by Alan Holt on Victoria's wheat farms, completed in the mid-1940s. This range of sources allows us to address the questions of how the settlers experienced wind erosion, if and how the dust storms disturbed their routines of 'everyday life', and how settlers reacted to the phenomenon.[253]

The use of autobiographic sources, of course, requires a specific methodological reflection. Autobiographic sources in general and specifically oral history are always reconstructions of the past through memory and have to be considered as such.[254] Two diaries have been consulted from people living in the Victorian Mallee during the time. A diary is a "form of periodic life writing" and as such records dailiness in subjective accounts and gives observations of emotional responses.[255] They reflect individual preoccupations in the form of a mosaic of experiences, but they also act as a filter of everyday life, presenting but a small portion of the actual experience.[256] They do not purely reflect identity, but shed a light on the process of identity construction, being part of this construction themselves.[257] Just as other autobiographic sources, diaries have particular methodological strings attached, and far from being a transparent activity of diurnal recording, they are acts of remembering and as such, subject to conscious and unconscious modifications and omissions.[258]

The first diary from the years 1944 and 1945 is from Karen Douglas, who worked at that time as a school teacher in the Millewa.[259] Her husband Gerald had taken up the farm at Werrimull in 1926 as part of a closer settlement scheme, and the married couple lived there until 1960, when they retired. The farm of ca. 260 hectares (640 acres) was a typical dry farming holding and still virgin mallee land when Karen and Gerald first arrived.[260] The

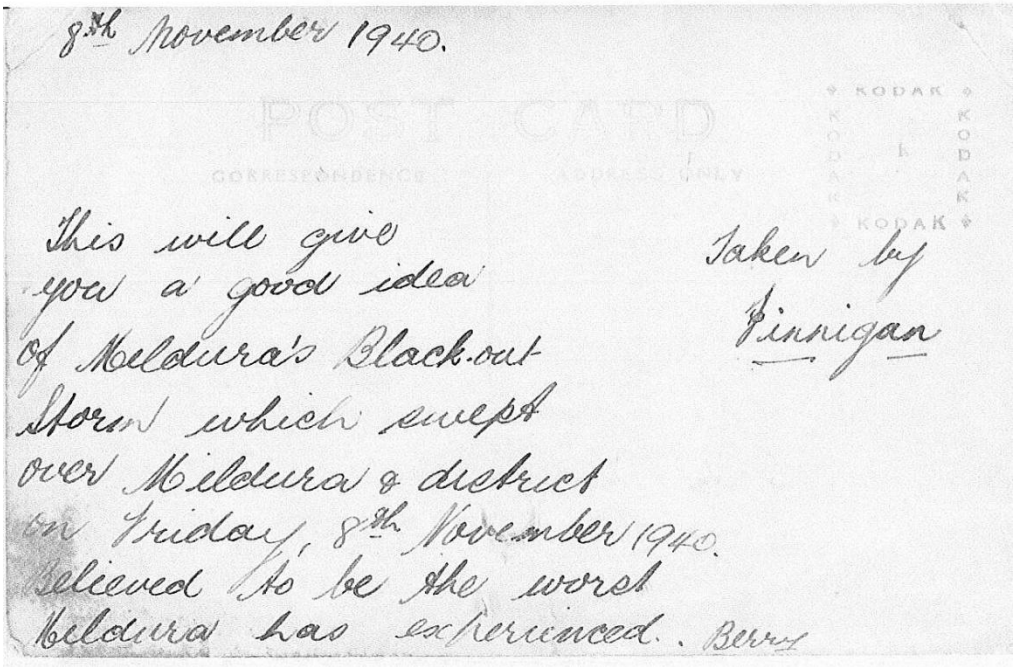
[253] For the conceptualization of the German historiographical discipline of 'Alltagsgeschichte' see: Geoff Eley (1995): Forword. In: Alf Lüdtke (ed.), The History of Everyday Life, pp. vii-xi.
[254] John Murphy (1986): The Voice of Memory. History, Autobiography and Oral Memory. In: *Historical Studies* 22 (87), pp. 157-175, here p. 157.
[255] Sidonie Smith/Julia Watson (2010): Reading Autobiography: A Guide for Interpreting Life Narratives, Minneapolis, University of Minnesota Press, pp. 266-267.
[256] Ibid.
[257] Ibid.
[258] Ibid.
[259] The diary has been accessed in May 2013 and is privately owned by the son, Jim Douglas, living in Mildura. The information has been obtained in an interview with Jim Douglas on the 2nd May 2013 at the Mildura Rural City Council Library.
[260] Interview with Jim Douglas on the 2nd of May 2013 at the Mildura Rural City Council Library.

second diary is that of farmer Charles William Coote, from Quambatook.[261] It is wholly preserved at the University of Melbourne Archives, spans the years 1896 to 1955, and presents a unique source for rural life in Victoria's southern Mallee region. For the purpose of this thesis, the years from 1928 to 1945 have been systematically analysed, during which farmer Coote wrote entries for every single day, altogether more than 2,000 pages. Coote was born in 1872,[262] and after having grown up on his father's property in Charlton, started farming in the 1890s in the Quambatook area.[263] His diary is that of a farmer, and as such, has several distinctive purposes: Coote notes private events about his family life, observations about his local community, and general observations about the broader contemporary events. At the same time, the diary is also an important professional tool helping the farmer to engage with the natural environment he depends upon: weather observations and general remarks about the land take a dominant place in his daily remarks. In this way, Coote's diaries are an interesting documentary record of past weather events, especially in regard to the effects of wind erosion or dust storms, which at that time were not yet being systematically recorded by meteorological stations.[264] His diary could be classified as 'general weather chronicles', as it contains systematic weather observations like the temperature, rainfall, cloudiness, sunshine, and force and direction of the wind, which however, were always oriented to the needs of his personal farm business. The diaries are also "impressionistic, focusing on occurrences which have attracted the attention of the author",[265] which is apparent when Coote describes in extent some particularly bad dust storms that must have strongly impressed on him. Numerous notes added in retrospect show that Coote systematically re-read his diary to compare and analyse his notes in regard to climatic patterns, changes in yields, prices of primary products, etc. The diary does not contain any explicit reflections on the occurrence of wind erosion or on methods of soil conservation. Coote's observations of the land and weather, his farm work, and yields reflect, however, the complex relationships between the farmer and the land from which he lives. It catches the perceptions of the natural environment through the eyes of the farmer and, therefore, reflects his subjective emotions and judgments. Coote's diary supplements official meteorological records on droughts, permitting us to see the changes in weather, soils, and community life through the lens of a farmer over a series of

[261] Many thanks to Charles Fahey for having drawn my attention to that most interesting source.
[262] Charles Coote, 17 June 1940: "Close holiday on King's birthday. It is also mine and has been for 68 years. Henry Lawson's too."
[263] Cf. description of archival record at the University of Melbourne Archives. Online: http://gallery.its.unimelb.edu.au/imu/imu.php?request=multimedia&irn=5524. [Accessed 30 March, 2016].
[264] A. J. Catchpole/D. W. Moodie (1978): Archives and the Environmental Scientist. In: *Archivaria* 6, pp. 113-135, here p. 117.
[265] Ibid., pp. 121-122.

consecutive years. The diary is, therefore, an important source for the first sub-chapter of this part, which shows in the way of a chronicle how drought, dust, and depression affected the Mallee region from the 1920s to the mid-1940s.

Fig. 4: Experiencing a Dust Storm: A Postcard showing a Mallee Dust Storm.
[Postcard sent from Kaye Page's mother to her husband serving in the Middle East during World War 2. Provided by Kaye Page (Mildura), interview conducted the 2. May 2013 at Mildura Library.]



The second sub-chapter more closely analyses how wind erosion affected the settlers in different domains of their lives. It is in this chapter that the oral history interviews have become important for accessing the personal view of the settles. In the case of oral history, the process of the interview and the influence of the interviewer have to be reflected upon.[266] Two oral history collections have been assessed for this study, one from the Ganawarra Shire Council, Kerang, collected in 1984 and 1985 and the second from Swan Hill Shire, collected over a longer time period from 1986 to 2002.[267] Both had been initiated by local government entities and were recorded by volunteers stemming from the same local community. They reflect the increasing popularity during the 1980s of the discipline of oral history as a method to recollect local experiences, then being considered as meaningful enough to be recorded. The questions formulated by the interviewer are of course already guided by presupposition and reflect what was thought worth to ask at the time of the interview. It is interesting that while some interviewees seem to have taken up the topic of dust storms and wind erosion by themselves, the majority of them were explicitly asked about what they remembered. Apparently, the topic of wind erosion was on the agenda, which is not surprising considering the drought and dust storms of the 1980s and the public debate about soil erosion at that time. That basic corpus has been enlarged by several specific interviews conducted in May 2013 during a tour through the Victorian Mallee, where I asked specifically about the dust storm experience in the larger context of farming.[268] Autobiographic memories are also embodied in several books that cover the topic of rural life in Victoria. Some give an insight into rural life, but do not cover extensively the experience with wind erosion.[269] For the purpose of this thesis, a series of local history publications that are based mainly on individual memories were helpful, for example Ivan George's recollection *From London to Willah 1926-1949*[270] or Hugh Serpells *Mallee Memories*[271] and *Shifting Sands: Presented to Millewa Community Pioneer Forest & Historical Society*.[272]

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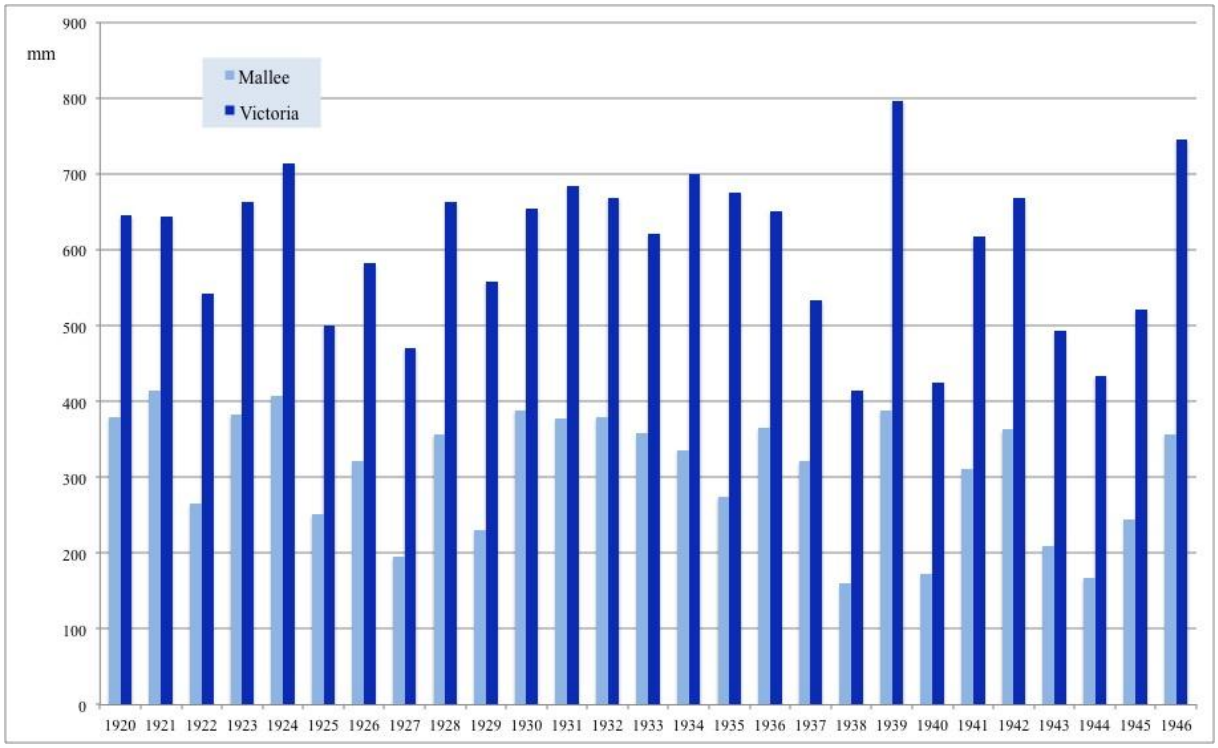
[266] Murphy, The Voice of Memory, pp. 157-158; Alistair Thomson (2007): Four Paradigm Transformations in Oral History. In: *The Oral History Review* 34 (1), pp. 49-70, here pp. 61-62.
[267] Kerang (Oral) History Research Project. Prepared for the Borough and Shire of Kerang by Linleigh Hall and Fay Hobson, 1985. Held at Gannawarra Shire Library, Kerang, Vic.; Mallee Oral History Group. Local History Collection. Held at Swan Hill Regional Library, Swan Hill, Vic.
[268] Many thanks to the uncountable friendly locals who supported my research trip in the Victorian Mallee.
[269] For example: John F. Edey (1981): From Lone Pine to Murray Pine. The Story of a Mallee Soldier Settler, Red Cliffs, The Sunnyland Press; Catherin Watson (ed.) (1984): Boots and All. An Oral History of Farming in Victoria, Collingwood, Friends of the Earth; Wendy Lowenstein (ed.) (1978): Weevils in the Flour. An Oral Record of the 1930s Depression in Australia, Melbourne, Hyland House.
[270] Ivan George (1990): From London to Willah 1926-1949. The Story of how the George Family Came as Pioneers to the Millewa, Mildura [self-published].
[271] Hugh Serpell (1997): Mallee Memories, Myrtleford, Vic. [self-published].
[272] Margaret Kelly (ed.) (2004): Shifting Sands, Cullulleraine, Millewa Community Pioneer Forest & Historical Society.

2.1 Chronology of a Disaster

The period of the 1920s to the mid-1940s were dark years for the Mallee, as the region suffered severely from consecutive dry years and economic troubles, an already difficult situation, which was worsened through the occurrence of wind erosion. Despite the fact that the following account is painted in dark colours, it is important to bear in mind that it explicitly focuses on the negative aspects, trying to explain why the Victorian Mallee was abandoned by a large part of the settlers at the end of the period. By necessity, the picture is therefore unbalanced. While reading the following 'chronology of a disaster', it is therefore crucial to keep in mind that for the majority of settlers, the Mallee region was, despite many difficulties, a well-loved place that offered home and work as well as family and social life for its residents.

The 1920s in general are not considered to be a drought period as such, yet, in the larger context of the droughts of the 1930s and 1940s, they have been described as being part of a distinctly 'drought prone' period.[273]

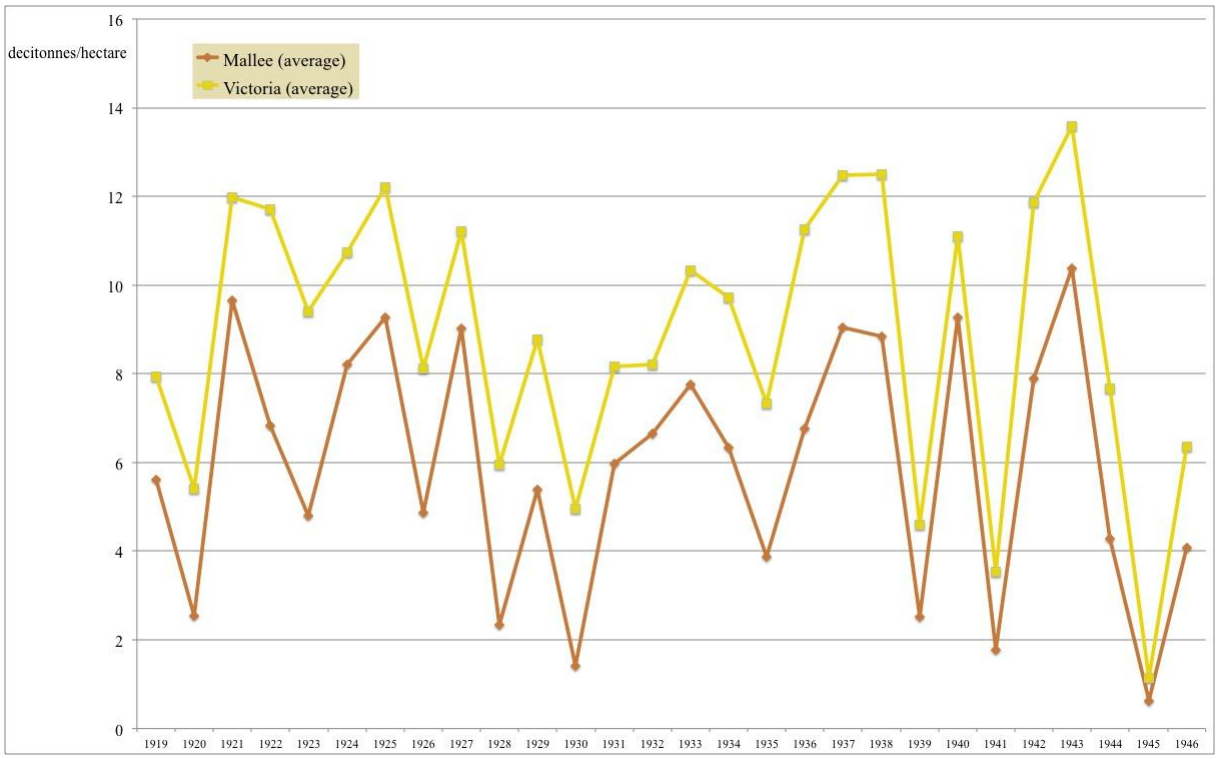
Fig. 5: Annual Average Rainfall in Victoria (whole) and the Victorian Mallee.
[Table 'Victoria, Rainfall in districts', in: Victorian Year-Book, 1945/46, p. 145].



[273] BoM/Wright, Drought, Dust and Deluge, p. 32; Foley, Droughts in Australia, pp. 27-28.

The summers 1922-23 and 1925 were below average in precipitation in many parts of Victoria, which led to cases of acute water shortage in the Mallee.[274] The second half of the decade brought another series of dry years over large parts of Victoria, particularly in its northern districts.[275] In the Mallee, the rainfall for the period 1925-1929 averaged only 271 mm and restrictions on water use had to be partly established.[276] By the end of 1927, many of the Mallee settlers were facing severe problems, and a drought assistance scheme was established that had to be continued in 1928 and 1929.[277] The Mallee settlers waited in vain for good rainfall, while their crops failed again, and their debts increased.[278] The lack of rainfall in 1929 hampered the growth of the cereals, and the wheat yield of the Mallee in 1930 turned out especially low, with an average of only 1.4 decitonnes/ha.[279] Just as in other marginal areas, the farmers in the Mallee had followed the advice of experts in regard to fallowing methods, and for the period 1920-1945, the proportion of fallow from the total land under cultivation in the Mallee was between one quarter and one third.[280]

Fig. 6: Annual Average Wheat Yields in Victoria (whole) and the Victorian Mallee.
[Data compiled from various Year-Books Victoria.]



[274] Ibid.; see also: Jenny Keating (1992): The Drought Walked Through: A History of Water Shortage in Victoria, Melbourne, Dept. of Water Resources Victoria, p. 117.
[275] Keating, The Drought Walked Through, pp. 119-120.
[276] Ibid.
[277] Ibid.
[278] Ibid.
[279] See Figure 6.
[280] Table 'Victoria-Average Cultivated Annually, 1856 to 1945', in: Victorian Yearbook, 1944-45, p. 227.

In 1929, when rainfall in the Mallee stayed below the mark of 250 mm annual average rainfall, more than 400,000 hectares of soils in the district were consequently lying almost completely bare of vegetation for between 12 to 15 months.[281] Today's wind erosion experts point to the fact that the combination of bare fallow, repeated ploughing and low rainfall had created "perfect conditions for wind erosion".[282]

Not surprisingly, the region suffered from severe wind erosion during 1929.[283] In November that year, farmer Charles Coote noted on nine days a dusty atmosphere and for 25 November 1929 alone, he recorded "three or four duststorms".[284] Wind erosion, in turn, also affected the productivity of the soils. While it is hard to estimate the actual share of wind erosion in the loss of productivity, it is very likely that it was at least partly responsible for the low wheat yields in the late 1920s, as the wind blew off the surface soil, destroyed seeds and young plants and rendered double sowing necessary.[285] These climatic and environmental developments coincided with a fall of wheat prices in the second half of the 1920s.[286] As a result of the combination of the drought, soil erosion, reduced wheat yields, and low wheat prices, many Mallee farmers found themselves in a difficult economic position during the 1920s. In the especially dry year of 1929, the newspapers repeatedly published articles about the Mallee where they painted the "plight of the settlers".[287]

From a climatic point of view, the Mallee lived from 1930 to 1934 through a period of relatively rich rainfall, with an average precipitation of 368 mm for the period.[288] The favourable weather conditions concurred with a political campaign to increase wheat production: The 'Grow More Wheat Campaign' was a result of the Great Depression starting in 1929.[289] The economic depression was hard on the Australian economy, as it accelerated the fall of prices for primary products.[290] The prices for wheat and wool, Australia's main export products, were rapidly declining, so Australia's balance of payments was deeply in

[281] Victorian Yearbook, 1928-1929, p. 569.
[282] McTainsh et al., Wind Erosion and Land Management, p. 20.
[283] 'A severe dust storm. Spoils Christmas afternoon', *Sunraysia Daily*, 27 December 1929.
[284] Charles Coote's diary, 25 November 1929.
[285] 'Soil Erosion. Great Mallee Problem', *The (Melbourne) Argus*, 15 June 1929.
[286] Carl B. Schedvin (1970): Australia and the Great Depression. A Study of Economic Development and Policy in the 1920s and 1930s, Sydney, Sydney University Press, p. 153; Dunsdorfs, The Australian Wheat-growing Industry, pp. 269-274; Wadham, Australian Farming, p. 51.
[287] 'Plight of settlers. Four good crops in 16 years', *The (Melbourne) Argus*, 27 February 1929; 'Plight of the Mallee', *The (Melbourne) Argus*, 4 March 1929; 'New Mallee settlers. Desperate Plight. Women and Children suffer', *The (Melbourne) Argus*, 4 September 1929; 'Mallee Farmers' plight', *The (Melbourne) Argus*, 21 September 1929; see also: Dingle, Settling, pp. 187-188.
[288] See Figure 5.
[289] Schedvin, Australia and the Great Depression, p. 146; Dunsdorfs, The Australian Wheat-growing Industry, p. 268.
[290] Barrie Dyster/David Meredith (1990): Australia in the International Economy in the Twentieth Century, Sydney [et al.], Cambridge University Press, p. 124.

deficit. The flow of capital into Australia had reduced to a trickle and the country had difficulties meeting the required payments for interest due on its foreign debts.[291] The Commonwealth and state governments reacted with a reduction of public spending, economic protection, an increase in tariffs, and a halt to immigration.[292] In order to balance the national budget, the Commonwealth government planned to increase the export income by an extension of agricultural production.[293] Wheat was assigned the key role for that.[294] Australian Prime Minister James Scullin proclaimed the slogan to grow more wheat and the Premiers of all the other wheat-growing states joined in. In March 1930 the Victorian Premier Edmond Hogan appealed to the farmers in the wheat belt to put "a million more acres" under cultivation.[295] In order to incite the wheat growing, the Commonwealth, in agreement with the state Premiers and Agricultural ministers, held out the prospect of a guaranteed wheat price of 4s. per bushel.[296]

The farmers all over Australia responded enthusiastically to the appeal. The total area under wheat crop in Australia was increased by 21 per cent and the total produce in 1931 was a record harvest of more than 6 million tonnes, an increase of 30 per cent.[297] In Victoria, the call to grow one million more acres of wheat was even exceeded slightly, as the farmers put 1,034,065 acres (418,471 hectares) under wheat.[298] Over half of the newly sown area was in the Mallee, where farmers increased their cultivation area by more than 200,000 hectares.[299] Like most other wheat growers, or perhaps even more so, the Mallee farmers now saw the opportunity to finally compensate for the bad yields and the low prices in the past.[300] The harvest of 1931 consequently brought a 'bumper crop' of 566,000 tonnes in the Mallee, followed by another good crop of more than 536,000 tonnes.[301] This was partly a result of a better yield output but mainly due to the increase in the area of cultivation. More Mallee land than ever before had been put under wheat crop and the portion dedicated to fallow or pasture had decreased considerably.

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[291] Ibid.; Dunsdorfs, The Australian Wheat-growing Industry, p. 268.
[292] Dyster/Meredith, Australia in the International Economy, pp. 131-144; Dingle, Settling, p. 191.
[293] Dunsdorfs, The Australian Wheat-growing Industry, p. 268.
[294] Dyster/Meredith, Australia in the International Economy, p. 132.
[295] Ibid.; Dunsdorfs, The Australian Wheat-growing Industry, pp. 267-267; N. N. (1930): A Million More Acres of Wheat. In: *Journal of Agriculture of Victoria* 28, pp. 1-5.
[296] Dunsdorfs, The Australian Wheat-growing Industry, p. 268; Wadham, Australian Farming, p. 51; Dyster/ Meredith, Australia in the International Economy, p. 132.
[297] Wadham, Australian Farming, p. 51.
[298] Dunsdorfs, The Australian Wheat-growing Industry, p. 269.
[299] Yearbook Victoria, 1930-31, p. 351.
[300] Dunsdorfs, The Australian Wheat-growing Industry, p. 273; Dingle, Settling. p. 192.
[301] Table 'Wheat Yields in Counties for the last three seasons', in: Victorian Yearbook 1931-32, p. 341.

Unfortunately, the campaign ended in what has been described as "one of the greatest disasters in Australian economy".[302] While the aim of the campaign to boost the country's export income was realised to a certain extent, its human and environmental costs were high.[303] As many wheat-growing nations chose the same path as Australia and the demand for wheat on the world markets remained stable (the demand for wheat being in general quite inflexible) an oversupply of wheat was generated which led to a collapse of wheat prices in September and October 1930.[304] The promised price guarantee in turn was never realised.[305] The export price in 1930-31 brought only 2s.5d. a bushel (compared to 4s.10d. in 1928-29) which brought the farmer around 1s.9d. at the railway sidings, in some months even less.[306] This was lower than the actual production costs, so that many wheat cultivators' very existence was threatened.[307] The disastrous situation of the wheat-growers called for governmental action and several federal as well as state Debt Adjustment Schemes for farmers were established.[308] In Victoria, an Unemployed Occupiers' and Farmers' Relief Bill was passed in 1931 to ease the situation of the farming population.[309] In the Mallee, where most settlers had mortgages and debts, the situation was especially disastrous.[310] After several years of low yields in some of the region, the wheat bags were now piling up at the railway sides, without bringing any money.[311] The *(Melbourne) Argus* featured a four part series on the "Tragedy of the Mallee", and that despite an exceptional good season, as farmer Charles Coote noted:[312]

> Climatically the season so far is good. Growth of wheat in stubble is as good as ever I saw it. […] Argus articles on conditions of new mallee settlers particularly from Manangatang to Millewa show parlous state of farming there. *Charles Coote, 26 April 1931*

At the beginning of 1931, a system of coupons was established.[313] Advances to settlers in need had first been made in cash, but – according to the Minister for lands – some abuse had occurred and the coupon system had been introduced instead.[314] With those coupons, the settlers could buy necessities at the stores, and the storekeepers would be guaranteed

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[302] Dunsdorfs, The Australian Wheat-growing Industry, p. 274.
[303] Dingle, Settling, p. 192.
[304] Wadham, Australian Farming, p. 51; Dingle, Settling, pp. 191-192.
[305] Ibid.
[306] Ibid.
[307] Schedvin, Australia and the Great Depression, pp. 146-153; Dunsdorfs, The Australian Wheat-growing Industry, pp. 269-274; Wadham, Australian Farming, p. 51.
[308] Wadham, Australian Farming, pp. 52-53.
[309] Dunsdorfs, The Australian Wheat-growing Industry, pp. 276-277.
[310] Lake, The Limits of Hope, pp. 110-112.
[311] 'Tragedy of the Mallee', *The (Melbourne) Argus*, 25 April 1931.
[312] 'Tragedy of the Mallee', *The (Melbourne) Argus*, 25, 27, 28 &29 April 1931.
[313] 'Sustenance coupons not accepted in Mallee. New system widely resented', *The (Melbourne) Argus*, 23 March 1931; 'Coupons for settlers', *The (Melbourne) Argus*, 18 April 1931.
[314] 'Sustenance Money. Mallee coupons to remain', *The (Melbourne) Argus*, 30 April 1931.

reimbursement by the Treasury. As the storekeepers were required to supply detailed invoices signed by the settlers, the government had the complete control of how the money was spent.[315] Needless to say, this system was considered deeply humiliating by the settlers and was fervently criticised.[316] The government distributed coupons worth between £15,000 and £20,000 monthly among 3,500 settlers.[317] While the government supported those settlers who were in economic trouble, some farmers of the older generation resented the attitude of the newer settlers that allegedly did not work hard enough and unduly profited from public help.[318] The government also installed liens on the future crops of the farmers, a measure some farmers tried to avoid by 'flogging off' the wheat secretly.[319] The situation was so bad for some of the settlers that the Melbourne press even published calls to donate clothes and blankets.[320] The settler's economic hardship most probably further pushed them to exploit the land in order to make a living out of it, thus most likely increasing its erodibility. In this way, the 'Grow More Wheat' campaign ended not only in an economic disaster, but also had disastrous effects for the environment.

Public concerns about the effects of drifting sand multiplied in the early 1930s. The *(Melbourne) Argus* spoke in 1931 about concerns of disappearing top soils and warned that parts of the Mallee might turn to uninhabitable areas.[321] The Mallee settlers themselves were looking for ways to mitigate the problem of sand drift.[322] The increasing concerns about the effects of off-site erosion in form of sand drift that impaired the functioning of the

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[315] 'Coupons for settlers', *The (Melbourne) Argus*, 18 April 1931.
[316] 'Sustenance coupons not accepted in Mallee. New system widely resented', *The (Melbourne) Argus*, 23 March 1931; 'Tragedy of the Mallee. Coupon Currency', *The (Melbourne) Argus*, 28 April 1931; 'Withdrawl refused', *The (Melbourne) Argus*, 1 May 1931; 'Mallee Coupons opposed in Parliament', *The (Melbourne) Argus*, 13 May 1931; 'Coupon system. Letters from farmers and traders', *The (Melbourne) Argus*, 20 May 1931; 'Sustenance Coupons, Dissatisfaction in the mallee', *The (Melbourne) Argus*, 15 August 1931.
[317] 'Coupons for settlers', *The (Melbourne) Argus*, 18 April 1931.
[318] John A. Senyard (1974): A Mallee Farming Community in the Depression. The Walpeup Shire of Victoria, 1925-1935, Unpublished Master thesis, Melbourne, Monash University, p. 239; Marc Brodie (2005): The Politics of Rural Nostalgia Between the Wars. In: Graeme Davison/Marc Brodie (eds.), Struggle Country. The Rural Ideal in Twentieth Century Australia, Melbourne, Monash University ePress, pp. 09.1-09.13, here p. 09.8-09.9. The diary entries of Charles Coote suggest a similar attitude: "The majority seem to think they should not be expected to pay old debts. Generally it seems as though people have not faced their difficulties of the past five years as those forty years ago would have done and relied upon themselves. Charles Coote Diary, 10 February 1935. Similar: "[…] many country debtors away on holiday * led the creditors worry seems to be the policy practiced by many young farmers as regards this affair. They have been safeguarded in that by the government of Australia during recent years enacting legislation to 'protect' genuine cases of possible hardships." Charles Coote Diary, 1 March 1936.
[319] Kelly, Shifting Sands, p. 9.
[320] 'Clean Clothing wanted. Special request for Boots', *The (Melbourne) Argus*, 1 May 1931; 'Mallee relief, splendid response', *The (Melbourne) Argus*, 2 May 1931; 'Mallee relief, Many splendid gifts, clothes and rugs for waste', *The (Melbourne) Argus*, 4 May 1931; 'Mallee relief: 15,000 garments received', *The (Melbourne) Argus*, 6 May 1931.
[321] 'Drifting Sand in Mallee', *The (Melbourne) Argus*, 29 January 1931.
[322] 'Disastrous Drift of Sand. Conference on Serious Position in Mallee', *Sydney Morning Herald*, 3 July 1931.

infrastructure led to the establishment of a committee that investigated the sand drift problem in the Mallee.[323] While the committee stated in its report that "many places have been seen where the sandy surface soil has been blown away and rendered unproductive",[324] the main problem of wind erosion was considered to be the effect the sand drift had on roads, railways, and water channels (see chapter 2). The first half of the 1930s thus saw an increase in public awareness about problems of wind erosion in Victoria's north-west. Yet, the environmental problems were eclipsed by the economic and social problems of the region, which was battling with the effects of the depression. This would change under the impact of increasing wind erosion and public communication about the threatening character of erosion.

The period from 1937 to 1945 was very low in rainfall over most parts of eastern Australia, marked by three consecutive droughts known under the name of 'World War Two Droughts'.[325] The first of those more general droughts began in 1937 and lasted until January 1939, immediately followed by a second drought in the second half of 1940.[326] In the Mallee, however, the dry spell had already started two years earlier in 1935. As the graph indicates, the region was not only affected by limited rainfall, but also haunted by a large number of dust storms [see Figure 7]. After the climax of wheat production in 1931 and 1932 and the bitter realization that the focus on one single product was making the farmer especially vulnerable to fluctuations in world prices, the high proportion of land under wheat crops in the Mallee decreased during the 1930s by about 400,000 hectares.[327] The drop of land under crop can in some particular years be explained by the specific climatic conditions, as the farmers would not sow their wheat without the necessary amount of rainfall. The general trend, however, reflects a change in the primary production: mixed farming was gaining more and more ground. The Victorian Yearbook shows that in the season 1935/36, from the 13,780 holdings that were growing wheat for grain in Victoria, 72.4 per cent also had sheep.[328] In the Mallee, the number of sheep reached a record low of around 650,000 in 1931. It almost doubled in the following two years reaching nearly 1,300,000 in 1933, and then remained approximately around this number for most of the 1930s and first half of the 1940s.

The prices of farm products in general began to rise during the later 1930s, but a glance at the low wheat yields shows that this did not bring much relief to the Mallee

[323] Victoria. Sand Drift Committee (1933): Report on Sand Drift Problems in Mallee Areas, Melbourne, Government Printer.
[324] Ibid., p. 1.
[325] Foley, Droughts in Australia, pp. 28-29; BoM/Wright, Drought, Dust and Deluge, p. 34.
[326] Ibid.
[327] Year Book Victoria, 1930-31 to 1939-1940.
[328] Year Book Victoria, 1938-39, p. 455.

farmers.[329] The trouble of the Mallee farmers started in 1935 with a scarcity of rainfall that impaired the growth of crops and grass:

> crops+ grass are backward for this time of year in the district. But the conditions now are very favorable for growth as far as moisture in the soil is concerned although generally the season could be described as drought. *Charles Coote, 21 July, 1935*

Even though rainfall was more pronounced in the second half of the year,[330] the total rainfall amounted to only 275 mm of rain, while the average of the state reached 676 mm.

The average wheat yield for the harvest in early 1936 would reach 6.92 decitonnes/ha in the Mallee, which was not too bad.[331] Wind erosion, especially sand drift, increased and the public debate on the topic flared. Newspapers repeatedly recorded the negative effects of wind erosion on the infrastructure and the farm production.[332] Sand drift was considered by some farmers as an "ever-increasing menace" and the "most serious [problem] with which wheatgrowers have to contend".[333] Dust storms had a destructive effect on the crops and grasses as the flying soil particles had the effect of a razor. For example, in June 1935, the *(Melbourne) Argus* reported how "flying sand cut back or covered many young wheat crops in this district, and completely destroyed patches on the more exposed sandhills" adding that this had been "the second time in a week that they have been buffeted by wind and sand".[334] The following year, 1936, started dry in the Mallee.

> Most people looking for rain. Country quite dry + dusty appearance.
> *Charles Coote, 26 April, 1936*

But the second half of 1936 brought relief as far as rainfall and prospects for crop yields were concerned, and the farmers gained new hope:

> Crops sown during June are coming up evenly thickly + with a healthy appearance- the best 'Strike' for many years. […] Owing to the improved seasonal outlook and the prospect of higher prices for all primary products there is a more hopeful feeling among producers and country dwellers generally but the financial condition of a large numbers of wheat growers is still very bad indeed – in fact in many cases quite hopeless. *Charles Coote, 12 July, 1936*

[329] Wadham, Australian Farming, p. 53.
[330] 'Widespread Rains. Millewa and Mallee Benefit', *Sunraysia Daily*, 22 October 1935.
[331] See Figure 6.
[332] 'Sand Drift in Mallee. Serious Problem', *The (Melbourne)Argus*, 24 January 1935; 'Drifting Sands in Mallee', *The (Melbourne) Argus*, 22 February 1935.
[333] 'Sand Drift in the Wheat Belt', *The (Melbourne) Argus*, 21 May 1935.
[334] Ibid.; 'Flying Sand Destroys Crops at Ouyen', *The (Melbourne) Argus*, 20 July 1935.

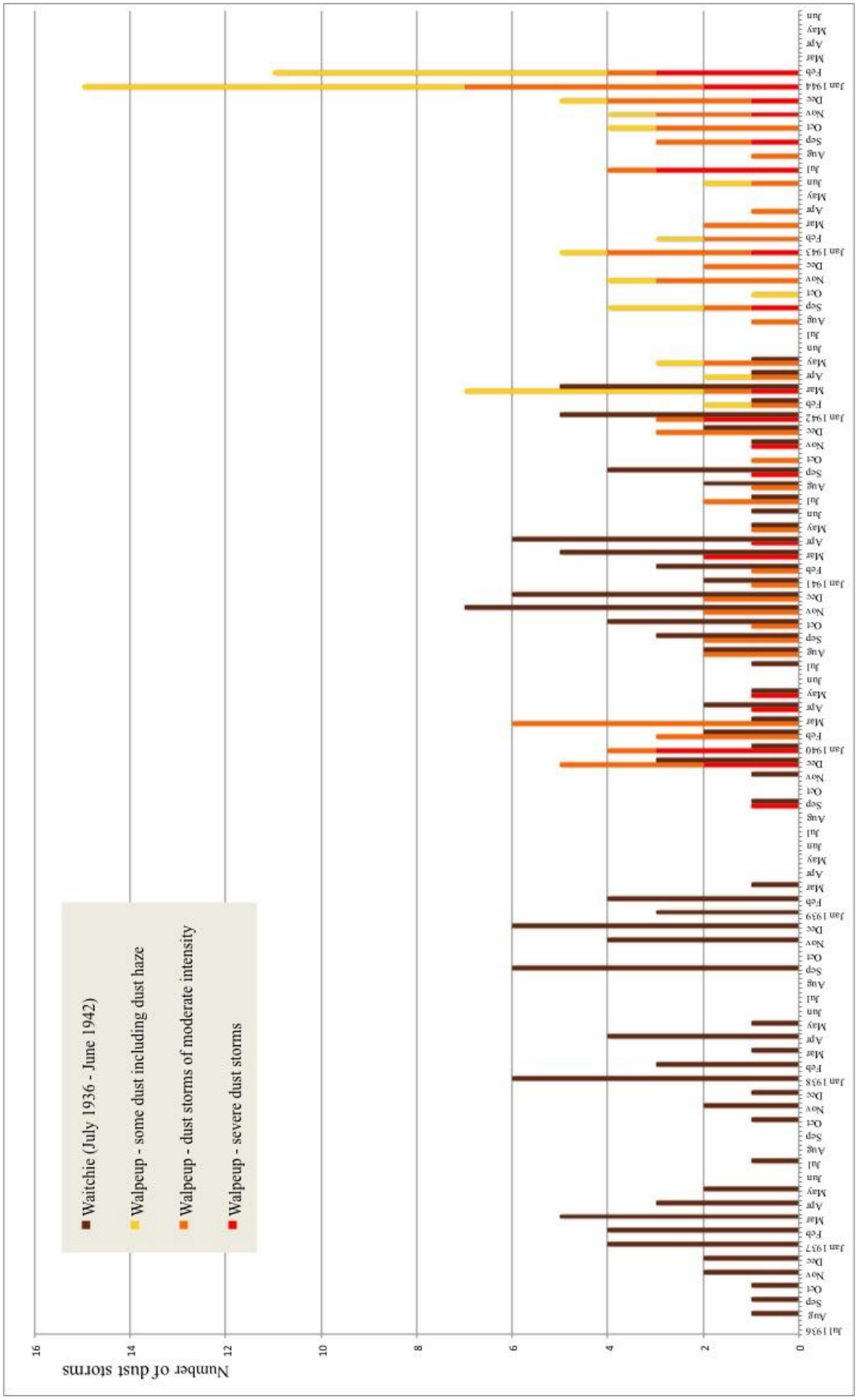

Fig. 7: Frequency of Duststorms in Mallee towns Waitchie and Walpeup.
[Holt (1946): Wheat farms of Victoria, p. 146].

As a matter of fact, the high annual average rainfall of 366 mm translated into an increase of the wheat yield in 1937 of 9 decitonnes/ha. In February the following year, however, the Mallee, just like the rest of Victoria, as well as parts of New South Wales, Queensland, and Western Australia, fell under a dry spell again.[335] In May 1937, the land clearly showed the signs of the drought and wind erosion:

> This year at this time of year much dust rises to be nearly always in the atmosphere. The country in north Victoria is very dry. Ewes are lambing under rather adverse conditions from a feed point of view. Every slight wind raises dust. Melons on fallows are about eaten out + have furnished [?] deep in the mallee country with the only green feed they have had for months. Farmers in wheat areas waiting for rain to start seeding. *Charles Coote, 9 May, 1937*

In July much of the livestock in Victoria already had to be hand-fed as vegetation was scarce.[336] The situation did not escalate, however, and the stock numbers even increased. The rainfall of 322 mm was altogether not too bad for the Mallee, and the wheat yield was equal to the previous year with 9 decitonnes/ha. The situation worsened in 1938, despite the La Niña current of this year.[337] The summer had been dry and the effects of wind erosion became more and more apparent:

> A strong N.E.+ North wind blew from daylight carrying thick dust + completely obscuring the sun at times. Temp. at 2 pm 96 fahrenheit. The country is dry and apart from stubble paddocks almost bare of natural grass in the mallee. […] Many dams and waterholes on farms are dry + water carting is more general than has been there for some years past.
> *Charles Coote, 20 February, 1938*

In August 1938, an extremely dry spell began in Victoria and lasted for six long months.[338] In December 1938, "one of the worst dust storms the district had experienced" almost totally destroyed the small feed that had remained in some areas. In the Millewa, "stubble feed and grass were either blown away or covered with dust".[339] The drought and dust storms resulted in a severe shortage of feed for stock.[340] In the Mallee, during 1938-39, the area was practically bare of stock and it was difficult to find enough sheep to restock.[341] The sheep population in the Mallee decreased by circa 500,000.[342] As soil conservationists point out, the most critical aspect of grazing is, as far as wind erosion is concerned, during times of drought.[343] When land owners have limited financial resources, as was the case for many

[335] BoM/Wright, Drought, Dust and Deluge, p. 34.
[336] Foley, Droughts in Australia, p. 29.
[337] BoM/Wright, Drought, Dust and Deluge, p. 34; Keating, The Drought Walked Through, p. 124.
[338] Ibid.
[339] 'Boisterous weather did some damage in Sunraysia & Millewa', *Sunraysia Daily*, 12 December 1938.
[340] Foley, Droughts in Australia, p. 29.
[341] Ibid.
[342] Victorian Year Book, 1937-38, p. 474; Victorian Year-Book, 1938-39, p. 474.
[343] McTainsh et al., Wind Erosion and Land Management, p. 20.

Mallee farmers during the 1930s and first half of the 1940s, they lack the ability to move stock to better areas during drought.[344] In this way, the grazing pressure on the land probably increased as Mallee scrub was used as a source of food when pasture was lacking, in this way accelerating the denudation of even more soil surface.[345] In 1938, the state government established a drought relief fund for drought-affected farmers.[346] The crop of early 1939 was meagre and yielded only an average of 2.6 decitonnes/ha in the Mallee, and the country had a dry and bare look and was badly affected by wind erosion.

> […] the harvest has been a comparative failure owing to drought. Sandy spots on mallee farms are badly blown and roads running alongside fallow paddocks are buried (?) with drifts from the west and the south the worst for many years. *Charles Coote, 29 January, 1939*

The drought culminated in the horrible Black Friday bushfires of January 1939 that cost the life of nearly seventy Victorians.[347] The bushfires further increased the vulnerability of the soils to erosion.[348] The dry period broke only with a heavy rain fall in late February 1939 over Victoria as well as the other states.[349] For the rest of the year, rain was sufficient across most of Victoria and the average rainfall for the year would even amount to 389 mm. Wind erosion seemed to have decreased markedly.[350] The following harvest of the summer 1939/40 brought very good wheat yields of an average of 9.5 decitonnes/ha.

Such was the situation when Australia entered the Second World War. Economically the situation somewhat improved as the demand for primary produce increased.[351] New farm machinery made farming more efficient and profitable. Tractors became more widely used as well as new disc ploughs that were particularly adapted for low value land.[352] At the beginning of the war, the Australian Wheat Board was established under Commonwealth authority and managed the production and trading of wheat for the whole of Australia.[353] This had a stabilising effect on wheat prizes and meant more security for its cultivators. Yet, the war economy also had obstructive effects on the rural community. The restrictions on petrol,

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[344] Ibid.
[345] Ibid.
[346] Keating, The Drought Walked Through, p. 124.
[347] Ibid., p. 129; BoM/Wright, Drought, Dust and Deluge, p. 34.
[348] Victoria/Stretton, Leonard E. (1939): Report of the Royal Commission to Inquire into the Causes of and Measures Taken to Prevent the Bush Fires of January, 1939, and to Protect Life and Property and the Measures to be Taken to Prevent Bush Fires in Victoria and to Protect Life and Property in the Event of Future Bush Fires, Melbourne, Government Printer, pp. 28-29.
[349] BoM/Wright, Drought, Dust and Deluge, p. 34.
[350] Keating, The Drought Walked Through, p. 135.
[351] Wadham, Australian Farming, p. 57.
[352] Ibid.
[353] Ibid., p. 53.

and the use of railways for war needs rendered transport in the countryside more difficult.[354] Also, farm labour became scarce, so that labour intensive tasks on the farm were delayed.[355]

Climatically, some relief was brought about by the rainfall in autumn 1939. However, this was quite short and a second major drought over most of the southern parts of the continent began in December 1939 and remained in force during 1940, an El Niño year.[356] In March 1940, the temperature was searing and serious bushfires occurred again. In August, the drought was well established and the flow of the Goulbourn at Fildon Reservoir decreased significantly at the end of August.[357] In the Victorian wheat belt the rainfall was especially low during the growing season in winter and spring, causing much wind erosion.[358]

> Yesterday's strong north wind carrying dust was very drying. 80°Fahrenheit during afternoon of yesterday. At the present time this threatens to be the worst of droughts though prospects could be changed by rains within five or six weeks. *Charles Coote, 8 September, 1940*

The situation also became threatening for pastoralists who had been hand-feeding their stock from August onwards.[359] Yet, livestock was apparently not so badly affected by the drought as cereals, since the sheep population in the Mallee as well as in Victoria increased in this year.[360] Wind erosion was very acute and the newspapers gave accounts of sand drift covering fences and threatening to submerge farm houses.[361] When harvesting time approached in the Mallee, it became apparent that there would not be much to gather from the fields.

> Wind with dusty stratosphere? Many farmers report now that they will have no crops in QK district. Seed must be obtained. Producers are facing a serious time – how to exist is the immediate problem. Federal govt. agrees to make £600000 available to Victorian farmers through the state govt. as drought Relief- possibly to provide seed.[…] All this afternoon the wind blew strongly + steadily from W.N.W. and the horizon in all directions appeared a bank of dust. *Charles Coote, 10 November, 1940*

As the drought affected Australia's entire mainland, the states appealed to the federal government for funds for drought relief which the Commonwealth granted, even if it considered that drought relief was not its responsibility.[362] This year's harvest in the Mallee produced an average of only 1.8 decitonnes/ha, one-fifth of the previous year.[363] The much wanted break of the drought came in January 1941 when heavy rain set in.

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[354] Wadham, Australian Farming, p. 62.
[355] Barr/Cary, Greening a Brown Land, p. 133.
[356] BoM/Wright, Drought, Dust and Deluge, pp. 34-35.
[357] Foley, Droughts in Australia, p. 29.
[358] Ibid.
[359] Ibid.
[360] Ibid.
[361] Keating, The Drought Walked Through, p. 136; *The (Melbourne) Herald*, 19 September 1940.
[362] Keating, The Drought Walked Through, p. 136.
[363] See Figure 6.

The wind erosion during the years 1935-1940 had driven home to the Victorians that dust storms, sand drift and wind erosion in general were a menace for the agriculture of the Mallee. In 1938, a Committee appointed to investigate erosion in Victoria came to the conclusion that "in the final analysis the real cause of most erosion can be attributed to the mistreatment by man of the soil and other natural resources in his endeavor to collect from them the greatest return in the shortest time".[364] In addition to the damage done by sand drift, the farming community became more and more aware of the negative effects of on-site erosion, namely the loss of topsoil.[365] Towards the end of the 1930s and the beginning of the 1940s, agricultural experts increasingly advised the farmers to use soil conservation methods.[366] The loss of agricultural and pastoral productivity through wind erosion was also recognised by politicians. In 1940 a soil conservation bill was adopted and resulted in the establishment of the Victorian Soil Conservation Board in the same year.[367]

In January 1941 heavy rain fell over the drought stricken south-eastern states and brought the long-awaited end of the drought for many parts of Victoria. The average rainfall for Victoria and the Mallee was relatively high in 1941, which was beneficial for the replenishing of the reservoirs.[368] In large parts of Northern Victoria, however, the dry conditions seem to have continued during the first six months of the year.

> In country districts of N. Vic. Dry conditions afford a dull prospect – hand feeding of stock general; dust storms make life unpleasant. *Charles Coote, 30 March, 1941*

In any case, vegetation could not regenerate in the short period of relief and wind erosion was marked throughout the year:

> Drought conditions continue. All stock being handfed. Paddocks bare + windswept. Crabholes, channels sheltered depressions filled with sand drift. Houses, sheds etc. all contents covered in dust. *Charles Coote, 13 April, 1941*

Apparently, the land was so bare that despite the rainfall, the wind would easily pick up the soil even in winter, which is quite unusual as dust storms usually occur during late spring and early summer.[369] It was also an unusual experience for Charles Coote who had lived in the Mallee for more than 40 years:

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[364] Victoria (1938): The Report of Committee Appointed to Investigate Erosion in Victoria, Melbourne, p. 2.
[365] 'Land of Drifting Sands', *The (Melbourne) Argus*, 22 February 1935.
[366] N. N. (1939): Sand Drift Control. Cultivation Trials. In: *Journal of Agriculture of Victoria* 37, pp. 543-546; H. L. Hore (1940): Sand Drift and Control Measures. In: *Journal of Agriculture of Victoria* 38, pp. 219-228.
[367] Soil Conservation Authority, Victoria (1953): A Brief History of Victorian Erosion Control, a Résumé of the Soil Conservation and Land Utilization Acts, and the Policy, Organization, and Procedure of the Authority, Melbourne, Soil Conservation Authority, p. 8.
[368] Foley, Droughts in Australia, p. 29; Keating, The Drought Walked Through, p. 135.
[369] Edward Bryant (1991): Natural Hazards, Melbourne [et al.], Cambridge University Press, p. 51.

> Dense cloud of dust from all bare patches are carried by a strong cold S.W. wind until 5pm- Dust storms in June!! *Charles Coote, 21 June, 1941*

The year 1942 started well for farmers, with enough rain and generally good weather conditions for agricultural operations, and farmers were beginning to win back some of their optimism.[370] Meanwhile the sheep population throughout Australia increased and in Victoria reached a high in 1942 with more than 20.5 million sheep.[371] The rainfall remained good throughout the year, averaging at 363 mm in the Mallee, so crop prospects looked promising and pastures for stock grew well.[372] In December 1942, however, another dry spell began over Victoria and lasted until 1943 in the whole south of Australia. The dry spell was too late to considerably affect the yield of 1943, which reached an exceptionally high average of 10.7 decitonnes/ha in the Mallee. But stock and cereals were strongly affected and a plague of mice additionally affected the region.[373]

> Droughty conditions causing concern. Country very dry. Dry feed in many paddocks but depredations of mice in stubble paddocks make it of little value. Hand feeding being resorted to. Little seeding has been done in mallee districts. *Charles Coote, 30 May, 1943*

When the drought struck, pastures were quickly eaten away and some sheep were removed to other regions in Victoria where the natural grasses were more abundant.[374]

> The dry conditions in northern Victoria are serious indeed – no natural stock feed. Nearly all stock being hand fed. Many flocks of sheep with young lambs. Drovers being engaged to take sheep on roads further east. Little or no wheat has been seeded. […] Men power shortage acute in all primary industries. *Charles Coote, 27 June, 1943*

Due to the war, the rural areas were short of labour, so the fodder reserves were not well established and disappeared very quickly.[375] Stock would soon become a burden to the farmers as fodder became scare and prices for feed increased. This of course, would lead to a collapse of the prices for sheep.

> There is a rush of fat stock to market; each grazier is trying to get off surplus consumers of dwindling stocks of animal feed. Buyers of fats have sellers at their mercy.
> *Charles Coote, 28 November, 1943*

[370] Charles Coote's Diary, 24 May 1942.
[371] Wadham, Australian Farming, p. 62.
[372] Charles Coote's Diary, 6 September 1942: "Seasonable conditions for growth of crops and grass could hardly be better. […] Crops very fine. Not a wilted leaf to be seen."
[373] Foley, Droughts in Australia, p. 30.
[374] Wadham, Australian Farming, p. 62.
[375] Ibid.

The rainfall in 1943 only averaged 210 mm in the Mallee and the scrubby crop was given over to stock.[376] The drought and overstocking of the land led to the destruction of the vegetal soil cover and wind erosion was again very pronounced.

> Strong S.W. wind carrying dust all afternoon. The weather for this spring has been generally cold and very dry with some high winds. Ground is dry and hard and the scanty native grasses dead so that the country is bare except for stubble and last years dry weed.
> *Charles Coote, 30 November, 1943*

The year of 1944 was even worse, with an average rainfall of only 167 mm in the Mallee and 434 mm in Victoria. By April 1944, most districts in northern Victoria had to cart water, and the lack of rain in the growing period from May to October led to a general failure of the wheat crop.[377] The average wheat yield for the harvest in early 1945 fell to an even lower number of 1.16 decitonnes/ha in Victoria and 0.65 decitonnes/ha in the Mallee.[378] In October 1944 the flow of the Murray and its tributaries had been the lowest ever recorded and when the drought extended during 1945, the river dried up at places.[379] The stockmen resorted to grain reserves to feed their sheep, but the Victorian (and Commonwealth in general) wheat production in 1944 was only the half of that of 1943 and the production of 1945 was not even a thirteenth of this amount.[380] A shortage of cereals therefore occurred throughout the Commonwealth.[381] Overstocking was common and further increased the vulnerability of the soil particles to the forces of the wind.[382]

> Dust drifts from country eaten bare by starving sheep. Principal activities on some district farms is looking after stock. *Charles Coote, 12 March, 1944*

Despite all efforts, many sheep could not be saved and in August 1944 heavy stock losses had occurred in the north-west and north of Victoria. As a matter of fact, the sheep population was decimated Australia-wide by more than a quarter during this drought.[383] In Victoria there was a decrease in sheep numbers of more than 28 per cent from 1942 to 1946.[384] In the Victorian Mallee, the losses were even worse: After reaching a peak in stock numbers of ca. 1.5 million sheep in 1943, this number dropped more than 55 per cent in two years.[385] Sheep were the

[376] See Figure 5.
[377] Foley, Droughts in Australia, p. 29.
[378] See Figure 6.
[379] Foley, Droughts in Australia, pp. 29, 31.
[380] See Figure 6.
[381] Wadham, Australian Farming, pp. 62-63.
[382] McTainsh et al., Wind Erosion and Land Management.
[383] Wadham, Australian Farming, p. 63.
[384] Table 'Live Stock in Victoria, 1861 to 1946', in: Victorian Year-Book, 1945-46, p. 190.
[385] Victorian Year Book, 1942-43, p. 461; Victorian Yearbook, 1945-46, p. 193.

most affected livestock, but other animals suffered from the scarcity of fodder too, and some farmers shot their surplus horses.[386]

> Fine frosty east to north wind. Country about the driest I've ever seen at this time of year - it is quite bare of anything green except where watered. A few wheat crops on fallow still green but many quite dead. Stock have eaten most. Horses to be removed. Some being shot in bare paddocks. Old shorn sheep dying in scores. No wheat expected to be harvested. Water carting general where no channel supply. *Charles Coote, 17 September, 1944*

Due to the lack of rural labour, rabbit numbers could not be adequately controlled and large numbers infested the grain belt.[387] It is no wonder that the region was completely bare of vegetation and affected by huge dust storms that worsened the situation of the Mallee farmers: For the three months of October to December 1944, Karen Douglas at Werrimull recorded 17 days with heavily dust laden air or dust storms in her diary.[388] In October and November 1944 "sand-blasts" destroyed crops[389] and in the irrigated fruit growing region around Mildura the "cutting force of the sand"[390] damaged the vines and plants.[391] The dust storm on the 20th November, 1944 was reported to have reached such a force that the dust had even travelled as far as New Zealand.[392] It was dubbed as the "the worst in history" or at least the "worst for the last 20 years",[393] but forfeited this unflattering title a month later to several dust storms that occurred in December 1944.[394]

In December 1944 the wind erosion situation became so acute that the Soil Conservation Board of Victoria published a leaflet on *Emergency Measures for Control of Wind Erosion* that addressed not only the Mallee farmers, but all the farming community of the state.[395] The Victorian government also established a drought relief fund in August 1944 of a sum of £500,000.[396] Another £1,100,000 was agreed to be spent on drought relief in October 1944, half of the sum to be provided by the state and the other half by the

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[386] Wadham, Australian Farming, p. 63; Keating, The Drought Walked Through, p. 137.
[387] Barr/Cary, Greening a Brown Land, p. 133.
[388] Karen Douglas' Diary.
[389] 'Danger of bad black spot year is disappearing', *Sunraysia Daily*, 26 October 1944.
[390] 'Mildura suffers worst dust storm for 20 years', *Sunraysia Daily*, 20 November 1944.
[391] 'Dust storms, gone with the wind, leave mark on farms', *Sun News Pictorial*, 21 November 1944.
[392] 'Our Dust in New Zealand', *The (Melbourne) Herald*, 21 November 1944.
[393] 'Mallee's worst dust storm in 20 years', *The Weekly Times*, 22 November 1944; 'Mildura suffers worst dust storm for 20 years', *Sunraysia Daily*, 20 November 1944; 'Sunday's dust storm. Worst in history', *Swan Hill Guardian*, 21 November 1944; 'Sunday's Dust Storm. Worst for years', *Quorn Mercury*, 24 November 1944.
[394] 'Pall of Dust Like 'Mountain Range'', *The (Melbourne) Herald*, 16 December 1944; 'Tons of dust scattered over four states', *Sun News Pictorial*, 18 December 1944; 'Worst dust storms in memory. Reminder of soil erosion menace', *Hamilton Spectator*, 19 December 1944; 'Swan Hill's Trying Saturday. Worst dust-storm ever', *Swan Hill Guardian*, 22 December 1944; 'Severe duststorms, worst for years, sweep over 4 states', *The Weekly Times*, 20 December 1944.
[395] Victoria, Soil Conservation Board (1944): Emergency Measures for Control of Wind Erosion. Leaflet No. 4, Melbourne, Government Printer.
[396] Foley, Droughts in Australia, pp. 30-31; Keating, The Drought Walked Through, p. 138.

Commonwealth.[397] Similar schemes supported by the federal government were established in New South Wales and South Australia, which were also badly affected.[398] The drought continued during 1945 and the problems of denuded lands and wind erosion were exacerbated; throughout summer 1944/45, news of the Mallee turning into a dust bowl appeared in the daily press.[399] In January 1945, another record dust storm that swept over Mildura was described as being the worst ever experienced, having the effect "as though someone had emptied a huge can of dust" over the region.[400] Karen Douglas likewise noted in her diary that the dust storm was the worst yet, reaching almost cyclonic force, so that "everything [was] smothered in dirt".[401] The drought conditions and dust storms continued in the following months:[402]

> The atmosphere is dusty but cool. Country quite bare of natural grasses. All stock being hand fed. No work practically being done on farm except perhaps moving drifting sand from fences and buildings. Many yards drifted full and channels choked from paddocks which have been overstocked. Some sheep trained away last September for agistment on roads to southern and western Victoria have been railed back to be hand fed on bare paddocks.
> *Charles Coote, 11 March, 1945*

Finally, in June 1946, the drought broke in the southern states and the worst wind erosion and dust storms gradually ceased.[403]

2.2 Affecting Everyday Life: The Dust Storms and the Farm Family

The underlying principle of the closer settlement schemes had been to establish the family farm as the basic unit of rural society.[404] That this ideal was in great parts realised is reflected in the fact that in the mid-1940s, about 64 per cent of the households on Victoria's wheat farms consisted of families without any further addition of an employee or the like.[405] Most families in the Mallee comprised four persons, a mother, father, and two children.[406] The family therefore comes into the focus of our study, as it was the basic framework for social as well as economic life in the region.

Experiencing a dust storm is first of all a physical experience that in some cases can become life-threatening. When huge storms take up several tons of sand particles with high

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[397] Ibid.
[398] Ibid.
[399] 'After Dust Come the Headaches', *The (Melbourne) Herald*, 18 October 1944.
[400] 'Blanket of Red Dust', *The (Melbourne) Herald*, 31 January 1945.
[401] Karen Douglas' Diary, 31 January 1945.
[402] W. S. Noble, 'Imagine Mallee Home as matchbox in Tray of Sand', *The (Melbourne) Herald*, 9 February 1945.
[403] BoM/Wright, Drought, Dust and Deluge, p. 35.
[404] Dingle, Settling, p. 203.
[405] Alan J. Holt (1946): Wheat Farms of Victoria. A Sociological Survey, Melbourne, School of Agriculture, University of Melbourne, p. 47.
[406] Holt, Wheat Farms of Victoria, pp. 46-48.

velocity, their effects on the human body can reach from discomfort to death. How it can feel to live through such a dust storm is vividly reflected in the statement of a women, who writing under the pseudonym of 'Mallee Pinnette', described her personal experience of a dust storm in 1929 in retrospect: "I have seen dust storms, which in the distance look like a forest fire coming nearer and nearer, till at last an avalanche of sand and dust smote one in the face, getting in the eyes, nose and mouth".[407] Keeping in mind the difficulties of accessing past emotions,[408] it seems that the immediate experience of a dust storm did in many cases trigger emotions of fear, as several persons described the experience as "very frightening", "a terrifying experience" or "shocking".[409] It most certainly caused a sense of distress: Alan Holt, in his survey of the farms of Victoria's wheat belt, noted that the interviewee stated that the dust was "collected by the perspiration on the body, especially hands and legs and imparts a gritty feeling to everything. One woman said that the dust had a 'maddening smell' and she found she always lost her temper".[410] In a letter to the editor of the Mallee newspaper, *Sunraysia Daily*, one woman wrote in 1935, that "many women in the Mallee [...][were] in ill-health, made nervous wrecks through worry and dust, and more than half have bad eyesight through dust and glare, and no hope of any treatment".[411] Present scientists link atmospheric dust, especially dust storms, to the occurrence of multiple diseases. The inhalation of the fine dust particles can lead to respiratory diseases such as asthma or even pneumoconiosis, which in turn can be fatal.[412] The dust storms can, furthermore, carry pathogenic agents like viruses and bacteria, but also herbicides, pesticides, or radioisotopes, and thus be a vector of multiple diseases and a source of intoxications.[413] The dust storms are also linked with eye irritation and infections like 'sandy blight', a form of Ophthalmia caused by dust particles carried by

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[407] *The Weekly Times*, 2 July 1932, p. 19, quoted in: Ruth Ford (2011): 'The wattles are in bloom… Crops are looking wonderfully well'. Settler Women in the Victorian Mallee, 1920s-30s. In: Alan Mayne/Stephen Atkinson (eds.), Outside Country. Histories of Inland Australia, Kent Town, S. Aus., Wakefield Press, pp. 63-94, here p. 74.

[408] The history of emotions has developed to a significant historical discipline since the ground laying work of Lucien Febvre (1941): La sensibilité et l'histoire. Comment reconstituer la vie affective d'autrefois? In: *Annales d'histoire sociale* 3, pp. 5-20. For an overview see: Barbara H. Rosenwein (2002): Worrying about Emotions in History. In: *The American Historical Review* 107 (3), pp. 821-845.

[409] Recollections of George Hall at 'Moola' in: Jill Sutherland (2000): Murrabit, our Murrabit: The History of why we're how we are, Bendigo, Vic. [self-published], p. 484; see also interviews with Alexander George and Agnes Morton in: Kerang (Oral) History Research Project; interviews with Else O'Brien, Val Steggall, and Barbara Manuel, in: Mallee Oral History Collection; for a description of a dust storm as terrifying in literature see: Ion L. Idriess (1950/1st ed. 1941): The Great Boomerang, Sydney [et al.], Angus&Robertson, pp. 178-179.

[410] Holt, Wheat Farms of Victoria, p. 147.

[411] 'The Women of the Mallee. To the editor', *Sunraysia Daily*, 18 February 1935.

[412] D. Campbell et al. (2008): Responding to Health Impacts of Climate Change in the Australian Desert. In: *Rural and Remote Health* 8 (1008), p. 3; D. W. Griffin et al. (2001): Dust in the Wind: Long Range Transport of Dust in the Atmosphere and its Implications for Global Public and Ecosystem Health. In: *Global Change and Human Health* 2, pp. 20-33, here pp. 24-26.

[413] Ibid.

strong winds that injure the eyes, which then become a host for bacteria and viruses transmitted by flies.[414]

The detrimental health effects of the dust-loaded air on the Australian population, especially in those regions where wind erosion was pronounced such as in the Mallee, were evident, even though there is no indication that Australians experienced anything comparable to the life-threatening and often fatal 'dust pneumonia' that affected thousands of people during the 'Dust Bowl' in the United States of America.[415] Alan Holt observed that although the number of the farmers he assessed in his survey was small, "the frequency of catarrhal and eye troubles [was] marked".[416] He considered that the dust had a manifest negative effect on health: "It probably causes much of the catarrhal condition noted during the survey. The air dries and the dust irritates the mucous membranes of the nose and throat".[417] Warnings about the detrimental effects of dust storms on health were issued by medical experts,[418] and drug companies advertised remedies like "Vapex" or "Hearne's Bronchitis Cure" against the cough of dust storm plagued settlers.[419] The dusty atmosphere and dust storms also led to cases of the painful disease 'sandy blight'.[420] The negative effects of the dust were – together with a general "backwardness in sanitation and hygiene" in the rural areas and the lack of accessible medical facilities[421] – the major reason that caused Holt to conclude that "rural life is widely believed to be particularly healthy. Its advantages, however, are often overestimated".[422] Those harmful effects on health were, of course, in marked opposition to the yeoman ideal that conceptualised rural life as particularly healthy.

The dust storms and sand drifts affected the daily routines of the members of the family in different ways, according to their respective place within the family structure. Usually, the husband and father in the family would be the chief worker on the farm.[423] Holt calculated that the average work week of a farmer in the Mallee and Wimmera amounted to a

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[414] Neville Nicholls (1997): 'A Healthy Climate?'. In: Eric K. Webb (ed.): Windows on Meteorology: Australian Perspective, Collingwood, Vic., CSIRO Publishing, pp. 105-117, here pp. 107-109.
[415] Worster, Dust Bowl, pp. 20-21.
[416] Holt, Wheat Farms of Victoria, p. 143.
[417] Ibid., p. 147.
[418] Prof. J. B. Cleland, University of Adelaide: 'Dust and Disease. How Tiny Particles Can Injure our Health', *The (Adelaide) Advertiser*, 6 May 1933.
[419] 'Vapex: Prevent the infections caused by dust storms', *The Australian Women's Weekly*, 21 August 1937; 'Hearrne's Bronchitis Cure', *Sunraysia Daily*, 22 January 1945.
[420] Nicholls, 'A Healthy Climate?', p. 109; Bill Moore: 'Fighting Battle Against Dust, Drought. Family Forced to Leave Home, Land', *The Daily Telegraph*, 28 November 1944; 'Victoria Reaps the Whirlwind. Dust Blisters Vines: Blocks Channels: Turns Sun Blue', *The (Melbourne) Herald*, 20 November 1944.
[421] Holt, Wheat Farms of Victoria, p. 143.
[422] Ibid.
[423] Ibid., pp. 45, 59.

sixty-hour working week that strongly varied according to the seasonal farming activities.[424] The fact that the farmers worked during long periods of the year day after day on the paddocks meant that they were especially exposed to the dust. The farm machinery – whether moved by horse teams or tractors – did not offer a shield from dust, sun, and heat. During the drought years, the land was so dry and the soil so loose that a slight rise in wind would suffice to blow up the dust, even more so when the land was worked. In his diary, Charles Coote noted how the dust affected the men working the land: referring to the work of his aide Frank Farr he noted for example: "Farr working fallow in 280 with disc plow. Dust following".[425] During strong wind, the dust filled the air and made farm work a distressing undertaking: "Strong N.W., W. and S.W. wind carrying dense dust all afternoon. Very unpleasant working".[426] On some days, the dust became so bad that some outdoor work had to be ceased altogether: "Clouds of dust from south all day. Too dusty at farm to work at dam".[427] Being caught in a dust storm during field work was an unpleasant experience, as Hector Cathcart from Sea Lake remembered:

> I can remember one day that my brother and I, we were up the paddock. We used to go around and round a big 270 acre paddock with two teams, (one was behind the other of course) and we looked at it one day and here's this black cloud in the sky and we knew what was coming. So we decided that we would yell out to one another, and decided to unyoke the horses and decided to let them go where they were instead of going around to the corner. At any rate we did that. The horses galloped off home, and we ... by that time you couldn't see your hand in front of you really and they ah,... we wended our way across to where we knew where the fence was, and we followed the fence home. That's how we got home, in the duststorm.[428]

In his sociological survey, Alan Holt explicitly ascertained the detrimental effect on the health of the male farming population: "The men on the farm have to work in hot weather amidst dust". "These circumstances", he concluded, "do not always harden a man; they may weaken him and predispose him to disease".[429]

Ideally, the men would do the farming activities while the women would take care of the agricultural sidelines and be in charge of the domestic work. Farm work was not considered as being 'womanly' and clashed with the prevalent conception of separated spheres between men and women that saw the man in the role of breadwinner and the women

[424] Ibid., p. 83.
[425] Charles Coote Diary, 29 September 1942.
[426] Charles Coote Diary, 22 December 1943.
[427] Charles Coote Diary, 16 October 1944.
[428] Hector Cathcart in: Mallee Oral History Collection. Another recollection of being caught in a dust storm while working the paddock in: Serpell, Mallee Memories, pp. 14-15.
[429] Holt, Wheat Farms of Victoria, p. 143.

as housewife.[430] It also was in opposition to the idea that women's primary role was that of child bearer, a view that gathered momentum during the interwar years within a society particularly anxious to increase its population.[431] As Marilyn Lake has demonstrated, this ideal often clashed with the realities of the economic structures that required high capital. Where capital for hiring labour and machinery were short, children and women often had to assist in farming activities.[432] While many women thus worked on the farm, their contribution was not always fairly acknowledged.[433] The work load of farm women was considerable, as studies about rural families and women in Victoria have shown.[434] Women were at the same time mother, housewife, and helpmate on the farm, and thus frequently had to carry a double burden.[435] The dust storms considerably increased their already heavy workload.

Alan Holt's survey found that women on wheat farms were predominantly engaged in the following farm work: 51 per cent of the women milked cows, either on her own or with the assistance of others, and 73 per cent of them were responsible of the feeding and maintenance of fowl. If there was income from these activities, the women in most cases received them as a personal allowance.[436] Some women also helped their husbands with numerous duties, like marking lambs, handling horses and sheep and assisting with machinery repair. On 12 per cent of the farms surveyed, women assisted during the harvesting operations, mainly by sewing bags or skewering them for the silos. It is not surprising that this was especially the case on one-man farms. The relatively high number of female farm labour was, according to Holt, caused by the abnormal situation of wartime.[437] Charles Coote's observation in regard to the Quambatook district sustains this assumption; it also illustrates how the engagement of women in farm work was also made problematic by the dust.

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[430] Lake, The Limits of Hope, pp. 178-179; Ead. (1985): Helpmeet, Slave, Housewife. Women in Rural Families 1870-1930. In: Patricia Grimshaw et al. (eds.), Families in Colonial Australia. Sydney, Allen&Unwin, pp. 173-185, here p. 184.
[431] Lake, The Limits of Hope, pp. 180-181; cf. also Jill J. Matthews (1984): Good and Mad Women. The Historical Construction of Femininity in Twentieth-Century Australia, Sydney [et al.], Allen&Unwin, p. 88.
[432] Lake, Helpmeet, Slave, Housewife, pp. 174, 177.
[433] As Maroske has shown for the women on wheat farms in the adjacent Wimmera, the work done by women on the farms did not always get its due acknowledgement, cf. Sara Maroske (1985): Wives, Housewives and Mothers? Wimmera Farm Women in the 1930s. In: *Oral History Association of Australia Journal* 7, pp. 101-107, here p. 101.
[434] For a general review of the historical literature on women in rural Australia, see Jill Roe (2004): Women on the Land. In: *History Australia* 2 (1), pp. 03.1-03.2.
[435] Lake, Helpmeet, Slave, Housewife, pp. 174, 177.
[436] Holt, Wheat Farms of Victoria, p. 97.
[437] Ibid., p. 98.

> Labour for harvesting is scarce + dear. Labour saving machinery helps in solving such problems. […] There is not much female labour on farms in the district + what is engaged in actively helping on machinery are finding it strenuous. Some women assist in stitching up bags of wheat for the silo but it is more in the nature of novelty than regular employment. The desire to help is general but heat & dust are discouraging and wearying.
> *Charles Coote, 20 December, 1942*

Besides the farm work, women of course also had to master the domestic work and the main share of the childcare. The typical 'homemaker'[438] of a Victorian wheat farm was female, in most cases the farmer's wife, while mothers, sisters, or daughters were also found occasionally.[439] Men were markedly in the minority, although they probably assisted in the domestic work in occasional situations if necessary.[440] The main tasks of the women in the house were cooking, cleaning, and washing. The water for those domestic purposes, as well as for drinking and cooking was usually stored in tanks outside the house that were filled with rainwater collected through catchments on the roof.[441] As many houses lacked a water line into the house, the domestic work was difficult and often involved much effort to carry water. Holt found that only 39 per cent of farm houses of his survey had a kitchen sink and that 24 per cent of kitchens had no running water.[442] As far as the bathroom was concerned, 74 per cent of the houses had a bathroom under the main house-roof and a further 20 per cent had a detached bathroom. But only half of the houses had a bathroom with running water.[443] The laundry was traditionally done on Monday or Tuesday with the help of a laundry cauldron and a washing trough. In summertime most women rose early to do the washing, which would usually take about two or three hours.[444] Yet, they could not always avoid the fact that the dust settled in the freshly washed and hung out laundry, as Holt noted: "Dust in the Mallee and part of the Wimmera is a problem with half dried clothes".[445] Dawn Clemann (born 1907) recalled her personal fight against the dust: "I remember trying to beat the dust by doing the washing late at night and bringing it in again before sunrise but we could not win, the dust engulfed everything all the time".[446]

[438] Defined by Holt as "the person chiefly responsible for the domestic work of the household", see: Id. Wheat Farms of Victoria, p. 45.
[439] Ibid., p. 59.
[440] Maroske, Wives, Housewives and Mothers?, p. 104.
[441] Holt, Wheat Farms of Victoria, p. 74.
[442] Ibid., p. 75.
[443] Ibid., pp. 76-77.
[444] Ibid.
[445] Ibid.
[446] Dawn Clemann, in: Kerang (Oral) History Research Project.

A Mallee women from an irrigated fruit-growing farm and writing under the pseudonym of 'Viteus' in the 'Women's Bureau' section of the *Weekly Times* described her battle against the dust with the following words:

> We had six dust storms in 12 days, then two whole days of clouds of dust. Boxing Day was nothing less than a 'black storm'. Because of the water supply difficulties for a while we had to carry water from distant channels for our baths. This is another terrible day, with a hot north wind blowing and more dust. Our place is a wreck. I have almost everything packed away in boxes and all the linos have been rolled up and put away. One needs a tremendous amount of energy to wash linos three times after every dust storm, and that actually is necessary sometimes before the pattern shows up.[447]

The fact that the dust penetrated into the house was partly due to their bad shape. The typical Mallee house, consisting of four rooms, was built from weatherboard and therefore not dust-proof.[448] Furthermore, many Mallee houses were in poor condition: Nearly half of the houses (44 per cent) were not in a good state and one in ten was even categorised by Holt as "hardly habitable".[449] It was just impossible to keep the dust out of those houses, a fact probably reinforced by the insufficient shelter around the houses.[450] The dust would not even stop before the food, as Muriel Irvin remembers:

> As one chap said to us one time, "When you' re out in the Mallee", he said, "you don't put the tablecloth on the table and set it, you set the table and put cloth over the top to keep the dust out of the food a bit". And I daresay we ate a bit of sand in those years. Because that particular Summer we had three really very bad dust storms. And honestly we have had odd ones since, but nothing near as bad.[451]

The dust storms made the cleaning of the house an exhausting task:[452] Often, the broom was completely useless, and a shovel was necessary to master the huge amounts of sand.[453] 'Sunshine Hatter' described the cleaning-up after a dust storm as follows: "It took nearly a week to clean up. Every floor, shelf, ornament had to be scrubbed – sweeping and dusting made no effect".[454]

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[447] 'Difficult days in the Mallee', *The Weekly Times* (The Women's Bureau), 4 February 1939.
[448] Holt, Wheat Farms of Victoria, pp. 69-71.
[449] Ibid., pp. 68-69.
[450] Ibid., pp. 65-66.
[451] Muriel Irvin, in: Mallee Oral History Collection. For more examples see also: Neil Master and Arthur Smyth, in: Mallee Oral History Collection; Dawn Cleman in: Kerang (Oral) History Research Project. For a visual impression of the custom to put cloth on the table to protect the food from the dust, cf. John Flynn (1880-1951): Christmas dinner at Innamincka Nursing Home during a dust storm, South Australia [transparency]: a lantern slide used in lectures on all Australian Inland Mission activities, [1937?]. Online: http://nla.gov.au/nla.pic-an24681601[Accessed 30 March, 2016].
[452] 'Victoria Reaps the Whirlwind', *The (Melbourne) Herald*, 20 November 1944; Bill Moore: 'Fighting Battle Against Dust, Drought. Family Forced to Leave Home, Land', *The Daily Telegraph*, 28 November 1944.
[453] Uanita Hinton, Howard Brown, Muriel Irvin, Berris Simmons, and Neil Masters, in: Mallee Oral History Collection, .
[454] *The Weekly Times*, 8 June 1935, quoted in: Ford, 'The wattles are in bloom…', p. 79.

Fig. 8: A Heavy Workload – Cleaning Home after a Duststorm.
[*Illustrated London News*, 27 January 1945.]

A HOME THREATENED IN THE MILDURA-EUSTON DISTRICT: A HUGE SAND-DRIFT THREATENING TO OVERWHELM A FARM. WHOLE VILLAGES HAVE BEEN WIPED OUT.

The plight of the mallee women also found a sympathetic ear in parliament, where Francis Edward Old repeatedly opted for better housing in the north-western part of Victoria to ease the situation of the housewives:

> In the northern parts of the State during the recent drought conditions there were severe dust storms which made life miserable for housewives. […] I suggest that the State Government should offer a substantial prize for an air-conditioned and dustproof house which could be erected at a reasonable cost in the northern parts of the State.[455]

Schoolteacher and farmer's wife Karen Douglas' diary gives an insight into the dusty routine of a Mallee woman during the drought summer 1944/45. On Friday, 8 December, 1944, when coming home from school, a terrific dust storm blew up from the south. The next entry reads "Had just started a sweeping when dust started and soon was raging. Kept it up all day." On

[455] PD, Legislative Assembly Victoria, Local Government (Emergency Housing Accommodation) Bill, 22 August 1945, p. 3778; see also: PD, Legislative Assembly Victoria, Housing Shortage, 12 June 1945, pp. 3308-3309.

the next day, it was "Impossible to wash. Dust still blowing" and it was only in late afternoon that she could start cleaning out the house. On Monday, 11 December, she noted being faced by the amount of dust in the school building: "A shock awaited me at school. School simply awful".[456] It is therefore not surprising that many women described the dust storms as a genuine plague: Under the pseudonym 'Blue Bonnett Also', one woman wrote, for example, in the *Weekly Times* that "the flies, mosquitos and dust would drive any housekeeper grey".[457] And 'Another Winsome' described in the same column her feelings in the following way: "I felt I just hated the Mallee last night – grasshoppers and dust".[458] Alan Holt obviously encountered

similar reactions among the Mallee women, as he noted in his report:

> Most of the interviewees stated that dust affected their tempers more than anything else. Dust is more irritating to homemakers. It finds its way everywhere, into food, bedclothes and wardrobes. […] Houses had to be swept out sometimes five times a day if one were to be comfortable.[459]

The family members that were the most vulnerable to the dust storms were the children. The daily life of a Mallee child growing up on a farm in the 1930s and 1940s was largely filled with school and farm work. It was common that children would assist on the farm with multiple jobs, such as "droving cows and sheep; looking after younger children; general help during harvest, such as sorting out bags and preparing sewing twine; taking out lunches; leading relief horse teams; holding and directing bag loader; gathering firewood, odd farm errands".[460] Usually, the sons would assist with the heavier farming work, for which they would get pocket money at best, but daughters were also called on if necessary.[461] Dawn Clemann, born in 1907, remembers growing up at a mallee farm with mixed feelings. Despite her evidenced talent at school and the advocacy of her teacher, her father did not allow her to continue schooling and become a teacher, as she was needed at home to help with farm work. Her work at home included, amongst others, ploughing with a horse team, handling sheep, sewing and loading bags of wheat. While she states that she and her sisters "cheerfully shouldered our share of the work and more" she regretted in hindsight that her life had "not been fulfilled as it would otherwise have been".[462]

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[456] Karen Douglas Diary, 8 to 11 December 1944.
[457] *The Weekly Times*, 15 June 1935, quoted in: Ford, 'The wattles are in bloom...', p. 75.
[458] *The Weekly Times*, 12 January 1935, quoted in ibid., p. 77.
[459] Holt, Wheat Farms of Victoria, p. 147.
[460] Ibid., p. 91.
[461] Ibid., pp. 88-90; Dingle, Settling, p. 198.
[462] Dawn Clemann, in: Kerang (Oral) History Research Project.

While doing farm work, children were of course exposed to the dust the same as their parents. But they were in general more vulnerable because of their physical constitution. When the big dust storms rolled over the regions, mothers would try to protect their small children from inhaling the dust, as Berris Simmons remembered, for instance:

> And occasionally we would actually get under the table, as little kids. And I can just remember this. It's hard to know whether you remember what your Mother tells you, or whether you really remember it. But then she said that, you know, it was so bad that she'd wet the sheet and keep us underneath, so that you'd hoped that you could keep breathing properly. I suppose it must have been a bit thick or something at one stage.[463]

Also, they would easily get lost and scared during the dust storms.[464] Dorothy Martins remembers the first dust storm she experienced as a child growing up in Kerang while helping with the farm work: "The first one I remember I was out in the paddock bringing in the cows and a large rolly polly bounded from the town across the paddock, just to see that coming at me, it was terrifying".[465] Since 1872 Victoria had free and compulsory schooling for all children aged six to fifteen.[466] There are abundant recollections of interrupted lessons that suggest that the dust storms interfered with the purpose of education.[467] The detrimental effects on the proper work of schooling must have been high, as the reminiscences from Beatrice Guinane (Toomer) suggest:

> We literally lived with the red sand for our entire school days. The wind had blown most of the loose surface from the boys football ground beyond the Sugar Gums and deposited it at the back of the school building. Here, where we assembled to go into our rooms, the sand dune was slowly creeping up to the steps and the verandah. We dusted it from our desks and books, and we ate it in our sandwiches, but it was also our construction material. At playtime we would pile the sand up between our hands to make the walls of our playhouses.[468]

Mastering the often long way to school was also a challenge to the children, and many recollections speak about the experience of getting caught in a dust storm on the way to or

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[463] Berris Simmons, in: Mallee Oral History Collection. Cf. also the recollections of David McFarlane: "The Mothers had to have wet gauze towels over the babies cots and it would catch the dust and turn to mud, so there was a constant watch over them", in: Kerang (Oral) History Research Project; George Hall at 'Moola': "The children were terrified. Heather, born in 1943 was only a few months old and they feared she would suffocate, so [they] put her on a mattress in a galvanized laundry tub under the table, and covered the table with a sheet dipped in water", in: Sutherland, Murrabit, our Murrabit, p. 484.

[464] Hazel Ryland, in: Kerang (Oral) History Research Project.

[465] Dorothy Martins, in: Kerang (Oral) History Research Project.

[466] Albert G. Austin (1976): Australian Education 1788-1900. Church, State and Public Education in Colonial Australia, Westport, Conn., Greenwood Press, pp. 185-187; K. S. Cunningham (1955): Education in Victoria. In: Geoffrey W. Leeper (ed.), Introducing Victoria, Carlton Vic., Melbourne University Press, pp. 201-206, here p. 205.

[467] Recollections of: Arthur Smyth, in: Mallee Oral History Collection; Frank Pendock (Meringur) and C. T. Sartain in: Margaret Kelly et al. (eds.) (1985): Millewa District Schools, 1923-1985, Mildura, Vic., Millewa Schools Reunion, pp. 98, 179; Mary E. Jemonson (nee Affleck), in: Ouyen Primary School (ed.) (1989): Tales and Times of Ouyen Primary School 1909-1989, Red Cliffs, The Sunnyland Press, p. 90.

[468] Christine Cook et al. (eds.) (1999): Red Cliffs East. 75 years of Getting it Right. The History of Red Cliffs East Primary School 1924-1999, Red Cliffs, Sunnyland Press, p. 18.

from school.[469] Val Steggall remembers having been sent home by the 'city bred' teacher and getting caught up with his schoolmates in the eye of the storm: "Frightened of the storm, and of our unruly, head tossing horses, we rode round in circles for five hours, until the dust lifted to a thick haze and we could make the outline of people searching us".[470] If one brings to mind that up to over a metre of sand could be deposited during one of the bigger dust storms, one realises the actual danger of children confronting such a weather phenomenon. In October 1944, one boy died in a particularly bad dust storm at Broken Hill after having lost his way.[471] The four Mallee children that got lost at Koorlong during a dust storm in January 1945 were luckier, as they could be found by the search troupes after two hours.[472]

The extent to which children's daily life was affected by the dust storms also becomes apparent in their letters written to the *Sunraysia Daily*. There, in the children's section called 'Aunt Beth's Letter' children could become 'nephews' and 'nieces' of 'Aunt Beth' and correspond with her through the newspaper columns. The letters, despite their shortness, reveal that the children were much concerned about the frequent dust storms: Gertrude Stanyer from Ginquam wrote, for example, how it had been "dusty on Monday and Tuesday, and on Tuesday we did not go to school because it was too dusty".[473] Edith from Ginquam asserted that "that dust-storm was awful; it spoilt some of our garden".[474] Rhonda Carlson from Williamsville, Wentworth was relieved about the end of the dust storms that she described as "terrible"[475] while Dorothy McKay from Mildura stated that the dust was "not very nice".[476] Lois Ball, who had just moved to Mildura wrote that while they "didn't like the dust" they knew "all about it" as they previously lived in Ouyen.[477] In February 1945 Marion Croft, from Ouyen rejoiced that they had not had "any dust for over a week. And it is just lovely, but I had not be saying too much about it, or it might come".[478] Even if the experience of the dust was often perturbing for the Mallee children, they did not always resent its occurrence. Some children seem to have even taken some pleasure in certain aspects of the

[469] Heather Morrell (nee Cameron), in: Kelly, Millewa District Schools, p. 55; Mary E. Jemonson (nee Affleck), in: Ouyen Primary School, Tales and Times, p. 90.
[470] Val Steggall, in: Mallee Oral History Collection.
[471] 'Cyclone, Duststorm, Gales in N.S.W., S.A.', *The (Melbourne) Herald*, 17 October 1944.
[472] 'The worst dust-storm in memory blocks out Sunraysia. Children lost at Koorlong', *Sunraysia Daily*, 31 January 1945.
[473] *Sunraysia Daily*, 14 November 1930.
[474] *Sunraysia Daily*, 21 November 1930.
[475] *Sunrasia Daily*, 4 December 1944.
[476] *Sunraysia Daily*, 26 December 1944.
[477] Ibid.
[478] *Sunraysia Daily*, 12 February 1945.

dust storms,[479] for example Berris Simmons, who remembered one day when a dust storm blew an enormous amount of sand into the kitchen: "But we loved it. I can remember quite clearly, Marj and I making sand castles underneath the kitchen table. We thought it was great, you know".[480]

After all, and besides all the hardship induced by wind erosion, the Mallee people experienced it as a part of their life and seem to have adapted to it to a certain degree. In several of the recollections, a certain sense of dry humour appears in regard to the hardships brought along through the dust storms. Recalling the wedding of his elder sister Joan in December 1944, Neil Masters told:

> I can remember this, that all the people, there was white tablecloths and everything, that was all set up for the wedding breakfast. And I can remember it. When the bride and the groom came back to the supper room and sat up at the head table, and when the waitress came around the tables serving your meal, everybody said: "Oh well we've got cinnamon on our food". The dust was that thick.[481]

Kaye Page remembers being told her about her aunt who lived in the Millewa and had a "bit of a dry sense of humour". When asked how she got along with the frequent dust storms, her aunt used to answer: "We just open all the doors and the windows and let them blow through".[482] These recollections indicate that settlers in the Mallee tried to deal with the situation as well as they could. A sense of humour in the face of the hardship and a strong-will to not yield to the adverse elements, especially among Mallee women, appears also in several of the contemporary publications, as in the article of journalist Keith Newman about the Mallee:

> The women joke about things which make housekeeping a heart-breaking job, such as dust so deep on floors that a broom cannot tackle the job of removal. The dust is first scraped into heaps, carried out in buckles, and wheeled away in wheelbarrows. The broom is only a finishing instrument. Yet even on mornings after dust storms I never saw a dirty house.[483]

As we will see in the last section of the thesis, the regional identity of the Mallee was strongly built on ideas about the settlers as courageous pioneers and fighters in the face of adverse conditions, and such underlying concepts might have influenced contemporary perceptions, public accounts, or even subsequent recollections.

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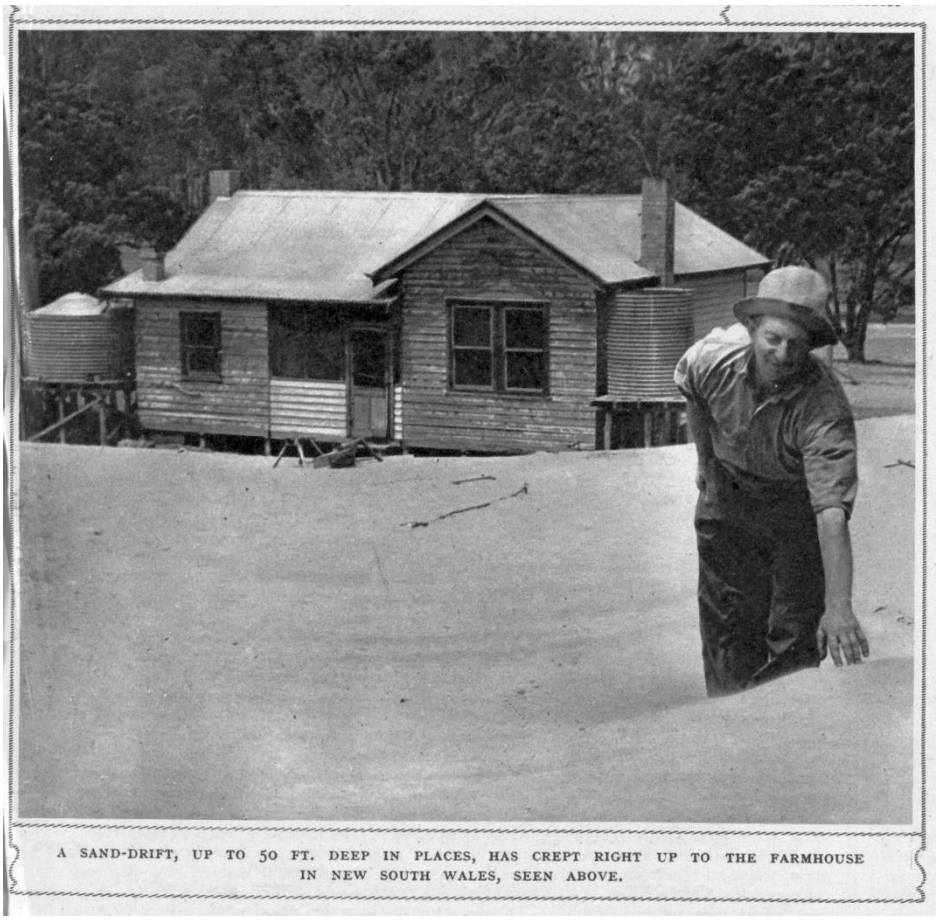
[479] For another example see: Beatrice Guinane (Toomer): "At playtime we would pile the sand up between our hands to make the walls of our playhouses", in: Cook, Red Cliffs East, p. 18.
[480] Berris Simmons, in: Mallee Oral History Collection.
[481] Neil Masters, in: Mallee Oral History Collection.
[482] Kaye Page (Mildura), Oral history interview conducted by author on the 2nd May 2013 at Mildura Rural City Council Library Service.
[483] Keith Newman: 'Drought Lands Varied Pattern. Falling Birthrate of the Trees Menaces the Future', *Sydney Morning Herald*, 18 December 1944.

Wind erosion affected not only the farm family, but also the proper functioning of the farm machinery and buildings, especially through the covering up of the fences and siltation of the water channels and dams. The accounts of fences that were drifted over are countless, and the farmers had to remove the sand drift regularly from the fences.[484] In some cases it would be less effort and money to build another fence on top of the old one.[485] In some cases, sand drift even threatened to engulf entire homesteads. The same was true with the water supply channels and the dams that had to be cleared regularly if one wanted to assure the water supply at the farm.

Fig. 9: Sand Drift threatening a Farmer's Home.
[*Illustrated London News*, 27 January 1945.]


A SAND-DRIFT, UP TO 50 FT. DEEP IN PLACES, HAS CREPT RIGHT UP TO THE FARMHOUSE IN NEW SOUTH WALES, SEEN ABOVE.

The dust also affected the animals that were omnipresent on the farms: While the process of mechanization of the primary industry was in full swing, wheat farming in the 1930s and first half of the 1940s still largely relied on the muscle power of animals. During

[484] 'Sand Drift in Mallee. Serious Problem', *The (Melbourne) Argus*, 24 January 1935.
[485] Recollections of Berris Simmons, Hector Cathcart, Colin Mooring, and Alfred Pearse, in: Mallee Oral History Collection.

the 1920s, the first tractors began to appear on the Victorian farms, and it was only during the later 1930s that the cost advantage of tractors began to out-do the horses.[486] At the end of World War II, around 57 per cent of the Mallee farms still exclusively employed horses for draught operations, while 14 per cent of the farmers used tractor and horses. Around 29 per cent solely used tractors.[487] The numbers indicate that the Mallee farms were a little less mechanised than the average farm of Victoria's wheat-growing districts.[488] Horses were not only used for farming operations, but for all kinds of transport. In 1945/46, 17 per cent of the Mallee farms still had no motorised vehicle and were solely using horse-drawn vehicles.[489]

Livestock also played a major role on the farms, as mixed-farming became more and more prevalent and farmers had animals for sidelines. In 1945/46, around 94 per cent of all Mallee wheat farms carried sheep, mostly for fat lamb production.[490] While only 2 per cent raised sheep for fine wool growing, it was also common to shear fat lambs if the occasion was given.[491] Most wheat farms in Victoria had, in addition, various sidelines, 97 per cent had fowls and 93 per cent had one or more cows.[492] The animals were an important part of life and played a major role for the proper operation of the farm as well its economic success. The dust storms, especially during the already difficult periods of drought, often contributed to the worsening of the difficult situation for the animals. The animals became frightened during the dust storms, especially horses, which would then either refuse to move at all or move in panic, so in most cases, they were unyoked when a dust storm was approaching and then firmly held or let free.[493] Sometimes, animals would just get lost in the darkness of a dust storm and get hurt, for example when sheep went on a railway line and were run over by a train[494] or horses got caught up in fences and were so badly injured they had to be killed.[495] Another harmful factor of the dust storms was the dust that settled in the wool of the sheep. Jack Tomamichel remembered that in the drought years 1943-1946: "The sheep would have that much dust and sand in the wool they couldn't walk, so you would have to get them up and shake the dirt out, give them a handful of wheat and let them go. They were starving too".[496]

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[486] Dingle, Settling, p. 194.
[487] Holt, Wheat Farms of Victoria, p. 29.
[488] Ibid.
[489] Ibid., p. 120.
[490] Ibid., pp. 26-27.
[491] Ibid.
[492] Ibid.
[493] See recollections of Hector Cathcart, John Jack Brady, and Clive Pearce in: Mallee Oral History Collection; and Lloyd Ashwin in: Kerang (Oral) History Research Project.
[494] Cyril Robert Staley, in: Mallee Oral History Collection.
[495] Hazel Perris, in: Mallee Oral History Collection.
[496] Jack Tomamichel, in: Mallee Oral History Collection.

A further danger was present in the fact that the wind erosion would cover plants in dust that the animals would then absorb while feeding, as Charles Coote noted:

> Inspected 31 sheep including 4 BL rams in house paddock. They nibble the leaves of wattlebush scrub growing there. The old decayed grass carried a thick coating of very fine dust which may be injurious. There have been no showers to clean dust off vegetation.
> *Charles Coote, 13 March, 1945*

When too much sand was eaten, the animals were 'sanded' or had a 'sand fever' which could be fatal to them,[497] as Jack Tomamichel recalled: "The best of the horses were kept or sent to the Western District on agistment. […] Others just died of sand and starvation, or were shot and burnt to save that end".[498]

2.3 Disruption of Routines: The Blocking of Infrastructure

Wind erosion processes, above all in the form of sand drift, affected the region's infrastructure and thus damaged the social and economic backbone of the Mallee. The settlement in this semi-arid part of Australia had only been possible thanks to an extensive water supply network. Roads and railways were not only crucial for the transportation of the farm products to the markets, but also for community life in a region where isolation was still an integral feature of everyday life.[499] When wind erosion caused soil particles to clog water channels and block roads and railways, it interrupted essential work and life routines and challenged the very idea of settlement in parts of the region.

2.3.1 The Clogging of Water Channels

The history of settling Victoria and especially its north-western part is intrinsically linked to irrigation, comprehensively described by historical geographer Joseph Powell as the "watering of the garden state".[500] The question of water supply was particularly vital for the settlement of the Mallee. While the Murray River demarcates the northern boundary of the region, the interior of the Mallee has no reliable watercourse, and rainfall is too low and

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[497] 'Sand Colic in Horses', *The Countryman*, 12 October 1945; see also Graham Gardner (2009): Looking Back… A History of Kerang and its Historical Technical High School 1919-2009, Gannawarra Library Service , Sea Lake, Mallee Printers, p. 143.

[498] The 'sanding' of horses was also a major problem in the wind eroded areas of South Australia. In his book "Flying Fox and Drifting Sand" Francis Ratcliffe reports that a farmer told him that not only horses, but also "a man would get sanded here", cf. Ratcliffe, Flying Fox and Drifting Sand, p. 237.

[499] Holt, Wheat Farms of Victoria, pp. 171-172.

[500] Powell, Watering the Garden State. For a regional history of water supply see: Rhona van Veldhuisen (2001): Pipe Dreams: A Stroll through the History of Water Supply in the Wimmera-Mallee, Horsham, Vic., Wimmera Mallee Water; more recently, Robyn Ballinger has published a study that focuses on the interactions of humans with their land in areas of erratic rainfall, namely the Victorian Riverina plains, see: Id. (2012): An Inch of Rain: A Water History of Northern Victoria, North Melbourne, Vic., Australian Scholarly.

irregular to secure the domestic and stock needs of water.[501] When settlement of the Mallee came to the attention of the Victorian government in the second half of the 19th century, irrigation was considered as the key to opening the region.[502] Irrigation apostles like Hugh McColl (1819-85) or Alfred Deakin asserted that water was the only requirement for the Mallee's brilliant future.[503] During the 1880s, regional water trusts were established that arranged for the setting up of reservoirs, channels, weirs, and tanks in Victoria's north-west.[504] In the same decade, an agricultural irrigation scheme modelled after Californian examples was established by the Canadian brothers George and William B. Chaffey.[505] The water for the scheme was supplied by the Murray River and therefore restricted to the lands adjacent to the river.[506] In the search for additional water supplies in the 1890s, the government promoted bores for artesian water that would be pumped up by windmills.[507] It soon became apparent, however, that in the majority of the Mallee, artesian water was unfit for drinking, so the extraction of water by bores was confined to limited areas, most of them situated near the South Australian border.[508] As a reaction to the Federation Drought, which painfully demonstrated the necessity of a reliable water supply, the Victorian government constructed the Lake Lonsdale reservoir in the Wimmera in 1902, and soon the region was covered with a net of private, trust or shire built channels.[509]

In order to co-ordinate and improve the distribution of available water supplies in the state, legislation was passed in the opening decade of the 20th century. Under the Water Act of 1905 and its amendment in 1909, all natural water sources were nationalised.[510] The Act also provided for the constitution of the State Rivers and Water Supply Commission (SRWSC) in 1906.[511] The SRWS was the responsible body for the construction of an elaborated water supply system, the Wimmera-Mallee irrigation system, which enabled the closer settlement of

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[501] Lewis R. East (1965): Water in the Mallee. Read at the symposium 'The Victorian Mallee' of the Royal Society of Victoria, 9th September 1965, Melbourne, State Rivers and Water Supply Commission Victoria, pp. 2-5.
[502] Powell, Watering the Garden State, pp. 95-96.
[503] Ibid., pp. 89-90, 104-105, 111.
[504] R. F. McNab (1944): The Early Settlement and Water Supply of the Wimmera and Mallee, Victoria, State Rivers and Water Supply Commission, pp. 4-5; cf. also Powell, Watering the Garden State, pp. 98-100, 170.
[505] McNab, The Early Settlement, p. 5; Powell, Watering the Garden State, pp. 120-125.
[506] East, Water in the Mallee, p. 54.
[507] Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 11; East, Water in the Mallee, p. 12.
[508] East, Water in the Mallee, p. 15. For the use of artesian water in the early 1940s see also: Holt, Wheat Farms of Victoria, pp. 114-115; Lewis R. East (1951): Water Conservation and Irrigation. In: Gordon L. Wood (ed.), Australia. Its Resources and Development, The Macmillian Company, New York, p. 172.
[509] Powell, Watering the Garden State, p. 170; McNab, The Early Settlement, p. 7.
[510] McNab, The Early Settlement, p. 7; Powell, Watering the Garden State, p. 170. Cf. also van Veldhuisen, Pipe Dreams, pp. 88-90.
[511] Powell, Watering the Garden State, p. 150.

the Mallee in the early decades of the 20th century.[512] Closely linked to the irrigation and opening up of the Mallee is the name of engineer Alfred S. Kenyon (1867-1943),[513] who supervised the water distribution throughout the Mallee from 1906 to 1910, which set up more than 400,000 hectares of land for farming.[514] In 1910, Kenyon became the SRWSC's Engineer-in-Charge, North-West Mallee and served later as a Commissioner from 1932 to 1935.[515] The Wimmera-Mallee irrigation system developed at high speed: The length of the earthen channels grew from ca. 800 km in 1891 to ca. 1,600 km in 1906 and reached ca. 9,800 km in 1931.[516] The network of channels expanded and densified, as the area covered by the system increased from ca. 5,200 km^2 in 1891 to 8,600 km^2 in 1931.[517] In the 1930s, the Wimmera-Mallee irrigation system was considered to be "the most extensive of its kind in any part of the World",[518] and Australians looked proudly on "one of the most outstanding instances of the engineer's triumph over the stern forces of nature".[519]

The water supply of the Mallee was mainly secured by two systems.[520] The north-western part of the Mallee was supplied through the Murray-Loddon system: the irrigation districts of Nyah, Red Cliffs, and Merbein as well as the high level Waterworks Districts of Millewa, Coreena, Carwarp, and Yelta received their water directly from the River Murray.[521] Yet, the use of water from the River Murray by pumping was not only costly, it was also rigorously limited through the River Murray Waters Agreement in 1914/15.[522] This meant that the largest part of the Mallee water supply had to be gained from somewhere else. The Wimmera-Mallee Waterworks District received its water supplies principally by gravitation from the Headworks Reservoirs, located in the vicinity of the Grampians Mountains on the

[512] McNab, The Early Settlement, p. 7; Powell, Watering the Garden State, pp. 150-153. As R. F. McNab, at the time engineer in charge of the water supply system, affirmed in 1944, he was "certain that without it the area could not have been developed", see: Id., The Early Settlement, p. 13.
[513] Powell, Watering the Garden State, p. 170.
[514] Ibid.
[515] Ibid.
[516] McNab, The Early Settlement, p. 9.
[517] Ibid.
[518] Victoria, SRWSC, 33rd annual report (1937-38), p. 16.
[519] L. Peacock: 'Conservation of Water. Proud Record. Engineer's Triumph', *Sydney Morning Herald*, 11 June 1937.
[520] The designation in the sources is unclear. In the "Report on Sand Drift Problems in Mallee Areas" of 1933, the north-western part is included in the map entitled "Wimmera and Mallee channel system". In a paper of the chairman of the SRWSC, Lewis R. East, the north-western part is, however, excluded from the map showing the Wimmera-Mallee channel system, see: Id., (1945): Wimmera Mallee Water Supplies: Pipe Lines versus Channels, Melbourne, State Rivers and Water Supply Commission Victoria, p. 2.
[521] Including the towns of Carwarp, Merbein, Meringuer, Nyah, Nyah West, Piangil, Red Cliffs, and Werrimull, see: Victoria, SRWSC, 40th annual report (1944-45), p. 27; for the construction of the pumping system, especially in regard to the Millewa in 1924, see also: East, Water in the Mallee, p. 40.
[522] Daniel Connell (2007): Water Politics in the Murray-Darling Basin, Annandale, N.S.W., Federation Press, p. 15; Powell, Watering the Garden State, pp. 136-137.

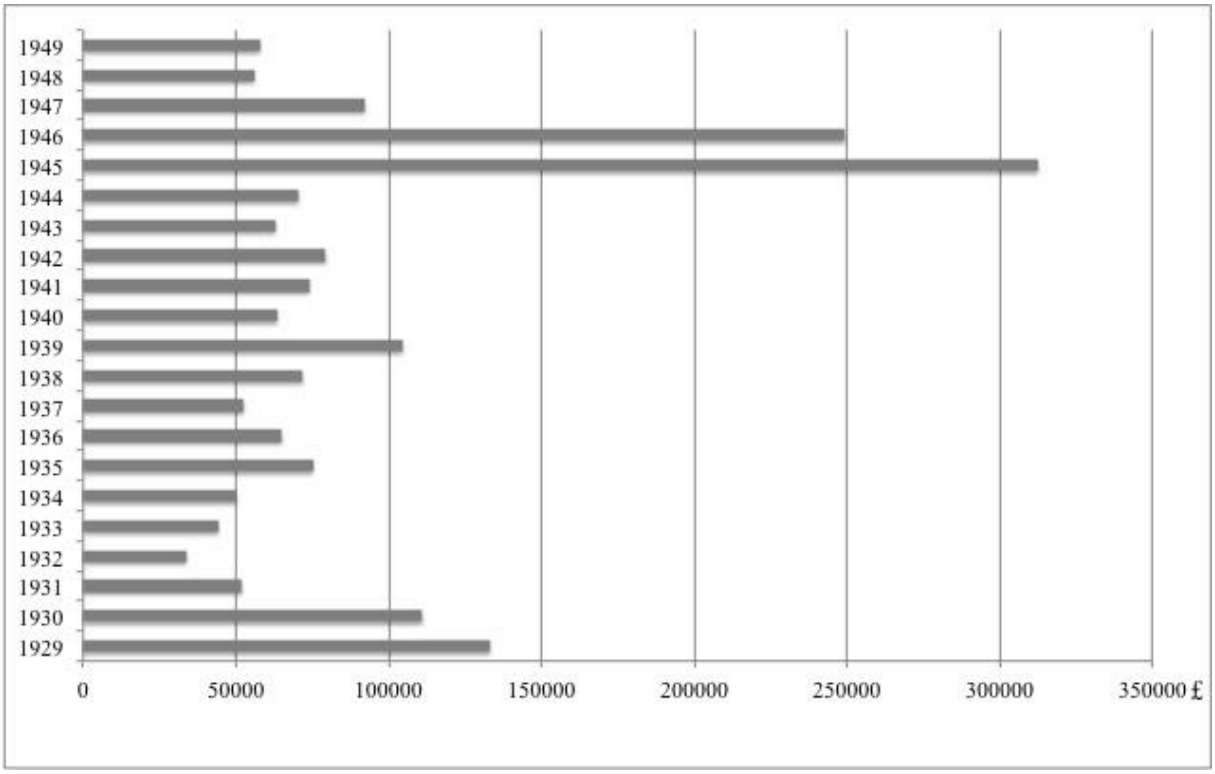
Wimmera and Glenelg Rivers.[523] Its combined storage capacity was ca. 250 million cubic metres.[524] Supplementary supplies came, when available, from the Loddon River and Goulbourn Channels through the Waranga Western extension channel.[525] The total area supplied under the distribution of this scheme was approximately 28, 500 km^2.[526] 94 per cent of this area was supplied by gravitation from the Headworks reservoirs, while only 6 per cent of comparatively high country areas needed pumping plants to lift the water from the channels to a higher level.[527] The total length of the system in the mid-1940s covered more than 10,000 km of Commission's channels and more than 4,800 km of farmers' connecting channels. Once a year, usually between May and October when evaporation was relatively low, the SRWSC ran the system with water.[528] The channels then provided water to town storages, tanks or dams excavated on farms.[529] Farmers were compelled to make sufficient storage on their lands available to hold enough water until the next running the following year.[530] The system was financed basically by a rate imposed on the net annual valuation issued by the Commission of the Lands in the various Waterwork Districts of the system.[531] All in all, 45 towns with a population of 40,000 people obtained their water supplies from the Wimmera-Mallee system and the total population supplied was 80,000.[532] The Wimmera-Mallee Gravitation Scheme was considered as "a marvel of modern engineering, without which much of the vast North-West Mallee wheat land could never have been developed".[533]

The "marvel of modern engineering" had, however, some weak spots. The open water channels were prone to siltation by soil particles, which resulted in the clogging of the water supply system. Drifting sand had posed problems to the channels since their construction.[534] By 1925, the problems were serious enough in the northern Mallee to prompt the SRWSC to establish a bylaw under the Water Act to prohibit cultivation on areas adjacent to the channels.[535] In 1929, the problem became extreme as the costs for clearing the channels from

[523] Victoria, SRWSC, 41st annual report (1945-46), pp. 23-24.
[524] Ibid.
[525] Victoria, SRWSC, 33rd annual report (1937-38), p. 16; Victoria, SRWSC, 41st annual report (1945-46), pp. 23-24.
[526] Victoria, SRWSC, 34th annual report (1938-1939), p. 17.
[527] Ibid.
[528] Victoria, SRWSC, 41st annual report (1945-46), p. 24; see also East, Water in the Mallee, p. 33.
[529] McNab, The Early Settlement, p. 12.
[530] Ibid.; Holt, Wheat Farms of Victoria, p. 115.
[531] McNab, The Early Settlement, p. 14.
[532] Victoria, SRWSC, 41st annual report (1945-46), pp. 23-24.
[533] 'Life-Giving Water for the Mallee. Channels Work despite Sand', *The (Melbourne) Argus,* 30 December 1936.
[534] East, Water in the Mallee, p. 41.
[535] Sims/Webb, Mallee Sand to Gold, p. 15.

the sand soared:[536] In June 1929, the *Argus* reported on the obstruction of channels by sand, which had forced many farmers to clear them, a task which was not only costly but also time consuming.[537]

Fig. 10: Costs of Clearing the Water Channels from Sand Drift in Mallee-Wimmera Water Supply System.
[Data compiled from: SRWSC Victoria, Annual report 1945/46, p. 27; Annual report 1950/51, p. 24].



In December the same year, the sand drift at Ouyen was described as being "the worst in living memory" and reports spoke about severely obstructed water supply channels.[538] In the Timberoo district, water therefore had to be carted, but this was easier said than done as the roads were partly blocked by sand, too.[539] In 1929-30 the cost of clearing the channels had risen from an annual £60,000 to £163,000.[540]

The SRWSC reacted promptly to the problem and asked for political support in order to mitigate the problem. The Minister for Water Supply, Mr. Bailey, conveyed a conference at

[536] Powell, Watering the Garden State, p. 212; on the sand drift problem during the dry years of the 1920s and 1930s see also Keating, The Drought Walked Through, p. 121.
[537] 'Soil Erosion. Great Mallee Problem', *The (Melbourne) Argus*, 15 June 1929.
[538] 'Drifting Sand. Serious in Mallee", *The (Melbourne)Argus,* 24 December 1929.
[539] Ibid.
[540] Powell, Watering the Garden State, p. 212.

Ouyen on 16 July, 1931[541] to "seek means of combating the menace of drifting sands".[542] At the conference, Mr. McNab of the SRWSC warned that unless prompt action was taken, the charges for water supply would have to be raised, as the present system was uneconomic.[543] In the previous six or seven years, the department had spent on average £60,000 a year to keep the channels clear for supplying water. McNab urged for an Act of Parliament to give the SWRSC further control of the land adjoining the channels. In his opinion, if the length of 60 metres (three chains) along the channels were spared from cultivation and fallowing, sand drift could be checked.[544] The conference decided to appoint an expert committee in order to investigate the problem.[545] The Committee, chaired by McNab, started a tour of investigation in August 1932 that included not only the Victorian Mallee but also a trip to South Australia into the Loxton and neighbouring districts in order to study the effects of the already existing South Australian legislation on the prevention of sand drift.[546] The report of the committee, accompanied by maps showing the extent of sand drift affecting the infrastructure as well as photographs of sand drifted areas, was published in March 1933. The map of the Wimmera and Mallee water channel systems shows that the problem was most critical on the Mallee region.[547] The Committee considered the sand drift to be "due in a great measure to indiscriminate clearing of the natural growth in course of settlement and to the thoughtless cultivation of sandy areas on which the natural cover should be allowed to remain as a protection against sand drift".[548] As settlement, especially of the 'New Mallee', was still progressing, and it was to expect that the clearing and cultivating of the land would further intensify, the Committee assumed that the problem would escalate in the future.[549] Were this to be the case, and were the costs to clear the channels amplify, it might be inevitable to abandon parts of the channel system, a prospect the Committee considered a "serious calamity".[550] To prevent such a development, the Committee recommended that an Act of Parliament should be introduced that would give the Water Commission, as it was the main authority affected by sand drift, full powers to deal with the problem within the Victorian Mallee.[551] The Act should also determine adequate penalties for offences under the Act.[552]

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[541] 'Disastrous Drift of Sand. Conference on Serious Position in Mallee', *(Adelaide) Chronicle*, 9 July 1931.
[542] 'Drifting Sand. Menace in the Mallee', *The (Melbourne) Argus*, 17 July 1931.
[543] Ibid.
[544] Ibid.; 'Sand Drift in Mallee', *The (Melbourne) Argus*, 18 July 1931.
[545] Ibid.
[546] Victoria, Sand Drift Committee (1933): Report on Sand Drift Problems in Mallee Areas, p. 4.
[547] Ibid., Appendix: Picture 1; cf. also Powell, Watering the Garden State, p. 219.
[548] Victoria, Sand Drift Committee (1933): Report on Sand Drift Problems in Mallee Areas, p. 1.
[549] Ibid.
[550] Ibid., p. 2.
[551] Ibid. pp. 3-4.

The Committee furthermore suggested the establishment of a Sand Drift Board, consisting of two departmental officers and one representative of farming interests, in order to supervise the work under the Act as well as to continue research into sand drift on scientific and practical lines.[553]

Despite these proposals, none of the recommendations of the Committee were realised for the time being,[554] and when drought and sand drift became acute again in 1935, the chairman of the Victorian Water Commission Richard (Rick) Horsfield declared that despite appeals to the landholders, results in sand drift prevention had so far "been practically nil".[555] The sand drift that occurred in this year seriously impeded the channels' function. In February 1935 the *Argus* described the Mallee as "the land of drifting sand" and reported that the SRWSC had not only spent £300,000 in clearing sand from the Wimmera-Mallee system in the last three years, but was again "faced with the expenditure of an enormous sum before the channels can be opened up again for the annual run of water".[556] In May, the situation had worsened and storms had blocked water channels in the Mallee, so the state ministry allocated an extra £25,000 for the work of clearing sand from them.[557] In July, during the annual watering of the system, several channels were blocked, most severely at Boinka, Rownack, Winnambool, and Nyang.[558] As the water could not flow freely, it backed up, and in some cases the water pressure destroyed the banks of the channels, for example at Rownack, where 180 metres of banks were washed away. The SRWSC employed extra men and teams to deal with the problem.[559]

The work of clearing the channels by 'scoping' was done by teams of horses and men, mostly temporary staff that were often engaged under unemployment relief schemes. In 1933, for example, the Water Commission was granted £20,000 for the removal of drift sand, a work estimated to engage 650 men for a four month term.[560] In 1936 the sum of £37,793 from Unemployment Relief Funds was expended in clearing the channels in addition to the ordinary maintenance.[561] For the rural population in the depressed economic situation, this job

[552] Ibid.
[553] Ibid.
[554] Powell, Watering the Garden State, p. 212.
[555] Letter from R. Horsefield, SRWSC to G. Lightfood, CSIR, re: Report of Sand Drift Committee, 21 March 1935, in: [NAA: A9778, C30/5/127, Soil erosion, sand drift in Mallee, Investigating C'ttee [Committee] report, 1933, [photos]].
[556] 'Land of Drifting Sands', *The (Melbourne) Argus*, 22 February 1935.
[557] 'Sand Drift in Mallee. Clearing Water channels', *The (Melbourne) Argus*, 10 May 1935.
[558] 'Flying Sand Destroys Crops at Ouyen', *The (Melbourne) Argus*, 20 July 1935.
[559] Ibid.
[560] 'Work for 650 men. Clearing water Channels', *The (Melbourne) Argus,* 13 May 1933.
[561] Victoria, SRWSC, 31st annual report (1935-36), p. 6.

opportunity was sometimes more than welcome, as the Chairman of the SRWSC at the time, Lewis R. East stated in 1945:

> [...] although expenditure on sand drift removal is wasteful and is to be deplored, this expenditure has provided thousands of farmers in semi-arid areas with an appreciable portion of their total income in that they and their teams have been employed on channel clearing each year and that the amount of this work available has been much greater in the drought years when their normal income from crops or stock has been very low.[562]

During war time, however, the lack of manpower temporarily posed a problem for the clearing of the channels from sand drift.[563] In 1940, 492 men and 770 horses were needed to clear out the channels and in 1941, the number even rose to 663 men and 1,010 horses.[564] After the Second World War, when tractors gradually replaced the horse teams on the farms, specialised mechanical equipment for clearing the channels became widespread.[565]

The total cost for the year 1935 amounted to £75,133 and was thus noticeably higher than in average years, while not as high as in 1929 and 1930.[566] Various remedies were debated in the press and the farming community: The SRWSC emphasised that it was imperative to put the recommendations of the Sand Drift Committees Report into practice.[567] This aroused opposition within the farming community. The executive council of the *Victorian Wheatgrowers Association* opposed the proposal of the SRWSC to take over control of the adjacent 60 metres (three chains) on every side of the water channels, arguing that the financial burden on the farmers would be too heavy and that the costs would be distributed unfairly.[568] Instead, the association opted in favour of pipe channels for the most affected stretches.[569] The pipeline proposal was in turn rejected by the chairman of the SRWSC, Richard Horsfield, who pointed out that the water supply of the Mallee through pipelines would cost 23 times more than through the existing earthen channels.[570] Seeking a compromise, the Minister for Water Supply, Francis Edward Old, suggested establishing a

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[562] East, Wimmera Mallee Water Supplies, p. 14.
[563] PD, Legislative Assembly Victoria, Adjournment, 21 July 1942, pp. 310-311.
[564] '£74,000 for Cleaning Water Channels. Hon. Minister on Need for 3-chain Easement', *The Countryman*, 4 December 1942.
[565] East, Water in the Mallee, p. 44.
[566] Victoria, SRWSC, 41st annual report (1945-46), p. 27.
[567] Victoria, SRWSC, 13th annual report (1934-35), p. 12.
[568] 'Sand-Drift Problem. Opposition to wider channel easements', *The (Melbourne) Argus*, 8 November 1935.
[569] 'Sand Drift in Mallee', *The (Melbourne) Argus*, 31 August 1935; 'Drifting sand. The Mallee problem', *Sunraysia Daily*, 28 August 1935.
[570] 'Pipe Lines for the Mallee. Commission opposed. Financial Prohibitive. Farmers Blamed for Drift', *The (Melbourne) Argus*, 20 November 1935; 'Drift sand in the arid Mallee. Commission has no ideas', *Sunraysia Daily*, 31 August 1935; 'Checking Sand Drift. Protection of Channels', *Sunraysia Daily*, 20 November 1935; 'Sand Drift Problem. Ministers to Investigate', *Sunraysia Daily*, 21 November 1935; 'Water Commission. Bigger deficits', *Sunraysia Daily*, 1 November 1935.

reserve stretch solely on that side of the channels from which the prevailing wind blew.[571] Once more, despite the intense debates, no actual action was taken.

The years 1936 and 1937 were not as costly as the year 1935, but the SRWSC kept repeating its demands to implement the recommendations of the report and to take control of the area adjacent to the channels, a suggestion that again angered some farmers.[572] At the Mallee farmers' convention in October 1936, the majority of the farmers voted against provisions to adopt a 60m protection belt along channels and roads.[573] In December 1936 further warnings of the possible abandonment of the channel system were issued by the SRWSC.[574] In the season 1938/39 sand drift reached "colossal proportion" as the cost for clearing the channels mounted again up to £71,925 in 1938 and reached the sum of £104,561 in 1939.[575] In January 1939 the SRWSC informed the farmers in the north-west Mallee that because of the drought, further water could only be supplied if rain fell in the catchment areas. It feared that even if water were to become available, its supply would be delayed by blocked channels, and thus exhorted the farmers to do everything they could to prevent sand drift of the channels.[576] In December, Lewis R. East, a disciple of Alfred Kenyon, who had become Commissioner in 1935 and then succeeded Richard Horsfield as chairman of the SRWSC,[577] warned that drifting sand threatened the guarantee of full water supplies for an area of about 26,000 km^2.[578]

The annual report of the SRWSC again stressed the need for immediate action and emphasised the uneconomic character of the present system where the revenues through water rates of some sections did not even reach half the amount of the costs of keeping the channel clear of drifting sand.[579] Finally, legislation in 1939 authorised the SRWSC to prohibit cultivation within 20 metres (one chain) of channels in specified areas, and this range was increased to 60 m (three chains) in 1942.[580] An increasing problem for the water supply was the progressive abandonment of holdings in the Mallee that left the remaining properties isolated, rendering their provision of water especially expensive and difficult.[581] The situation

[571] 'Prevention of Sand Drift in Mallee', *The (Melbourne) Argus,* 26 November 1935.
[572] 'Sand Drift in Mallee. Seeking System of Control', *The (Melbourne) Argus,* 14 October 1936.
[573] Sims/Webb, Mallee Sand to Gold, p. 47.
[574] 'Sand Drift in Mallee. Commission's warning', *The (Melbourne) Argus,* 28 December 1936.
[575] Victoria, SRWSC, 41st annual report (1945-46), p. 27.
[576] 'Water Supplies Cut Off', *The (Melbourne) Argus,* 11 January 1939.
[577] Powell, Watering the Garden State, pp. 174, 196.
[578] 'Sand Drift Threatens Water Supplies', *The (Melbourne) Argus,* 25 December 1939.
[579] Victoria, SRWSC, 34th annual report (1938-39), p. 18.
[580] '£74,000 for Cleaning Water Channels. Hon Minister on Need for 3-chain Easement', *The Countryman,* 4 December 1942; see also East, Water in the Mallee, pp. 42-43.
[581] Victoria (1940): Report from the Parliamentary Public Works Committee on the Position of Settlers on Isolated Holdings in Mallee Districts, with Respect to the Problem of Water Supplies, pp. 5-6.

of those scattered farms became so alarming that in 1940 a Public Works Committee was appointed to investigate their situation.[582] While it did not propose any final solution, it emphasised the fact that this area was not suited for closer settlement associated with wheat growing.[583]

In the drought years of 1944 and 1945, the sand drift problems for the Wimmera-Mallee channel system reached unprecedented proportions, as the heavier Wimmera soils began to erode, too.[584] The dust storms that repeatedly swept over the north-east of Victoria at the end of the year refilled the channels as soon as they were cleaned.[585] In November 1944, sand drift affected the Quambatook-Piangil channel and threatened to cut off the area extending about 80 km northward from Piangil, and covering 280 km^2, from the water supply.[586] If that were to happen, the rural newspaper *Swan Hill Guardian* warned, and the settlers not get their water supply, "many [would] have no alternative but to turn the whole thing in".[587] The SRWSC estimated that it needed a total of 1,300 horses for the clearing of the channels, and, as it had not enough horses at its disposal, asked farmers to make their teams available.[588] In December 1944, the chairman of the SRWSC East suggested abandoning those parts of the Mallee where sand drift removal had become too costly.[589] Despite the adverse conditions, water for stock and domestic purposes could be secured in the season 1944-45 for the large majority of the landholders, excepting some isolated holdings in the northern Mallee.[590] Ivan George from Willah remembered that their family property was among those which could not be served in 1944: "We had nearly two years of continuous drought, and the channel, through all the cleared paddocks, was full to ground with drift sand. We just could not afford to keep the channel clean, so we could not get any water".[591]

For the season 1945/46, the completion of the usual watering of the channels was delayed for several months as the lack of horse teams for the clearing operations had delayed the whole process.[592] In 1945, the costs for clearing the removal of sand from the channels

[582] Ibid.
[583] Ibid., pp. 6-7.
[584] Victoria, SRWSC, 40th annual report (1944-45), p. 28.
[585] 'Drift Sand Serious Threat to N.W. Water. Blocking of Channels', *The (Melbourne) Herald*, 14 November 1944.
[586] 'Sunday's dust storm. Worst in history', *Swan Hill Guardian*, 21 November 1944; 'Sand blocks irrigation channels. Settlers' serious position', *Swan Hill Guardian*, 24 November 1944.
[587] Ibid.
[588] Ibid.; 'Big Job to Remove Sand from Channels. Watering Schedule Will be Affected', *The (Melbourne) Herald*, 10 January 1945.
[589] 'Would Leave Part of Mallee', *The (Melbourne) Herald*, 12 December 1944.
[590] Victoria, SRWSC, 40th annual report (1944-45), p. 28.
[591] George, From London to Willah, pp. 51-52.
[592] Victoria, SRWSC, 41st annual report (1945-46), p. 24.

rocketed to £312,419.[593] The annual report of the SRWSC for the financial year 1945/46 spoke of the record number of 9 million cubic metres of sand that had to be excavated.[594] Chairman of the SRWSC East repeated his arguments that some parts of the Mallee, namely the Millewa, where the past story of settlement "was one of blasted hopes and broken hearts", should be completely abandoned for wheat growing and transformed into a grazing area, as it was a "plain fact [...] that there were no prospects of successfully establishing farming under closer settlement conditions there".[595] The SRWSC's report deplored that not enough attention had been paid to the report of the Sand Drift Committee of 1933 and declared that "the farming community in general continued to overstock and to farm their holdings in the Mallee in a manner which accentuated soil erosion".[596] The Commission again urged the farmers to cooperate by using soil conservationist farming methods and threatened that if nothing was done it would have to abandon those parts of the channel system where "the cost of sand clearing is becoming out of all proportion to the benefits and the revenue received".[597] The SRWSC also took charge of the problem itself by planting some 1,000 hectares of rye-corn on the windward side of circa 320 km of channels.[598] Again, the SRWSC could secure in large parts the supply of water despite the high costs, and the majority of the of the farms depending upon the Commission's channels received sufficient water for domestic and stock purposes, so the most adverse effects of the drought could be avoided.[599] Some 1,100 km, however, could not be run in the season 1945/46 and many farmers waited in vain for their annual water supply.[600] The proposal of the SRWSC to discontinue parts of the channel system came into reality: After the drought some 225 km in the far north of the Mallee beyond Kooloonong, Annuello and Ouyen, as well as a further 200 km of channels in the Carwarp and Coreen district were abandoned because of sand drift.[601] The question of pipelines was debated again vigorously in public and found fervent supporters among the Mallee population.[602] It was, however, strongly rejected by chairman Lewis R. East on the

[593] See Figure 11.
[594] Victoria, SRWSC, 41st annual report (1945-46), p. 24; see also: 'Mallee sand causes heavy loss £325,000 to clear channels this year', *The (Melbourne) Argus*, 25 May 1946.
[595] 'Millewa settlement story of blasted hopes', *Sun News Pictorial*, 16 February 1945; 'Millewa. Failure as Wheat Area. Reversion to Grazing Urged by Expert', *The (Melbourne) Herald*, 15 February 1945.
[596] Victoria, SRWSC, 41st annual report (1945-46), pp. 26-27.
[597] Ibid.
[598] East, Water in the Mallee, p. 44.
[599] Victoria, SRWSC, 41st annual report (1945-46), p. 24.
[600] Victoria, SRWSC, 42nd annual report (1946-1947), pp. 25-26.
[601] East, Water in the Mallee, p. 31.
[602] Steele Blayde: 'The Longevity of Pipelines', *Sunraysia Daily*, 11 May. 1944; Id.: 'Mr Allnutt and the Pipeline Plan', *Sunraysia Daily*, 19 May 1944.

ground that it was uneconomic.[603] The SRWSC again emphasised the need for co-operation of the farmers if the water supply through channels should be carried on. If not, farmers in badly affected areas might be "forced to leave their holdings solely because of the careless farming methods of their neighbours or themselves".[604] After the peak of 1945/46, sand drift became less problematic and costly, and a pipeline system was finally reconsidered during the 1960s and completed in 1975.[605] Altogether, the SRWSC had spent more than £1,455,000 to remove sand from the domestic and stock channels from 1928 to 1946 in the Wimmera-Mallee Area including the Millewa, Carwarpy, and Coreena Districts.[606] Wind erosion had become a very costly threat to the lifeline of the Mallee and, as such, contributed to changing the settlement policies of the region.

2.3.2 Traffic Obstructions: The Blocking of Roads and Railways

Besides the water supply, transport was the most important infrastructural basis for the economic and social viability of the Mallee region. The most important means of transportation in the 1930s and 1940s were the roads and railways.[607] Roads were the first means of transport established in the Mallee region.[608] Distance was still a reality in the scarcely settled rural parts of north-western Victoria and the road network was essential for the smooth functioning of everyday life. Alan Holt highlighted this key role in his social survey on the *Wheat farms of Victoria* in 1943/44, when he stated that "because of the necessity for travelling relatively long distances, means of reasonable fast transport, for both passengers and goods, is imperative".[609] Such fast transport was insured by the combination of a good road network and the use of motorised vehicles. Around 1900, the first motor cars had appeared on Victorian roads and they were so successful that control soon became necessary: Obligatory registration of vehicles was introduced in 1910.[610] Even if there were merely 8,000 motor vehicles on Victoria's roads, the government understood the potential that cars offered for transport in the countryside and saw the need to establish a reliable road

[603] 'Mr. East Against Pipelines', *Swan Hill Guardian*, 9 January 1945; 'Millewa settlement story of blasted hopes', *Sun News Pictorial*, 16 February 1945.
[604] Victoria, SRWSC, 42th annual report (1946-1947), p. 25.
[605] See Figure 11; also: East, Water in the Mallee, pp. 44, 51; Land Conservation Council, Victoria, Report on the Mallee Area Review, p. 43.
[606] Victoria, SRWSC, 41st annual report (1945-46), p. 27.
[607] Jean J. McIntyre/Alan J. McIntyre (1944): Country Towns of Victoria: A Social Survey. Melbourne, Melbourne University Press, p. 106.
[608] Holt, Wheat Farms of Victoria, p. 118.
[609] Ibid., p. 120.
[610] Donald Garden (1984): Victoria: A History, Melbourne, Thomas Nelson, pp. 303-304.

network.[611] To this end, the Country Roads Board was established in 1912 in order to supervise the construction and maintenance of the major country roads.[612]

With the rapid motorization after the First World War, road construction accelerated, and in 1924 there were already nearly 90,000 motorised vehicles registered in Victoria.[613] The opening up of the Northern Mallee was supplemented by a huge infrastructural programme, in the course of which the SRWSC cleared and surfaced more than 9,660 km of roads.[614] In the period under consideration, the Mallee was touched at its northern peak by the Sturt Highway, and traversed by two major highways, the Calder and the Murray Valley Highway, and a third, the Henty Highway was under construction in the 1940s.[615] Main and developmental roads had also been constructed to most railway sidings and connected to the highways and the utilization of local limestone had allowed for the good quality of the roads.[616] Most farmers in Victoria's wheat belt possessed a car in the first half of the 1940s.[617]

From an economic point of view, the roads were primarily important for carting wheat to the railway sidings.[618] But they were also crucial for assuring the supply of tools, seed, and fertilizers necessary for agricultural production, as well as to guarantee the provision of consumer goods for daily life. As far as the wheat belt was concerned, the distance between the market towns and the farms amounted on average to 21 km.[619] The towns were not only an economic hub, but also a social gathering point. As Alan Holt pointed out, the car thus had "a social value which cannot be measured so easily".[620]

Sand drift and dust storms affected the roads and thus seriously threatened the economic and social function of the Mallee farming community. It appears that the trouble became acute for the first time in 1929/1930 when several newspapers reported of roads covered in sand. In some cases the clearing of the roads became so futile that the original roads were abandoned and travellers instead used tracks through paddocks and reserves.[621] The newspapers reported worriedly about the menace of blocked roads as far as the distribution of seed and fertilizer was concerned, which exemplifies the economic

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[611] Ibid., p. 304; Geoffrey Blainey (2006): History of Victoria, Cambridge [et al.], Cambridge University Press, p. 161.
[612] Ibid.
[613] Susan Priestley (1984): The Victorians. Making their Mark, McMahons Point, N.S.W., Fairfax, Syme & Weldon Associates, p. 170.
[614] East, Water in the Mallee, p. 19.
[615] Holt, Wheat Farms of Victoria, pp. 118-119.
[616] Ibid.
[617] Ibid.
[618] Ibid.
[619] Ibid.
[620] Ibid.
[621] 'Mallee Troubles. Many Roads Impassable', *The (Melbourne) Argus*, 18 February 1930.

significance of the road system.[622] In the north-west of Victoria, the problem became so acute that some shire councils discussed the problem during various meetings;[623] in one of those gatherings, the delegates of several shires decided to refer the matter of sand drift to the Country Roads Board for the next five years.[624] The Country Roads Board consequently mentioned the sand drift problem for the first time in its report for the financial year 1929/30 and acknowledged that the drought conditions had "accentuated the sand drift trouble in the northern Mallee". The report stated that sand had drifted over distances of 800 metres or even longer. As there was a lack of timber belts for wind breaks, the Board saw the only solution in the clearing of the roads by scooping the sand.[625] In the following years, the Country Roads Board initiated improvements of the road sections that had been especially affected by sand drift, namely the road between Mittyack and Trinita and parts of the Calder Highway between Trinita and Red Cliffs.[626] The Sand Drift Committee Report of 1933 also mentioned the problem of drifted roads and recommended paying attention to the problem when constructing roads in the future.[627]

The problem became acute again in early 1935, when there was "hardly a week passing without high winds and blinding duststorms"[628] and sand drift interrupted traffic along many kilometres.[629] In January, several roads had become practically impassable in the Mallee.[630] In February the main Ouyen-Pinnaroo road was badly affected between Ouyen and Underbool.[631] Some roads were engulfed in almost one metre of sand so that settlers had to cart their wheat twice their usual distances.[632] The section of the Calder Highway near Nandaly was particularly affected by sand drift, as was the region south of Rainbow.[633] In the Birchip Shire, the problem had become so urgent that the Shire council asked the landowners to leave their fences open in order to enable cars to bypass the drifted spots.[634] In the Walpeup Shire, the shire engineer estimated that the clearing of the roads would exceed the financial capacities of the shire, so the councillors decided to apply to the Country Boards Road for a

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[622] Ibid.
[623] 'North-Western Shires. Problem of Sand-drift', *The (Melbourne) Argus*, 29 June 1929; 'Preventing Sand Drifts', *The (Melbourne) Argus*, 16 August 1929; 'Drift Sand in the Mallee', *The (Melbourne) Argus*, 16 January 1930.
[624] 'North-Western Shires. Problem of Sand-drift', *The (Melbourne) Argus*, 29 June 1929.
[625] Victoria, Country Roads Board, 17th annual report (1929-30), p. 24.
[626] Victoria, Country Roads Board, 20th annual report (1932-33), p. 8.
[627] Victoria, Sand Drift Committee (1933): Report on Sand Drift Problems in Mallee Areas, p. 3.
[628] 'Roads Blocked. Government Grant Sought', *The (Melbourne) Argus*, 9 February 1935.
[629] Victoria, Country Roads Board, 22nd annual report (1934-35), p. 11.
[630] 'Sand Drift in Mallee. Serious Problem', *The (Melbourne) Argus*, 24 January 1935.
[631] 'Roads Blocked. Government Grant Sought', *The (Melbourne) Argus*, 9 February 1935.
[632] Ibid.; 'Cost of Clearing Drift Sand', *The (Melbourne) Argus*, 12 June 1935.
[633] Victoria, Country Roads Board, 22nd annual report (1934-35), pp. 8, 12.
[634] 'Roads Blocked. Government Grant Sought', *The (Melbourne) Argus*, 9 February 1935.

special grant of £2,000 from the unemployment relief fund.[635] Other shires were in a similar position, and the Country Roads Board made funds available under the Unemployment Relief Act No. 4097. In the financial year 1935/36, grants from the unemployment relief fund of a total sum of £6,250 were given to the shires of Birchip, Borung, Dimboola, Karkarooc, Mildura, and Wycheproof specifically for clearing Mallee roads affected by sand drift and to undertake metalling and surfacing work on the affected roads.[636] In the following financial year, the Walpeup shire received a grant for a further £2,300 for sand drift removal, forming, and metalling.[637] The problem abated somewhat in the following years, and the report of the Country Roads Board did not mention any further particular problems. In 1939, its annual report stated that "in spite of the frequency of sand storms in the north-west", sand drift removal on major roads by the Board had not been expensive, the total cost for the clearing of the Calder Highway and Henty Highway had amounted to only £292.[638] In the late 1930s and early 1940s, the Board was more concerned with the damage of Victoria's roads by water erosion than with the problems posed by wind erosion.[639]

This would dramatically change in the drought years of 1944/45: Again, dust storms were frequent and sand drift repeatedly blocked the roads in large parts of Victoria's north-west. The *Sunraysia Daily* reported of sand drift obstructing roads in the counties of Millewa and Karkarooc.[640] In addition to the obstruction of roads, the bigger dust storms also brought interruptions of traffic as they reduced visibility.[641] In some cases, the effects could be more dramatic than the simple inconvenience of travelling delays, for example when the dust storm prevented a doctor from reaching his patients.[642] The blocked roads affected the everyday life of the local communities in many ways. At Kunat, for example, as Eric Jobling recalls, the schooling of the children was assured by correspondence through a mail service from Lake Boga after the school had closed in the early 1940s. During the 1944/45 drought, however, the sand drift on the roads became so bad that the Postal Authorities threatened to cancel the

[635] Ibid.; 'Drift Sand in Mallee. Shire Roads Impassable', *The (Melbourne) Argus*, 15 May 1935; 'Cost of Clearing Drift Sand', *The (Melbourne) Argus,* 12 June 1935.
[636] Victoria, Country Roads Board, 23th annual report (1935-36), pp. 107-110; all but the Mildura Shire spent all or nearly all of the amount granted.
[637] Victoria, Country Roads Board, 24th annual report (1936-37), p. 123.
[638] Victoria, Country Roads Board, 26th annual report (1938-39), p. 12.
[639] F. W. Fricke (1940): Country Roads and Soil Erosion. In: Charles T. Clark (ed.), Soil Erosion in Victoria. A Symposium arranged by the Victorian Institute of Surveyors. Melbourne, Department of Lands and Survey Victoria, pp. 24-25.
[640] 'Sand-drift on Shire roads', *Sunraysia Daily*, 5 May 1944; 'Roads blocked by Drift', *Sunraysia Daily*, 15 February 1945.
[641] Charles Coote Diary, 8 December 1944.
[642] Keva L. Lloyd (1997): Then Awake Sea Lake. A History of Sea Lake District and Tyrell Station, Sea Lake, Mallee Printers, pp. 161-162.

service, a fact that Eric could luckily prevent.[643] The Country Roads Board had – with the approval of the government – made provisions of funds totalling £17,480 for sand drift removal, under the condition that the Councils added another £3,886.[644] The municipalities affected were the Shires of Birchip, Charlton, Dimboola, Dunmunkle, Karkarooc, Mildura, Walpeup, Warracknabeal, Wimmera, and Wycheproof.[645] As the board's report explained, the local settlers suffering from drought and failure of crops appreciated the chance to find employment through the clearing of roads.[646] In the next financial year, the expenditure from the Board on sand drift removal through government approved funds even increased to £24,522.[647] The Board hired special earth-moving machinery from the Allied Works Council for sand clearing works in the shires of Birchip, Karkarooc, Mildura, Swan Hill, Walpeup, and Wycheproof.[648] Furthermore, the Board had, in cooperation with the Soil Conservation Board, planted rye corn on sand hills which extended into road reserves in the north-western area of the state.[649] There was also money from the Federal aid funds flowing to sand drift removal. In the three financial years from 1944 to 1947, a sum totalling £43,940 of such funds was expended on "removal of drift sand and bush fire restoration works etc.".[650]

Next to the roads, wind erosion also affected the proper functioning of the railways, being the "arteries and veins of Victoria".[651] The railway had been an important tool for the settlement of the Mallee region and its opening as a wheat growing region.[652] The railway lines spread out from the state capital towards the interior, and accordingly from the south to the north of the state. In 1891 the railway into the Mallee went as far as Swan Hill, Boort, Wycheproof, Donald, and Warracknabeal, with the interstate line from South Australia passing from Dimboola to Serviceton.[653] In the following years, the network expanded further north. During the 1890s, extensions reached Birchip, Hopetoun, Jeparit, Quambatook, Wycheproof, and Sea Lake. At the beginning of the 20th century, infrastructural construction preceded the settling of the region for the first time: the opening of the Ouyen-Murrayville railway in 1908 was followed by a swift rush of settlement of that part of the western Mallee

[643] Eric Jobling, in: Mallee Oral History Collection.
[644] Victoria, Country Roads Board, 32th annual report (1944-45), p. 15.
[645] Ibid.
[646] Ibid.
[647] Victoria, Country Roads Board, 33th annual report (1945-46), p.19.
[648] Ibid.
[649] Ibid.
[650] Victoria, Country Roads Board, 32th annual report (1944-45), p. 4; Id., 33th annual report (1945-46), p. 4; Id., 34th annual report (1946-47), p. 4.
[651] Blainey, History of Victoria, p. 159.
[652] Alfred S. Kenyon (1916): The Story of the Mallee: A History of the Victorian Mallee. Read before the Historical Society of Victoria 18 March 1912, Melbourne, Government Printer of Victoria, pp. 185-189.
[653] Andrews, The Emergence of the Wheat Belt, p. 35. For the early development up to 1915, see also Kenyon, The Story of the Mallee, pp. 185-189.

starting in 1909.[654] At about the same time, the railways had reached Piangil, Manangatang, and Nandalay. The construction of the railway brought more settlers, so large areas of the central Mallee were occupied at the onset of the First World War.[655] In the wake of the closer and soldier settlement schemes initiated during the war, extension lines stretched out to Kulwin and Robinvale.[656] The last lines constructed were those from Redcliffs over Werrimull (1923) to Meringur (1925) and the extension line from Nowingi to Millewa South in 1929, opening up the marginal Millewa country.[657] Altogether, the railway system in the Mallee covered ca. 1,200 km.[658]

The railway was crucial for development of the Mallee as a wheat growing area. As wheat was a low value product, its transport from the rural areas to the coastal cities had to be low-cost in order to be economic. The railways allowed for such cheap means of transport.[659] In the period from around 1910 to 1930, wheat growing became dependent upon railways more than ever, as economic historian Edgars Dunsdorfs has shown,[660] and this remained true for the first half of the 1940s.[661] The railway rates for primary produce were fixed by the Victorian government at a particularly low level in order to support the wheat growing industry in the marginal areas.[662] As the rates for other commodities were higher in return, the railway rates policy really was "a subsidy to the wheat industry by other users of the railway".[663] The trains normally passed daily on the central lines and between three times a week or once a week on secondary lines reaching out in the far north and far west of the state.[664] This web of transport was not only the economic core of the Mallee region, it was also fundamental for the social life of the settlers, as it guaranteed the physical link to the state capital. Jean and Alan McIntyre's social survey on the Victorian Country Towns of 1944 came to the conclusion that it was "hard to over-estimate the economic and social importance of transport [and communication], particularly to people who live away from the large centres of population".[665]

When the erosion years set in with the drought of 1929/1930, sand increasingly engulfed the rails. Of course, sand drift had caused problems for rail traffic well before this

[654] Ibid.
[655] Ibid.
[656] Andrews, The Emergence of the Wheat Belt, p. 36.
[657] Ibid., pp. 37-38.
[658] Victoria, Sand Drift Committee (1933): Report on Sand Drift Problems in Mallee, p. 2.
[659] Dunsdorfs, The Australian Wheat-growing Industry, p. 162.
[660] Ibid., pp. 212-216.
[661] Holt, Wheat Farms of Victoria, pp. 116-118.
[662] McIntyre/McIntyre, Country Towns of Victoria, pp. 109-110.
[663] Ibid.
[664] Cf. Figure 17: 'Railway service in wheat belt', in: Holt, Wheat Farms of Victoria, p. 116.
[665] McIntyre/McIntyre, Country Towns of Victoria, p. 112.

period when the region had become more densely populated.[666] But now wind erosion reached a whole new dimension, as E. Richard, engineer of the Country Roads Board acknowledged in 1940 when stating that "within the last ten years or so the menace has assumed very much greater proportions".[667] Sand now repeatedly overwhelmed the rails, causing trains to run late or even to derail. This was a major nuisance for the habitants of the region who relied on the transport for the delivery of mail, city newspapers, and the transport of commodities. Even worse, the sand drift also posed a deadly threat to the passengers on the trains, as the sand drift could cause accidents. Luckily, it seems that no serious injuries happened in the region. The costs for the Railway Department were substantial, as it faced expenditures for preventive measures as well as for work to remedy actual damage, like the hiring of additional labour to clear the sand off the tracks. Additionally, there were expenses caused by the need for setting up substitute services and for keeping the normal staff at work during train delays, as well as losses of money caused by the standing time of rolling stock.[668]

In the first years of the 1930s, the Railways Department had serious problems in keeping certain lines open, as the Sand Drift Committee stated in its 1933 report. It had spent up to £10,000 annually to maintain its services, a sum that went well beyond its financial capacities.[669] Of the ca. 1,200 km of Mallee railways, 320 km were considered as threatened by sand drift, and approximately 24 km were extremely affected. In one season, sand drift had caused as many as twelve derailments.[670] The Railways Department blamed the Postal Department for having aggravated the situation through unnecessarily removing protective vegetative cover near their telegraph lines on railway reserves.[671] The line Melbourne–Bendigo–Sea Lake–Kulwin was strongly afflicted, especially the section north of Sea Lake. In February 1930, the *Argus* reported that the passenger train from Kulwin to Wycheproof was 2 hours 35 minutes late because of sand blocked railway lines. All the men available on the section had to clear the lines before the train could continue its journey to Sea Lake.[672]

The year 1935 was particularly troublesome. In January, the *Sea Lake Times* reported that the "drift sand menace" covered the rails to a depth of nearly one metre for more than 1.6 km, thus preventing the mixed train from reaching Kulwin and causing the longest delay

[666] See for example: 'Drifting Sand in Mallee', *The (Melbourne) Argus*, 13 October 1927; E. Richard (1940): Soil Erosion as it affects Railway Activities. In: Charles T. Clark (ed.): Soil Erosion in Victoria, pp. 21-23, here p. 23.
[667] Richard, Soil Erosion as it affects Railway Activities, p. 23.
[668] Ibid.
[669] Victoria, Sand Drift Committee (1933): Report on Sand Drift Problems in Mallee Areas, p. 2.
[670] Ibid.
[671] Ibid.
[672] 'Mallee Sand-Drifts. Railway Line Covered', *The (Melbourne) Argus*, 20 February 1930.

so far.[673] Railway lines were continually covered by sand during this first month of the year, and men worked long hours to clear them.[674] In February the situation worsened: On the 1st of February westerly winds again blew sand over the railway line between Sea Lake and Kulwin. Although 20 men worked through the night, the line was blocked for several hours. When the mixed train finally left Sea Lake, it was five hours late.[675] Two days later, the mixed train was three hours delayed when it arrived at Kulwin, despite the fact that 30 men had been shovelling sand from the line at several places. The drift was particularly bad around Ninda, where one section was buried over 3.5 metres deep in sand for a distance of about 1.6 km.[676] Not even a week had passed when the drift at the Kulwin–Sea Lake line had become so bad that the mixed train had to be cancelled altogether, the first time since the line had been constructed 20 years before.[677] And this despite the fact that 25 men had been shovelling sand at various points of the line all day before finally giving up in the late evening.[678] The train stayed at Sea Lake; mail for stations beyond was carried by car as well as one passenger who was taken to Kulwin. Relays of motor-trycicles were used to bring the mail from Kulwin and all the other stations to Sea Lake in the morning.[679] A further train was held up by a dust storm and sand drift on the 8th of February[680] and it would not be the last time: On the 13th of April, while other parts of Victoria had severe rain, the Mallee residents experienced a dust storm so big that the *Sea Lake Times* termed the day "Brown Saturday".[681] The rails were quickly covered by sand and on the 15th, the mixed train coming from Sea Lake had to be stopped at Kulwin and return from there.[682] Three days later, the train from Sea Lake was cancelled because the train was so late that by the time it was supposed to leave Sea Lake at 8.a.m., it had just reached Kulwin, the terminus of the line.[683] The return of the train from Kulwin to Sea Lake then posed great difficulties, as the engine derailed at one point.[684]

The clearing of the railway lines was unpleasant and exhausting work. Several reports mention that the men worked long hours and during the night, often in dusty conditions. In January 1935 a total of 50 men worked on the line between Sea Lake–Kulwin, "in a continual

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673 Lloyd, Then Awake Sea Lake, p. 285.
674 'Sand Drift in Mallee. Serious Problem', *The (Melbourne) Argus*, 24 January 1935.
675 'Shovelled Sand for 20 Hours', *The (Melbourne) Argus*, 2 February 1935.
676 'Sand Drift 12 Feet Deep Covers Line', *The (Melbourne) Argus*, 4 February 1935.
677 'Sand Drift Menace. Train Cancelled', *The (Melbourne) Argus*, 9 February 1935.
678 Ibid.
679 Ibid.; 'Mallee sand drifts delay train', *Sunraysia Daily*, 9 February 1935.
680 Ibid.; 'Mallee Train Delayed by Drift Sand on line', *Sunraysia Daily*, 13 February 1935.
681 Lloyd, Then Awake Sea Lake, p. 161.
682 'Blinding Sand in the Mallee', *The (Melbourne) Argus*, 15 April 1935.
683 'Hazardous Train Trip in Mallee', *The (Melbourne) Argus*, 18 April 1935.
684 Ibid.

dust storm and at night by lantern light".[685] While the men shovelled the sand from the line onto the east side of the tracks, the wind constantly blew more sand on the line from the west, thus rendering the work a Sisyphean task.[686] In February 1935, the *Argus* reported on 20 men working from 2 p.m. until 10 a.m., some of them for 10 hours without a meal because no provisions could be brought along.[687] In April the same year, the gangs worked from "Saturday afternoon until 4 a.m. on Sunday and after a few hours of sleep returned to work later".[688] When the wind blew, the rails were drifted again immediately or shortly after they had been cleared, so the gangs could only start working a couple of hours before the train passed.[689] Sometimes, the trains got blocked from the front and the behind, so the clearing of the rails would be restricted to a train-length, the train moved on the cleared section, and then the next part would be cleared.[690] In normal periods, the clearing of the rails was done by the regular railway maintenance staff, but in periods of very intensive sand drift, additional labour was employed.[691] This was another additional employment opportunity much appreciated by the rural population in times of drought and depression: In February 1935, the *Argus* reported that "all unemployed at Sea Lake, Nandaly, and Kulwin have found work on clearing the line from time to time".[692] In December 1938, 50 men were needed to clear the Sea Lake–Kulwin line, and the *Argus* reported that "many of the men who had cleared the line had been unemployed for some time, and others were farmers whose crops had failed completely. They were pleased to get the money for their labour".[693]

The Railways Department tried to mitigate the situation as well as it could. To facilitate the work of clearing the sand once it was already on the lines, it built a temporary narrow-gauge line in parallel to the original rail line where tip wagons would run to carry the sand from the drifted sections to other parts of the line.[694] While this was a useful device once the damage was done, the Railways Department simultaneously searched for preventive measures: early experiments with wind chutes that were modelled on a system employed in the USA started in June 1935 on the Sea Lake–Kulwin line.[695] The engineers placed wind-

[685] Lloyd, Then Awake Sea Lake, p. 285.
[686] Ibid.
[687] 'Shovelled Sand for 20 Hours', *The (Melbourne) Argus*, 2 February 1935.
[688] 'Blinding Sand in the Mallee', *The (Melbourne) Argus*, 15 April 1935.
[689] 'Shovelled Sand for 20 Hours', *The (Melbourne) Argus*, 2 February 1935.
[690] Lloyd, Then Awake Sea Lake, p. 285.
[691] 'Mallee Sand Drift costs many thousands. Railways efforts to protect lines', *Cairns Post*, 17 May 1939.
[692] 'Sand Drift 12 Feet Deep Covers Line', *The (Melbourne) Argus*, 4 February 1935.
[693] 'Drift Sand Blocks Train', *The (Melbourne) Argus*, 14 December 1938.
[694] 'Sand Drift 12 Feet Deep Covers Line', *The (Melbourne) Argus*, 4 February 1935; 'Sand Drift Menace. Train Cancelled', *The (Melbourne) Argus*, 9 February 1935; 'Blinding Sand in the Mallee', *The (Melbourne) Argus*, 15 April 1935.
[695] 'Keeping Drift Sand Off Railways', *The (Melbourne) Argus*, 12 June 1935.

chute fences on the westward side of the cuttings, the side from which the winds prevailed.[696] The slopes of the cutting were flattened, and timber planks were placed on the chutes to a depth of 1.5 metres (5ft.) from the top leaving an open space of 1.2 metres (4ft.) at the bottom. The idea was that the wind would strike the top of the fences, then be deflected downwards and blow through the opening at an accelerated speed, thus carrying the sand across the track.[697] The chutes were quickly considered a great success.[698] While this did of course not prevent erosion, it at least prevented the drifting of the railways.[699] In 1938, the Railway Department had already put up nearly 1,500 m of optimised chutes on the three lines mostly affected by sand drift, which was, aside from the Sea Lake-Kulwin line, the Ultima-Robinvale, and the Nyah West-Yungera line.[700] The chutes cost approximately £5 per 20 metres (1 chain) and saved the department about 50 per cent of the total cost of clearing railway tracks as well as improved the running times.[701]

While the chutes might have reduced the drift problem, the troubles were by no means over: In February 1936, the locomotive of a mixed train on the Sea Lake line derailed due to drift sand. Fortunately, there were no passengers on the train.[702] Sand storms in December 1938 caused delays of trains, as again the railways were covered in sand.[703] On the 13 December, 1938, the train from Melbourne to Kulwin had a new record delay of one day and three hours; the majority of the delay had been caused by sand drift between Sea Lake and Kulwin.[704] In some places on the line, the sand was 1.5 metres deep; the wind-chutes that were supposed to protect the line had simply been blown down.[705] While it is not possible to list all incidents and accidents that occurred, it is worth mentioning that the years 1944/45 brought another extreme period with a resurge in delays and derailments of trains on several Mallee lines.[706] By clogging the basic infrastructure of the region, wind erosion seriously hampered the economic and social life of the region and in this way heaped serious hardship

[696] Ibid.; 'Mallee Lines Freed from Sand', *The (Melbourne) Argus*, 22 November 1935.
[697] Ibid.
[698] Ibid.; Richard, Soil Erosion as it affects Railway Activities, p. 23.
[699] Ibid.
[700] Richard, Soil Erosion as it affects Railway Activities, p. 23; 'Mallee Railway Blocked by Sand', *The Weekly Times*, 17 December 1938; 'Mallee Sand Drift costs many thousands', *Cairns Post*, 17 May 1939.
[701] Ibid.
[702] 'Drift Sand Derails Locomotive', *The (Melbourne) Argus*, 28 February 1936.
[703] 'Sand Drift Delays to Train', *The (Melbourne) Age*, 12 December 1938; 'Sand Drift Blocks Railway at Sea Lake, *The (Melbourne) Age*, 13 December 1938.
[704] 'Mallee railway blocked by sand', *The Weekly Times*, 17 December 1938; 'Sand Drift Menace', *The Countryman*, 16 December 1938; 'Delayed By Sand Drift. Sea Lake Train 30 hours late', *The (Melbourne) Age*, 14 December 1938.
[705] 'Train delayed by Sand Drifts', *Horsham Times*, 13 December 1938.
[706] 'Good Rain with Storms, Dust, Sand', *Sun News Pictorial*, 17 October 1944; 'Dust Storms, Gone with the Wind, Leave Mark on Farms', *Sun News Pictorial*, 21 November 1944; 'Milder Temperatures, some Rain - and Dust', *Sun News Pictorial*, 11 January 1945.

on the farmers who were already suffering from the drought. No doubt, the Victorian Mallee – once the pride of the state and the proof of humankind's ingenuity at putting an adverse land into production – was now turning into an appalling dust bowl.[707]

As we have seen in this second chapter, the settlers experienced wind erosion in many ways as threatening: The analysis of autobiographical sources has made clear that dust storms brought serious physical discomfort and health issues to the individuals and were often perceived as being harmful or terrifying. Dust storms also interrupted daily life routines, and added further workload to the members of the family farm. As sand drift covered fences and farm buildings, wind erosion threatened the economic basis upon which the family depended. Additionally, the clogging of water channels and the blocking of roads and railways threatened the normal social and economic functioning of the rural community. As a result, wind erosion contributed to the partial abandonment of some parts of Victoria's Mallee region, as the following chapter will illustrate.

3 Abandoning the Mallee Dust Bowl

Similar scenes as in the Victorian Mallee happened in the other marginal areas of Australia's south-eastern wheat belt as well as in parts of Western Australia, even if the problems were altogether less severe than in the Victorian Mallee. In the South Australian Murray Mallee, for example, sand drift also posed serious problems to roads and railways.[708] In the financial year 1943-1944 the South Australian Railways Department employed additional workers to scoop the sand from their lines at a cost of £3,255.[709] In all of the marginal wheat growing regions, sand drift exacerbated the problems of the drought years: the obstructions of the infrastructure added further costs to the public purse for maintaining the basic functioning of areas where a large number of holdings were already operating uneconomically, largely due to low average yields. As a consequence, during the 1930s, all of the south-eastern states established schemes of reconstruction under which significant areas were retired from wheat production and transformed into mixed farming propositions or

[707] For example: "Little is being done about dust erosion – it seems that we will not see the end of it until all the surface soil has been lifted off the mallee 'dust bowl' and the land ruined for cultivation" in: *The (Adelaide) Advertiser*, 17 November 1938; another example: 'Mallee Major Problem 'Dust-bowl' fears. Why is Victoria's far north-west becoming a dust bowl?', *The (Melbourne) Argus*, 28 December 1940.
[708] 'Sand on rail tracks', *The (Adelaide) Advertiser*, 24 July 1945; 'Grave Sand Drift Problem', *The Pinnaroo &Border Times*, 21 December 1944.
[709] Robert Herriot (1944/45): Soil Erosion. The Problem in South Australia and what is done about it. In: *Journal of Agriculture of South Australia* 48, pp. 112–120, here p. 115.

converted to grazing lands.[710] At the end of the 1930s, the problems had become so serious that the Commonwealth agreed to allocate funds to relieve distressed farmers and remove wheat growers from marginal areas.[711] This was of course only possible with a transfer of settlers from these areas, a population movement that intensified the general trend of rural exodus.[712] In the course of the 1930s, which brought the awareness that the marginal wheat areas were not economically productive, the ecological argument gradually appeared next to the economic one. Faced with the sand drift problems, more and more public voices acknowledged that the opening up of the marginal areas for wheat production and the concomitant clearing of vegetation and ploughing of the soils disregarded the specificities of the natural environment.

The retreat of settlement in the Victorian Mallee and other marginal areas is intrinsically inscribed within the broader failure of soldier and closer settlement programs after the First World War.[713] Everywhere in the Commonwealth, the settlement schemes brought about financial losses to a greater or lesser extent.[714] In regard to soldier settlement projects, the factors that are generally considered as having contributed to their failure are the economic depression, leading to falling prizes of primary products, and the over-capitalization of the farms, as the land was bought during a period of unusually high prices whose real value plummeted as soon as farm products declined.[715] Other important factors were the allocation of unit sizes that were too small and the selection of settlers that often lacked capital, experience, professional training or sometimes even physical integrity.[716]

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[710] Jasper, An Historical Perspective, p. 8; William J. Lines (1991): Taming the Great South Land: A History of the Conquest of Nature in Australia, Berkeley [et al.], University of California Press, p. 187; Dunsdorfs, The Australian Wheat-growing Industry, pp. 299-307.

[711] PD, Legislative Assembly Victoria, Wheat-growing Industry, 8 May 1940, pp. 144-147; in regard to the reconstruction of marginal areas in South Australia, cf. N.N. (1942): Marginal Lands. In: *Proceedings of the Royal Geographical Society of Australasia. South Australian Branch* 43, pp. 55-70.

[712] Graeme Davison (2005): Rural Sustainability in Historical Perspective. In: Chris Cocklin/Jacqui Dibden (eds.), Sustainability and Change in Rural Australia, Sydney, University of NSW Press, pp. 38-55, here pp. 47-48; Id., (2005): The Exodists: Miles Franklin, Jill Roe and the 'drift to the metropolis'. In: *History Australia* 2 (2), pp. 35.1-35.11, here p. 35-3.

[713] Joseph M. Powell (1985): Australia's 'Failed' Soldier Settlers. In: *Australian Geographer* 16 (3), pp. 225-229; Marilyn Lake's profound analysis of the soldier settlement scheme in Victoria remains the most comprehensive study on soldier settlement schemes in Australia. Her study has encountered some criticism, directed mainly at her focus on the failure of the schemes, cf. Templeton, Set up to Fail?; Monica Kenely for example emphasises that in the Western District of Victoria, around three quarters of the soldiers settlers under the settlement scheme were still in occupation of their land in 1930, cf. Ead. (1999): Land of Hope: Soldier Settlement in the Western District of Victoria 1918-1930. Working Paper Series School of Economics, Deakin University, Geelong, Vic., Deakin University, p. 4.

[714] Lloyd/Rees, The Last Shilling, p. 223; Lake, The Limits of Hope, p. 222.

[715] For Australia in general see: Joseph M. Powell (1981): The Debt of Honour. Soldier Settlement in the Dominions, 1915-1940. In: *Journal of Australian Studies* 8, pp. 64-87, especially pp. 65-68; for Victoria, see: Lake, The Limits of Hope, pp. 133-134.

[716] Ibid.

In regard to the marginal wheat growing areas, however, the most important factor was that the settlement had been based on false assumptions concerning the climate, the natural environment and the land's productivity. Michael Quinn spoke in this context of "the failure of wider society to come to terms with the rangeland environment".[717] The role of ecological factors in the failure of settlement schemes has often been neglected in historical studies of the soldier and closer settlement schemes.[718]

3.1 Setting a Precedent: Initial Adjustments and Official Compensation

That the Australian soldier settlement schemes were fraught with problems became more and more apparent towards the middle of the 1920s.[719] On behalf of the Commonwealth, Justice Pike started an enquiry in 1927 and found that throughout Australia, 29 per cent of the soldiers had left their land.[720] In Victoria, some three thousand settlers had abandoned their allotments between 1917 and 1929.[721] This was almost a quarter of the original settlers, but the failure rate in Victoria was still lower than in the other states.[722] Boards to enquire into the soldier settlement in Victoria started work in 1927.[723] They investigated the position of 3,542 soldier settlers and found that 1,247 of their holdings were not sufficient living areas.[724] Some of them were given additional land, but this was a rather slow process: By mid-1928 only 262 settlers had obtained an increase of their holdings.[725]

Between 1918 and 1927 the Victorian public debt increased considerably, mainly due to the large expenses for soldier and civilian land settlement.[726] The most problematic region was without doubt the Mallee region.[727] Between 1920 and 1937, the state advanced the sum of £15,361,523 to settlers under the various schemes, nearly half of it, namely £6,577,819, was directed to the Mallee. As far as the actual payments during this period were concerned, however, only £3,257,481 out of the total amount of £18,900,896 was paid by Mallee settlers,

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[717] Quinn, Michael (2001): Rights to the Rangelands: European Contests of Possession in the Early 20th Century. In: *The Rangeland Journal* 23 (1), pp. 15-24, here p. 19.
[718] Marilyn Lake mentions that "poor land producing continuous crop failure was a major factor to soldier settlers' grave indebtedness in the Mallee" but pays no attention to the role of ecological factors for the failure of soldier settlement schemes, cf. Lake, The Limits of Hope, p. 121; also neglect of the ecological factors for example by Fedorowich, Unfit for Heroes.
[719] Lake, The Limits of Hope, p. 220.
[720] Lake, The Limits of Hope, p. 222; Powell, The Mapping of Soldier Settlement, p. 44.
[721] Powell, The Mapping of Soldier Settlement, p. 51.
[722] Ibid.
[723] Lake, The Limits of Hope, pp. 116, 222-223.
[724] Lake, The Limits of Hope, p. 225; Lloyd/Rees, The Last Shilling, pp. 224-225.
[725] Lake, The Limits of Hope, p. 225.
[726] Ibid., p. 220.
[727] Victoria, Report of the Closer Settlement Commission for the year ended 30 June 1933, p. 5.

not even a fifth.[728] The soldier settlers in the Mallee were often burdened with greater debts than in other parts of the state, as they had often been granted higher advances.[729] Marilyn Lake's study of Victoria suggests that in those regions that were first cleared and opened up for wheat growing, the capital expenditure was especially high as the blocks contained no pasture at the beginning and the land had to be prepared for cultivation from scratch.[730] They were often especially disadvantaged, as they started with nothing and had no local network to support them.[731]

The Great Depression with the slump of prices for agricultural products brought further financial hardship for the rural population, and the settlers under the various settlement schemes required still more support from the state to continue their operations.[732] Among those farmers that struggled most to maintain their businesses were those British settlers that had been settled under the British Migrant scheme, initiated in 1922.[733] Because of the shortage of Crown land in Victoria, the majority of the 464 migrants (family heads) that had participated under the scheme had been settled in the difficult areas of the Mallee, Gippsland, Maffra-Sale, and Katandra.[734] By 1933, 170 of them had vacated their blocks and some had even returned to England.[735]

In its endeavour to stimulate immigration, the Victorian government had painted the capacity of the land in the brightest colours.[736] From 1923 onwards, T.E. Wyatt, a longstanding officer at the Victorian Lands Department, zealously distributed information among potential English migrants, for example the pamphlets *Australia – farms for British Settlers in Victoria* and *Victoria, the Speedway to Rural prosperity*.[737] Both publications gave distorted views of the farming prospects of the Mallee:[738] In regard to the climate, *Speedway* asserted, for example, that the rainfall would vary from 280 to 380 mm, which would be sufficient to secure a good crop, as more than 75 per cent of the total fall would occur during

[728] Cf. Table 'Advances to and receipts from settlers since 1920', in: Victoria, Report of the Closer Settlement Commission for year ended 30th June 1937, p. 7.
[729] Lake, The Limits of Hope, pp. 110-111.
[730] Ibid., pp. 112, 128.
[731] Ibid.
[732] Ibid.
[733] Victoria (1933), Report of the Royal Commission on Migrant Land Settlement, pp. 2-12; see also: McDonald, Victoria's Immigration Scandal, p. 229; Kent Fedorowich (1990): Society Pets and Morning Coated Farmers: Australian Soldier Settlement and the Participation of British Ex-servicemen 1915-1939. In: *War and Society* 8 (2), pp. 38-56; Id., Unfit for Heroes, pp. 172-175.
[734] Gordon Taylor (1936): The Problems of Closer Settlement in Victoria. In: *Economic Record* 12, pp. 57-70, here pp. 62-63; McDonald, Victoria's Immigration Scandal, p. 230.
[735] Ibid.
[736] "Some extravagant representations seem to have been made", in: Victoria (1933): Report of the Royal Commission on Migrant Land Settlement, p. 8.
[737] Ibid., pp. 4-6; McDonald, Victoria's Immigration Scandal, p. 231.
[738] Victoria (1933), Report of the Royal Commission on Migrant Land Settlement, p. 8.

the growing season.[739] As we have seen, the average yearly rainfall between 1925 and 1945 would amount to 294 mm only, and in this way stay at the lower margin of the promised average.[740] The pamphlet furthermore affirmed that the average yield would be approximately seven decitonnes per hectare.[741] In reality, the average yield in the northern parts of the Mallee from 1920-1935 would amount to only around half that figure.[742] The confident assertion of the publications, that "the Mallee holds no fear for the settler" would prove tragically wrong.[743]

Altogether, 311 migrant settlers accused the Victorian government of having published false statements and made claims for compensation.[744] They argued that the public authorities had failed to furnish sufficient farm training and, most notably, had settled them on blocks with adverse climatic conditions and unsuited land of "limestone rubble" and "barren wastes".[745] At first, the government denied responsibility for the migrants' failure and emphasised the contingent factors for the lack of success, namely the drought and economic depression.[746] Determinant to get compensation, the British migrants started a vigorous lobbying campaign to make their grievance public, directing complaints to the Victorian parliament and, most effectively, to members of the English House of Commons, the English Prime Minister, and even the King.[747] It was mainly the pressure from London that finally brought about the appointment of a Royal Commission to investigate migrant land settlement.[748] The findings of the Royal Commission by and large agreed with the migrant settlers' claims: its conclusion was that the scheme in general was a failure and that the Victorian government was largely at fault.[749] As far as the blocks in the north-western Mallee were concerned, the Commission had found that in the face of the competition between Australian and British applicants for land, the migrant settlers had often received the inferior and more remote blocks.[750] Even more important was the fact that the land allocated was in most cases unsuited to the designated land use.[751] The government was responsible, because the information available on the quality of soil and on the amount of rainfall in the Mallee had

[739] Quoted in ibid.
[740] See Figure 5.
[741] Victoria (1933), Report of the Royal Commission on Migrant Land Settlement, p. 8.
[742] 'Average wheat returns in various northern mallee localities', Appendix B, in: Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1935, p. 6.
[743] Quoted in: Victoria (1933), Report of the Royal Commission on Migrant Land Settlement, pp. 8-9.
[744] McDonald, Victoria's Immigration Scandal, p. 230.
[745] Ibid., pp. 231-232.
[746] Ibid.
[747] Ibid.
[748] Ibid.; Roe, Australia, Britain and Migration, pp. 152-153.
[749] Victoria (1933), Report of the Royal Commission on Migrant Land Settlement, pp. 15-17.
[750] Ibid., p. 21.
[751] Ibid., p. 18.

not been "enough to justify confidence that either soil or rainfall would allow for farming to be carried on successfully even by experienced Australians upon the blocks allocated to the complainants".[752] The report stated prosaically: "Indeed, the contrary is indicated".[753] Its final statement on the Mallee blocks asserted: "The blocks allocated to the migrants varied in merit, but none of them fulfilled the state's obligations. Either the quality or area, or both, coupled with climatic conditions, caused it to be deficient".[754] It was evident that the government had ignored the natural limits of the land.

Having the authority of the Royal Commission at their back, the migrants could enforce their claims: In 1933 the Migrants' Agreement Bill and the Migrant Settlement Bill passed by the Victorian and federal governments respectively secured the funds for their compensation.[755] The pressure from the mother country to pass the Acts was crucial, as Australia's reputation as an immigration country was at stake. Accounts of the migrant settlers' experience appeared in the English press, one of the most sensational was certainly that of British ex-servicemen Charles Clark in the British newspaper *Star*. The article, published in July 1933, was entitled "Emigrants' Awful Life in Australia. Toll of the Bush. 1,500 settlers – Most of them Dead or Insane - 'Struck Hell': London Man's Story" and presented Clark's experience in Australia as a 'typical case'.[756] In his account, Clark described the natural environment of his holding in most unfavourable terms and emphasised that the land had been totally inappropriate for cultivation:

> […] the land was not fit for blacks to live in, let alone whites. For four years [I] pitted my strength against the bush, battered by sand storms and wind storms, plagued by 14ft snakes, dingoes, and blinding flies. […] Year after year we sowed our crop, and harvested nothing. The earth was white with salt deposit, showing that it was fit only for eucalyptus and turpentine.[757]

The Migrant Acts recognised the claims of the British migrants and allowed for a basic compensation of £300 for each settler and £50 for each child, with a maximum of £500 for each family.[758] Also, all liabilities to the state and local governments were written off, as well as the most pressing personal debts.[759] Those settlers who wanted to stay on the land would be

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[752] Ibid., pp. 20-21.
[753] Ibid.
[754] Ibid.
[755] McDonald, Victoria's Immigration Scandal, p. 233.
[756] Reported in: PD, Legislative Assembly Victoria, British Migrants Agreement Bill, 9 November 1933, pp. 2333-2334. For a later account of the hardship endured by the migrant settlers in the Australian press, see for example: Bill Moore, 'Fighting Battle Against Dust, Drought. Family Forced to Leave Home, Land', *The Daily Telegraph*, 28 November 1944.
[757] Quoted in: PD, Legislative Assembly Victoria, British Migrants Agreement Bill, 9 November 1933, pp. 2333-2334.
[758] McDonald, Victoria's Immigration Scandal, p. 233.
[759] Ibid.

compensated analogously: They would get additional land or receive a new block. Additionally, they would obtain £100 cash and get their capital liability written off in an amount equivalent to what they would have received had they vacated their blocks, less the £100.[760] Migrants had a month to decide whether they would leave their blocks or not.[761] Most of them did not lose any sleep over the question: when the compensation money was first paid to the settlers in 1934, many migrants in Victoria promptly turned back to England.[762] By May, 1934 the claims of 184 migrant settlers had been fully allowed for under the British Migrants' Agreement Act, and a further 13 who had been partly recompensed. The expenditure to this date was £80,000.[763] Compensation had also been paid to all but 2 of the 13 families who had returned to England before the passing of the Act.[764] In the Mallee 43 settlers vacated their blocks under the terms of the Migrants Agreement Act between 1933 and 1938.[765]

The failure of the British migrant settlement scheme impressively brought forward the limits of the Victorian rangelands.[766] The fact that the government was held responsible for the failure and had to pay compensation to the English settlers gave an impetus to Australian settlers in closer and soldier settlement schemes. The Australian settlers naturally requested to be treated on equal terms with their comrades from overseas.[767] Thus, 'Victoria's immigration scandal' contributed not only to the re-evaluation of the marginal lands of the Mallee in the public opinion, but also accelerated political measures that would provide compensation for Australian settlers as well.[768]

3.2 Organised Retreat: The Victorian Closer Settlement Commission

At the same time that the Victorian government was facing the claims of British migrants, it also had to cope with the financial and social disaster that was taking place under the other settlement schemes. The Great Depression and the fall of world market prices for Australia's primary products had badly affected all primary producers, but especially those who were heavily indebted like many farmers settled under the soldier and closer settlement

[760] Ibid.
[761] Ibid., pp. 233-234.
[762] Ibid., p. 235.
[763] 'Migrant Settlers. £80,000 Compensation Paid', *The (Melbourne) Argus*, 8 May 1934.
[764] Ibid.
[765] During the terms of the Closer settlement commission; cf.: Victoria (1940): Report from the Parliamentary Public Works Committee on the Position of Settlers on Isolated Holdings in Mallee Districts, p. 5.
[766] McDonald, Victoria's Immigration Scandal, pp. 235-236.
[767] PD, Legislative Assembly Victoria, British Migrants Agreement Bill, 14 November 1933, pp. 2393, 2395.
[768] Lake, The Limits of Hope, p. 234; McDonald, Victoria's Immigration Scandal, p. 237, endnote 41.

schemes.[769] As the debts of the settlers increased, the Victorian government replaced the Closer Settlement Board in 1933 with a Closer Settlement Commission in order to remove the administration from political and ministerial control and to render it more efficient.[770] Clive McPherson, a Melbourne businessman, was appointed head of the new commission and charged with the task of readjusting the holdings of those settlers with good prospects of success and to eliminate the hopeless cases.[771] The working period of the Closer Settlement Commission was limited; the aim was that after 1937, the remaining settlers would be able to continue without further advances from the government.[772] Particular attention was paid to the Mallee, especially the 'New Mallee', as it was the district responsible for the majority of unpaid debts.[773] The Commission acknowledged that, especially in the Mallee, land had been given to settlers that was unsuited for the intended land use. The Commission classified certain areas in the Mallee as unfit for wheat production as the average yields were unprofitable and advised its withdrawal from cereal growing.[774] For those settlers with a good record, it suggested compensation. The Parliament followed the recommendation and passed a provision in the same year (1933) under the Closer Settlement Act that authorised the Commission to pay up to a maximum £100 as compensation to those settlers whose blocks had been classified as inappropriate.[775] They could also have their liabilities on the land and further advances to the state written off if they were found to have not been responsible for their situation.[776]

The acknowledgement of the ill-suitedness of the land was in some way a moral victory for the settlers.[777] As Marilyn Lake has shown, when soldier settlers failed to fulfil their financial obligations, the official administrators often blamed flaws in their character for this failure, referring to conservative yeomanry ideology and insinuating that the settlers were not genuine 'triers'.[778] Even so, the £100 compensation for settlers who had given all their financial resources as well as the best years of their worklife to their blocks, with little

[769] Lake, The Limits of Hope, p. 228; Fedorowich, Unfit for Heroes, p. 175.
[770] Lake, The Limits of Hope, p. 233; Taylor, The Problems of Closer Settlement, pp. 68-69.
[771] See also Lake, The Limits of Hope, p. 233.
[772] Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1935, p. 3.
[773] Ibid., p. 4.
[774] Ibid., p. 3.
[775] Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1937, p. 4; Lake, The Limits of Hope, pp. 234-235.
[776] Ibid.
[777] Ibid., p. 236.
[778] Ibid., p. 203.

prospect for a brighter future elsewhere, was considered by many Mallee people as too small and aroused opposition.[779]

When the Closer Settlement Commission inspected parts of the Millewa in February 1935, for example, and told some farmers they had to leave their holdings because the land was inapt, the Commission met severe resistance.[780] Similar opposition was aroused in the county of Karkarooc, where in 1935 the Carwarp district, situated between Ouyen and Red Cliffs, was declared as unsuitable for wheat growing, and seventeen of its settlers protested against the proposal and demanded higher compensation.[781] Out of these protests emerged a veritable, well-organised public campaign to amend the Closer Settlement Act, especially section 13, which fixed the maximum compensation at £100, to increase the compensation to a minimum of £500. The campaign was in the main driven by the Mallee Women's and Settler's Association, which also established for this purpose a Mallee Settlers' Protection Committee, and the Returned Soldiers League.[782] As a result of this campaign, ten United Australia Party members of the Victorian Parliament undertook a four day study tour to investigate in the settlement of the northern Mallee in October 1935.[783] What they saw were "lost crops, broken hopes, drifting sand, ruin".[784] After visiting the Carwarp district, members were reported to have stated to have seen "an incredible blunder in land settlement".[785] In addition to the economic and climatic reasons for the desolate situation of the settlers, the problem of wind erosion appeared as one important contributing factor. Between Mildura and Redcliffs, the members of the tour were reported to have seen:

> Ridges of drifting sand rolled out into the distance, and where crops had once been sown were often hard beds of gray limestone, laid bare by wind erosion. Mounds of sand which half smothered some crops made a desolate spectacle. Once the motor-cars made a detour over a fence covered by sand.[786]

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[779] For example: 'The Plight of the Mallee Farmer. Editor's Mail Bag', *Sunraysia Daily*, 11 February 1935.
[780] For example in February 1935, when 20 farms in the Millewa were designated as unsuitable for farming operations and found necessary to be vacated, cf. 'Treatment of Mallee Settlers', *Sunraysia Daily*, 14 February 1935.
[781] 'Farmers Seek Help from State Ministers', *The (Melbourne) Argus*, 18 April 1935.
[782] 'Mallee Settlers. Their Claims Pressed', *Sunraysia Daily*, 22 October 1935; 'Treatment of Mallee Settlers', *Sunraysia Daily*, 14 February 1935; 'Mallee Settlers. Compensation of £500 Desired', *Sunraysia Daily*, 19 October 1935; 'Stick to the Land! Advice to soldier settlers. Disregard the £ 100 Offers', *Sunraysia Daily*, 1st November 1935; 'Mallee Settlers A Generous Concession', *Sunraysia Daily*, 5 November 1935; 'Mallee Women and Country Party. Letter to the Editor', *Sunraysia Daily*, 29 October 1935; 'Editor's Mail Bag. Mallee Women's Request', *Sunraysia Daily*, 12 November 1935.
[783] 'Parliamentarians' Close-Up View Of Misery in Mallee', *Sunraysia Daily*, 12 October 1935.
[784] 'Lost Crops. Broken Hopes. Drifting Sand-Ruin', *The (Melbourne) Argus*, 12 October 1935.
[785] Ibid.
[786] Ibid.

Similar scenes were encountered by the investigative tour in the Millewa, where the tour passed by "what might have been a normal crop covered by a pall of drift sand". MP Allnutt was reported to have "pointed out a dreary stretch barren of vegetation which had been cleared for settlement" and to have asserted that on this stretch blue bush had once grown there which had been a good pasture to raise sheep.[787] The suggestion to transfer some of the Mallee lands into mixed farming or grazing areas was not only advanced because this seemed to be the only way to turn the land into something economically productive, but also because this would "free land from intense cultivation to check sand drift".[788]

In the debates of the Closer Settlement (Financial) Bill on the funding of the work of the Closer Settlement Commission, in October and November 1935, several members from the United Australia Party criticised the settlement of the Northern Mallee and referred to wind erosion problems. When Vinton Smith, for example, spoke of the dust storms that occurred in the Mallee, he pointed to the unreliable climatic conditions and declared that in the light of the huge expenses to clear the SRWSC channels from sand drift "certain parts of the Mallee should never have been settled".[789] John Cain from the Labor Party was not prepared to go so far as to label the Mallee a "complete failure" but criticised the government policy to settle people in an area where there was not enough rainfall. He stated that the Mallee was "now wind-swept and sand blown because it has been denuded of its natural timber" a point on which "the settlers may be criticized", a criticism that would apply to farmers in many other parts of the state as well.[790] He strongly supported leaving suitable settlers on the land when the prospects indicated that they would be successful as mixed farmers.[791] While Minister of Lands Albert Lind (Country Party) admitted that the Mallee had given him "a good deal of concerns" and "headaches" he still insisted that the "North-West Mallee [was] quite attractive country in a good season".[792] Lind reluctantly acknowledged that – while in his eyes the land was by no means unsuitable – there were parts where the rainfall was below what is sufficient for any country.[793]

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[787] 'Problem of Northern Mallee', in: *The (Melbourne) Argus*, 15 October 1935.
[788] 'Lost Crops. Broken Hopes. Drifting Sand-Ruin', *The (Melbourne) Argus*, 12 October 1935.
[789] Mr. Lind, in: PD, Legislative Assembly Victoria, Closer Settlement (Financial Bill), 23 October 1935, p. 3798.
[790] Mr. Cain, in: PD, Legislative Assembly Victoria, Closer Settlement (Financial) Bill, 6 November 1935, p. 4145.
[791] Ibid.
[792] Mr. Lind, in: PD, Legislative Assembly Victoria, Closer Settlement (Financial) Bill, 6 November 1935, p. 4147.
[793] Ibid.

In the Victorian press, the removal of Mallee settlers was also linked with the wind erosion problem. In October 1935, the *Argus* featured a story about "A heritage scattered" where it explicitly linked the abandonment of the Mallee with man-made wind erosion:

> Soil destruction has become one of the major menaces of the world. Members of the Victorian Parliament who visited portions of the Mallee during the week-end witnessed scenes of desolation. […] The natural cover having been removed, the surface of the soil is exposed to the winds and has been swept away over large areas. The mallee bush which presented itself in the first light an impediment to progress in reality formed a large part of Nature's plan.[794]

In September 1936, taking up the claim of the veterans that had been settled in the Mallee, some members of the UAP opposition proposed to increase the compensation sum from £100 up to a maximum £250.[795] In this context, Archie Michaelis (UAP) emphasised the vulnerability of the Mallee soils to wind erosion:

> There are, particularly in the northern Mallee, a certain number of settlers who cannot do any good with their blocks, and have been, or are about to be, removed from them by the Commission, owing very largely to the fact that the land on which the men were settled in the first place was totally unsuitable for settlement. […] I think the honorouble member for Mildura, who knows more about that area than does any other honorable member, will agree that the very fact **that the cultivation of that land was started meant the ruination of the land, because the soil is of a very sandy nature**. Originally it was covered with Mallee scrub, under which there was a light growth of thin grass. As soon as the settlers took over the land they chopped down the trees and ploughed up the fields, with the result that the light soil became useless, and was rapidly blown away to other paddocks. We went on to blocks some of which made us literally heart-sick. On the block of ground at Yatpool where a school is situated, we saw children playing, and noticed that the ground consisted of limestone rock. What had been on the top of it had been blown away.[796] [Emphasis mine]

Opposition leader Sir Stanley Argyle (UAP) took the same line and pointed at the responsibility of the parliament and the government, as they had settled men in climatic conditions where "they could not make good".[797] Fellow party member Vinton Smith (UAP) (Oakleigh) attested that in his eyes, "setting a person up in the Sahara desert is comparable with setting a person up in certain parts of the Carwarp area".[798] The Country Party members, however, disavowed those arguments. Minister of Lands Albert Lind (Country party) was strictly against any interference with the work of the Closer Settlement Commission and – just like Premier Albert Dunstan – emphasised his faith in a great part of the Mallee. He and the government were "desirous of keeping as many of these settlers on their blocks as is possible provided always that they have a reasonable chance of success".[799] Albert Dunstan saw the

[794] 'A Heritage scattered', *The (Melbourne) Argus*, 15 October 1935.
[795] PD, Legislative Assembly Victoria, Land Settlement, 16 September 1936, pp. 1508-1543.
[796] Ibid., pp. 1520-1521.
[797] Ibid., p. 1542.
[798] Ibid.
[799] Ibid., p. 1519.

cause for the settler's plight in the economic factors and explained the low yields with bad farming techniques, insisting that the problems were "certainly not due to the inferior quality of the soil".[800] After several prolongations, the vote brought about a majority against the motion.

In the meantime, however, the abandonment of the Victorian Mallee was more closely linked with the occurrence of wind erosion, even outside of Victoria. In 1936, the *Sydney Morning Herald* reported on the New South Wales Soil Erosion Committee inspecting the northern part of the Victorian Mallee under the title "Sand Drift. Tragedy of the Mallee":

> Since the timber was removed and the soil ploughed the wind has played havoc with the exposed soil surfaces, and so acute is the problem that settlers have had to walk off their blocks. In fact, it is stated that some have been paid £100 to leave. Many of the occupants were soldier settlers and others were British migrants who returned to England very discontented.[801]

Alarmed by the sand drift problem, the Victorian government appointed W. J. Zimmer, Chief Forester of the Mildura District, to study the problem of sand drift in Victoria's north-west in 1937.[802] In his report on the sand drift problem in the counties of Millewa and Karkarooc, Zimmer stated that from the original 1084 blocks, 420 were abandoned on 28 February, 1937.[803] While he assessed that "this exodus [was] not due to sand drift but to the impossibility of farmers making a financial success of an undertaking which at the best was an extremely precarious one", Zimmer left no doubt that one of the main causes of wind erosion was the "ill-considered selection of areas for cereal growing". He continued that "the prevention of soil erosion is a matter of urgency, not only because of the huge financial loss which is involved in keeping roads, channels and railway lines open, but on account of the great deterioration of soils affected by wind." Especially the Mallee dust storms would be damaging, as they would carry away the finer and more valuable parts of the soil.[804] The correspondence indicates that Zimmer's report was not published, as it was considered as being too critical towards the government.[805]

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[800] Ibid., p. 1537.
[801] 'Sand Drift. Tragedy of the Mallee', *Sydney Morning Herald*, 25 April 1936.
[802] Andrews McCormick (2010): Closer Settlement in the Mallee. Dust Followed the Plough: The Millewa in the 1930s and 1940s, Master Thesis, Bendigo, La Trobe University, pp. 101-102.
[803] W. J. Zimmer (1937): The Sand Drift Problem in the Counties of Millewa and Karkarooc, pp. 16-17, in: [PROV, VA 534 Department of State Forests (Forests Commission), VPRS 11563/P1, General Correspondence Files, Annual Single Number System I, Unit 241, 45/83 Research into Soil Erosion, paper by Zimmer, Photos].
[804] Ibid., p. 11.
[805] Cf. correspondence in: [PROV, VA 534 Department of State Forests (Forests Commission), VPRS 11563/P1, General Correspondence Files, Annual Single Number System I, Unit 241, 45/83 Research into Soil Erosion, paper by Zimmer, Photos].

Fig. 11: Abandoning the Mallee dust bowl.
From the photographic album of Samuel Clayton.
[Mitchell Library, Sydney, New South Wales.
Manuscript Series 6745 (Eric Elwin Samuel Clayton Papers), 1910-1987 (Box4)].

In the whole of Victoria between 1933 and 1937 the number amounts to 1,656 cases that were paid up to £100 to leave the land under the provision of the 1933 Act for a total sum of £133,291.[806] All in all, the Commission had declared 275,811 hectares (681,544 acres) of land as unsuitable for closer settlement, the large majority, namely 234,221 hectares (578,773 acres) of it in the northern Mallee.[807] Those blocks situated in areas of the Mallee judged as suitable for wheatgrowing were increased to 518 and 607 hectares.[808] The blocks that were declared unsuitable for cereal growing reverted to the Lands Department. In contrast to the regions outside the Mallee, where the blocks vacated by the settlers were usually sold by public tender or by auction, the Mallee blocks were then licensed at areas of from 1,214 to 2,428 hectares for a term of years, at rental averaging 7.4 d./ha.[809] The lands were licensed for

[806] Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1937, p. 4; Lake, The Limits of Hope, p. 124.
[807] Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1937, p. 7.
[808] Respectively 1,280 and 1,500 acres, cf.: '500 Mallee farms. Unsuited to wheat-Transfer of occupants', *Sunraysia Daily*, 13 June 1935; 'Not suitable for growing wheat, 500 blocks in Mallee', *The (Melbourne) Argus*, 13 June 1935.
[809] Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1935, pp. 3-4; Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1937, p. 6.

pastoral use, with a sideline of cultivation for stock feeding. From an economic point of view, this was considered by the Closer Settlement Commission as positive, as "instead of making continuous advances which experience has proved to be irrecoverable, the State is actually receiving a rental average 3d. per acre per annum for the area licensed in large blocks".[810] In 1938, when the Closer Settlement Commission completed its affairs, 2,773 settlers had vacated their holdings, 1,127 of them from the Mallee since 1933.[811] The two Mallee counties of the Millewa and Karkarooc (being the most marginal) spoke for about 39 per cent of settlers that abandoned their blocks up to 1937.[812]

In its report in 1937, the Commission was quite optimistic about achieving its goal in enabling the remaining settlers on the land to continue without further advances by the government.[813] As far as the Mallee was concerned, it stated that a large majority of the settlers were now on holdings equalling 'living areas'. As the average settler now would also be more efficient and the average acreage larger, thus allowing for better maintenance of the cultivation area, the average wheat-yield was expected to be "very considerably increased in the future" and the outlook of the Mallee was judged as being "of much greater promise than in the past".[814]

The 1930s saw similar developments in the other marginal areas of Australia's south-east: In South Australia, official concerns rose in 1930 about the degradation of the marginal areas and declining yields.[815] The following year, the government set up an Agricultural Settlement Committee that among other things anticipated the idea of evacuating farmers from the marginal areas, an idea that was not put into action for the time being.[816] In New South Wales, the government appointed a committee in 1935 to survey the area of the South-West Mallee around Cargellio and Hilston, an area of 1.2 million hectares (3 million acres) where about 2,000 farmers had been settled for wheat growing in the early decades of the 20th century.[817] It came to the conclusion that the most suitable land use method for the area was mixed-farming and that consequently, the size of the holdings had to be increased. The

[810] Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1937, p. 7.
[811] Commonwealth of Australia, RRC (1944): Financial and Economic Reconstruction of Farms: The Commission's Fourth Report, p. 71.
[812] W. J. Zimmer (1937): The Sand Drift Problem in the Counties of Millewa and Karkarooc, pp. 16-17, in: [PROV, VA 534, VPRS 11563/P1, Unit 241, 45/83].
[813] Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1938, p. 3.
[814] Victoria, Report of the Closer Settlement Commission for the year ended 30th June 1937, p. 7; 'New Hope for the Mallee. Prosperity Where Despair Previously Reigned', *The Countryman*, 2 July 1937.
[815] South Australia (1948): Report of the Pastoral and Marginal Agricultural Areas Enquiry Committee, p. 6.
[816] Dunsdorfs, Australian Wheat-growing Industry, p. 301; Williams, The Making of the South Australian Landscape, p. 300.
[817] Commonwealth of Australia, RRC (1944) (4th report): Financial and Economic Reconstruction of Farms. Appendix 1: A detailed account of marginal wheat area schemes, p. 68; Dunsdorfs, The Australian Wheat-growing Industry, p. 303.

Rural Reconstruction Board of New South Wales subsequently established a scheme for inducing about half of the remaining 1,700 to 1,800 farmers to vacate their holdings, thus enabling the remaining ones to obtain additional land and enlarge their holdings.[818] The government fixed the maximum compensation at £300.[819] By May 1939, a total of 173 farmers had agreed to vacate;[820] in September 1940 the number had risen to 274 and more than £63,000 had already been paid.[821] In Western Australia, the state government commenced the reconstruction of the marginal wheat lands in the Lakes district and the Esperance in 1937, again based on the principles of transferring the lands to mixed farming and evacuating parts of the settlers.[822]

3.3 Federal Action and Reconstruction of the Marginal Areas

The optimism displayed by the Commission in 1937 was misguided. As we have seen, a series of three consecutive droughts began in 1937 over much of south-eastern Australia and brought new distress for the Mallee region and other marginal areas. In 1938, the state government established a drought relief fund for drought-affected farmers.[823]

More and more settlers of the marginal areas could not afford to continue farming, and many left the countryside in the search for work. As increasing numbers of settlers left the region, community life was seriously affected, as farmer Charles Coote noted in 1941 in his diary:

> The long continued drought is a very adverse factor. It is said that upwards of 30 families have left QK. The hospital is closed after operating for 19 years. There is no Doctor although for over 20 years there has been a resident doctor in QK until resintly [sic]. Wind storms have filled channels + and in some areas covered fences. Many farmers who a few years ago were comfortably off are getting sustenance.[824]

In the Victorian parliament, some members warned that if the erosion problem was not successfully dealt with, the very survival of the Mallee rested on a knife edge.[825] The problems of wind erosion were by now considered as a serious factor for the breakdown of

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[818] Dunsdorfs, The Australian Wheat-growing Industry, p. 303; 'Must prepare for big trek from sth.-west', *The Land*, 25 November 1938; 'New South Wales. South-West Areas to be Vacated', *The Countryman*, 2 December 1938.
[819] Ibid.
[820] Commonwealth of Australia, RRC (1944) (4th report): Financial and Economic Reconstruction of Farms. Appendix 1: A detailed account of marginal wheat area schemes, p. 68.
[821] 'Progress of S. West Reconstruction Plan', *The Land*, 20 September 1940; Dunsdorfs, The Australian Wheat-growing Industry, p. 303.
[822] Dunsdorfs, The Australian Wheat-growing Industry, p. 305.
[823] Keating, The Drought Walked Through, p. 124.
[824] Charles Coote Diary, 6 April 1941.
[825] William H. Everard (Nationalist-UAP) stated that "unless the problem is dealt with in a systematic way, within 50 or 100 years the Mallee will be a thing of the past", in: PD, Legislative Assembly Victoria, Grievances, 13 July 1939, pp. 267-268.

the region, and the Mallee was repeatedly compared to the US Dust Bowl. In the Legislative Assembly, the following verbal exchange took place in 1940:

> Mr. McKenzie: In four years, 160,000 persons have left the 'Dust Bowl' in the United States of America. They were driven because of the depredations of erosion. The settlement of the Mallee is of comparatively recent date, but if something is not done in the near future to check erosion a similar exodus may take place from that area.
> Mr. Everard: The exodus has already commenced.
> Mr. Cameron: It is only temporarily.[826]

The same year, Harold Hanslow, Commissioner at the SRWSC warned along the same lines: "In four years 160,000 persons left the Dust Bowl in the United States of America. If something is not done to prevent the soil losses in the Mallee, a similar exodus may happen there".[827]

As similar problems occurred in all of the marginal areas of Australia's wheat growing industry, the Commonwealth saw a need for action. In 1939 the Commonwealth agreed to aid the stabilization of Australia's wheat growing industry by providing funds to relieve distressed farmers and remove wheat growers from marginal areas.[828] In this context, the states defined what they considered to be a marginal area, which resulted in different definitions for each of the states.[829] South Australia adopted, for example, the legal definition of 'marginal lands' as:

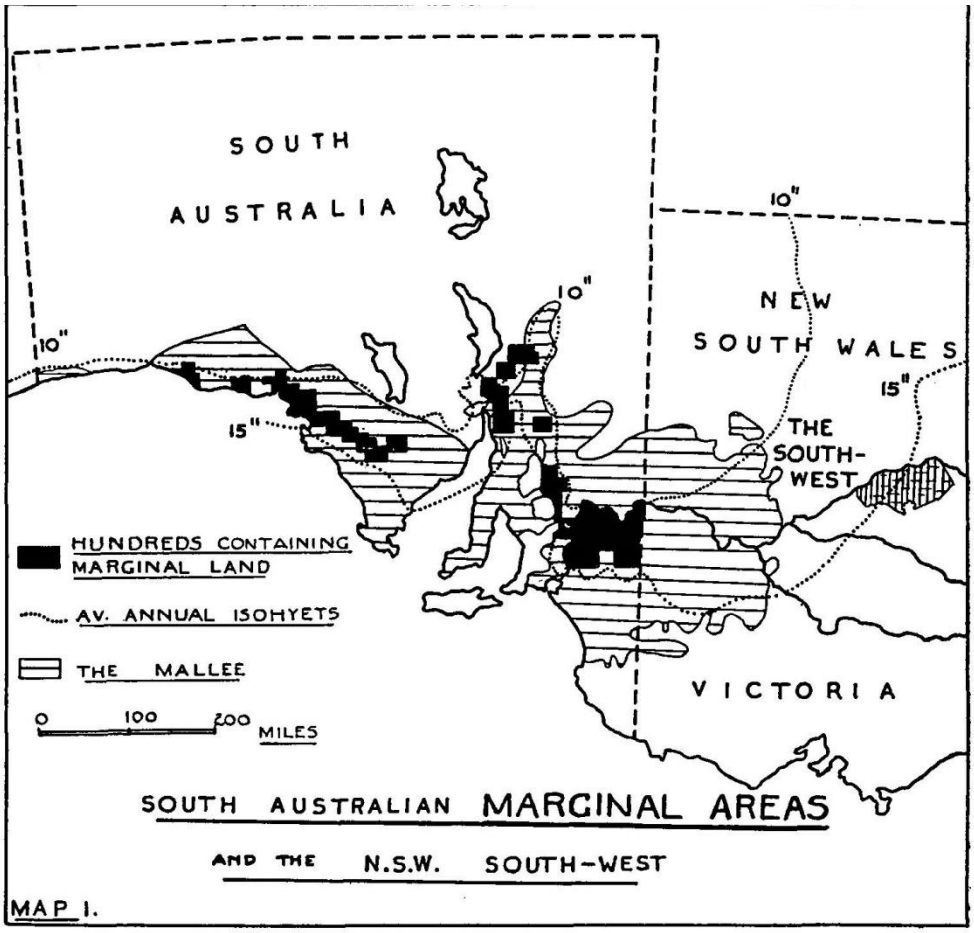
> Marginal wheat areas are areas which have been subdivided into blocks intended principally for wheat growing and which have been utilized mainly for that purpose, but owing to the combination of an inadequate rainfall and unsuitable land, have proved to be unsuitable for wheat as a major operation.[830]

In Victoria, after the work of the Closer Settlement Commission, there were only 546 settlers left in those regions considered as marginal, namely in the Mallee region north of the Ouyen and Managatang line.[831] The first plan submitted by the Victorian government in 1940 targeted 309,584 hectares (765,000 acres) and 273 settlers, but was not accepted by the Commonwealth.[832] In 1941, the Victorian Minister for Lands then submitted a scheme to the

[826] PD, Legislative Assembly Victoria, 19 November 1940, p. 1647.
[827] Harold Hanslow (1940): Soil Erosion as it Affects the Farmer. In: Charles T. Clark (ed.): Soil Erosion in Victoria, p. 43.
[828] PD, Legislative Assembly Victoria, Wheat-growing Industry, 8 May 1940, pp. 144-147.
[829] Marjorie L. Proctor (1940): Marginal Land. South Australia and New South Wales Compared. In: *Australian Geographer* 3 (8), pp. 16-31, here pp. 17-20.
[830] N. N. (1942), Marginal Lands, pp. 55-56; Dunsdorfs, The Australian Wheat-growing Industry, p. 300.
[831] Commonwealth of Australia, RRC (1944) (4th report): Financial and Economic Reconstruction of Farms, p. 71; 'Marginal Areas', *Sunraysia Daily*, 29 October 1941.
[832] Dunsdorfs, The Australian Wheat-growing Industry, p. 305.

Commonwealth concerning 320,000 hectares (800,000 acres) situated in the north-western part of the Mallee, where 530 settlers were located.[833]

Fig. 12: Marginal lands of South Australia.
[Proctor (1940): Marginal Land. South Australia and New South Wales Compared. In: *Australian Geographer* 3 (8), pp. 16-31. Here: Figure 1, p. 19].



The scheme anticipated removing 300 settlers and enlarging the remaining 230 holdings by at least 1,000 hectares (2,500 acres), each with sheep as the main source of revenue and only a limited amount of cereal growing.[834] Under this agreement, payments of up to £320 could be made to settlers who voluntarily vacated their holdings; settlers could also retain their stock and plant.[835] In total, the scheme was estimated to amount to up to £187,000.[836] While this scheme was approved, its realization did not progress as planned. Causes for the poor implementation were the improvement of the seasonal conditions, the

[833] Ibid., p. 306.
[834] Commonwealth of Australia, RRC (1944) (4th report): Financial and Economic Reconstruction of Farms, p. 71; Dunsdorfs, Australian Wheat-growing Industry, p. 306.
[835] Victoria (1946): North west Mallee facts finding committee 15th July 1946, p. 4; Dunsdorfs, The Australian Wheat-growing industry, p. 306.
[836] Ibid.

shortage of labour and material and especially its largely voluntary character.[837] Also, some settlers who lived in the districts declared as unsuited for cereal growing opposed the proposition, as they felt that the area was stigmatised.[838] The situation in the Mallee stayed uncertain, and public voices like those of East claimed that the whole of the Millewa should be turned into grazing lands.[839]

To investigate the situation, the Victorian government established a "North West Mallee Facts Finding Committee" in 1946. In its report, the Committee observed that the objective to reconstruct the marginal area in Victoria was "far from attainment".[840] The Committee found that the vacated holdings that had been mainly

> [...] leased on annual license for grazing and/ or cultivation had led to 'bad farm husbandry' (especially overstocking) and the results [could] be seen right through the area in the form of wind erosion. Much cleared land [had] been denuded of topsoil, fences [had] disappeared, roads been rendered impassible and water channels been made unusable.[841]

Therefore, in the eyes of the Commission, the actual position in the northern Mallee constituted "a definite menace to the future of the whole area" and the time for a "complete plan of re-organization"[842] was considered as being overdue. The Committee made recommendations on the land utilization most suited to the different zones in the Mallee. In those suggestions, considerations about soil conservation played a key role: Within the 'regional problem areas' comprising the Millewa-Carwarp Area as well as the Nulkwyne, Annuello, and Kooloonong Area, the Commission recommended wheat cultivation only in parts of the region where good soils were found and then only on a long rotation "providing soil conservation precautions are taken".[843] In these areas the approximate minimum area of holdings should be ca. 1,200 hectares of cleared land with about ca. 160 hectares of wheat cropped annually and about 500 dry sheep. Where the soils were not suited for cultivation, the area should be ca. 4,000 hectares with about 1,200 to 1,500 dry sheep on it.[844] The Committee recommended placing as much land as possible under perpetual lease and recommended including special conditions like the prevention of further clearing of timber and /or scrub without prior consent of the Board of Land and Work. The number of stock to be carried on

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[837] Ibid.
[838] 'Further Exodus from Northern Districts Feared. Swan Hill D.C. Wants Marginal Area Scheme Amended', *The Countryman*, 24 October 1941.
[839] 'Millewa, Failure as Wheat Area. Reversion to Grazing Urged by Expert', *The (Melbourne) Herald*, 15 February 1945.
[840] Victoria (1946): North west Mallee facts finding committee 15th July 1946, p. 4.
[841] Ibid.
[842] Ibid.
[843] Ibid., p. 5.
[844] Ibid., p. 6; in 1965 there were some 200 settlers in the Millewa, all on holdings exceeding 1214 hectares, cf. East, Water in the Mallee, p. 51.

the 'holding' should be limited and the board of Land and Work should receive the power to compel the lessee to reduce the number of stock carried if land degradation became apparent. The Lessee should also be required to take any action considered necessary by the Board of Land and Works for the preservation and conservation of the soil; furthermore, in most parts, land within 100 metres (five chains) of any water supply channel or other work maintained by the Water Supply Authority was not allowed to be cleared or cultivated without the consent of the authority.[845] If those conditions were observed, the Commission was confident that the erosion problems in the Mallee would be eased.[846]

As a result of the suggestions, the North-West Mallee Settlement Areas Act was passed in 1948, providing for most of the Commission's recommendation.[847] Closer settlement of the Mallee had been a failure and had proved costly not only for the public purse but also for the environment. If one looks at the population numbers of the Mallee, this failure becomes apparent: In 1921, there were 41,763 persons in the Mallee, a number that increased to 63,404 in 1933.[848] In the following years, however, more and more settlers left the Mallee so that in 1947 the number had fallen to only 48,474. If it had not been for the increase in population of nearly 3,000 in the local government area 'Mildura City', the loss of population would have been even higher. In the county of Millewa, only 118 farmers with their families stayed after the readjustment, while those who left were compensated up to £750.[849]

Behind each of these numbers was an individual story. Among those who left under the provisions of the North-West Mallee Settlement Areas Act was Mr. Green, who had a block in the parish of Tunart in the Millewa. He had taken over the block when in 1944 he married the widow of the original owner, William R. Hill, who had died in 1942. Hill, an ex-soldier, had taken up the allotment of 312 hectares (771 acres) under Crown Lease in 1926 and had struggled all along to pay the annual leases, despite some adjustments.[850] When Green took over the allotment in 1944, it showed clear signs of erosion: The report of the closer settlement inspector of October 1944 stated that "soil erosion was particularly bad on this property until this year", but affirmed that it had improved thanks to Mr. Green's tillage methods. The report of November 1945 mentioned, however, that "wind had caused soil

[845] Cf. Dunsdorfs, The Australian Wheat-growing Industry, p. 306; Victoria (1946): North west Mallee facts finding committee 15th July 1946, pp. 8-9.
[846] Victoria (1946): North west Mallee facts finding committee 15th July 1946, p. 14.
[847] North-West Mallee Settlement Areas Act, 1948; Dunsdorfs, The Australian Wheat-growing Industry, p. 306.
[848] Victorian Year Book, 1932-33, pp. 270-275; Victorian Year Book, 1945-46, pp. 518-519.
[849] *Sunraysia Daily*, 8 October 1948, quoted in: McCormick, Closer Settlement in the Mallee, p. 104.
[850] [PROV, VA 538 Department of Crown Lands and Survey, VPRS 5714/P0, Land Selection Files, Section 12 closer Settlement Act 1938 [including obsolete abd top numbered Closer Settlement and WW1 Discharged Soldier Settlement files], Unit 2190, 720/12 William Richard Hill Deceased Estate Tunart].

erosion to an alarming extent on the property" in the first half of the year, but that the natural regrowth of vegetation after the rain had rectified the situation and gave hope for the future. Still, even after the break of the drought, Mr. Green was not able to pay back his debts and finally, in 1948, applied for a cancellation of lease and received a compensation of £750.[851]

After the Commonwealth had announced its support for the marginal areas in 1939, New South Wales likewise extended its previous scheme concerning the marginal areas in the Hilston-Lake Cargellico district. It now targeted an area of a total of about 1.6 million hectares with 2,600 to 3,000 settlers, half of whom were planned to be evacuated at an estimated costs of about £2.2 million in four years.[852] The scheme planned to increase the acreage of the remaining holdings of the marginal wheat area from around 280 to 810 hectares to around 570 to 2,020 hectares.[853] These areas should be grazing areas, with only a minority of wheat growing as sideline.[854] Problems were encountered, as most of the lands were privately owned, and some settlers were reluctant to give up their lands.[855] The drought of 1944/45 accelerated the problems of the region which suffered under numerous dust storms and increased sand drift.[856] The reconstruction was, however, under way and up to 1947, a total of 857 holdings were vacated.[857]

In South Australia, the involvement of the Commonwealth induced the government to appoint a Marginal Lands Committee in February 1939 to investigate the marginal areas of the state.[858] The Committee's report estimated that the total area of marginal land, located at Eyre Peninsula, the Murray Mallee, and the northern portions of the wheat belt, amounted to 2.7 million hectares; more than double that of New South Wales.[859] For some northern parts of these areas, it advocated giving up farming altogether and turning the land back to purely grazing operations.[860] For most of the marginal lands, however, the Committee suggested the transformation to mixed farming of wheat and sheep.[861] As a majority of the holdings were regarded to have already sufficiently large sizes for this purpose, the Committee focused on

[851] Ibid.
[852] Dunsdorfs, The Australian Wheat-growing Industry, p. 303.
[853] Ibid.; Commonwealth of Australia, RRC (1944) (4th report): Financial and Economic Reconstruction of Farms, Appendix 1: A detailed account of marginal wheat area schemes, p. 69.
[854] Ibid.
[855] Ibid.
[856] 'Wind erosion in West Wyalong district', *The Land*, 19 January 1945.
[857] Dunsdorfs, The Australian Wheat-growing Industry, p. 303.
[858] Ibid., p. 302; Proctor, Marginal Land, pp. 16-31.
[859] South Australia (1939): Report of the Marginal Lands Committee, Adelaide, p. 4.
[860] Ibid., p. 6.
[861] Dunsdorfs, The Australian Wheat-growing Industry, p. 302.

1,276 holdings which, in its opinion, were adequate for 659 settlers only.[862] The reconstruction of the rangelands began in 1939 with the Marginal Lands Scheme, but drought and dust storms outpaced its activities. Dust storms swept over the region and numerous South Australian farmers left the marginal regions: Between 1933 and 1946, more than 4,280 people (an estimated total of 31 per cent) of the population left the marginal agricultural and the adjacent pastoral districts.[863] The drought summer 1944/45 was so devastating on the marginal and pastoral lands that the South Australian Parliament established a Pastoral and Marginal Agricultural Areas Inquiry Committee in order to investigate the "calamitous effects which would follow a further mass migration from these areas, and to ensure that the continued occupation of these areas should be made possible under conditions which would conserve soil fertility and permit family life under just conditions to continue".[864] It is noteworthy that the concern for the conservation of soil fertility now figured prominently in official land use plans. Moreover, South Australia's first soil conservator Robert Herriot was among the members of the Committee. In its report, the Committee condemned land policies of the past:

> In a nutshell, the problem resolved itself into a combination of economics and political administration. Through force of circumstances largely beyond their control, many settlers have been working upon completely impossible systems of land use, and in an endeavor to work out their own salvation have finished in wrecking not only themselves but much of the country as well.[865]

While the main focus lay on the marginal areas, it also concerned itself with the adjacent pastoral areas, where the native vegetative cover had been destroyed through farming methods of the past and overstocking, so that the region was considered prone to developing a "'dust bowl' equal to the worst".[866] As far as the marginal wheat growing areas were concerned, the Committee denounced that many of the remaining settlers were indebted and that a considerable number of holdings were still too small,[867] so substantial reconstruction was necessary, especially in the areas of the Murray Mallee (Stony), Murray Plains, Flinders, Eyre (Heavier), and Nuyts.[868] In these latter regions, wheat growing, even as part of mixed-farming

[862] South Australia (1939): Report of the Marginal Lands Committee, p. 5; Dunsdorfs, The Australian Wheat-growing Industry, p. 302.
[863] South Australia (1948): Report of the Pastoral and Marginal Agricultural Areas Enquiry Committee, Table 1: 'Comparable Population Figures at various centres throughout the Marginal Agricultural and Pastoral Districts for the Years 1933 and 1946', pp. 6-7.
[864] Ibid., p. 3.
[865] Ibid., p. 28.
[866] Ibid., p. 62.
[867] Ibid., p. 11.
[868] Ibid., pp. 61-62.

operations, was deemed to be uneconomic and to damage the soils.[869] According to the report, there was much evidence that the abuse of the land in the past had caused erosion and loss of fertility, which had contributed to the decline of wheat yields.[870] The Committee strongly discouraged any further financial support by the government for maintaining the agricultural settlement and urged that the areas had to be turned over to sheep grazing on a wide scale.[871] While it admitted that this would "involve a further substantial depletion of existing population", it saw no alternative.[872] If the readjustment was unsuccessful and the settlers continued with the present system of land use, the Committee warned, this would "of necessity wreck the country they occupy as well. Recognition of the menace of erosion where low rainfall country is stocked or cropped on anything but the most conservative basis, is one of the signs of the time that cannot be unheeded".[873] Up to June 1950, a total of 742 South Australian settlers had benefited from the Marginal Lands Scheme.[874] In the Murray Mallee, large stretches of land were transformed to grazing areas, and about 600 Marginal Lands Perpetual Leases covering 418,586 hectares (1,034,326 acres) were issued.[875] By 1960, the "planned abandonment of farms" was by and large completed.[876] Up to June 1947, the Commonwealth had paid more than £2 million to the four main wheat growing states for the transfer of marginal wheat farms.[877]

As the third chapter has demonstrated, the failing of closer settlement for wheat growing in the marginal south-eastern wheat belt had made Australians aware that the farming operations in the marginal wheat areas were neither economically nor ecologically sustainable. Faced by the sand drift problems, more and more public voices acknowledged that the opening up of the marginal areas for wheat production and the concomitant clearing of vegetation and ploughing of the soils disregarded the specificities of the natural environment. Thus, the experience of wind erosion in the marginal wheat areas helped induce Australians to adopt a new vision of their natural environment and their land resources.

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[869] Ibid., p. 69.
[870] Ibid., p. 59.
[871] Ibid., p. 69.
[872] Ibid.
[873] Ibid.
[874] Dunsdorfs, The Australian Wheat-growing Industry, pp. 302-303.
[875] Michael Williams (1976): Planned and Unplanned Changes in the Marginal Lands of South Australia. In: *Australian Geographer* 13, pp. 271-281, here p. 275.
[876] Ibid., pp. 271-274.
[877] Table: 'Costs of transferring marginal wheat farms to 30 June 1947' in: Dunsdorfs, The Australian Wheat-growing Industry, p. 307; Western Australia submitted a similar scheme in 1940, see: Dunsdorfs, The Australian Wheat-growing Industry, p. 305; Jasper, An Historical Perspective, p. 8.

As the first section *Living* has shown, wind erosion in the 1930s and first half of the 1940s was first of all a physical experience, with significant impacts on the regions affected by it and the people who lived there. In the wake of the settlement process and expansion of agricultural use in the south-east marginal areas during the last decades of the 19th century and especially in the first decades of the 20th century, large tracts of Mallee country had been cleared and put under cultivation, thus accelerating processes of wind erosion. In the dry 1920s, and especially in the period 1930 to 1945/46, the Victorian Mallee and other marginal areas of the wheat-belt experienced a succession of problematic years that were caused by the economic depression of the rural sector in the early 1930s and the effects of a series of dry years which resulted in particularly low yields. Wind erosion in the form of sand drift and dust storms was probably not the decisive factor for the difficulties many settlers lived through, but it was an important additional distress. Dust storms brought about physical discomfort or health issues and interrupted daily life routines. As sand drift submerged farm buildings and the basic infrastructure, the economic and social life of the region was menaced. The increasing costs required to maintain the functioning of the infrastructure contributed to raising doubts about whether parts of the Victorian Mallee region were at all suitable for wheat growing. Scenes similar scenes to those in the Victorian Mallee were apparent in other parts of Australia's south-eastern wheat belt, and the state government introduced schemes to allow the settlers to leave their ruined farms. The Commonwealth got involved in the reconstruction of the marginal areas of the four wheat growing states (SA, VIC, NSW, WA) and paid 2 million pounds between 1939 and 1947. In the face of increasing wind erosion, the recognition of the economic problems of wheat growing was increasingly linked with an acknowledgement of the ecological damage. Thus, the actual experience of wind erosion was an important factor contributing to the emergence of changing attitudes on the part of Australians towards their land resources and their natural environment. This promoted interest into scientific research, and illustrated the need to look for political solutions.

II Understanding

The previous section of this thesis illustrated how wind erosion affected the lived reality of many rural Australians in the 1930s and 1940s. At the same time, this natural phenomenon was conceptualised by humans in a certain manner in order to make sense of it. The second section of the thesis starts from the assumption that the way people think about the soil and its erosion is crucial for how they deal with it.[1] It also presumes that the lived experience of erosion played an important part in how such concepts of understanding were formed.

The way humans interpret phenomena of the natural world has primarily been defined by the natural sciences since the Modern Era. Since the 17th century, in the wake of the process that has been controversially debated under the term of the 'Scientific Revolution', science (or natural philosophy as it was called up until the 19th century) has sought to produce well-founded knowledge (*episteme*) about the natural world with the aid of a scientific method based on empirical evidence, i.e. systematic observation and the use of repeatable measurements or experiments in order to formulate and test hypotheses.[2] During the Age of Enlightenment, such empiricism in science was coupled with a strong belief in its progressive character: science allowed for the steady accumulation of human knowledge and thus helped humanity to progress.[3] In the 19th century, finally, natural sciences defined itself in an even more strict sense, claiming to be objective and to provide knowledge with a higher content of truth than other non-scientific disciplines.[4]

Such notions of empiricism and objectivity of science have, however, been questioned in the course of history. In the twentieth century, philosophers and sociologists began emphasising the cultural and social conditions for the production of knowledge.[5] This notion has been even further developed and expanded, namely by cultural studies, which consider knowledge, culture and society as inherently linked.[6] For history of science, the work of

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[1] McNeill/Winiwarter, Soils, Soil Knowledge and Environmental History, p. 3.
[2] For a critical introduction of the term see for example Steven Shapin (1998): The Scientific Revolution, Chicago, Il., University of Chicago Press, pp. 1-14.
[3] Jan Golinski (1998): Making Natural Knowledge: Constructivism and the History of Science, Cambridge [et al.], Cambridge University Press, p. 3.
[4] See for example: Lorraine Daston/Peter Galison (2010): Objectivity, New York, Zone Books.
[5] See for example: Steven Shapin (1995): Here and Everywhere: Sociology of Scientific Knowledge. In: *Annu. Rev. Sociol.* 21, pp. 289-321; Barry Barnes et al. (1996): Scientific Knowledge: A Sociological Analysis, Chicago, University of Chicago Press.
[6] See for example: E. Doyle McCarthy (1996): Knowledge as Culture. The New Sociology of Knowledge, London [et al.], Routledge.

Ludwig Fleck *Genesis and Development of a Scientific Fact* (1935) is fundamental. He asserted that the production of knowledge, even of what seems to be a hard fact, is socially determined, emerging out of a specific interactive community (*Denkkollektiv*) which sustains a distinctive style of reasoning (*Denkstil*).[7] Fleck's work was popularised much later by Thomas Kuhn through his *Structure of Scientific Revolutions* (1962).[8] Kuhn described the change of scientific paradigms not as a gradual development, but rather as a revolutionary process that went along with shifts of the psychological frameworks within which the scientists operated, as well as a transformation of the social organization of the community.[9] Science historians have followed such constructivist approaches since the 1960s and 1970s and have largely broken with the project of epistemological validation of scientific knowledge. Scientific concepts about natural phenomena consequently appear as but one of many ways to conceptualise such phenomena. In the wake of this constructivist shift, science historians have highlighted the fact that knowledge production is an aspect of human culture that requires material and cultural resources and that this, in turn, depends on politics and power relations.[10] The specific social community that frames the work of scientists and follows certain rules is considered a decisive factor for knowledge production, as is the larger social and cultural context, specifically the fact that scientists are in a permanent campaign to secure resources, status, and influence within the society, a process described by Frank Turner as 'public science'.[11] In a situation of crisis, societies often call for expertise to mitigate the situation: Consequently, such situation present often a window of opportunity for the scientific community to provide expertise and gain authority, as natural disaster studies have highlighted.[12]

The second section of this thesis subscribes to the constructivist tradition in science history, considering the scientific vision a priori as one vision on the phenomenon of wind erosion among others. There is no doubt, however, that for most contemporaries of then as today, science still provides the most legitimate and relevant way of understanding phenomenon of the natural world. Starting from the assumption that scientific research is

[7] Thaddeus J. Trenn/Robert K. Merton (1979): Descriptive Analysis. In: Eid. (eds.), Ludwig Fleck: Genesis and Development of A Scientific Fact, Chicago [et al.], University of Chicago Press, pp. 154-165.
[8] Thomas S. Kuhn (1962): The Structure of Scientific Revolutions, Chicago [et al.], University of Chicago Press.
[9] Ibid.
[10] See for example: Achim Landwehr (2002): Das Sichtbare sichtbar machen. Annäherungen an 'Wissen' als Kategorie historischer Forschung, in: Id. (ed.), Geschichte(n) der Wirklichkeit. Beiträge zur Sozial- und Kulturgeschichte des Wissens, Augsburg, Wißner-Verlag, pp. 61-89.
[11] Frank M. Turner (1980): Public Science in Britain, 1880-1919. In: *Isis* 71 (4), pp. 589-608.
[12] Klaus Gestwa/Elie, Marc (2014): Zwischen Risikogesellschaft und Katastrophenkulturen. Zur Einführung in die Katastrophengeschichte des östlichen Europas. In: *Jahrbücher für Geschichte Osteuropa* 62 (2), pp. 161-179, here p. 174.

historically determined by a series of social and cultural factors, the following analysis aims to historicise past wind erosion research. In order to access the scientific vision, a large number of scientific publications, namely journal articles, but also monographs from the different disciplines concerned with the phenomenon of wind erosion have been analysed. In order to shed a light on the process of knowledge production, additional archival material has been consulted where available.

4 Structuring Wind Erosion Research: Australia's Scientific Landscape

If one considers scientific knowledge as a historically contingent social and cultural construction, the elements that determine this knowledge construction come into focus. In the case of Australia, the colonial settlement is the major such historical determinant: When Europeans settled the continent in the 18th century and violently displaced the indigenous population, they cut off the Aboriginal communities from their land and cultural traditions, a process that presumably resulted in the corrosion of the indigenous knowledge.[13] As European settlers pushed aside Aboriginal knowledge, there was no interweaving of traditional indigenous knowledge with Western science.[14] It has been only in the last decades that there has been a stronger acknowledgement of traditional indigenous knowledge on an equal footing to Western science in Australia and other colonial societies and attempts to integrate the two systems.[15]

As a result of the importance of its colonial past, the historiography of science in Australia has been debated under the concept of 'colonial science' since its beginnings in the 1960s.[16] Based on the assumption that rational modern science emerged in the 17th century in Europe as the geographic centre, the original idea of a 'colonial science' assumes that science in the colonial peripheries was affected by a relationship of dependency on the centre.[17] One

[13] Attwood, The Making of the Aborigines, pp. 70-80. About the problems to define this "complex set of beliefs, understanding and practices which are 'indigenous knowledge'" see: Heather Goodall (2008): Riding the Tide: Indigenous Knowledge, History and Water in Changing Australia. In: *Environment and History* 14, pp. 355-384, here p. 356.
[14] Roderick W. Home (1988): Introduction. In: Id. (ed.), Australian Science in the Making, Cambridge Eng. [et al.], Cambridge University Press, pp. vii-xxvii, here p. viii.
[15] See for example: Anne Ross/Kathleen Pickering (2002): The Politics of Reintegrating Australian Aboriginal and American Indian Indigenous Knowledge into Resource Management: The Dynamics of Resource Appropriation and Cultural Revival. In: *Human Ecology* 30 (2), pp. 187-214; Goodall, Riding the Tide, p. 356.
[16] After a long period of negligence, Australian science was only discovered as interesting topic by historians in the second half of the 20th century, as part of the larger interest in colonial science, spurred by the process of decoloniazation. As a result, Australia's history of science has from the beginning focused on questions about imperial relations and colonial dependencies; see for an overview: Roy MacLeod (1988): Introduction. In: Id. (ed.), The Commonwealth of Science. ANZAAS and the Scientific Enterprise in Australasia 1888-1988, Oxford [et al..], Oxford University Press, pp. 1-16.
[17] Home, Introduction, p. xi.

foundational work in this respect was that of American historian Donald Flemings, who, in 1962, compared science in Australia, the USA and Canada and found similarities due to their former or enduring colonial status: all these states of the periphery were dominated by Great Britain, as the best scientists, including those from the colonies, chose to work in Great Britain, which remained the centre for scientific authority and legitimacy.[18] According to Fleming, this dominance of the centre went along with a colonial self-perception of subordination, a sort of mental cultural cringe in matters of science.[19] Such elements of colonial science were long lasting: in the case of Australia, they were important at least until the Second World War.[20] The idea of a geographical centre of knowledge in Europe from which science diffuses into the rest of the world was widely distributed in the decade of the 1960s in the wake of modernization theories.[21] In *The Spread of Western Science* (1967), George Basalla conceived a three-stage model that described how former colonies developed progressively towards an autonomous national scientific tradition.[22]

Such ideas of Europe as a geographical centre of knowledge as well as the diffusionist model of Western science have been dismissed by science historians and in general replaced by the idea of modern science as a "polycentric communications network".[23] At the same time, the view that there is a straight development of science towards national autonomy has been questioned. As Europe is no longer perceived as a geographically fixed centre for scientific knowledge, Australia's geographical distance to Europe loses much of its analytical significance, as David Chambers has illustrated.[24] This is all the more true as colonization of the continent started in a period when technology was already advanced enough to assure that science acted internationally and knowledge flowed across boundaries.[25] As a result, science historians have found new ways to explain why Australia was relegated to the scientific periphery, namely the lack of its intellectual capital and of coordination among the generally

[18] Ibid., pp. ix-x.
[19] MacLeod, Introduction, pp. 6-7.
[20] Home, Introduction, p. x.
[21] Notbably by Walt W. Rostow, cf. David W. Chambers/Richard Gillespie (2000): Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge. In: *Osiris* 15, pp. 221-240, here pp. 224-227.
[22] George Basalla (1967): The Spread of Western Science. In: *Science* 156 (3775), pp. 611-622; Home, Introduction, pp. x-xi. The development was conceived as starting from a first phase of colonial status when the colony was a mere object of European studies to a second period of dependent 'colonial science', when the colony dependent on the centre in matters of infrastructure, training, theories, bodies of knowledge and scientific authority. In the third and final stage, the former colony had then reached a stage of scientific self-sustainity and an 'independent scientific tradition'.
[23] Chambers/Gillespie, Locality in the History of Science, p. 223.
[24] David W. Chambers (1991): Does Distance Tyrannize Science? In: Roderick W. Home/Sally G. Kohlstedt (eds.), International Science and National Scientific Identity. Australia between Britain and America, Dordrecht, Boston, Kluwer Academic Publishers, pp. 19-38, here pp. 19-20.
[25] Home, Introduction, p. viii.

small number of scientists.[26] Following the above described approaches suggested by sociology of knowledge, these are in turn explained by a whole bundle of social, cultural, and economic factors, of political decisions, and not least power relations, namely the explicit will of the centre to keep the colonies dependent upon them paralleled by a certain readiness of Australians to accept their subordinate position.[27] The history of Australian science has therefore developed since the 1960s towards a much richer and complex picture, but its colonial past and its effects on the scientific landscape and knowledge construction remain arguably the most important guiding principle for any historical analysis.[28]

The conception of modern science as a polycentric communication network opens new questions about the role of locality in the history of (colonial) science.[29] The scientific locality is no longer bound to geographic or administrative boundaries, but can take any shape relevant as a frame of analysis.[30] Its infrastructure can be considered as an amalgam of many factors, containing material elements such as institutions, buildings, and journals, as well as ideas and practices, for which Chambers and Gillespie have suggested the term 'vectors of assemblage'.[31] In the case of wind erosion, locality is not only important in regard to the specific social and cultural context of the knowledge production, but also in regard to the local natural environment(s), climate(s), and not least the local experience. In these approaches, history of science meets with theoretical reflections brought forward by environmental history. The new understanding of modern science as global network thus opens questions about the relation of the local and global, namely the question of how local scientific knowledge construction connects with the network of international science systems.[32]

The first chapter of this section gives a general outline of the domestic scientific infrastructure of Australian wind erosion research, with special attention paid to the three south-eastern states. It takes into account the historical determinants for the formatting of the scientific landscape and the links of the local infrastructure to the international science

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[26] Chambers, Does Distance Tyrannize Science?, pp. 23-24; Home, Introduction, pp. viii- xv; Roy MacLeod (1988): From Imperial to National Science. In: Id. (ed.), The Commonwealth of Science. ANZAAS and the Scientific Enterprise in Australasia 1888-1988, Oxford [et al.], Oxford University Press, pp. 40-72, here p. 65.
[27] Chambers, Does Distance Tyrannize Science?, pp. 20-26, 32-33.
[28] Cf. for example: Roderick W. Home/Sally G. Kohlstedt (eds.) (1991): International Science and National Scientific Identity. Australia between Britain and America, Dordrecht, Kluwer Academic Publishers; Tom Griffiths/Libby Robin (eds.) (1997): Ecology and Empire: Environmental History of Settler Societies, Edinburgh, Keele University Press; Nathan Reingold/Marc Rothenberg (eds.) (1987): Scientific Colonialism. A Cross-Cultural Comparison. Washington D.C., Smithsonian Institution Press.
[29] Chambers/Gillespie, Locality in the History of Science, pp. 221-240.
[30] Ibid., p. 228.
[31] Ibid.
[32] Ibid.; Home, Introduction, p. viii.

network. This provides the framework for the second chapter, which will then closely look at the content of scientific knowledge construction on wind erosion. The history of scientific interest into wind erosion began in the second half of the 19th century and was closely linked to fundamental changes within Australia's scientific landscape: The increase in population was paralleled by the opening of universities and museums, the establishment of scientific societies, a general expansion in education and an increase of scientific research undertaken by the government departments.[33] At that time, however, scientific interest in wind erosion was limited to a few botanists and foresters who merely observed the problems of sand drift on some pastoral areas without conducting any field research. In the face of increasing social and economic costs caused by erosion since the 1920s, scientists became more and more interested in the problem of wind erosion, supported by the demand of the public and official authorities who increasingly called for experts to study the causes and find solutions.[34]

The scientific landscape of Australia between the 1920s and 1940s was one in transition: The traditional colonial structures, characterised by the fact that research was limited to public agencies and focused on applied sciences in the domain of forests, agriculture, and engineering, continued to be formative.[35] However, changes occurred on several levels: The First World War brought about a larger recognition of the role that science played for a strong nation and economy and thereby emphasised the need for a national coordination of scientific research.[36] Consequently, the Commonwealth slowly emerged as promoter of scientific research during the interwar years.[37] This did not necessarily mean that the imperial pull weakened: Economically, Australia's ties to the Empire strengthened after the First World War and Australian sciences aligned to the imperial needs, focusing on fields relating to agriculture and mining.[38] During the 1920s the British Empire continued to be the frame of reference for most Australian scientists.[39] In the wake of the Great Depression, the vision of an integrated imperial economy blurred somewhat and Australian science became more autonomous.[40]

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[33] Home, Introduction, pp. xi-xiii.
[34] Macintyre, A Concise History, pp. 187-188.
[35] Home, Introduction, p. xvii.
[36] Carl B. Schedvin (1987): Shaping Science and Industry: A History of Australia's Council for Scientific and Industrial Research, 1926-1949, Sydney, Allen&Unwin, p. 12.
[37] George Currie/John Graham (1966): The Origins of CSIRO: Science and the Commonwealth Government 1901-1926, Melbourne, CSIRO, p. 8; Home, Introduction, p. xv.
[38] Schedvin, Shaping Science and Industry, pp. 17-18; Home, Introduction, p. xv.
[39] Home, Introduction, pp. xiii-xv.
[40] Ibid., p. xv.

The Second World War was a turning point for Australian sciences:[41] Cut off from much of the manufactured import products of the Empire and Great Britain, Australia needed to produce many military and industrial goods by itself, which required the establishment of new secondary industries.[42] This brought about a continued expansion of scientific research and disciplines in these domains.[43] As a direct result, natural scientists were in great demand and the numbers of scientifically trained staff increased substantially.[44] Through their important role in the war effort, science and technology in general gained prestige in the eyes of the general community, and government funding was generous.[45] University research expanded after the war and universities gradually engaged in post-graduate education.[46] In this way, Australian science became more self-confident and independent and at the same time increasingly looked to the USA.[47] The post war period saw likewise a greater involvement by industrial companies in the funding of research at universities and institutes.[48] Also, as a corollary of the war situation, federal involvement became more important, and the Commonwealth took a greater role in the funding of research institutes as in tertiary education.[49]

4.1 Local Answers: The Role of the States in Research

As already noted, scientific research in Australia has been from its colonial beginnings closely linked with public service.[50] In the period under consideration, the Australian states were the most important level to provide the framework for scientific research into wind erosion, be it through their governmental institutions, especially the Departments of Agriculture and the emerging governmental soil conservation bodies, the research institutes, or universities. While scientific research in general was mainly supported by the states, this was perhaps even more marked in the case of erosion than in other domains, as this research field impacted matters of land, a traditional prerogative of the states. The different natural environments and settlement patterns, as well as differences in the historically grown

[41] Home, Introduction, p. xvi; Jean Buckley/Ron Johnston (1988): The Shaping of Contemporary Scientific Institutions. In: Roderick W. Home (ed.), Australian Science in the Making, Cambridge Eng. [et al.], Cambridge University Press, pp. 374-398, here p. 374.
[42] Schedvin, Shaping Science and Industry, p. 309.
[43] Ibid., pp. 281-282, 309; Buckley/Johnston, The Shaping of Contemporary Scientific Institutions, pp. 374, 376; Home, Introduction, p. xvi.
[44] Ibid.
[45] Buckley/Johnston, The Shaping of Contemporary Scientific Institutions, p. 374.
[46] Home, Introduction, p. xvi.
[47] Ibid.
[48] See for example: Norman H. Olver (1955): Research in Victoria. In: Geoffrey W. Leeper (ed.), Introducing Victoria, Carlton Vic., Melbourne University Press, pp. 246-261, here pp. 248-249.
[49] Home, Introduction, p. xvi; Gordon Greenwood (1955): Australia – A Social and Political History, Sydney, Angus&Robertson, p. 387.
[50] Home, Introduction, p. xvii.

structures and political settings of the states, led to variations in the respective scientific research into wind erosion. At the same time, the intra-Australian exchange of knowledge was vivid, spurred by mutual reception of literature, personnel exchange of scientists and a series of national conferences on the problem of soil erosion, either organised ad hoc by one of the affected states, or taking place within the framework of already institutionalised forums of knowledge exchange, namely the congresses organised by the Australian and New Zealand Association for the Advancement of Science (ANZAAS).[51] The ANZAAS had been founded in 1888 to promote science in the colonies.[52] Modelled on the British Association for the Advancement of Science, the ANZAAS had always a double perspective: to promote national science as well as to strengthen the ties to the Empire.[53] By 1938, the ANZAAS had become the principal national forum for the presentation of science in Australia and New Zealand.[54] Soil erosion was a prominent topic on the agenda of the ANZAAS congress in January 1939 in Canberra, where next to several Australian speakers, a representative of the Imperial Soil Bureau in England, John Russell, also presented a paper.[55]

4.1.1 With Public Authority: The Role of Government Departments

Government scientists have played an important role for Australian wind erosion research since the 19th century. As food production on the continent depended largely on introduced plants, experts in botany were from the early settlement an important group.[56] It is therefore not surprising that the earliest scientific interest into the problem of wind erosion stemmed from a handful of public servants, namely foresters and botanists of the last third of the 19th century.[57] The gold rush and spectacular population increase around the mid-19th century had augmented the demand on Australia's natural resources; in the light of their economic dependence on these resources, Australian governments created administrative bodies during the 1880s and early 1890s that focused on agriculture and forestry and

[51] For example: Robert Herriot (1942/43): Soil Conservation. A Review of Activities in Victoria and New South Wales. In: *Journal of Agriculture of South Australia* 46, pp. 205-212.
[52] Roy MacLeod (1988): Organizing Science under the Southern Cross. In: Id. (ed.), The Commonwealth of Science, pp. 19-39.
[53] MacLeod, Organizing Science, pp. 19-39; Id., From Imperial to National Science, pp. 40-72.
[54] MacLeod, From Imperial to National Science, p. 42.
[55] 'Soil Erosion. Need for Empire Survey', *The (Melbourne) Age*, 14 January 1939; 'Science Congress. Keenly Practical Issues Discussed. Soil Erosion in Australia', *Sydney Morning Herald*, 14 January 1939.
[56] John Dargavel (1995): Fashioning Australia's Forests, Melbourne [et al.], Oxford University Press, p. 61.
[57] Dargavel, Fashioning Australia's Forests, p. 61; Beattie, Empire and Environmental Anxiety, pp. 143, 165; Joseph M. Powell (1988): An Historical Geography of Modern Australia: The Restive Fringe, Cambridge [et al.], Cambridge University Press, pp. 36-37; Powell,Watering the Garden State, p. 70; Powell, The Emergence of Bioregionalism, p. 26.

employed an increasing number of foresters, botanists, and agronomists.[58] Forest conservation in the Australian colonies was, for example, spurred by concerns of an impending famine caused by the extension of railways that used hardwood for sleepers.[59] In the colonies of Victoria and South Australia, which were leading in this matter, a forestry administration was established in the 1870s and 1880s.[60] As will be shown in the following chapters, some of these foresters concerned themselves with wind erosion as a symptom of the spread of deserts and changing climate patterns resulting from deforestation.

Botany likewise saw some fundamental changes during this period: In the 1880s, Australians' interest in the exploration of their own flora was spurred by economic interests, and botanists were employed by the newly established colonial agricultural and forestry departments.[61] For all interested in the flora and fauna of Australia, the natural history and field naturalists' societies, as for example the Field Naturalist Club of Victoria, offered an institutionalised arena for knowledge exchange.[62] As a matter of fact, among the earliest voices that raised the alarm about wind erosion as a sign of the deterioration of Australia's lands were those of field naturalists in South Australia and Victoria.[63] Another wave of interest into wind erosion by state botanists in New South Wales was triggered during the 'Federation drought', when wind erosion affected especially the pastoral regions of western New South Wales.[64] Interestingly enough, agricultural experts at the state Departments of Agriculture only became central to wind erosion research in the 1920s. Most of the colonies had set up such Departments of Agriculture by the late 1880s.[65] Their establishment went along with the opening of associated teaching colleges in most Australian colonies, the first being South Australia's Roseworthy in 1883, later followed by Gatton in Queensland, Hawkesbury in New South Wales, and Dookie and Longerenong in Victoria.[66] In parallel, a

[58] Linden Gillbank (1988): The Life Sciences: Collections to Conservation. In: Roy MacLeod (ed.), The Commonwealth of Science. ANZAAS and the Scientific Enterprise in Australasia 1888-1988, Oxford [et al.], Oxford University Press, pp. 99-129, here pp. 100-101.
[59] Dargavel, Fashioning Australia's Forests, p. 64; Powell, An Historical Geography, pp. 36-38; Beattie, Empire and Environmental Anxiety, p. 174.
[60] Beattie, Empire and Environmental Anxiety, pp. 138, 143, 165; Powell, An Historical Geography, pp. 36-37; Powell, Watering the Garden State, p. 70; Powell, The Emergence of Bioregionalism, p. 26.
[61] Gillbank, The Life Sciences, pp. 101-103. Not all of those botanists were professionally trained, however, some of them were rather passionate amateurs.
[62] Ibid.
[63] Bolton, Spoils and Spoilers, p. 139; Drew Hutton/Libby Connors (1999): A History of the Australian Environment Movement, Cambridge [et al.], Cambridge University Press, pp. 37, 56.
[64] C.A. Benbow (1901): Interior Land Changes. In: *Agricultural Gazette of New South Wales* 12, pp. 1249-1254, here p. 1253; Joseph H. Maiden (1903): The Sand-Drift Problem in New South Wales. In: *Journal and Proceedings of the Royal Society of New South Wales* 30, pp. 82-106, here pp. 97, 102; see also: Beattie, Empire and Environmental Anxiety, pp. 206-208.
[65] Schedvin, Shaping Science and Industry, pp. 6-9.
[66] Ibid., p. 7; Edgeloe, The Waite Agricultural Research Institute, pp. 2-3.

series of experimental farms were also established across the states, permitting the generation and application of scientific knowledge on a local level.[67] This process, as science historian Schedvin has highlighted, went along with a rise in crop production and dwindling land resources in the second half of the 19th century.[68] The departments of agriculture largely expanded until the outbreak of World War One and focused on the problems of the typical small-scale wheat farmer while largely neglecting the pastoral industry.[69] This probably explains why they did not concern themselves with wind erosion, which mainly affected the pastoral areas. This substantially changed with the process of closer settlement of the marginal areas in the opening decades of the 20th century, a period of government-induced agricultural development in Australia.[70] In the wake of this process, wind erosion increasingly threatened agricultural production so that the Departments of Agriculture became involved in wind erosion research. As a result, the soil conservation bodies that were established in all of the Australian states during the 1930s and 1940s often emerged out of the Departments of Agriculture or where put under their aegis, as was the case in South Australia, Queensland, and Western Australia, whereas Victoria and NSW had more autonomous organisations.[71] Irrespective of their status, these newly established soil conservation bodies lacked the personnel and funding for their own research at the beginning. Consequently, until well into the 1940s, they cooperated with other governmental bodies and heavily relied on the already existing infrastructure of the agricultural departments.

In regard to wind erosion research relating to farming, Victoria took a leading role as most of its eroded soils were located in marginal wheat areas, namely the Mallee region. The main initiative for legislation against soil erosion originated not from within the Department of Agriculture, but from the SRWSC[72] which was, as has been comprehensively described, struggling with enormous costs to keep the water channels free from sand.[73] In matters of wind erosion research, however, the Department of Agriculture was in charge, more precisely the Mallee Research Station at Walpeup.[74]

Since 1905, the Victorian Department of Agriculture had arrangements with farmers throughout the wheat growing districts of the state to undertake experimental work on wheat

[67] Schedvin, Shaping Science and Industry, p. 7.
[68] Ibid., p. 6.
[69] Ibid., pp. 6-7, 9.
[70] Ibid., p. 8.
[71] Commonwealth of Australia, Department of Environment, Housing and Community Development (EHCD) (1978): A Basis for Soil Conservation Policy in Australia, Canberra, p. 12.
[72] Powell, Watering the Garden State, p. 218.
[73] Ibid., pp. 211-213; Victoria, Sand Drift Committee (1933): Report on Sand Drift Problems in Mallee Areas.
[74] Two long-time staff members, namely Harry J. Sims and Colin G. Webb, have written in 1982 a comprehensive institutional history of the Walpeup Research Station, cf. Sims/Webb, Mallee Sand to Gold.

varieties.[75] In 1912, under Arnold Edwin Victor Richardson (later director at the Waite Institute), the experimental strand of the Department was reorganised, and two permanent research stations for cereal and livestock were established at Werribee and Rutherglen.[76] In the Mallee, which was still sparsely settled at the time, experimental plots on farmers properties were established in 1914 to look into diseases and the use of fertilizers.[77] After the First World War, when the Mallee was more closely settled, voices from the farming community multiplied, demanding the establishment of an agricultural research station in the Mallee.[78] But lack of funding as well as a limited professional staff hindered such plans for the time-being; the government, however, saw the need for agricultural research and launched a programme to train more persons in Agricultural Science at Melbourne University.[79] The economic crisis in the primary sector, along with the economic and ecological tragedy that unfolded in the Mallee during the 1920s induced farmers to urge the Department of Agriculture to provide scientific information about local conditions and methods to increase production and reduce costs.[80] Additionally, in the light of increasing costs through sand drift, a governmental committee under the chairmanship of R.F. McNab of the SRWSC investigated the sand drift problem in Victoria, and its report, published in March 1933, was instrumental in pointing to the need for scientific research on the occurrence of wind erosion.[81]

The plans for a research station in the Mallee were finally put into concrete terms with the opening of a station in Walpeup in 1933.[82] Its location had been controversially discussed, but finally Walpeup won the race because its soils were characteristic for the Mallee and its rainfall average for the region.[83] Put under the administration of the Cereal (later the Agronomy) Branch of the Department of Agriculture,[84] the station was first managed until 1938 by agronomist H.L. Hore, and then followed by Harry Sims.[85] Experiments into soil conservation methods started in 1937 and intensified after 1939 as a result of the

[75] Ibid., p. 6.
[76] Samuel M. Wadham (1955): The Extension of Agricultural Knowledge. In: Geoffrey W. Leeper (ed.), Introducing Victoria, Carlton Vic., Melbourne University Press, pp. 232-237, here pp. 232-233; *The Australasian*, 16 August 1913.
[77] Sims/Webb, Mallee Sand to Gold, pp. 6, 11.
[78] Ibid., p. 20.
[79] Ibid.
[80] Ibid., p. 17.
[81] Ibid., pp. 13-15; Powell, Watering the Garden State, pp. 212-213.
[82] Sims/Webb, Mallee Sand to Gold, pp. 29-31, 43.
[83] Ibid.
[84] Ibid., p. 121.
[85] Ibid., p. 45.

recommendations made by the Committee Appointed to Investigate Erosion in Victoria.[86] The committee recommended that the "limited work of an experimental and observational nature regarding sand drift in the Mallee at present being carried out by the Department of Agriculture" should be extended, and for this purpose an additional officer should be appointed to be stationed at the Mallee Research Station.[87] The plan was approved in August 1938, and in January 1939 G. (Dick) Blackburn was appointed as additional research officer.[88] This gave an important impetus for erosion research at the station that predominantly focused on mechanical factors affecting the soils physical condition.[89] After this first boost, wind erosion research largely stagnated in the period from 1942 to 1945 as a number of the station staff served in the armed forces or were involved in other tasks related to the war.[90] Since its inception, the Mallee research station had been embedded in a larger research infrastructure, maintaining close contact with other sections of the Department of Agriculture, the SRWSC, the Department of Crown Lands and Survey, the Victorian Forest Commission, the Victorian Railways, and the Education Department, as well as with the University of Melbourne and the CSIR.[91] It had an especially close relationship with the Victorian Soil Conservation Board.[92]

The Victorian Soil Conservation Board, established in 1940 and attached to the Premier Department,[93] was made up of members of the state departments concerned with soil erosion and a representative of the farming community.[94] Its chairman, H.G. Strom from the SRWSC, was the only full-time member of the Board, while the other members, namely H.L. Hore, from the Walpeup research station, C.T. Clark from the Lands Department of Crown Lands and Survey, R.F. McNab, from the SRWSC, A.O. Lawrence from the Forests Commission and W. Baragwanath from the Mines Department, were only part-time members, largely occupied with their work in their own respective departments.[95] In theory, applied

[86] N. N. (1939): Sand Drift Control. Cultivation Trials. In: *Journal of Agriculture of Victoria* 37, pp. 543-546, here p. 545; Sims/Webb, Mallee Sand to Gold, pp. 44, 55; Powell, Watering the Garden State, pp. 212-213.
[87] Victoria (1938): Report of Committee Appointed to Investigate Erosion in Victoria; Sims/Webb, Mallee Sand to Gold, p. 55.
[88] H. L. Hore (1940): Experimental Research in Sand Drift. In: Charles T. Clark (ed.), Soil Erosion in Victoria, pp. 101-107; Sims/Webb, Mallee Sand to Gold, pp. 46, 55. Blackburn became later research officer at the CSIRO Division of Soils.
[89] N. N. (1939): Sand Drift Control. Cultivation Trials. In: *Journal of Agriculture of Victoria* 37, pp. 545-546.
[90] Sims/Webb, Mallee Sand to Gold, pp. 49, 55.
[91] Ibid., p. 122.
[92] Ibid.
[93] Soil Conservation Authority, Victoria (1953): A Brief History of Victorian Erosion Control, p. 8; George T. Thompson (1979): A Brief History of Soil Conservation in Victoria, 1834-1961, Melbourne, Soil Conservation Authority, Victoria, p. 30.
[94] Thompson, A Brief History of Soil Conservation, p. 24.
[95] Ibid.

research conducted by the Board was possible: given the consent of the landholder, the Minister, and the concerned public bodies, the Board could conduct its own experiments or demonstrations on land.[96] In reality, however, shortages of staff and material during the war years prevented any substantial research work of their own, and the lack of personnel even led to the suspension of the Board activities between March and December 1942.[97] When the decade of the 1940s closed, the only accomplishments in regard to research by the Soil Conservation Board was the financial support it had given to an ecological investigation undertaken at the Hume Catchment, as well as investigations into soil erosion in the Dookie and Coleraine district in co-operation with the CSIR, none of which were concerned primarily with wind erosion.[98] Institutional soil conservation research in Victoria became much more prominent in February 1950, when the Board was replaced by a more permanent Soil Conservation Authority.[99] The Authority was organised into five units, one of them dealing explicitly with research in the fields of soil physics, conservation economics and conservation ecology, which is defined as the study of land in order to "determine the amount and kinds of erosion that have occurred and the reasons for their occurrence in relation to the features of the environment such as soils, climate, vegetation, topography and land-use".[100] The research division was built up under Downes, who was at its head until June 1953 when A. Costin resumed the position.[101] Thanks to the appointment of a range of scientific personnel, including T. Ian Leslie, a specialist on soil physics and pedologist Frank Gibbons, several research projects were thus under way in the 1950s, for example experiments into water infiltration characteristics of soils or physical aspects of wind erosion.[102]

In the state of New South Wales, the Department of Agriculture played an important initial role in soil erosion research, which is closely linked with the name of Eric Elwin Samuel (Sam) Clayton (1896-1987). After graduating in 1915 from the Hawkesbury Agricultural College in Richmond, New South Wales, Clayton started to work at the states' Department of Agriculture where he got interested in the problem of eroded soils.[103] In 1929 and 1930, Clayton studied wheat growing in the marginal areas of the Victorian, South Australian, and Western Australian Mallee, in order to gain information for the development

[96] Soil Conservation Authority, Victoria: A Brief History of Victorian Erosion Control, pp. 8-9; Thompson, A Brief History of Soil Conservation, pp. 28, 78.
[97] Ibid.
[98] Ibid.
[99] Soil Conservation Authority, Victoria: A Brief History of Victorian Erosion Control, pp. 8-9.
[100] Ibid., pp. 19-22.
[101] Thompson, A Brief History of Soil Conservation, p. 80.
[102] Ibid., pp. 79-81.
[103] Roland Breckwoldt (1988): The Dirt Doctors. A Jubilee History of the Soil Conservation Service of N.S.W., Sydney, Soil Conservation Service of NSW, pp. 24-25.

of a planned settlement scheme in the New South Wales Mallee area of Roto and Euabalaong.[104] A keen observer, Clayton emphasised the specificity of the Mallee soils that would not "stand up to very constant cropping" and recognised that the method of fallowing increased sand drift on the lighter soils.[105] In the Victorian Mallee, Clayton observed that the "abuse" of the land by too frequent cropping had increased the sand drift[106] and warned that ignorance of the climatic and soil peculiarities combined with an "extreme and blind optimism" in land settlement policy was likely to reproduce such disastrous settlement results as in the north-western Mallee.[107] In 1930, Clayton conducted the first soil conservation field day in Australia at the Department of Agriculture Cowra Experiment Farm, and the following year, he published his first article that addressed exclusively the problem of soil erosion.[108] He encouraged the establishment of an Erosion Committee by the state government in 1933, of which he became a member.[109] In 1936, with government funding in his pocket, Clayton started an overseas tour investigating soil erosion that brought him to the USA, Canada, Britain, France, and Germany. During the tour, he met Hugh H. Bennett from the American Soil Conservation Service, with whom he developed a deep friendship.[110] Since his trip to the USA, Clayton wanted to establish a soil conservation service along the US model, but in contrast to the latter, outside of the Department of Agriculture, in order to assure its independence and prevent a potential conflict of interest between the aims of soil conservation and increase of primary production.[111] Clayton could not convince the director of Agriculture,

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[104] Department of Agriculture, N.S.W., Report on Mallee Investigation, by E. S. Clayton, H. D. A., Senior Experimentalist, May 1930, in: [State Records of New South Wales (SRNSW): Department of Agriculture; NRS 54, Agriculture Special files, 1889-1981, [12/3528 pt] Mallee farming in Victoria, South Australia and Western Australia – Report by Mr E.S. Clayton (ASF 151), 1929-1961]. Only parts of Clayton's observations were published, cf. Eric E. S. Clayton (1929): Wheat-growing on the Mallee Lands of New South Wales. In: *Agricultural Gazette of NSW* 40, pp. 321-333; Id. (1929): Wheat Growing in South Australia. Some Comparisons With New South Wales. In: *Agricultural Gazette of NSW* 40, pp. 487-492. In 1937, the area was still in pastoral use only, but the development for wheat was still debated, see f.ex. Griffith Taylor (1937): Possibilities of Settlement in Australia. In: Isaiah Bowman (ed.), Limits of Land Settlement. A Report on Present-day Possibilities, New York, Council on Foreign Relations, pp. 195-227, here p. 216.

[105] Department of Agriculture, N.S.W., Report on Mallee Investigation, by E.S. Clayton, H. D. A., Senior Experimentalist, May 1930, p. 22, in: [SRNSW: NRS 54, [12/3528 pt]].

[106] Ibid.

[107] Ibid., p. 26.

[108] Breckwoldt, The Dirt Doctors, p. 24; Eric E. S. Clayton (1931): The Control of Soil Erosion on Wheat Lands. In: *Agricultural Gazette of NSW* 42, pp. 825-832.

[109] Breckwoldt, The Dirt Doctors, p. 26.

[110] Breckwoldt, The Dirt Doctors, pp. 38-41. On Clayton's journey to the USA, his contacts with the US soil conservationists and the influence of the US model on the NSW soil conservation policy, see also: Stephen M. Powell (2000): Mothering, Husbandry and the State. Conservation in the United States and Australia, 1912–1945. Unpublished Ph.D. thesis, Melbourne, Monash University, pp. 62-68. Clayton's trip also brought him to Germany. In regard to his visit to Berlin, he noted: "[…] visited various Ministers and Institutes, Ecology Agriculture etc., didn't see Hitler […].", in: Clayton: Investigations abroad (handwritten note): Mitchell Library [MSS 6745, E.E.S. Clayton- papers ca. 1910-1987/Box 1].

[111] Breckwoldt, The Dirt Doctors, p. 41.

Alexander McDonald, of the need for a separate soil conservation service, but gained the support of Vincent, Minister for Forests and Mines.[112] In 1938, the Soil Conservation Act of New South Wales led to the establishment of a Soil Conservation Service, the second in the world after the USA, and Clayton became its director.[113] After much debate, the Soil Conservation Service was finally put under the Department of Mines, but in the years to come, several attempts were made to put it under the Department of Agriculture.[114] In 1944, when a Department of Conservation was created, Soil Conservation was taken out of the Department of Mines and placed under the Minister for Conservation.[115]

The Soil Conservation Service was responsible for the bulk of erosion research in the state, though it focused on water erosion:[116] sheet erosion and gullying were more common in New South Wales and affected the better agricultural lands, so the economic losses through water erosion were far more extensive than in the comparably low value lands of the wind eroded Western Division.[117] Clayton was, nonetheless, neither oblivious to the effects of wind erosion, nor to the high public attention that a big dust storm could raise for the cause of soil conservation.[118] In 1939, among the first positions advertised by the newly established Soil Conservation Service was the position of a research officer and botanist to investigate the situation in the Western Division.[119] Noel Beadle, who had developed an interest in the plants of western New South Wales shortly before the position was opened, got the job.[120] Beadle had been introduced to the subject by Professor Ashby of the Botany Department of Sydney University, who later encouraged him to submit his research results on the vegetation of the Western Division as a doctoral thesis.[121] From 1939 to 1946, Beadle was the person from the

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[112] Ibid.
[113] Stephen Powell (2001): Francis Ratcliffe's First Impressions of Australia. In: *Eras Journal* 1, n.p. http://artsonline.monash.edu.au/eras/eras-journal-powell-s-francis-ratcliffes-first-impressions-of-australia. [Accessed 30 March, 2016].
[114] Breckwoldt, The Dirt Doctors, pp. 54, 57-58.
[115] Ibid., p. 74.
[116] For example: Eric E. S. Clayton, The Control of Soil Erosion on Wheat Lands; Id. (1934): Soil Erosion. In: *Agricultural Gazette of NSW* 45, pp. 361-366.
[117] The Eastern and Central Division of NSW contained only approximately three-fifth of the total land, but allocated most of the state's agricultural land and hosted 90 per cent of its total livestock. Preliminary survey of those two divisions indicates that in 1944, less than 0.45 % of the lands surveyed suffered from severe wind erosion, and 19.1 % from minor wind erosion, this exclusively on the Western Slopes and Plains. In comparison, 41.5 % of the land suffered from severe or moderate gully erosion or sheet erosion. The survey had not been completed and the incoming data from the outstanding south western counties were supposed to increase the lands affected by wind erosion of around 4 per cent, see: Commonwealth of Australia: RRC (1944) (3rd report): Land utilization and farm settlement, pp. 51-52.
[118] For example: 'Red Rain an Omen from the Sky. Warns of Soil Erosion's Slow but Sure Advance', *The Land*, 24 September 1937.
[119] Breckwoldt, The Dirt Doctors, pp. 114-115.
[120] Ibid.
[121] Ibid.

Soil Conservation Service responsible for the Western Division and the main person researching into wind erosion problems in New South Wales.[122]

In contrast to Victoria and New South Wales, the South Australian Department of Agriculture and the emerging soil conservation body were relatively passive in soil conservation research. This is surprising, as South Australia is the state with the longest tradition of government funded agricultural innovation: The Roseworthy Agricultural College, founded in 1883 and opened two years later, was the first such college in Australia.[123] In 1888, the Central Agricultural Bureau was established and began running studies about pasture and crop plants suited for the local conditions. Relying on a network of branches, this constituted the first applied research and extension service in South Australia.[124] It was within this farmers' network of the Central Agricultural Bureau that the first initiative for soil conservation measures in South Australia originated around the turn of the century.[125] In 1902 a state Department of Agriculture was established that played an important role in the establishment of soil conservation legislation in the state, though its role in fundamental research was strongly limited.[126] With the Sand Drift Act of 1923, South Australia had launched a first legislative attempt to control wind erosion.[127] The Act provided that in some badly affected areas in the Murray Mallee, Eyre Peninsula and on Upper York Peninsula, the landholders could compel their neighbours to take control measures if they were impeded by sand drifting on their lands from the adjacent areas.[128]

In the second half of the 1930s, more political action in soil conservation followed under John Walter Spafford (1884-1962), Director of the Department of Agriculture of South Australia from 1936 to 1949.[129] As early as 1920, at the time in the position of Superintendent of Experimental Work at the Department of Agriculture,[130] Spafford was well aware of the

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[122] Ibid.; 'Erosion in Far West. Officer's Valuable Survey', *The Land*, 28 July 1944.
[123] Edgeloe, The Waite Agricultural Research Institute, pp. 2-3.
[124] Peter Trumble: A History of Agriculture in South Australia. Available online: http://pir.sa.gov.au/aghistory/left_nav/dept_of_agriculture_as_an_organisation/structures/c19. [Accessed 30 March, 2016].
[125] Arthur F. Tideman (2008): The Struggle for Landcare in South Australia. The Story Behind Soil Conservation and the Quest for Natural Resource Management 1939 – 2004, Department of Water, Land and Biodiversity Conservation, South Australia, p. 5.
[126] Tideman, The Struggle for Landcare, p. 6; Edgeloe, The Waite Agricultural Research Institute, p. 3.
[127] Tideman, The Struggle for Landcare, p. 5; John R. Bradsen (1988): Soil Conservation Legislation in Australia. Report for the National Soil Conservation Programme, Adelaide, University of Adelaide Printing Department, p. 42.
[128] Tideman, The Struggle for Landcare, p. 5.
[129] Spafford was a graduate of Roseworthy Agricultural College in 1903, cf: Commonwealth of Australia, Australian National Herbarium Biography: Spafford, Walter John (1884 - 1962). Online: http://www.anbg.gov.au/biography/spafford-walter-john.html. [Accessed 30 March, 2016].
[130] Ibid.

problem of sand drift.[131] When the South Australian government formed a Committee in order to investigate the erosion problem as recommended by the meeting of agricultural ministers in Adelaide in 1936, Spafford chaired the committee.[132] The report of this so-called 'Spafford Committee', published in 1938,[133] recommended the establishment of a soil conservation body which was realised in 1940 with the establishment of an Advisory Committee on Soil Conservation.[134] Despite the recommendations that such a conservation body should be independent of existing government agencies,[135] the Advisory Committee on Soil Conservation was integrated into the Department of Agriculture.[136] It consisted by and large of the members of the Spafford committee: Spafford as Director of Agriculture, Mr Rogers as Conservator of Forests, Mr McGilp as member of the Pastoral Board, Mr Johnson as Engineer for Water Supply, and Trumble, as head of the Agronomy Department at the Waite Agricultural Research Institute.[137] The Spafford committee had further recommended the appointment of three additional technical advisers who should advise the rural community on how to protect their soils; their appointment was delayed, however, as the Premier of South Australia, Sir Thomas Playford (Premier of SA from 1938-1965) thought the task could be completed by the already existing staff in the Department of Agriculture and the Lands Department.[138] Only after much insistence from the Advisory Committee, was Robert (Bob) Herriot finally appointed as the first Soil Conservator in 1941, and a Soil Conservation Branch was established; the other two technical advisers were appointed only at the beginning of 1945.[139] The first years of the Advisory Committee were not very effective as the war led to many restrictions on travelling and funding, and there was a shortage of qualified persons to employ.[140] It is therefore not surprising that in matters of basic research, the Advisory Committee was utterly passive: its function was purely advisory and its role focused on education, so it relied on soil investigations done by the Soils Division of the CSIR (for example of the eastern half of the County Victoria) and the research undertaken by the Waite Institute.[141]

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[131] N.N. (1920): A World-Wide Problem. In: *Journal of Agriculture of South Australia* 24, p. 235; Walter J. Spafford (1923): Sand Drift. In: *Journal of Agriculture of South Australia* 27, pp. 422-423; Id. (1929): The Control of Drifting Sand. In: *Journal of Agriculture of South Australi*a 32, pp. 700-709.
[132] Tideman, The Struggle for Landcare, pp. 5-6.
[133] Ibid.
[134] Ibid.
[135] Ibid.
[136] Ibid., pp. 6-8.
[137] Ibid., p. 5.
[138] Ibid., pp. 5-6, 9-10.
[139] Herriot, Soil Erosion. The Problem in South Australia, p. 120; Tideman, The Struggle for Landcare, p. 10.
[140] Ibid.
[141] Herriot, Soil Erosion. The Problem in South Australia, pp. 119-120.

4.1.2 Of Academic Interest: University Research Into Wind Erosion

The Universities played an important role in scientific research on soil erosion, particularly the academic disciplines of agronomy and botany. Most of the Australian colonies had founded Universities in the second half of the 19th century, starting with Sydney University in 1850.[142] Strongly leaning on the British model, the universities focused for much of the 19th century on teaching Arts, Law and Medicine, looking down on more practical or technical areas of study.[143] From the turn of the century on, sciences were increasingly accepted as equal to the classical triad.[144] When the colonies formed the Commonwealth, education had remained a matter of the states, which were consequently responsible for the financial support of their universities.[145] By 1938, six universities existed in Australia, offering largely undergraduate teaching for some 12,000 students.[146] In order to reach higher university degrees, young academics had to enter universities overseas, with Oxbridge being the first choice.[147] As the monetary share of the governments for the universities was comparatively small, a large part of the financial provisions came from student fees or from private benefactors.[148] The universities were, consequently, largely dependent on the prevailing economic situation: in the interwar years, the economic depression and the expansion of the student numbers, therefore, led to financial difficulties, overcrowded lecture rooms, and deterioration of university facilities.[149] This situation changed during the Second World War, when in the eyes of the public and of politicians, education and research grew in significance, and the Commonwealth took greater part in tertiary education:[150] the establishment of the Australian National University (ANU) in Canberra was one cornerstone of federal involvement, large scale federal funding of the state university system the other one.[151] In the late 1940s, University research in general expanded and the universities engaged gradually in autonomous research and post-graduate education

[142] Schedvin, Shaping Science and Industry, pp. 10-11; C. B. Wells/James A. Prescott (1983): The Origins and Early Development of Soil Science in Australia. In: CSIRO. Division of Soils (1983): Soils: An Australian Viewpoint, Melbourne [et al.], Academic Press, pp. 3-12, here p. 9.
[143] Ibid.
[144] Ibid.
[145] Ibid.
[146] Schedvin, Shaping Science and Industry, p. 10; Macintyrre, A Concise Histoy, p. 187.
[147] Carolyn Rasmussen (2001): Universities. In: Graeme Davison et al. (eds.), Oxford Companion to Australian History, South Melbourne, Vic. [et al.], pp. 662-663.
[148] Schedvin, Shaping Science and Industry, p. 11.
[149] Ibid., p. 12.
[150] Geoffrey Sherington/John P. Hughes (2015): 'Money Made Us': A Short History of Government Funds for Australian Schools. In: Helen Proctor et al. (eds.), Controversies in Education. Orthodoxy and Heresy in Policy and Practice, New York, Springer, pp. 157-173, here p. 163; Andrew Spaull (1976): Australian Education in the Second World War, St Lucia, Qld., University of Queensland Press, pp. 218-219.
[151] Home, Introduction, p. xvi; Greenwood, Australia – A Social and Political History, p. 387; Hannah Forsyth (2014): A History of the Modern Australian University, Sydney, NewSouth Publishing, pp. 26-28.

through offering the PhD degree, an important step towards an autonomous local scientific community.[152]

Soil erosion figured among the academic research agenda of agronomists at Australian universities. In the opening decade of the 20th century, the universities of the south-eastern states established faculties of agriculture and veterinary science.[153] The first university to offer a course leading to the Degree of Bachelor of Science in Agriculture was the University of Adelaide in 1901.[154] The Melbourne University instituted a Faculty of Agriculture in 1905, and offered courses leading to a Diploma in Agriculture or to the Degree of Bachelor of Agricultural Science.[155] The University of Sydney was the first Australian university to create and fill a Chair of Agriculture in 1910, and offered courses leading to the Degree of Bachelor of Science in Agriculture at the same time. The states of Western Australia and Queensland followed in 1913 and 1927 respectively.[156] In regard to soil erosion, the only substantial agronomic practical research was undertaken at the University of Adelaide, while at the University of Melbourne, Professor Samuel Wadham, a specialist of the economics of agriculture, approached the problem on a more theoretical basis as part of his more general reflections on land utilization.[157] The University of Adelaide had from the beginning emphasised the integration of practical and theoretical knowledge in its academic curriculum for agriculture.[158] After a bequest of Peter Waite, an Agricultural Research Institute had been established at the University in 1924 that would become an important centre for Australian wind erosion research.[159] Equipped with two foundation professorships, the Waite Agricultural Research Institute (in short 'the Waite') engaged in studies in a wide range of fields, among them agricultural chemistry and soil types, but all closely linked to the primary industries.[160] Professor Arnold E. Richardson (1883–1949) was the first director of the Waite from 1924 to 1937, at which time he resigned the position to take a full-time position as Deputy Chief Executive Officer at CSIR, and was succeeded by Professor Prescott.[161] The Waite had strong links to the Department of Agriculture: it gave advice in entomology to the

[152] Ibid.
[153] Schedvin, Shaping Science and Industry, p. 12.
[154] Tasmania only after the Second World War, cf. Wells/Prescott, The Origins, p. 9.
[155] Ibid.
[156] Ibid.
[157] And will therefore be treated in the fourth section of the thesis.
[158] Edgeloe, The Waite Agricultural Research Institute, p. 3.
[159] Wells/Prescott, The Origins, p. 9.
[160] Wells/Prescott, The Origins, pp. 9-10; Edgeloe, The Waite Agricultural Research Institute, p. 18; Schedvin, Shaping Science and Industry, pp. 75-76.
[161] R. L. Best (1988): Richardson, Arnold Edwin Victor (1883–1949). ADB Online: http://adb.anu.edu.au/biography/richardson-arnold-edwin-victor-8198/text14341 [Accessed 29 August, 2014]; Edgeloe, The Waite Agricultural Research Institute, pp. 29-31, 40.

Department in return for substantial financial support from the government.[162] On the other hand, the Department of Agriculture placed its experimental farms at the disposal of the Institute for field experiments and the collection of meteorological records.[163] The Waite had also cooperated with the CSIR since 1926, and in 1929 they commonly founded the CSIR Division of Soils Research (1929), which established its headquarters at Adelaide.[164] The common work of the CSIR Division of Soils and the Waite started in January 1930 and lasted until 1947, when the CSIR appointed its own full-time Chief.[165] The cooperation between the University and the CSIR stopped completely in 1958 when the CSIR Division of Soils established its own laboratories.[166]

Along with agronomy, the discipline of botany was primordial for research into soil erosion at the university level, especially for the rise of ecological research. The discipline of botany had seen its academic establishment in the south-eastern states before World War One: Australia's first chair of botany and plant physiology was established at Melbourne University in Victoria in 1905, with Alfred James Ewart as its first professor.[167] As has been stated in the first section of the thesis, Eward was concerned early on with wind erosion in the Mallee and published a paper on the topic in the *Australian Forestry Journal* in 1922.[168] After his death in 1937, the position was taken by John Turner, under whose direction ecological research into the soil erosion in the forested Hume Catchment was initiated during the 1940s.[169]

The founding of the discipline of ecology in Australia remains somewhat vague, but can be dated to somewhere in the 1920s when plant ecology studies were undertaken by several universities.[170] As a legacy of its colonial history, Australia's scientific landscape was comparatively underdeveloped in the first decades of the twentieth century, when ecology rose to a powerful academic discipline in the USA and Great Britain.[171] There was no Australian ecological institution, society or journal to coordinate research during the interwar

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[162] Edgeloe, The Waite Agricultural Research Institute, pp. ix, 29. By amendment of the University Act in 1935, starting in the year 1937/38, the Director of the Waite Institute was obliged to furnish every year a report on the work of the Institute to the Minister of Agriculture. The report was then read in parliament see: Edgeloe, The Waite Agricultural Research Institute, p. 40.
[163] Edgeloe, The Waite Agricultural Research Institute, p. 80.
[164] Wells/Prescott, The Origins, p. 10; Edgeloe, The Waite Agricultural Research Institute, p. 36.
[165] Edgeloe, The Waite Agricultural Research Institute, p. 36.
[166] Ibid.
[167] T. C. Chambers (1981): Ewart, Alfred James (1872–1937). ADB Online: http://adb.anu.edu.au/biography/ewart-alfred-james-6124. [Accessed 30 March, 2016].
[168] Ewart, A Serious Danger, pp. 240-242.
[169] Turner held the position until 1973, see: Richard J. Selleck (2003): The Shop: The University of Melbourne, 1850-1939, Carlton, Vic., Melbourne University Press, pp. 691-693; see also: Encyclopedia of Australian Science: Turner, John Stewart (1908 - 1991). Online: http://www.eoas.info/biogs/P000844b.htm#pub-resources. [Accessed 30 March, 2016].
[170] Gillbank, The Life Sciences, p. 109; Robin, Ecology: A Science of Empire, p. 68.
[171] Dunlap, Nature and the English Diaspora, p. 153.

period, and the ecological studies were limited.[172] The Ecological Society of Australia was only established in 1961, and the Australian Journal of Ecology did not start publishing before 1976.[173] The beginnings of ecological studies are closely linked with the name of (Theodore George) Bentley Osborn (1887-1973) and the Botany Department of the University of Adelaide.[174] In 1912, (Theodore George) Bentley Osborn (1887-1973) was appointed to the University of Adelaide's first Chair of Botany.[175] The South Australian government supported the Chair on condition that the professor would act as advisor on economic botany, namely plant pathology, to the state Department of Agriculture.[176] When Osborn and his staff began in the early 1920s to focus on the plant associations of the arid north in connection with soil drift,[177] this scientific interest was paralleled by the political commitment of the government to develop the unused land resources as part of the larger rural settlement enthusiasm after the war.[178] Osborn left the Botany Chair in Adelaide in 1928 to come to Sydney; his research into the ecological arid regions of South Australia was continued by his close associate Joseph Garnett Wood, who was then appointed lecturer-in-charge of the university's botany department and promoted to professor in botany in 1935.[179] In Sydney, Osborn took over the position of Abercrombie Anstruther Lawson, who had occupied the initial chair of Botany since 1913.[180] Osborn introduced ecology into the undergraduate curriculum at the University of Sydney against some resistance by his staff. When he decided to accept a Chair at Oxford University in 1938, his position was taken by Eric Ashby as Professor of Botany at the University of Sydney from 1938 to 1946.[181]

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[172] For example Alexander J. Nicholson, who worked in a comparative way on insect population stability, see: Dunlap, Nature and the English Diaspora, p. 152; Mulligan/Hill, Ecological Pioneers, p. 164.
[173] Robin, Ecology: A Science of Empire, p. 68.
[174] Gillbank, The Life Sciences, p. 109; E. L. Robertson (1986): Botany. In: Charles R. Twidale et al. (eds.), Ideas and Endeavours: The Natural Sciences in South Australia, Adelaide, Royal Society of South Australia, pp. 101-149, here p. 143.
[175] Robin, How a Continent Created a Nation, p. 104.
[176] Ibid.; Edgeloe, The Waite Agricultural Research Institute, p. 4.
[177] Theordore G. Osborn/Joseph G. Wood (1923): On some Halophytic and Non-halophytic Plant Communities in Arid South Australia. In: *Trans. Roy. Soc. S. Aust.* 47, pp. 388-399; Theordore G. Osborn (1925): On the Ecology of the Vegetation of Arid Australia. No.1: Introduction and General Description of the Koonamore Reserve for the Study of the Saltbush Flora. In: *Trans. Roy. Soc. S. Aust.* 49, pp. 290-297, here p. 294; cf. also: Robin, Ecology: A Science of Empire, p. 68.
[178] Robin, How a Continent Created a Nation, p. 104.
[179] Ray Specht (2002): Wood, Joseph Garnett (1900–1959). ADB Online: http://adb.anu.edu.au/biography/wood-joseph-garnett-12064. [Accessed 30 March, 2016].
[180] Clifford Turney/Ursula Bygott/Peter Chippendale (1991): Australia's First. A History of the University of Sydney. V.1:1850-1939, Sydney, University of Sydney, Hale & Iremonger, pp. 538-539.
[181] Ibid., pp. 539-540.

4.2 Of National Importance: Federal Involvement in Erosion Research

The Commonwealth became involved into soil erosion research primarily via the Council for Scientific and Industrial Research (CSIR) and to a limited extent, by the Commonwealth Bureau of Meteorology (BoM). The CSIR, the sole federal scientific research institution at the time, had been established in 1926 after a long period of preparation and negotiations between the states and the Commonwealth.[182] The lengthiness of the process was due to the general outline of the Australian scientific landscape: science and research were fundamentally matters of the states, and the majority of the scientific community was not inclined to attribute a greater role to the Commonwealth.[183] Consequently, before the First World War, any suggestions to create a federal institute for scientific and industrial research in Australia came to nothing.[184] This changed during the war, which brought home to Australians the necessity for a national organization for scientific research along the British model in order to foster strategic industries.[185] With the support of Prime Minister William (Billy) Hughes, a national scheme of applied scientific research for primary production in Australia was decided in December 1915.[186] The formation of the federal institute was slow, as some Ministers and officers in the states Departments of Agriculture opposed its establishment, considering scientific research in primary production as their own sphere of competence and being hostile to any competition.[187] When the Commonwealth Institute of Science and Industry finally resumed work in March 1921, it was from the outset in a weak position, lacking both personnel and financing.[188] In 1925, now under the premiership of Stanley Bruce, the reorganization of the Institute was decided, and in winter 1926, the new body was established under the name 'Council for Scientific and Industrial research' (CSIR).[189] The CSIR was designed as a co-coordinating body, which had to work within the framework of the existing institutions of the states.[190] In the wake of strengthening economic ties with the Empire after the war, much of the Council's research in the interwar years was

[182] Currie/Graham, The Origins of CSIRO, p. 8; Schedvin, Shaping Science and Industry, p. 1
[183] Ibid.
[184] Ibid.
[185] Currie/Graham, The Origins of CSIRO, pp. 11-18; Schedvin, Shaping Science and Industry, p. 12.
[186] Currie/Graham, The Origins of CSIRO, pp. 34-75.
[187] Currie/Graham, The Origins of CSIRO, pp. 81-83. But there was also some supporters within the Departments of Agriculture. In Victoria, for example, S.S. Cameron, the Director of Agriculture and A.E.V. Richardson, the Superintendent of Agriculture, were both dedicated members of the Executive Committee of the Council, cf. ibid., p. 90.
[188] Currie/Graham, The Origins of CSIRO, pp. 85-97, 104-109, 112-115; Schedvin, Shaping Science and Industry, pp. 12-17.
[189] Currie/Graham, The Origins of CSIRO, pp. 129-131, 135-140, 150-152.
[190] Schedvin, Shaping Science and Industry, p. 20.

directed towards problems arising from the major export industries of the primary sector.[191] In the course of the Great Depression, however, the imperial vision was somewhat blurred and the manufacturing sector became gradually more important, paralleled by trends towards a stronger autonomy.[192]

The CSIR, which had its head office in Albert Street, Melbourne, was comprised of nine statuary members: three members of the Executive Committee appointed by the Commonwealth and the chairmen of six state committees.[193] The Executive Committee were to ensure the continuity of work in the periods between the meetings of the Council, during which times it disposed of all of its (.a. the Council's) powers and functions.[194] Next to George A. Julius (chairman) and (A.C.) David Rivett, the third committee member was William J. Newbigin, who died suddenly in 1927 and was replaced by Arnold E. Richardson.[195] In his double function of CSIR executive committee member and head of the Waite, Richardson played a major role in establishing a close and exceptional cooperation between CSIR and Waite.[196] In this new personnel configuration, the Executive Committee remained unchanged for nearly two decades.[197] During the Second World War, the CSIR underwent major changes, reflecting more general trends within Australia's scientific sector: Its size increased four-fold during the war and its research fields, largely limited to agricultural and biological sciences up to then, diversified and then included a wide spectrum of the physical sciences.[198] In 1949, when the CSIR was restructured as the Commonwealth Scientific and Industrial Research Organization (CSIRO), its total budget had increased more than six-fold and the number of staff five-fold since the opening of the decade.[199] It continued to expand in personnel as well as in research areas.[200] While the majority of research was still directed towards primary industry, the share of investigations related to areas of the manufacturing sector continued to grow; at the same time, there was a stronger emphasis on basic research at the expense of applied science, which had been pre-eminent until then.[201]

Land degradation had been on the agenda of the CSIR since its inception, when it inherited a soil survey project of the Murray Valley that had been initiated in 1926 under its

[191] Ibid., pp. 17-18, 25.
[192] Ibid.; Home, Introduction, p. xv.
[193] Schedvin, Shaping Science and Industry, pp. 20, 35.
[194] Ibid.; Currie/Graham, The Origins of CSIRO, p. 150.
[195] Schedvin, Shaping Science and Industry, pp. 30-31, 34.
[196] Ibid.
[197] Ibid.
[198] Ibid., pp. 281-282, 309.
[199] Ibid., p. 282; Buckley/Johnston, The Shaping of Contemporary Scientific Institutions, p. 376.
[200] Home, Introduction, p. xvi.
[201] Ibid.

predecessor organisation.[202] The survey was conceived in order to do research into the land degradation caused by waterlogging and salinity in the irrigated agricultural areas of the Murray and Murrumbidgee.[203] The CSIR decided to assign the survey to the Soils Investigation Section of the Waite Institute of the University of Adelaide, at the time headed by Arnold E. V. Richardson.[204] When the University of Adelaide received a private inheritance for the building of a laboratory for soils research in June 1929, the CSIR agreed to a joint venture:[205] The result of this cooperation was the commonly founded CSIR Division of Soils Research (1929) which also had its headquarters at Adelaide.[206] The University provided the accommodation, the maintenance and services, and the CSIR provided the staff and equipment.[207] This cooperation between the Waite and the CSIR was the nucleus for the creation of the CSIR Division of Soil Research in 1929, which under the direction of soil chemist James A. Prescott, from 1929 to 1947, would contribute some basic information about Australian soils, relevant for erosion research.[208]

In addition to several soil surveys and erosion investigations conducted or supported by the CSIR Division of Soils, the Council became more directly involved with the problem of wind erosion in 1934. In December that year, Senator A.J. McLachlan, at the time Commonwealth Minister for Development, called the CSIR to point out the wind erosion problem and to request the Council to consider whether any action should be taken to combat the drift of soil in the arid and semi-arid parts of Australia.[209] Complying with the request, the CSIR assiduously collected information and advice available from concerned authorities of all of the Australian states.[210] It compiled a summary of information that contained a general statement from A.E.V. Richardson, as well as accounts and information from staff of the Department of Agriculture of NSW, Victoria, South Australia and Western Australia, the

[202] Wells/Prescott, The Origins, p. 10.
[203] Ibid.; John K. (1970): The Development of Soil Survey and Field Pedology in Australia, 1927-67, Melbourne, CSIRO, p. 8; Kenneth E. Lee (1998): A History of the CSIRO Division of Soils: 1927-1997, Canberra, CSIRO, p. 4.
[204] Edgeloe, The Waite Agricultural Research Institute, p. 29; Wells/Prescott, The Origins, p. 10.
[205] Wells/Prescott, The Origins, p. 10.
[206] Ibid.
[207] Edgeloe, The Waite Agricultural Research Institute, p. 36.
[208] Lee, A History of the CSIRO; Wells/Prescott, The Origins, p. 10; Edgeloe, The Waite Agricultural Research Institute, p. 36. Prescott had already been adviser on soils to CSIR since 1927, see: Edgeloe, The Waite Agricultural Research Institute, p. 30.
[209] Letter (copy) from A.C.D. Rivett to A.E.V. Richardson and Sir George Julius, 11 December 1934, in: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[210] CSIR. Standing Committee on Agriculture. Soil Drift – Summary of Information (1935), in: [NAA: A9778, C30/5/80, Papers and abstracts on soil erosion].

Western Lands Office for NSW, the Pastoral Board of South Australia, the Queensland Land Administration Board and a summary of the Victorian sand drift report of 1933.[211]

On initiative of the CSIR, the summary of information was brought up for consideration at meetings of the Standing Committee on Agriculture and the Australian Agricultural Council in April and May 1935.[212] These bodies were the result of a recent change in Australian public administration: In December 1934, the Australian Agricultural Council and its permanent expert committee, the Standing Committee on Agriculture, were established to assure a more efficacious coordination between the states and the Commonwealth.[213] This in turn was necessary as the states held the legislative power with respect to agricultural production while the Commonwealth had the competence for overseas marketing.[214] At the meeting of the Standing Committee on Agriculture held in Sydney in April 1935, the following resolution was passed:

> That in the opinion of the Standing Committee the question of soil drift is so serious that it should be investigated; that it is desirable that C.S.I.R. should appoint an officer to make observations in order to determine factors responsible for such drift, and that the Commonwealth Government should be urged to provide funds for the appointment of such an officer.[215]

On the subsequent meeting of the newly formed Australian Agricultural Council on 28 May 1935, it approved the resolution of the Standing Committee and granted the sum of £500 for the CSIR in order to conduct a soil drift research survey in inland pastoral areas.[216] On the suggestion of Richardson, the British biologist Francis Ratcliffe – who had already been to Australia in 1929 on behalf of the Empire Marketing Board in order to study the problem of flying foxes for Queensland's fruit industry – was put on the job.[217] A federal approach to the erosion problem was also among a series of items discussed at a conference of Commonwealth and state ministers in August 1936 in Adelaide.[218] The establishment of a national soil erosion bureau was discussed and resulted in the recommendation "that each State establish a Committee to study the problems of soil erosion and conservation, and to

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[211] Ibid.
[212] Memorandum from G. Lightfoot to Senator A. J. McLachlan, re Soil Drift- Provision of £500 on Estimates for 1935-36, 19th June, 1935, in: [NAA: A461, B302/1/6 Part 1, Soil drift and soil erosion].
[213] F. O. Grogan (1958): The Australian Agricultural Council. A successful experiment in Commonwealth-State relations. In: *Australian Journal of Public Administration* 17 (1), pp. 1-21, here pp. 3-6, 20.
[214] Ibid., pp. 1-2.
[215] Memorandum from G. Lightfoot to Senator A. J. McLachlan, re Soil Drift- Provision of £500 on Estimates for 1935-36, 19th June, 1935, in: [NAA: A461, B302/1/6 Part 1, Soil drift and soil erosion].
[216] Ibid.
[217] Powell, Francis Ratcliffe's First Impressions, n.p.; Powell, Mothering, Husbandry and the State, pp. 65-67.
[218] Commonwealth of Australia (1936): Conference of Commonwealth and State Ministers held in Adelaide, 26th to 28th August, 1936. Proceedings and Decisions of Conference, Adelaide, Government Printer. In: [NAA: A659, 1945/1/5300, Conference of commonwealth and state ministers, Adelaide-August 1936].

suggest means by which correctives might be applied; the Council for Scientific and Industrial Research to co-operate with such Committees".[219] The recommendation gave a major impetus into soil erosion investigations by the states supported by the CSIR.[220] On the same occasion, the proposal to send an officer abroad to undertake research into plants for semi-arid and arid lands in connection with the sand drift problem was discussed, but deferred, as David Rivett, considered as the authority on the subject, was abroad;[221] the proposal was finally rejected shortly afterwards, Rivett as well as Ratcliffe being sceptical about the benefits from such a tour.[222]

Next to the CSIR, the federal level became involved in wind erosion research through the Commonwealth Bureau of Meteorology (BoM).[223] The BoM had been established in 1908 in the wake of federation, when responsibility for meteorology was transferred to the Commonwealth government.[224] Until the 1930s, however, the shortage of professionally trained meteorologists and the lack of financial resources during the economic depression put a severe constraint on genuine meteorological research.[225] Consequently, the BoM's main activities were the collection of data on rainfall and weather events and their circulation among interested persons and institutions.[226] Meteorological research outside the ranks of the BoM was likewise strongly limited.[227] In the 1930s the ascent of aviation, which required more precise weather forecasts would radically change this situation.[228] Aviation became the main sphere of activity of Australian meteorology and prompted a huge financial and

[219] Ibid., p. 81.
[220] After the Second World War, when the CSIR became the CSIRO, the development of myxomatosis would be a fundamental step for rabbit control and soil conservation in Australia, see: Buckley/Johnston, The Shaping of Contemporary Scientific Institutions, p. 376.
[221] Commonwealth of Australia (1936): Conference of Commonwealth and State Ministers held in Adelaide, 26th to 28th August, 1936. Proceedings and Decisions of Conference, Adelaide, Government Printer. In: [NAA: A659, 1945/1/5300, Conference of commonwealth and state ministers, Adleiade- August 1936].
[222] Press statement by McLachlan on 'Soil Erosion – Sir David Rivett's Report'. Not dated; Francis N. Ratcliffe, 'CSIR Summary of Information to the proposed expedition to collect plants suitable for introduction to arid and semi-arid regions', March 1937; both in: [NAA: A461, B302/1/6 Part 1, Soil drift and soil erosion].
[223] The thesis focuses on the European history of meteorology in Australia. For weather observations by Aborigines see, for example: Jane Simpson (1997): Perceptions of Meteorology in some Aboriginal Languages. In: Eric K. Webb (ed.): Windows on Meteorology: Australian Perspective, Collingwood, Vic., CSIRO Publishing, pp. 20-28; Donna Green et al. (2010): Indigenous Australians' Knowledge of Weather and Climate. In: *Climatic Change* 100 (2), pp. 337-354. See also the Indigenous Weather Knowledge homepage established by the Commonwealth of Australia, Bureau of Meteorology. Online: http://www.bom.gov.au/iwk/ [Accessed 30 March, 2016].
[224] Bill Gibbs (1997): A Mini-history of Meteorology in Australia. In: Eric K. Webb (ed.), Windows on Meteorology: Australian Perspective, Collingwood, Vic., CSIRO Publishing, pp. 81-104, here pp. 95-96.
[225] Ibid., pp. 96-99; David Day (2007): The Weather Watchers: 100 years of the Bureau of Meteorology, Carlton Vic., Melbourne University Press, p. 156.
[226] Day, The Weather Watchers, p. 156.
[227] Gibbs, A Mini-history of Meteorology, p. 96.
[228] Day, The Weather Watchers, pp. 155-179.

personnel expansion of the BoM in the years before the Second World War.[229] In the course of this reorientation, the federal government furnished funding to provide professional training and establish a Department of Meteorology at the University of Melbourne in 1937.[230] The first reader in charge of the Department was Fritz Loewe, a Jewish refugee from Nazi Germany.[231] Loewe inaugurated Meteorological studies at the Melbourne University and participated actively in the professional training courses of the BoM.[232] The focus of meteorological research on aviation was, of course, closely linked to the impending war situation in Europe and the Australian government's endeavour to build up its air defense.[233] After the outbreak of war, the BoM extended its professional training (in cooperation with the Melbourne University)[234] and saw an unprecedented increase in material and personnel resources and the application of up to date technology that allowed it to establish a dense network of upper air observing stations.[235] In order to ensure that the military needs were prioritised, the BoM was put under the control of the Air Board and became part of the Royal Australian Air Force in 1941.[236] It was in this context that Loewe, as part of a Commonwealth funding programme for research into meteorological research relevant to aviation, investigated the origins of Australian dust storms.[237] Despite a marked expansion of meteorological research during the Second World War and a large increase of staff and material of the BoM, its equipment and finances still lagged far behind those of Great Britain and the US at the end of the war.[238] The post-war years then saw an increase of research in meteorology, primarily in the fields of atmospheric science, hydrological science, climatological studies and others.[239] This was linked to the expansion of research

[229] Gibbs, A Mini-history of Meteorology, p. 98; Day, The Weather Watchers, pp. 162, 170, 194. The BoM's emphasis on aviation was partly due to recommendations of H. F. Wimperis, the former director of scientific research at the British Air Ministry, issued in a report in late 1937, cf. Day, The Weather Watchers, pp. 180-181.
[230] Gibbs, A Mini-history of Meteorology, p. 98. For an extensive account of the history of the Meteorological Department of the Melbourne University, see: Uwe Radok (1993): UNIMET - the Meteorological Department of the University of Melbourne 1937-1990, Melbourne, University of Melbourne.
[231] Gibbs, A Mini-history of Meteorology, p. 98. Loewe had worked as Scientific Assistant at the Potsdam Meteorological Observatory since 1922 and was appointed first Head of Research Flights of the Prussian Meteorological Service in 1925. In 1934, he flew from the persecution of the Nazis to England, where he worked at the Scott Polar Research Institute at Cambridge, see: Fay Anderson (1999): Fritz Loewe. In: *Australasian Science* 20 (1), p. 46.
[232] Day, The Weather Watchers, p. 180.
[233] Ibid.
[234] Ibid., p. 195.
[235] Day, The Weather Watchers, pp. 194, 207, 218. In regard to scientific networks, the bonds of the BoM to Great Britain loosened as the international exchange, especially with the US Army Air Forces, amplified, see: Gibbs, A Mini-history of Meteorology, p. 100; Day, The Weather Watchers, pp. 194-197, 236.
[236] Ibid.; the BoM returned to the Department of Interior on 1 July 1946, see Day, The Weather Watchers, p. 259
[237] Loewe, Duststorms in Australia.
[238] Day, The Weather Watchers, p. 267.
[239] Charles H. Priestley (1982): Reminiscences of 30 Years of Meteorological Research in Australia. In: *Aust. Met. Mag.* 30, pp. 19-30, here p. 19; Day, The Weather Watchers, pp. 255-256, 273.

infrastructure, namely the establishment of climatological sections of the BoM in each state and the involvement of CSIR(O) in meteorological studies.[240] After the war, the CSIR(O) established a Section of Meteorological Physics that later became the Division of Atmospheric Research and soon rivalled the BoM in matters of meteorological research.[241] Under Chiefley, meteorology was thought to boost Australia's development, especially in agriculture but also in a series of other sectors.[242] Thus, more genuine research into the climatic conditions of soil erosion in Australia began in the 1950s.[243] In the closing years of the war and the period immediately thereafter, the BoM also actively promoted Australia's involvement in international cooperation in meteorology, namely in the World Meteorological Organisation.[244]

4.3 Across the Borders: International Knowledge Exchange on Erosion

Scientific research into wind erosion in Australia was embedded in the larger network of knowledge production by international scientists who were undertaking intensive research into wind erosion during the 1930s and 1940s. Even if there were no international scientific institutions that concerned themselves with wind erosion, one can rightfully speak of an international scientific community which Australian researchers were part of. In order to trace international influences in Australia, it is therefore necessary to trace these influences on the recipient side, looking at how Australian individuals interacted with the international community and how soil knowledge was received and applied locally.

The boom in wind erosion research was linked to the rise of an international alarm on soil erosion caused by the experience of major droughts and acute wind erosion in the early 1930s in a number of settler societies: besides Australia also North America as well as parts of East and South Africa.[245] Thus, deserts were 'on the march' in the 1930s, and fears of the negative effects of wind erosion triggered research on multiple levels.[246] An anonymous author, looking back at the *Dirty Thirties* at the end of the decade, described this process of the birth of an international awareness in the following words: "Thus from one source or another there sprang up a general consciousness of the gravity of the problem presented by soil erosion in

[240] Ibid.
[241] Ibid.
[242] Day, The Weather Watchers, pp. 264-265.
[243] Priestley, Reminiscences, pp. 25-26.
[244] Gibbs, A Mini-history of Meteorology, p. 100.
[245] N.N. (1939), Dust Bowls of the Empire; Kate B. Showers (2006): Soil Erosion and Conservation: An International History and a Cautionary Tale. In: Benno P. Warkentin (ed.), Footprints in the Soil. People and Ideas in Soil History, Amsterdam [et al.], Elsevier, pp. 367-406, here p. 373; Joachim Radkau (2014): The Age of Ecology: A Global History, Cambridge Malden, MA Polity, pp. 52-55.
[246] Radkau, The Age of Ecology, pp. 52-55.

almost every country where recent settlement or the growth of population had led to an intensification of agriculture".[247]

For this process of international alarm, the great media attention given to the events of the US Dust Bowl were, of course, fundamental. A weather cycle brought dry conditions over Northern America in 1930, and wind erosion affected the Great Plains and the Midwest of the United States of America, creating the notorious 'Dust Bowl'.[248] The USA had been leading in research into soil erosion since the 1920s, but up to then, they were mostly preoccupied with water erosion, which had been (and remained) the economically more costly problem.[249] As a result of the dust storm years, wind erosion then became a central concern for US soil conservationists. Hugh H. Bennett, since 1933 first director of the US Soil Erosion Service, a temporary agency under the Department of the Interior, cleverly used the public attention created by the dust storms to establish a more permanent soil conservation service, the first federal agency of its kind world-wide.[250] The Service was placed under the Department of Agriculture and Bennett appointed its head.[251] The Department of Agriculture, and within it the Soil Conservation Service, engaged in research and published a broad variety of scientific papers on the problem of soil erosion and desertification.[252] Even if the immediate relief measures were at the beginning the biggest concern, the Dust Bowl catastrophe also triggered a boost of theoretical research into wind-erosion by various disciplines.[253] The combination of a long tradition in soil erosion research, a national soil conservation programme and a large publication activity on the topic assured their influence. Their research was widely read and they were the main aim for study tours from experts around the world.[254] American

[247] N.N. (1939), Dust Bowls of the Empire, p. 339.
[248] There is abundant literature on the American dust bowl, the two classic still being: Worster, Dust Bowl; Paul Bonnifield (1979): The Dust Bowl: Men, Dirt, and Depression, Albuquerque, University of New Mexico Press. The expression 'dust bowl' was introduced by an American journalist in 1934, who described parts of Colorado, Kansas, New Mexico and Oklahoma as a 'Dust Bowl' when he reported on the drought and dust storms in the Plains, see: Worster, Dust Bowl, pp. 28-29.
[249] Showers, Soil Erosion and Conservation, p. 386. Water erosion remained the bigger problem, see: Worster, Dust Bowl, p. 213. The foundational paper of American soil conservation Soil Erosion a National Menace, published in 1928 as joint work by Hugh H. Bennett and William R. Chapline, mentioned wind erosion as a problem, but focused nearly exclusively on water erosion in the USA, see: Eid. (1928): Soil Erosion. A National Menace, Circular No. 33, Washington D.C., US Government Printing Office.
[250] The story of how Bennett orchestrated his evidence before a Congressional committee in such a way that a big dust storm obscured the sky over Washington D.C. just when he made his pledge for a permanent soil conservation service is legendary, see: Worster, Dust Bowl, p. 213.
[251] Ibid.
[252] For example: Hugh H. Bennett (1939): Soil Conservation, New York [et al.] McGraw-Hill; A. H. Joel (1937): Soil Conservation Reconnaissance Survey of the Southern Great Plains' Wind-erosion Area, U.S. Dept. Agr. Tech. Bul. 556.
[253] Ronald L. Heathcote (1980): Perception of Desertification on the Southern Great Plains: A Preliminary Enquiry. In: Id. (ed.), Perception of Desertification, Tokyo, United Nations University, pp. 34-59, here p. 44.
[254] Showers, Soil Erosion and Conservation, pp. 388-393.

philanthropic foundations such as the Carnegie Corporation supported many of these trips.[255] In the case of Australia, these links were traditionally close to Great Britain and other countries of the British Empire. However, the dominance of the USA in soil erosion research meant that Australians largely turned to the US as well.

The US was not the only country affected by severe wind erosion on the North American continent: In Canada during the first half of the 1930s, wind erosion similarly caused a major social, economic and ecological tragedy in the prairie lands of the so-called 'Palliser triangle', covering parts of southern Alberta and Saskatchewan as well as a small piece of south-western Manitoba.[256] Canadians responded to this problem with political and scientific action:[257] Their wind erosion research, namely by William S. Chepil, who came after the Second World War to the US for his research, is considered foundational for the discipline and was strongly received by Australian soil experts of the time.[258]

On the African continent, wind erosion affected especially Northern Nigeria, while water erosion affected all of the African colonies to some degree.[259] Pamphlets and books from the American Soil Conservation Service greatly influenced the anti-erosion measures in the three British East African territories.[260] As David Anderson put it, the news of the US erosion catastrophe seemed to "have a particular relevance to overcrowded African reserves of Kenya, to heavily overpopulated parts of Upland Tanganyika and to many intensively cropped regions of Uganda".[261] In South Africa, the Union had become more and more alert to the problem of soil erosion during the 1920s, which resulted in a South African Soil Erosion Conference in 1929.[262] When by 1933 anti-erosion schemes were implemented, they also reflected US-American experiences.[263] In the same year, Lord Hailey's published *African Survey* (1938) the first continent-wide study on soil erosion and this African-wide approach

[255] Ibid.
[256] N.N. (1939), Dust Bowls of the Empire, pp. 343-345.
[257] James H. Gray (1967): Men against the Desert, Saskatoon, Western Producer Book Service, pp. 25-26; Gregory P. Marchildon (2009): The Prairie Farm Rehabilitation Administration: Climate Crisis and Federal-Provincial Relations during the Great Depression. In: *Canadian Historical Review*, 90 (2), pp. 275-301.
[258] Middleton/Thomas, Desertification: Exploding the Myth, p. 22; Kenneth Pye (1987): Aeolian Dust and Dust Deposits, London [et al.], Academic Press, p. 6; Andrew S. Goudie (2008): Aeolian Processes and Forms. In: Tim P. Burt et al. (eds.), The History of the Study of Landforms or the Development of Geomorphology. Vol. 4: Quaternary and Recent Processes and Forms (1890-1965) and the Mid-Century Revolutions, London, The Geological Society London, pp. 767-804, here pp. 777-780.
[259] N.N. (1939), Dust Bowls of the Empire, p. 346.
[260] David Anderson (1984): Depression, Dust Bowl, Demography, and Drought. The Colonial State and Soil Conservation in East Africa during the 1930s. In: *African Affairs* 83 (332), pp. 321-343, here p. 326.
[261] Ibid.
[262] Ibid., p. 328; Showers, Soil Erosion and Conservation, pp. 394-396.
[263] Ibid.

was carried on with the establishment of inter-African conferences on soil conservation at the end of the 1940s.[264]

Concerned about agricultural production within its Empire, the British government had established the Imperial Bureau of Soil Science at the Rothamsted Agricultural Experiment Station in England in 1929.[265] Its review bulletin on Soil Erosion (1929) shows a likewise significant US-American influence.[266] The Imperial Bureau of Soil Science issued several publications on wind erosion, which were internationally distributed. The most popular and widely circulated was G. V. Jacks and R. O. Whyte's *The Rape of the Earth. A World Survey of Soil Erosion*.[267] As the title suggests, the book was an overview of the present world situation of erosion, covering North and South America, Asia, Europe, Africa, and Australia. The information that Jacks and Whyte drew from had been gathered through the imperial information service.[268] The Australian correspondent of the Imperial Bureau of Soil Science was James A. Prescott, the director of the CSIR Division of Soils Research, who was in close contact with his colleagues in Rothamsted.[269] On the request of Jacks, Prescott collected information on soil erosion from the different states in December 1936. His major sources were James Macdonald Holmes and Sam Clayton for information about New South Wales and Francis Ratcliffe and R. L. Griffiths for information about South Australia.[270] *The Rape of the Earth*, in turn, was wide spread in Australia, contributing to a circular flow of information.[271] In the book, Jacks and Whyte conceptualised soil erosion as an international environmental problem:

> Until quite recently erosion was regarded as a matter of merely local concern, ruining a few fields and farmsteads here and there, and compelling the occupiers to abandon their homes and move on to new land, but it is now recognized as a contagious disease spreading destruction far and wide irrespective of private, county, state or national boundaries.[272]

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[264] Showers, Soil Erosion and Conservation, pp. 386-387.
[265] Ibid.
[266] Ibid.
[267] Graham V. Jacks/Robert O. Whyte (1939): The Rape of the Earth. A World Survey of Soil Erosion, London, Faber and Faber; cf. Joseph M. Powell (2010): Development Imperative, Terrae Incognitae. A Pioneer Soil Scientist 1912-1951. In: *Geographical Research* 48 (3), pp. 249-264, here p. 256.
[268] Ibid.
[269] See correspondence in: [NAA: A8573, 1936A/P, CSIR – Animal Nutrition, Griffith, Imperial Bureau of Soil Science, Merbein, Prescott, Publications]. Especially letter from J. A. Prescott to G. V. Jacks Re Bulletin on Soil Erosion, 23rd December 1936.
[270] Ibid.; cf. also: Powell, Development Imperative, p. 256.
[271] The survey is, for example, frequently mentioned in the Parliamentary debates, cf. PD, Legislative Assembly South Australia, 22 August 1939, pp. 626-627; 22 July 1942, p. 147; 8 August 1945, p. 198; PD, Legislative Assembly Victoria, 19 November 1940, pp. 1641, 1660, 1665-1667. Cf. also reviews in newspapers: 'Soil Erosion. Danger Which Knows No Boundaries', *Sydney Morning Herald*, 15 May 1939; 'Letter to the editors' *The (Adelaide) Advertiser*, 6 March 1945.
[272] Jacks/Whyte, The Rape of the Earth, p. 20.

As we have seen, the research of the Imperial Bureau of Soil Science also found its way to Australia through institutionalised exchange, for example when John Russell presented a paper at the ANZAAS congress in 1939.[273]

Thus, as the fourth chapter has demonstrated, the scientific landscape in Australia underwent significant changes in the period under consideration. The colonial structures continued to be important, first of all the significant role of the states in scientific research. Another legacy of Australia's colonial past that continued to be powerful was the alignment of science to the needs of the export industry, which went along with a focus on the applied sciences. Science in Australia was also largely concentrated in public agencies, and the various Departments of Agriculture continued to play an important role in soil erosion research. However, the interwar years and especially the period of the Second World War also saw fundamental changes within Australia's scientific community. The federal level became important in the scientific landscape with the establishment of the CSIR in 1926. Also, Australian science became more autonomous, imperial structures weakened and new ties were knit. As the following chapter will show, the given structures influenced to a large degree knowledge production on wind erosion in Australia. On the other hand, erosion research also actively engendered new structures.

5 Scientific Research: Soil, Vegetation and Climate

Since the 1920s, wind erosion was increasingly seen as a phenomenon that was worthwhile and even necessary to analyse scientifically in order to find solutions to mitigate the problem. This was fuelled by the problems that wind erosion created in several pastoral and agricultural regions of Australia in the 1920s, 1930s and 1940s. It was supported by governmental and private funding and culminated in the emergence of the discipline of soil conservation. Research in wind erosion consequently proliferated when several scientific disciplines undertook research into the various factors relevant to the occurrence of wind erosion. The ecological understanding of the phenomenon was predominant in all of these endeavours, so that much research focused on the interplay between soils, vegetation, animals, and humans, even if ecological research in the strict sense of the term was largely limited to Australia's grazing lands. Another consequence was that the role of land

[273] 'Soil Erosion. Need for Empire Survey', *The (Melbourne) Age*, 14 January 1939; 'Science Comgress. Keenly Practical Issues Discussed. Soil Erosion in Australia', *Sydney Morning Herald*, 14 January 1939.

management in relation to the occurrence of wind erosion came into focus. The fact that the drought was a significant factor was generally acknowledged, but soil conservation advocates felt they had to fight against the popular belief that wind erosion was a normal concomitant feature of drought that would disappear as soon as the rain came back. This, together with a weak status of the meteorological discipline, probably contributed to the fact that the role of climatic factors in wind erosion was largely neglected during the 1930s and 1940s.

Despite the large increase in scientific interest during the 1920s, and then especially in the period 1935-1945, the overall achievements might seem rather limited, especially if compared to research in the US. In 1944, the first more extensive surveys and maps about the extent of soil erosion in Australia appeared, but original soil conservation research was still slow, hampered by the demands on funds and trained personnel during World War Two.[274] This was also felt by the soil conservation experts themselves, who considered their progress as rather inadequate. In 1945, South Australian soil conservationist Robert I. Herriot lamented that due to the lack of concerted experimental work that in turn resulted from the lack of scientific personnel, "no new discoveries in the field of sand drift control have been made" in the last decade.[275] The same year, Tom Taylor from the Soil Conservation Service of New South Wales came to the conclusion that "local knowledge and experience in erosion control is sadly lacking in Australia and the only approach to the problem so far has been based on overseas information, mainly from the U.S.A".[276] As late as 1953, a summary about soil conservation research in Australia concluded that, except for New South Wales, the Australian states had not adequately tackled the basic investigations and that there was "little new or characteristically Australian about the soil conservation practices being employed".[277] Still, important first steps were taken, and the wind erosion years engendered new knowledge especially on the ecology of the semi-arid and arid environments.

The fifth chapter of this thesis focuses on Australia's scientific research. It takes the natural phenomenon of wind erosion seriously, and therefore chooses the three most relevant factors of wind erosion – the soil, the soil surface and the climatic factors of wind and rain – as the relevant criterion for the chapter's subdivision. The scientific findings of the first half of the 20th century are regularly put in relation to more recent findings in order to give

[274] Thompson, A Brief History of Soil Conservation, pp. 74-78.
[275] Herriot, Soil Erosion. The problem in South Australia, p. 116.
[276] Tom P. Taylor (1945): Soil Conservation Research Stations. Their Part in the Control of Erosion. In: *Journal of Soil Conservation NSW* 1 (1), pp. 21-23, here p. 22.
[277] Commonwealth of Australia, Standing Committee on Soil Conservation (1953): Adaptation for Australian Conditions of 'An International Study on Soil Conservation' published by the FAO of the United Nations, Melbourne, p. 98.

orientation within the larger corpus of wind erosion knowledge and with the aim to show where threads of development pass. This method does not imply a concept of science in terms of progress and objectivity.

5.1 19th Century Precursors

Australian scientists were well aware of the problems of wind erosion before the dust storm years of the 1930s and first half of the 1940s, which gave an important impetus into scientific research. Since the mid-19th century, Australian experts had been interested in the problems of wind erosion, but this was limited to a small group of botanists and foresters. The second half of the 19th century saw not only an initial interest in the problem develop, but also a shift in the scientific concepts about wind erosion: In the 1860s, wind erosion appeared as a symptom of drought and the spread of deserts resulting from a wider process of climatological change caused by deforestation. This concept was gradually superseded at the end of the 19th century by a concept that understood sand drift and dust storms in ecological terms, as the direct result of a disturbed vegetative groundcover.

Australians' view on wind erosion in the period from roughly the 1860s until the 1880s was shaped by the idea that forests played a key role in the formation of the climate through attracting rainfall, an idea that resonated not only in the Australian colonies but also in the USA and in a number of French and British colonies.[278] This 'forest-rainfall equation' had its modern origin in the 17th century, and was a widely established and relatively well-defined concept in mid-eighteenth century.[279] Its theoretical underpinning was the assumption that under 'normal' conditions, the environment was humid and wooded, and grasslands or deserts were 'abnormal'.[280] The theories about how forests caused changes of the hydrological regimes were multiple: forests in general were thought to stop the winds or clouds and shield the ground; the trees' canopies in particular were said to increase evaporation, provide for shade, and break up raindrops while the humus was considered to act as sponge for

[278] Beattie, Empire and Environmental Anxiety, pp. 178-188; Dunlap, Nature and the English Diaspora, p. 89; Davis, Deserts, pp. 114-119; Bonyhady, The Colonial Earth, p. 163.
[279] The classic historical study on the 'deforestation-desiccation' debate is: Richard Grove (1995): Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600 - 1860, Cambridge [et al.], Cambridge University Press. Grove's argument that the concept can be traced back to fears originating in the 17th century in the context of colonial experiences of deforestation on tropical islands has been contested by Ravi S. Rajan (2006): Modernizing Nature: Forestry and Imperial Eco-Development 1800-1950, Oxford, Oxford University Press. Rajan stresses the fact that the concept was already broadly discussed in 17th century Europe, mainly in France and Germany. Cf. the discussion by Vasant K. Saberwal (1997): Science and the Desiccationist Discourse of the 20th Century. In: *Environment and History* 3, pp. 309-343, here pp. 312-314.
[280] Donald Pisani (1985): Forests and Conservation, 1865-1890. In: *The Journal of American History* 72 (2), pp. 340-359, here p. 346.

moisture.[281] The 'forest-rainfall equation' went in both ways: Humans could determine the climate in a positive term through tree planting; on the other hand, tree logging could encourage the occurrence of floods, droughts, and the spread of deserts.[282] The 'forest-rainfall equation' was one particular form of a more general idea that had guided the settlement of marginal areas in a number of countries, namely that settlers could influence the climate through their activity.[283] On the fifth continent, the idea that colonial settlers could convert Australia's arid plains into fertile and productive lands was especially enticing.[284] The folk-idea that 'a rain follows the plough' was, for example, such a climatological idea which was very popular in the Australian colonies of the 1870s.[285] As environmental historian James Beattie has noted, some advocates of forest conservation in the late 19th and early 20th century considered tree planting as a way for "assisting in the spread of civilization and colonial development".[286]

On the other side of the coin was the fear that deforestation might create deserts and droughts: Such ideas of human-made deserts have existed since antiquity.[287] In the second half of the 19th century they were highly popularised through the early ecological book *Man and Nature or Physical Geography as Modified by Human Action* by American diplomat George Perkin Marsh, published in 1864 in London and New York.[288] Marsh warned that extensive clearing of forests would not only result in a shortage of timber, but also in loss of plants and animals, soil erosion, floods and droughts. To support and illustrate his argumentation, Marsh invoked the example of ancient civilizations that had destroyed the once fertile lands around the Mediterranean and thus created "arid, sandy deserts", for example in Italy, Greece, or North Africa, which had once been the granary of the Roman Empire.[289] The book was received in Australia a year after its publication in 1865 where it hit

[281] Pisani, Forests and Conservation, pp. 347-350; Id. (1993): Forests and Reclamation, 1891-1911. In: *Forest & Conservation History* 37, pp. 68-79, here p. 69; Saberwal, Science and the Desiccationist Discourse, pp. 310-311.
[282] Ibid.
[283] Beattie, Empire and Environmental Anxiety, p. 205; Denis J. Carr/S.G.M. Carr (1981): Rain Follows the Plough. In: Eid. (eds.), People and Plants in Australia, Sydney [et al.], Academic Press Australia, pp. 288-294, here p. 288.
[284] Stephen Legg (2014): Debating the Climatological Role of Forests in Australia, 1827-1949: A Survey of the Popular Press. In: James Beattie et al. (eds.), Climate, Science, and Colonization. Histories from Australia and New Zealand, Houndmills [et al.], Palgrave Macmillan, pp. 119-136, here p. 128.
[285] Carr/Carr, Rain Follows the Plough, p. 289; Powell, The Emergence of Bioregionalism, pp. 24-25.
[286] Beattie, Empire and Environmental Anxiety, quote on p. 151; see also pp. 165-168.
[287] Grove, Green Imperialism, pp. 20-21; Davis, Deserts, p. 114.
[288] Powell, Watering the Garden State, p. 68; Bonyhady, The Colonial Earth, p. 165; Blainey, A Land Half Won, pp. 349-350.
[289] Bonyhady, The Colonial Earth, p. 165; Dunlap, Nature and the English Diaspora, p. 89; Pisani, Forests and Conservation, p. 354; Powell, The Emergence of Bioregionalism, p. 22.

a raw nerve:[290] From 1864-1866, a severe drought covered large parts of eastern Australia, reaching from Queensland over New South Wales to Victoria and across South Australia to Western Australia.[291] In the colony of South Australia, the drought brought massive economic distress for the colony's pastoralists and prompted its government to instruct Surveyor-General G. W. Goyder to investigate the extent of the regions affected.[292] The impact of Marsh was greatest in the colony of Victoria, where a range of newspapers echoed Marsh's warning about humans creating deserts through deforestation.[293] Thus, the weekly *Australasian* cautioned that if deforestation continued, the colony of Victoria would turn into another Sahara.[294] The pre-eminent conservationist newspaper of the period, the *(Melbourne) Argus*, took the same line when it wrote, for example, in 1865:

> Nature will not have her harmonies violated with impunity, and after dearly-bought experience, it is at last recognized that forests are absolutely requisite to mitigate the extremes of climate: that more than anything else, they are the great moisture gatherers; that they feed the clouds, and protect and enlarge the springs and streams. Deplorable, indeed, have been the consequences in nearly every country where nature's economy has been deranged by their indiscriminate destruction.[295]

The fear of the drought vanished when the rain came back, but the faith in the climatic correlation between forests and rainfall became even more attractive after the drought, when settlement further encroached towards the dry interior.[296] During the 1870s, forest conservation advocates in the US and parts of the British Empire, among them Australia, put forward the hydrological argument to get public as well as political support to foster their cause and build up their discipline.[297] Thus, next to economic arguments (and to a lesser degree aesthetic arguments), climatic arguments played a key role in promoting early

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[290] Joseph M. Powell (1976): Environmental Management in Australia 1788-1914, Melbourne [et al.], Oxford University Press, pp. 54-55. Interestingly enough, Australia held a small but relevant place in Marsh's reflections. According to him, Australia was a perfect object to study the impact of deforestation on rainfall, as the colony had large areas of woodlands that were still being cleared and enjoyed the wealth to pay for the necessary scientific research, cf.: Bonyhady, The Colonial Earth, p. 165; Ian Tyrrell (2004): Acclimatisation and Environmental Renovation: Australian Perspectives on George Perkins Marsh. In: *Environment and History* 10 (2), pp. 153-167.
[291] Foley, Droughts in Australia, p. 163.
[292] Meinig, Goyder's Line of Rainfall, pp. 105-110; Heathcote, Images of a Desert, p. 10.
[293] Powell, Watering the Garden State, pp. 68-70; Id., The Emergence of Bioregionalism, pp. 23-24; Legg, Debating the Climatological Role, p. 122.
[294] *The Australasian*, 28 October 1865, quoted in: Bonyhady, The Colonial Earth, p. 164.
[295] *The (Melbourne) Argus*, 16 October 1865; *The (Melbourne) Argus* 13 November 1865; both quoted in Powell, Watering the Garden State, pp. 68-70.
[296] Heathcote, Images of a Desert, p. 6; Powell, Watering the Garden State, p. 62; Legg, Debating the Climatological Role, p. 122. As a matter of fact, the forest-rainfall equation knew an uspurge in the US during the 1870s when settlers moved into the semi-arid plains, see: Pisani, Forests and Conservation, p. 347.
[297] Saberwal, Science and the Desiccationist Discourse, p. 314; Powell, An Historical Geography, pp. 36-37; Beattie, Empire and Environmental Anxiety, p. 174; Dargavel, Fashioning Australia's Forests, p. 64.

Australian forest conservation, pioneered by South Australia and Victoria.[298] In South Australia, where Forest Boards were established during the 1870s, main promoters of forest conservation were Surveyor General George Goyder, politician F.E.H.W. Krichauff, and German educated botanist Richard Schomburgk, Director of the Adelaide Botanic Garden.[299] Convinced of the correlation between forests and rainfall, Schomburgk warned that tree logging would encourage droughts, floods, and create soil erosion, and promoted planting of trees, mainly softwood, to redress the destructive tendencies of humans.[300] Another proponent of both afforestation and the rainfall-forest equation was John Ednie Brown, who was appointed as South Australia's first Forest Conservator in 1878 and later held similarly important positions in the forest bureaucracies of New South Wales and Western Australia.[301] Brown was convinced that tree planting would allow Australians to transform the continents arid deserts into fertile lands.[302] To that end, the Woods and Forest Department in South Australia started experiments with tree planting in the Far Northern districts in the 1880s.[303] By 1885, the department had distributed 600,000 trees to South Australian land holders for free, but in the light of high costs and the pressure for agricultural land, the overall results were disappointing.[304] In Victoria, German educated Ferdinand von Mueller, probably Australia's most prominent botanist, was among a group of forest conservation advocates that were instrumental in the establishment of a Victorian forestry administration in the 1870s and 1880s.[305] Mueller campaigned against forest destruction, following the climatic argument that forests attract rainfall.[306] By means of planting half a million tress through the arid interior of Australia, Mueller also sought to positively influence the climate of Victoria in the 1880s but the outcome was similarly disappointing as those in South Australia.[307]

In the closing decade of the century, several factors combined to discredit the 'tree-rainfall equation' among Australian foresters: One reason was the disappointing results of the

[298] Powell, An Historical Geography, p. 36; Beattie, Empire and Environmental Anxiety, p. 138.
[299] Powell, An Historical Geography, p. 36; Beattie, Empire and Environmental Anxiety, pp. 138, 143, 165.
[300] Legg, Debating the Climatological Role, p. 124; Powell, An Historical Geography, p. 36; Beattie, Empire and Environmental Anxiety, pp. 141-142; Dargavel, Fashioning Australia's Forests, p. 61; Carr/Carr, Rain Follows the Plough, p. 289.
[301] Powell, An Historical Geography, p. 38.
[302] Beattie, Empire and Environmental Anxiety, pp. 143, 165; Powell, An Historical Geography, p. 36; Brown would later modify his opinion in this matter, see: Legg, Debating the Climatological Role, p. 126.
[303] Legg, Debating the Climatological Role, p. 128; Carr/Carr, Rain Follows the Plough, pp. 290-291.
[304] Ibid.
[305] Powell, An Historical Geography, pp. 36-37; Id., Watering the Garden State, p. 70; Id., The Emergence of Bioregionalism, p. 26.
[306] Legg, Debating the Climatological Role, p. 124; Powell, An Historical Geography, pp. 36-37; Id., Watering the Garden State, p. 70; Id., The Emergence of Bioregionalism, p. 26; Bonyhady, The Colonial Earth, p. 165.
[307] Legg, Debating the Climatological Role, pp. 128-129.

previous tree planting endeavours.[308] A second reason was the increasing influence of the US forestry that had already largely dismissed the theory.[309] Instead of relying on tree planting to increase moisture, Americans had turned to irrigation and dry farming, and Australians largely followed their model.[310] Thirdly, the increasing professionalization of Australian forestry after Federation, which translated into the establishment of a more effective forest bureaucracy, the extension of institutions for professional training and greater coordination of the discipline on the national level.[311] Finally, Australian opponents to the hydrological argument became more influential, namely NSW-government astronomer and meteorologist Henry Russel, who argued that Australian droughts and floods were subject to cycles and that forests had no impact on them.[312] As a result, the idea that wind erosion was the result of a hydrological change induced by deforestation weakened, even if the argument never disappeared totally and still appears in public discussions about desertification today, as Saberwal has shown.[313] In regard to the explanation of wind erosion, the discipline of ecology furnished convincing explanatory models.

Around the turn of the century, the United States and Britain began to play a leading role in ecological research, the scientific study of the complex interactions of organisms with each other and with their environment.[314] Australian botanists also gradually adopted ecological explanation patterns to explain the local experience of sand drift in their pastoral regions. This was linked to the observations of land degradation in the wake of the pastoral expansion that was exacerbated through a period of dry years around the turn of the century. Wind erosion was now explained as the direct result of the local disturbance of the environmental balance through settlers' intervention; in these concepts, the semi-arid and arid environments were no longer pictured as purely deficiency, but as the result of a long process of adaptation between the climate and the natural flora and fauna that had been disturbed through the colonial settlers.

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[308] Ibid.
[309] While imperial influences, notably of Indian foresters, remained important, the US impact on Australia became stronger with the opening of the new century, see: Powell, An Historical Geography, pp. 37-38; Beattie, Empire and Environmental Anxiety, pp. 150, 171-72.
[310] Pisani, Forests and Conservation, p. 355; Beattie, Empire and Environmental Anxiety, p. 171; Legg, Debating the Climatological Role, pp. 128-131.
[311] Beattie, Empire and Environmental Anxiety, pp. 168-169; Powell, An Historical Geography, pp. 37-40; Dargavel, Fashioning Australia's Forests, pp. 65-66; Gregory A. Barton (2001): Empire Forestry and the Origins of Environmentalism. In: *Journal of Historical Geography* 27 (4), pp. 529-552, here p. 537.
[312] Legg, Debating the Climatological Role, pp. 128-129.
[313] Saberwal, Science and the Desiccationist Discourse, pp. 310-311.
[314] Dunlap, Nature and the English Diaspora, pp. 141-143, 151-152; Roderick Nash (1989): The Rights of Nature. A History of Environmental Ethics, Madison, Wis., University of Wisconsin Press, p. 55; Donald Worster (1994): Nature's Economy: A History of Ecological Ideas, Cambridge [et al.], Cambridge University Press, p. 192.

Among the earliest voices that considered wind erosion as the result of a larger disturbance of the natural environment were the Field Naturalists in South Australia and Victoria.[315] In 1892, South Australian Samuel Dixon, for 23 years the chairman of the Native Flora and Fauna Protection Committee, a sub-committee of the Field Naturalist Section of the Royal Society of South Australia, warned about the negative effects that the settlement and pastoral occupation in Australia had brought upon the indigenous vegetation.[316] He observed with growing concern the disappearance of much of the best native pasture plants in large tracts of Australia and saw the reason in the excessive stocking of the lands, which had disastrous effects:

> [...] as natural growth is exterminated, the sand, no longer protected by the herbs and shrubs shading its surface, and binding it together with their very long and widely-spreading roots, is driven by the prevailing winds over the surrounding country, to the destruction of all lowly vegetation; even forest-trees are overwhelmed in the advancing sand-waves- coast lines and interior, sandy lands.[317]

The Federation drought, which covered large parts of Australia, then brought heightened alarm about wind erosion by experts and the general public.[318] Concern came mainly from the pastoral lands of South Australia and New South Wales. In South Australia, the drought and wind erosion induced the government to establish a Pastoral Lands Commission in 1899, and in Queensland a Royal Commission into Land Settlement was set up.[319]

The best researched and probably most far-reaching reaction was in New South Wales, where the drought brought devastation on the arid and semi-arid countryside of the 'Western Division', the semi-arid and arid western third of the state.[320] In November 1899, the *Sydney Morning Herald* published a series of reports from parliamentarian member E. D. Millen, a former landholder of the Division that warned about the deterioration of the lands through drought, overstocking and inappropriate land use.[321] According to Millen, "on tens of thousands of acres the very roots [had] been eaten, trodden, or blown out", leaving behind

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[315] Bolton, Spoils and Spoilers, p. 139; Hutton/Connors, A History of the Australian Environment Movement, p. 56.
[316] Hutton/Connors, A History of the Australian Environment Movement, pp. 37, 56.
[317] Samuel Dixon (1892): The Effects of Settlement and Pastoral Occupation in Australia upon the Indigenous Vegetation. In: *Trans. Roy. Soc. S. Aust.* 15, pp. 195–206, here p. 204.
[318] Interestingly enough, as Stephen Legg has noted, instead of further discrediting the rainfall-tree equation, the drought brought a short-lived revival of the concept in the Australian press during 1896 to 1910, see: Legg, Debating the Climatological Role, p. 130.
[319] Heathcote, Images of a Desert, p. 10.
[320] 'Erosion damage to windblown lands of the west described as alarming', *The Land*, 6 December 1935. There was a series of historical studies published for the centenary in 2001, for example: Quinn, Rights to the Rangelands; Tom Griffiths (2001): One Hundred Years of Environmental Crisis. In: *The Rangeland Journal* 23 (1), pp. 5-14.
[321] Bonyhady, The Colonial Earth, p. 306; Janice Cooper (2013): Land as Property or Natural Resource. The Western Lands Act of 1901-1910. In: *History Australia* 10 (3), pp. 193–214, here p. 197.

hard subsoil that was "as much productive as a paved courtyard".[322] While Millen acknowledged that drought was an important factor contributing to the ongoing deterioration of the land, he highlighted that the extensive wind erosion had been mainly caused by overstocking and unsuitable land use:[323]

> In the pre-settlement days, though the drought raged and the wind blew, there were bushes that defied the one and checked the other, while the roots of the dead grass remained to steady and hold the soil together. But with the advent of stock and rabbits these counteracting forces have been removed. The destruction of the bushes has left the wind without check or break, the destruction of the roots (for which the rabbits must be held principally responsible) has left the soil hopelessly at its mercy, whilst the constant traffic of stock served to still further loosen and disintegrate a soil, invariably friable and frequently little more than pure sand.[324]

As drought was not an occasional affliction but endemic to the region, the only solution was, in Millen's eyes, the limitation of stocking numbers.[325] As a reaction to the public concern, a Royal Commission into the Condition of the Crown Tenants was established in 1901 that produced results similar to Millen's.[326] As main causes for the depression of the pastoral industry, the commission enumerated the low rainfall, the rabbits, and overstocking.[327] The combination of that had, according to the report, "immensely depreciated" the western country, causing "calamitous sandstorms" which had converted hundreds of thousands of acres of country into "windswept barren wastes".[328] The sand storms had in some cases completely buried rabbit-proof fences and sheep yards and, most damaging of all, filled in tanks and dams, in this way adding a "new terror" to the life of the western pastoralist.[329] The findings of the Royal Commission led to the Western Land Act of 1901 that put the western part of the state under a separate administration and extended the leases for pastoral use.[330] While historians still debate the question of whether the original Act truly aimed to protect the natural resource or modify land use practices to be better suited to the Australian environment, there is consensus that the implementation of any protective legislation was grossly inefficient.[331]

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[322] Millen, E. D. (1900): Our Western Lands: A Vanishing Asset, Sydney, S. E. Lees, pp. 12-13; Cooper, Land as Property, p. 197.
[323] Ibid.
[324] Millen, Our Western Lands, p. 12.
[325] Bonyhady, The Colonial Earth, p. 307.
[326] The Royal Commission made also photographs of wind eroded land, two of them are reprinted by Bonyhady, see: Bonyhady, The Colonial Earth, p. 307; see also: Heathcote, Back of Bourke, pp. 28-29; Id., Images of a Desert, p. 10.
[327] King, The Western Lands Act, p. 166.
[328] Ibid.
[329] Ibid.
[330] Ibid., p. 171.
[331] Michael Quinn states that the Western Lands Act of 1901 is a good example of adequate early land use control, see: Quinn, Rights to the Rangelands, p. 21; this affirmation has been contested by Janice Cooper, see: Cooper, Land as Property, pp. 195-196.

The disastrous results of the federation drought and sand drift on the Western Division also brought the scientific expertise of botanists on the scene, which also linked the occurrence of sand drift and dust storm to the disappearance of vegetation. In this context, as protective cover for the soils, forests were still assigned an important role, but no longer were they believed to attract rainfall. Confronted by the devastation of the NSW Western Division, Botanist C. A. Benbow stated in 1901 that NSW and Australia generally had tried "to force old-world methods upon a new world, land, and climate".[332] He warned that unless action was taken, Australia would be buried by sand drifts, just like the once-fertile lands of Africa, Egypt, and Persia.[333] In 1903, the wind erosion problem in the Western Division created a stir among public servants of the state: J. H. Maiden, since 1896 director of the Botanic Gardens and government botanist, issued warnings along the same line as Benbow.[334] While Maiden acknowledged that much research had already been done into the reclamation of sand dunes at New South Wales' coastline, scientific knowledge on the sand drift problem in the state's interior, according to him the more serious problem, was sparse.[335] His arguments follow the ecological line of interpretation: In the past, colonial settlers had through their grazing animals denuded the vegetation which naturally acted to fix the soil to a certain degree.[336] Thus, "the carefully adjusted 'balance of nature'" had been disturbed in such a way that desert sands had "encroached on agricultural lands and [...] overwhelmed villages and even large cities".[337] The main causes for drifting sands were, according to him, the drought, overstocking and the rabbit pest, which had aggravated the overgrazing done by sheep.[338] In the absence of further knowledge, Maiden suggested focussing on the conservation of the native vegetation and recommended putting sand drift areas under the control of the Forest department, which should assign a special staff of officers to deal with reclamation matters'.[339] The same year, Colin J. McMaster, Chief Commissioner of Western Lands, read a paper before the Royal Society of NSW about the "Sand-Drift problem of Arid New South Wales", where he warned that the red dust from the arid regions blown hundreds of miles by the westerly winds might indicate that the "Drifting Deserts Sands" encroached to the better and climatically more favoured lands in the Central and Eastern Territorial Divisions of

[332] Benbow, Interior Land Changes, p. 1253.
[333] Ibid.
[334] Maiden, The Sand Drift Problem; cf. also: Beattie, Empire and Environmental Anxiety, p. 208.
[335] Maiden, The Sand-Drift Problem, pp. 97, 102.
[336] Ibid., p. 98.
[337] Ibid.
[338] Ibid., p. 101.
[339] Ibid., pp. 92-93, 102.

NSW.[340] As he saw the chief cause being the overstocking in periods of drought, McMaster recommended the constructions of railways in order to relieve stock in periods of drought.[341] Another person attached to the staff of the Western Lands Commissioner, A. W. Mullen, wrote a report in July 1903 in which he described the situation in the north-west of NSW:

> Under the influence of westerly drought winds, the soil – loose and dry under the combined action of stock and drought, and absence of vegetation – is lifted and carried in clouds of dust in a north-easterly direction, the density of the dust-storms depending upon the force of the wind, and during the past five years of drought, occasionally the dust has so obscured the sun at midday, that it became necessary to light lamps indoors to carry on business, and I have frequently been caught in such storms whilst travelling, and on two such occasions I was unable to see the horses in the buggy in front of me through the dust. Work under these conditions is almost impossible, but fortunately the severe dust storms are not of frequent occurrence.[342]

The public concern and scientific interest about wind erosion and sand drift somewhat faded after the Federation drought. In the 1910s, the link between wind erosion in the pastoral areas and overstocking appeared in leading forestry publications, for example the Forestry handbook (1915), edited by R. Dalrymple Hay, director of forests in NSW or the newly founded *Australian Forestry Journal*, which named sand drift as one particularly disastrous effect of clearing and showed some pictures of sand drift in South Australia caused by overgrazing.[343] But more intensive scientific research waited until the 1920s, and especially the 1930s and 1940s, when wind erosion became again acute in several Australian states. In the context of the erosion crisis, scientific research not only increased, it also specialised on the different components relevant for the occurrence of soil erosion: the climate, the vegetative cover, and, first of all, the soil.

5.2 The Soil

The dust storms and sand drift of the 1930s and first half of the 1940s increased scientific attention on wind erosion; yet, at that this time, Australian soil science had just come of age and was still occupied with gathering basic information about Australian soils on a national scale. In matters of wind erosion, relevant information on Australian soils was gathered during the 1930s and 1940s; in matters of basic research into the soils properties in regards to their erodibility, Australians resorted largely to international research results, mainly from the US.

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[340] Colin J. McMaster (1903): Sand-Drift Problem of Arid N.S. Wales. In: *Journal and Proceedings of the Royal Society of New South Wales* 37, pp. 138-145, here p. 139.
[341] Ibid., p. 141.
[342] Quoted in: McMaster, Sand-Drift Problem, p. 144.
[343] R. Dalrymple Hay, Forestry Handbook (1915), W. A. Gullick, Sydney. Quoted in: N.N. (1919): Disastrous Effect of Excessive Clearing. In: *The Australian Forestry Journal*, 2 (9), pp. 273-275.

The origins of professional soil science in Australia are closely linked with the founding of the Waite Agricultural Research Institute in Adelaide in 1924 and the establishment of the CSIR Division of Soils in 1929.[344] Up to then, soil science in Australia was at a rudimentary level. Before the turn of the century, knowledge on Australian soils was largely limited to the recognition of a widespread phosphate deficiency.[345] In the wake of the closer settlement policy in the opening decades of the century, the state Departments of Lands and Agriculture collected data on their respective soils in order to guide their land settlement; the information obtained was however unsystematic and inadequate, as assumptions were often drawn from incomplete data sets.[346]

The establishment of the Waite Institute and the CSIR Division of Soils in the 1920s and the latter's systematic national survey of the soils was, therefore, a milestone in the development of Australian soil science. The establishment of the CSIR Division of Soils came out of earlier cooperation between the Waite Agricultural Research Institute and the CSIR to study the lands of the irrigation areas of the Murrumbidgee and Murray, where waterlogging and salinity had seriously deteriorated the soils.[347] Under the directorship of soil chemist James A. Prescott, from 1929 to 1947, the CSIR Division of Soils Research became the centre of soil science in Australia.[348] Soil erosion research did not, however, figure prominently on the Division's agenda in the 1930s and 1940s, as it focused on general soil surveys and the study of soils in irrigation areas.[349] Prescott's main aspiration and achievement was the establishment of the so-called 'new soil science' in Australia, which was largely focused on establishing a classification and nomenclature of the soils independently from their geological, climatic, or ecological basis.[350] This was a change to the earlier practice of Australian soil science which had mainly focused on the chemical characteristics of the soils, mainly aspects of soil fertility and nutrients, with the basic objective to boost primary production.[351]

Under Prescott's leadership, the Division of Soils undertook systematic soil surveys with regard to the physical properties of the soils: the surveys utilised a classification of the soil

[344] MacDonald Holmes, Soil Erosion, p. 43.
[345] Schedvin, Shaping Science and Industry, p. 77.
[346] Schedvin, Shaping Science and Industry, p. 77; Taylor, The Development of Soil Survey, pp. 5-7.
[347] Wells/Prescott, The Origins, p. 10; Taylor, The Development of Pedology, p. 8; Lee, A History of the CSIRO, p. 4.
[348] Powell, Development Imperative, p. 251.
[349] Lee, A History of the CSIRO, pp. 4-6. This did not mean that Prescott ignored the soil erosion problem, see for example his broadcast talk on soil erosion in 1937: [NAA: A9778, C30/5/12, Broadcast talk by Professor Prescott, on soil erosion, 1937].
[350] James Prescott (1937): The Classification and Mapping of Soils. In: Report of the Australian and New Zealand Association for the Advancement of Science 23, Auckland, pp. 258-271.
[351] Wells/Prescott, The Origins, pp. 8-10.

profile into its diverse horizons A, B, and C, a comprehensive description of their texture (with special attention paid to the soil colour types) and their structure.[352] For this method, Prescott and his colleagues replaced the old British soil analysis units with the international units and largely followed the model of the United States soil survey.[353] The soil series, types, and phase system of the US Department of Agriculture Soil Survey were largely adopted.[354] As Stephen Powell has noted, the switch to the US methods produced some irritation on the British side, but was linked to the better suitability of the American methods for Australian conditions.[355] With the help of earlier data, Prescott had compiled a first tentative Australian-wide soil map in 1930.[356] The process of the original soil survey was slow, however: By 1940, only about 647,497 hectares (1,600,000 acres) were closely surveyed and an additional 18,907 km^2 (7300 square miles) had received a broad survey.[357] In 1944 a more detailed soil map followed that classified Australian soils into 18 types,[358] but even in the late 1940s, information on Australian soils was still far less detailed and precise than on the American ones.[359]

The data raised in the soil surveys was relevant for the understanding of soil erosion and the use of international units and the US system allowed the expedient application of international findings to Australia: The soil texture, which referred to the solid material of the soil mass, was classified into four groups: coarse sand (grain size 2-0.2mm), fine sand (0.2-0.02mm), silt (0.02-0.002mm) and clay (less than 0.002mm).[360] A triangular texture diagram showing textural classes in terms of sand, silt and clay percentage, which served to determine the main soil classes, was derived with some minor modifications from the US diagram.[361] The information obtained about the soil texture in different areas of Australia was important to the assessment of the erosion hazard, as the mechanical properties of the soils play an important part in their erodibility.[362] The size of particles is, for example, relevant to the soil's

[352] Colour and texture codes were drawn up by J. K. Taylor during the early surveys, see: Taylor, The Development of Soil Survey, p. 8; Macdonald Holmes, Soil Erosion, p. 43.
[353] Taylor, The Development of Soil Survey, p. 8.
[354] But with some modifications: Australians were skeptical about the usefulness of highly detailed US maps and therefore tended to limit the number of soil types by broadening the categories, see: Taylor, The Development of Soil Survey, p. 9.
[355] Powell, Mothering, Husbandry and the State, pp. 60-62.
[356] James A. Prescott(1944): A Soil Map of Australia, Melbourne , CSIR Bulletin No. 177.
[357] Taylor, The Development of Soil Survey, p. 11.
[358] Prescott, A Soil Map of Australia.
[359] Powell, Mothering, Husbandry and the State, p. 210.
[360] Macdonald Holmes, Soil Erosion in Australia and New Zealand, p. 38; this differed from the American classification that used an upper size limit for silt of 0.05mm instead of 0.02mm see: Taylor, The Development of Soil Survey, p.12
[361] Taylor, The Development of Soil Survey, p. 10.
[362] Middleton, Wind Erosion and Dust-storm Control, p. 90.

resistance to being picked up by the wind:[363] The smaller particles of silt or clay can be transported over great distances by wind when they are dry. Larger particles can make saltation, while coarser sand particles are not lifted, but they can tumble along the land surface.[364]

In addition to the soil texture, the structure of the soils was analysed, that describes the aggregates in which soil arranges. Again, this was important for assessing the erodibility of the soils: The size of the particles is only insofar relevant as they remain individual particles. Most soils consist of aggregates or clods, their binding properties depending on the ratio of sand, silt and clay particles, their ability to retain moisture and the presence of various cements.[365] The higher the proportion of silt and clay in a soil, the greater is the production of clods and the lower is the erodibility of the soils.[366] The relevance of these aspects of soil texture and structure for the erodibility of soils was again well established by international erosion experts of the time, for example by British Ralph A. Bagnold or Canadian William S. Chepil.[367] In 1939, a first tentative map of the distribution of soil erosion in Australia had been published, combing "the results of several investigations of a reconnaissance nature".[368] Starting in the 1940s, several more extensive soil surveys on erosion were undertaken with support of the CSIR Soil Division, which combined the basic soil survey with ecological components in order to assess soil erosion in different Australian regions.[369] In these surveys and mapping of soil erosion, the CSIR Soil Division followed the system of numbers and letters as had been devised by the US Soil Conservation Service (Soil Conservation Handbook, U.S.D.A. Misc. Pub. 352 (1939).[370] During the war, these surveys were not continued, especially because of wartime difficulties to furnish the material and machines for aerial photographs. As a consequence, when MacDonald Holmes compiled a map on the

[363] Ibid.
[364] Young/Young, Soils in the Australian Landscape, pp. 112-113.
[365] Middleton, Wind Erosion and Dust-storm Control, p. 90.
[366] Ibid., p. 91.
[367] Cf. Ralph A. Bagnold (1937): The Transport of Sand by Wind. In: *The Geographical Journal* 89 (5), pp. 409-438; Id. (1941): Physics of Blown Sand and Desert Dunes, London, Methuen; William S. Chepil/ R. A. Milne (1939): Comparative Study of Soil drifting in the Field and in a Wind tunnel. In: *Science Agriculture* 19, pp. 249-257.
[368] N.N. (1939): The Depreciation of Soil Productivity. Bank of New South Wales , Circular 9 (1), Glebe, Sydney, Simmons Limited Printers. Map II, 'General Distribution of Soil Erosion', p. 5.
[369] John K. Taylor/Charles G. Stephens (1943): Note on the Mapping of Soil Erosion. In: *Journal of the Council of Scientific and Industrial Research* 16, pp. 33-36; Stephens, Charles G. et al. (1945): A Soil, Land-Use and Erosion Survey of Part of County Victoria, South Australia: Including the Hundreds of Belalie, Whyte, Reynolds and Anne and Part of the Hundreds of Caltowie, Yangya and Bundaleer, CSIR Bulletin No. 188, Melbourne; G. Blackburn/R. M. Baker (1952): Survey of Soils, Land Use and Soil Erosion in the Northern Marginal Lands, South Australia, Melbourne, CSIRO Division of Soils.
[370] Taylor/Stephens, Note on the Mapping of Soil Erosion, pp. 33-36.

extent of erosion based on the information available in 1944 and published in 1946, it showed only marginal changes to the earlier map of 1939.[371]

The focus on the soils' physical properties went along with a disinterest in their chemical characteristics. Cements play an important role in the soils' resistance to erosion, and their occurrence is closely linked to the organic matter content in a soil, as the decomposition of organic matter by microorganisms produces a series of binding agents and improves the soil structure.[372] The role of organic matter in the erodibility of soils was widely known by Australian agronomists during this period.[373] The fact that the one-crop farming system had lessened the organic matter content of the soils and therefore contributed to the erosion problem was generally acknowledged at the time.[374] But this did not necessarily raise much scientific interest in the matter. The only series of experiments seems to have been run at the Walpeup research station, where tests were carried out to establish if the addition of chemical substances to the soil, for example lime, gypsum or organic matter (the latter added in the form of stable manure) may influence its physical condition, namely its readiness to clod on the surface.[375] It seems that the interest in the role played by organic matter in soil erosion was somewhat stimulated in the mid-1940s, when the organic farming movement gathered momentum in Australia.[376]

Given the well-established fact that the organic matter content of a soil impinges directly on its fertility,[377] it is surprising that the relation between soil fertility and soil erosion kindled a vivid controversy among agricultural experts in New South Wales. The question of whether a decrease in soil fertility increased the soil's erodibility, or if it was the other way around, that erosion led to a decrease of the soil's fertility, became an ideological battleground between the director of the Department of Agriculture, Alexander McDonald, and Samuel Clayton, leading soil conservationist in NSW.[378] The fight between those experts was seemingly only about the scientific fact of the fertility-erosion ratio; in reality, a bitter dispute concerning authority and prestige was behind their respective arguments: McDonald,

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[371] Macdonald Holmes, Soil Erosion, p. 28.
[372] Middleton, Wind Erosion and Dust-storm Control, p. 91.
[373] Stated for example by Spafford in 1929, see: Id., The Control of Drifting Sand, p. 700; and Griffiths in 1936, see: Id., Wind Erosion of Soils, p. 28.
[374] 'Soil Fertility and Urgent Problem. Influence on Erosion', *Sydney Morning Herald*, 8 April 1938; 'Menace of Waning Soil Fertility', *The Land*, 8 July 1938.
[375] Hore, Experimental Research, p. 103.
[376] Thomas, Fundamentals of Soil Conservation, p. 146; Rebecca Jones (2010): Green Harvest. A History of Organic Farming and Gardening in Australia, Collingwood, Vic., CSIRO Publishing, pp. 5-7.
[377] FAO, Natural Resources Management and Environment Department: The Importance of Soil Organic Matter. Online: //www.fao.org/docrep/009/a0100e/a0100e02.htm. [Accessed 30 March, 2016].
[378] Eric E. S. Clayton (1941): Soil Erosion and its Control, Sydney, Department of Mines and Forests in association with the Rural Bank of NSW, p. 50.

who wanted the NSW Soil Conservation Service to be put under the umbrella of the Department of Agriculture, argued that this was its rightful place as conservation of soil was intrinsically linked to conservation of its fertility which had been the major task of the department all along.[379] Clayton, however, wanted the SCS to be constituted and remain as an autonomous service outside of the Department of Agriculture and therefore downplayed the relation between erosion and soil fertility, proclaiming for example: "A view mistakenly held by a very few is that on cultivation land loss of soil fertility is the cause of erosion. This is confusing cause and effect and is incorrect. It is the converse which is true. The position is that soil erosion causes loss of fertility".[380] The battle continued after McDonald (who now became Chief of the Division of Plant Industry) was replaced by Robert Noble as Director of the Department of Agriculture in 1940.[381]

While the question of how the content of soils impacted their readiness to erode was subordinated to research into the mechanical properties of the soils, the question to which extent erosion caused loss of fertility raised more interest, even if the answer to it remained indecisive for a long time.[382] The loss of soil fertility was, of course, the best argument for soil conservators around the world, as it translated into a decreased productivity of the soils and therefore directly resulted in economic loss.[383] In the Australian case, soil conservationists had to additionally struggle against a number of farmers that were convinced that wind erosion actually increased the fertility of the soils. This was largely due to the fact that in some regions like the Mallee, the wind blew the richer soils of the top hills into the less fertile flats, a fact that farmers had observed for a long time and welcomed.[384] A part of the vehemence of soil conservationists has, therefore, to be seen as a reaction to real or presumed resistance by the farming community.

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[379] For the dispute in general, see: Breckwoldt, The Dirt Doctors, pp. 66-74.
[380] Clayton, Soil Erosion and its Control, p. 50.
[381] 'Conservation of Soil, Views of Experts', *Sydney Morning Herald*, 6 October 1941; see correspondence, especially: Memorandum by McDonald, Chief of the Division of Plant Industry, Subject: Soil Erosion, 21 August 1942; memorandum of Under Secretary and Director Noble, Subject: Soil Conservation, 9th July 1942, in: [SRNSW: Department of Agriculture; NRS 54, Agriculture Special files, 1889-1981, [12/3528 pt] Soil conservation policy and administration proposals (ASF 137), 1940-65].
[382] Even in the 1980s, the information on productivity losses through wind erosion remained limited, see: G. W. Marschke (1988): The Effects of Soil Erosion on Soil Productivity: A Situation Statement on Current Knowledge and Future Research Needs, Sydney, Soil Conservation Service of New South Wales.
[383] 'Erosion–Public Enemy No. 1.', *The Countryman*, 8 January1937; Bennett/Chapline, Soil Erosion, A National Menace, p. 2; Jacks/Whyte, The Rape of the Earth, p. 18; Showers, Soil Erosion and Conservation, p. 373.
[384] "One farmer declared that where drift sand did £1 worth of damage it brought thousands of pounds to the Mallee. From the sandhills on his property six feet of sand had been blown off, and this placed a six-inch layer of good soil over previously unfertile heavy clay and limestone flats. A six-bag crop resulted, and six feet of pure sand still remianed on the hills.", in: 'Drift Erosion. Mallee Considers its Control', *The Countryman*, 1 July 1938.

Despite the significance of the argument, however, scientific data on the actual soil losses through wind erosion were scarce, so that most numbers quoted were broad estimates. In 1935, the New South Wales Erosion Committee investigated the amount of soil being lost through wind erosion in the Western Division (Euston district) and found that during two wind storms, 35 to 50 tonnes of dust had been deposited per square mile over the area observed.[385] One estimate that circulated widely in the Australian press and scientific publications was of eleven million tons of topsoil lost in one dust storm.[386] The record estimate of one hundred million tons for a dust storm that occurred in July 1935 was rather an exception,[387] and substantially too high if compared to today's estimates that put forward the numbers of between roughly 1 and 7 million tonnes of dust moved by Australian dust storms in the 1980s, 1990s and 2000s.[388]

The fact that wind erosion causes loss of soil fertility, as highlighted by today's wind erosion experts, was, however, well-established in the 1930s and 1940s.[389] Harold Hanslow of the Victorian SRWSC warned that "cultivated land is poorer after each wind-storm, since much of the fine material which is necessary to produce crop passes away in the air to travel some hundreds of miles".[390] At the Department of Agriculture of Victoria, chemists analysed the red dust of the dust storms in November and December 1944 on the basis of a few samples.[391] The results showed that the red dust contained between five and six times as much of the soil elements of nitrogen, phosphoric acid and potash than the typical Mallee soil, so that the most fertile part of the soil was carried away and partly lost.[392] This result is relatively close to current analyses, which suggest the factor four.[393] Some experiments were initiated at the Walpeup research station in 1939 in order to assess the loss of fertility through wind erosion and its impact on yields.[394] For the experiments, parcels of land were, for example,

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[385] Breckwoldt, The Dirt Doctors, p. 35; 'Erosion damage to windblown lands of the west described as alarming', *The Land*, 6 December 1935.
[386] 'Analysis of Dust. Contains Rich Soil', *The (Melbourne) Herald*, 30 January 1945; 'Duststorms Show Soil Loss Menace. Solemn Warning on Erosion', *The (Melbourne) Herald*, 18 December 1944; 'Dust Storm and Rain. Mallee Still Needs Relief', *The (Melbourne) Age*, 31 January 1945; Macdonald Holmes, Soil Erosion, p. 23.
[387] Idriess refers to a divisional meteorologist as source for this number, without giving a more detailed source, see: Idriess, The Great Boomerang, pp. 208-209.
[388] McTainsh et al., The 23rd October 2002 Dust Storm, p. 1234.
[389] John Leys (1996): Wind Erosion: Processes and Control, Wagga Wagga, NSW Department of Land and Water Conservation, pp. 8-9; John Leys/Grant McTainsh (1994): Soil Loss and Nutrient Decline by Wind Erosion: Causes for Concern. In: *Australian Journal of Soil and Water Conservation* 7 (3), pp. 30-51.
[390] R. F. McNab (1940): Sand Drift. In: Charles T. Clark (ed.): Soil Erosion in Victoria, Melbourne, Department of Lands and Survey Victoria, pp. 97-101, here p. 99.
[391] 'Analysis of Dust. Contains Rich Soil', *The (Melbourne) Herald*, 30 January 1945.
[392] Ibid.
[393] Leys, Wind Erosion, pp. 8-9.
[394] N.N. (1939), Sand Drift Control, pp. 545-546.

artificially stripped of different layers of top soil, and yields from these soils were compared to those grown on land were the layers were still intact.[395] Also, yields of wheat grown on wind-blown hard patches were compared to yields on normal areas.[396] The results, published in 1954, were the first calculations on yield losses through wind erosion done in Australia. On the bare patches, the average of three years yield was reduced by almost one quarter, largely due to poor seed-bed conditions.[397] On the paddocks where topsoil had been artificially removed, the results after 12 years showed that the highest yields on average were obtained on the paddocks that had been stripped of three inches of topsoil; in second place came the normal surface and in third place the paddock were six inches of the soil surface had been removed.[398] This surprising result was due to the fact that in dry years the seed had grown much better on the intact soil surface at the beginning of the season, but had then failed due to lack of moisture: on the paddock with three inches removed topsoil, the crops had been scarcer from the beginning, so they had gotten proportionally more moisture, giving in sum a higher yield. The fertility of the soils was lowered by this soil loss and translated, among other things, into lower protein content of the wheat.[399] Despite initial experiments and results, there were still not enough data for any reliable calculations about the economic costs of water or wind erosion in Australia as late as in the mid-1950s.[400]

5.3 The Soil Surface

The ground surface is the crucial point for the formation of wind erosion, as it is the place where the forces of the wind act upon the soil. The presence of non-erodible elements on the ground surface in form of larger objects or vegetation increases the threshold wind erosion velocity.[401] The proportion of ground surface covered by vegetation and its height and density determine the extent to which a surface is exposed to erosion and also impacts on the surface roughness.[402] Consequently, the removal of vegetation increases the risk of wind erosion and dust storms.[403] The establishment and maintenance of a vegetative cover on the

[395] Hore, Experimental Research, p. 103.
[396] H. L. Hore/H. J. Sims (1954): Loss of Top Soil. Effect on Yield and Quality of Wheat. In: *Journal of Agriculture of Victoria* 52, pp. 241-250, here p. 241.
[397] Hore/Sims, Loss of Top Soil, p. 246.
[398] Table 4: 'Effect of loss surface soil on wheat yield', in: Hore/Sims, Loss of Top Soil, p. 247.
[399] Ibid.
[400] First calculations on wind erosion: Hore/Sims, Loss of Top Soil; first calculations on water erosion: I. Molnar (1955): Effect of Soil Erosion on Land Values and Production. In: *The Journal of the Australian Institute of Agricultural Science* (September 1955), pp. 163-166.
[401] Middleton, Wind Erosion and Dust-storm Control, pp. 92-93.
[402] Ibid.
[403] Ibid.

surface is therefore considered by some soil conservationists as the "cardinal rule" in the control of wind erosion.[404]

The condition of the vegetative groundcover is first and foremost determined by the respective land use: On Australia's crop farming land, the removal of natural groundcover has been the prerequisite for any cultivation; on its pastoral lands, however, most livestock traditionally grazes on the natural vegetation. These differences impinged on the particular wind erosion problems and consequently on how scientists approached the problem: In regard to the pastoral regions, scientific interest focused on the natural vegetation and engendered a series of ecological research into the relationship of the vegetation with the soil and the climate and into the influences of animals and humans on it. As far as cultivated lands were concerned, research was largely directed towards methods to reduce the wind forces on the soil through land management techniques.

5.3.1 Ecological Research into the Pastoral Lands

As far as the pastoral semi-arid and arid lands of Australia were concerned, the regions most affected by wind erosion during the 1930s and 1940s were the western part of New South Wales and the northern areas of South Australia.[405] On these rangelands, the grazing of sheep (and to a lesser extent of cattle) on the natural vegetation was the main farming operation.[406] Regardless of the relatively low stocking rates on areas of natural plants, the vast size of the pastoral stations had allowed for great wealth in the grazing industry in the past and was an integral part of the economic success story of Australia's wool boom.[407] Yet, as we have seen above, around the turn of the century, pastoralists and government experts became increasingly alarmed about the disappearance of the natural plants and the associated increase of wind erosion that resulted in a decline of the land's carrying capacity.[408] The ensuing ecological research into the natural environments of the semi-arid and arid lands of Australia was largely driven from the beginning by concerns about the role of the natural vegetation in preventing wind erosion. These ecological surveys into wind erosion naturally focused on the most affected areas in New South Wales and South Australia.[409]

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[404] E. L. Skidmore (1986): Wind Erosion Control. In: *Climate Change* 9, pp. 209-218, here p. 209.
[405] MacDonald Holmes, *Soil Erosion*, p. 28; see also above, Figure 2.
[406] Samuel M.Wadham/Gordon L. Wood (1939): Land Utilization in Australia, Melbourne [et al.], Melbourne University Press, p. 86, Fig. 20 c.
[407] Barr/Cary, Greening a Brown Land, pp. 98, 100, 102, 105-106; Wadham/Wood (1939), Land Utilization, pp. 81-82.
[408] Millen, Our Western Lands; Benbow, Interior Land Changes, p. 1253; Maiden, The Sand-Drift Problem.
[409] There seems to be only one ecological survey of the vegetation of Victoria that takes account of the wind erosion problem, namely W. J. Zimmer (1937): The Flora of the far North-West of Victoria: Its Distribution in

Around the turn of the 20th century, the United States and Great Britain began to play a leading role in ecological research internationally.[410] The most influential scientist in the Anglo-American school during the first decades of the twentieth century was US-American Frederic Clements.[411] His *Research Methods in Ecology*, published in 1905[412] and his fundamental book *Plant Succession: An Analysis of the Development of Vegetation* (1916) were broadly received by the international scientific community.[413] In *Plant Succession*, Clements developed his theory that the vegetation of any given natural setting formed a specific community that depended on a complex set of variables like temperature, rainfall and wind.[414] Within the "complex organism" of any plant community, all of its parts were mutually dependent and worked together as a whole.[415] The development of such a plant community was conceived as a dynamic process, where the forces of nature were steadily moving upwards – changing and adapting – until they reached a final climax stage of stability, where plants were in 'equilibrium' with their surroundings.[416] If upset by any intruder, the white man in the case of North America, nature would react accordingly and immediately continue its movement towards the climax stage.[417] Clements was enormously influential, and his theory was widely assimilated, adapted, and also further extended.[418] Clements had devised his theory on the basis of the North American grasslands,[419] so it is not surprising that ecological scientists applied their theories to the 'Dust Bowl' area when the grasslands of the Great Plains started to blow away in the 'Dirty Thirties'.[420] Consequently, ecological theories gained a large influence among the newly established professional group of soil conservationists, not only in the US, but also in other countries.[421] They were, for example, internationally diffused through US-ecologist Paul Sears' *Deserts on the March* (1935), which

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Relation to Soil Types, and its Values in the Prevention of Soil Erosion, Melbourne, Forest Commission, Victoria.

[410] Dunlap, Nature and the English Diaspora, pp. 143, 151-152.

[411] Clements held a chair at Nebraska, at the University of Minnesota and finally at the Carnegie Institution of Washington see: Nash, The Rights of Nature, p. 56; Worster, Nature's Economy, p. 209.

[412] Frederic E. Clements (1905): Research Methods in Ecology, Lincol, Neb., University Publishing Company.

[413] Nash, The Rights of Nature, p. 56; Worster, Nature's Economy, pp. 209-211.

[414] Ibid.

[415] Ibid.

[416] Worster, Nature's Economy, p. 210.

[417] Ibid., pp. 210, 217.

[418] Ibid., p. 214. For example, in 1939, Clements developed in cooperation with animal ecologist Victor Shelford their joint concept of 'bio-ecology' that incorporated plant and animal communities in a broader 'biome'.

[419] Ibid., p. 215.

[420] Influenced by Clements' theories, Roger Smith at Kansas State Agricultural College analysed in 1932 the problem of the Dust Bowl. He came to the conclusion that wind erosion was due to human's land use methods which had overthrown the natural equilibrium of the Great Plains, see: Worster, Nature's Economy, p. 233.

[421] Worster, Nature's Economy, p. 234. US-American New Deal soil conservationists, most prominently Hugh H. Bennett, regarded soil erosion also in ecological terms, focusing on the human impact: Bennett, Soil Conservation, p. 1; see also: Worster, Dust Bowl, pp. 213-215.

is considered as the most influential ecological book on wind erosion of the period.[422] A similar process happened in Australia, as Libby Robin noted: "Conservation science, which included forestry and soil conservation, became the next important umbrella for ecological work in Australia".[423] As a matter of fact, the discipline of ecology was central for scientific concepts of wind erosion in Australia. The name intrinsically linked to ecological research of Australia's semi-arid and arid lands is that of Francis Ratcliffe, a British biologist who had studied under Sir Julian Huxley.[424] In 1935, the CSIR asked Ratcliffe to come to Australia in order to study the problem of sand drift in the country's pastoral areas.[425] After his research trip, Ratcliffe's observations were published in national and international scientific journals as well as in a popular volume, *Flying Fox and Drifting Sand. The Adventures of a Biologist in Australia*.[426] *Flying Fox and Drifting Sand* is the one book that rarely fails to be mentioned in any environmental history of Australia, and many historians rate it among the most influential books in Australia's history of conservation.[427] After its first publication in 1938, the book was frequently reprinted and even set out as a school textbook in the 1950s.[428]

The heroic narrative of *Flying Fox and Drifting Sand*, which follows the storyline of an lone adventurer in the outback, and the fact that Ratcliffe's investigation has been disproportionately well-researched by historians in the past, has meant that his role in land degradation appraisal of this time has sometimes been overrated and his assessment of the environmental problems has been considered as being more exceptional than it actually was. Without denying any of Ratcliffe's merit or impact, it is important to take account of the larger historical context in order to put the record straight: ecological research into the wind

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[422] Paul B. Sears (1935): Deserts on the March, Norman, University of Oklahoma Press. Sears worked at the University of Oklahoma, see: Worster, Nature's Economy, p. 233; Worster, Dust Bowl, p. 200. For a commentary on the significance of 'Deserts on the March' see also: Libby Robin (2013): Commentary: Sears, Deserts on the March. In: Ead./Sverker Sörlin/Paul Warde (eds.), The Future of Nature: Documents of Global Change, New Haven, Conn., Yale University Press, pp. 183-186.

[423] Robin, Ecology: A Science of Empire, p. 70.

[424] Powell, Francis Ratcliffe's First Impressions, n.p.

[425] This was his second trip to Australia; in 1929, the Empire Marketing Board had sent him to Queensland in order to study the pest of 'Flying Foxes', see: Powell, Francis Ratcliffe's First Impressions, n.p.; Tom Griffiths (2001): Going with the flow. In: Marion Halligan (ed.): Storykeepers, Potts Point, N.S.W., Duffy and Snellgrove, pp. 145-174.

[426] Francis N. Ratcliffe (1937): Further Observations on Soil Erosion and Sand drift, with Special Reference to South-Western Queensland. CSIR Pamphlet No. 70, Melbourne; Id. (1937): Soil Drift in South Australia. In: *Nature* 139 (3518), p. 580; Id., Flying Fox and Drifting Sand; Id., Soil Drift in the Arid Pastoral Areas.

[427] Bolton, Spoils and Spoilers, p. 140; Dunlap, Nature and the English Diaspora, p. 353; Id. (1997): Ecology and Environmentalism in the Anglo Settlers Colonies. In: Tom Griffiths/Libby Robin (eds.), Ecology and Empire: Environmental History of Settler Societies, Melbourne, Melbourne University Press, pp. 76-86, here p. 79; Powell, An Historical Geography, pp. 158-159; Robin, Ecology: A Science of Empire, pp. 63-75; Hutton/Connors, A History of the Australian Environment Movement, p. 57.

[428] Libby Robin suggests that the pastoral industry must have been unaware of the "subversive dimension" of the text, or it would never have been passed on to schoolchildren, see: Libby Robin (1998): Defending the Little Desert: The Rise of Ecological Consciousness in Australia, Carlton, Vic., Melbourne University Press, p. 66; Hutton/Connors, A History of the Australian Environment Movement, p. 57.

erosion problems of the arid environments significantly predates Ratcliffe's appointment, so when the young biologist came to Australia, he could and did build upon a substantial volume of research and scientific expertise already collected.[429]

The background to Ratcliffe's research trip was given by the Botany Department of the University of Adelaide, the centre for Australia's early ecological research. The University's first Chair of Botany was established in 1912 and filled with Theodore George Bentley Osborn.[430] The South Australian government supported the Chair on the condition that the professor would act as advisor on economic botany, more precisely plant pathology, to the state Department of Agriculture.[431] When Osborn and his staff began to focus on the plant associations of the arid north in the early 1920s, this scientific interest was paralleled by the political commitment of the government to develop the unused land resources as part of the larger rural settlement enthusiasm after the war.[432] The ecological studies in the first half of the 1920s count among the earliest in Australia and have been considered as the beginning of an academic 'school' of Australian ecology.[433] Libby Robin has highlighted the role of British ecologist R. S. Adamson, who came for a six month visit to the Department of Botany in 1922, in bolstering Osborn's interest in ecology, and concluded a strong imperial tie in the emergence of Australian ecology.[434] It is, however, also possible that Osborn was equally influenced by a visit of US-American ecologist William Austin Cannon, a colleague of Frederic Clements, who came to South Australia in 1921 and received some help by Osborn in his research of South Australia's arid vegetation.[435]

From the mid-1920s on, Osborn's interest was directed towards the deterioration of the natural pastures in the arid regions of South Australia and the wind erosion: Starting from the assumption that in their natural states, the plants were "in equilibrium with their environmental factors" Osborn sought to analyse the severe changes in that natural balance induced by "human interference".[436] Osborn was especially concerned about the disappearance of the perennial salt- and bluebush vegetation (especially Atriplex vesicarium

[429] The background has been analysed by Robin, Ecology: A Science of Empire, p. 68.
[430] Robin, How a Continent Created a Nation, p. 104.
[431] Ibid.; Edgeloe, The Waite Agricultural Research Institute, p. 4.
[432] Osborn/Wood, On some Halophytic and Non-halophytic Plant Communities, pp. 388-399; Osborn, On the Ecology of the Vegetation, p. 294. Cf. also: Robin, Ecology: A Science of Empire, p. 68; Robin, How a Continent Created a Nation, p. 104.
[433] Robin, Ecology: A Science of Empire, p. 68; Robin, How a Continent Created a Nation, p. 104; Robertson, Botany, p. 143.
[434] Robin, Ecology: A Science of Empire, p. 68.
[435] William A. Cannon (1921): Plant Habits and Habitats in the Arid Portions of South Australia, Carnegie Institution of Washington, Pub. No. 308, Washington, Gibson Brothers Inc.; cf. Russell Sinclair (2005): Long-term Changes in Vegetation, Gradual and Episodic, on the TGB Osborn Vegetation Reserve, Koonamore, South Australia (1926-2002). In: *Australian Journal of Botany* 53, pp. 283-296, here p. 284.
[436] Osborn, On the Ecology of the Vegetation, p. 293.

and Kochia sedifolia) in large parts of the arid areas, which were in a general state of regression and were failing to regenerate.[437] The disappearance of the perennial shrubs had severe repercussions, as Osborn explained: "This regression is serious. It means that not only are fodder plants of value disappearing, but that large secondary areas are open to the action of erosive forces, always severe in an arid climate. There being no covering of low bushes to hold the soil, it drifts".[438] While the underlying reasons for the failure of regeneration of these perennial plants were unresolved, there was in his eyes no doubt that the white man, through grazing of livestock and the introduction of pests, was the direct cause for the general regressive state of many plant communities.[439] In order to study the regeneration of the vegetation, Osborn sought to reproduce the conditions of the natural environment before the beginning of white settlement as closely as possible.[440] To that end, a vegetation reserve was established in 1925 at a sheep station at Koonamore, about 64 km outside of the little town of Yunta and 400 km north-east of Adelaide, situated in an area with less than 250 mm average annual rainfall.[441] Observations and ecological research at the Koonamore Reserve, later called the TGB Osborn Vegetation Reserve, continued under Osborn's successors, Joseph Garnett Wood (1931-1936) and Miss Constance M. Eardley (1937-1974) and are still in operation today, allowing for long-term surveys of vegetation.[442]

Osborn, who knew the pastoral station from a research visit on soil erosion undertaken on behalf of the Hamilton-Wilcox Ltd, had chosen the spot as it was exemplary for large tracts of pastoral area in Australia's arid zone.[443] In July 1925, a badly overgrazed area of 400 hectares on Koonamore Station was fenced to exclude sheep and – at least hypothetically – rabbits[444] in order to study the regeneration of natural vegetation on overgrazed land after all grazing influences were excluded.[445] Following the ecological method for research into plant succession as established by Clements, the technique of permanent quadrats was applied: The area was subdivided into ten quadrats of different size, then charted and photographed from

[437] Ibid., p. 295.
[438] Ibid.
[439] Ibid., p. 293.
[440] Ibid., p. 295.
[441] Osborn, On the Ecology of the Vegetation, p. 295; Theodore G. Osborn/Joseph G. Wood/Terence B. Paltridge (1935): On the Climate and Vegetation of the Koonamore Vegetation Reserve to 1931. In: *Proceedings of the Linnean Society of New South Wales* 60, pp. 392-427, here p. 392.
[442] Robin, Ecology: A Science of Empire, p. 68; Sinclair, Long-term Changes in Vegetation.
[443] Osborn, On the Ecology of the Vegetation, p. 295; Id. et al., On the Climate and Vegetation, p. 392.
[444] Ibid., p. 392. Rabbits entered the area in spite of the erection of a rabbit-proof fence, see: Joseph G. Wood (1936): Regeneration of the Vegetation on the Koonamore Vegetation Reserve, 1926 to 1936. In: *Trans. Roy. Soc. S. Aust.* 60, pp. 96-111, here p. 96.
[445] Osborn, On the Ecology of the Vegetation, p. 295.

two fixed points at regular intervals.[446] Part of the research was funded by the CSIR, who gave a grant in order to place a field officer, i.e. T. B. Paltridge, at the reserve for a period from 1928 to 1931.[447] As part of the ecological approach, the characters of the soils and the occurrence of weather events were likewise observed and recorded: Meteorological records at the reserve started in July 1928, and the different forms of wind erosion were closely watched: The frequent occurrence of summer dust storms in the north-east district was observed and their origin attributed to "over-stocked areas around dams or watering places, around townships, or from land that has been ploughed for agricultural purposes in essentially pastoral country".[448] Sand drift was serious, especially in overstocked areas and around watering places as well as on agricultural lands on the fringe of the pastoral country.[449] The effect of sand drift was judged as especially alarming as its destructive power was "accumulative" since the sand drift covered further vegetation and destroyed it.[450] In respect to the soils of the area, their character as sand and sandy loam soils was noted and, referring to US research, their liability to drift and removal by wind was highlighted.[451] But research also showed that drift of these soils only happened once their vegetative cover was removed.[452] Five years after the establishment of the reserve, Osborn could draw his first conclusion: In regard to wind erosion, the observations had shown that the damage caused by erosion was long-lasting on large parts of the area: The removal of perennial vegetation had caused serious soil erosion and the ensuing lack of topsoil made the establishment of new seedlings extremely difficult.[453] In the summary of the observations after this first period, the rabbit was designated as a major factor in preventing the regeneration of the perennial shrub.[454] This key role assigned to the rabbit referred, however, to the process of regeneration once the soils were depleted, and it was at least partly due to the fact that despite the erection of a rabbit-proof fence, a great number of rabbits had been able to access the experimental plots.[455] Shortly afterwards, in the assessment of the ten year period of observations at the reserve in 1936, the role of the rabbit was substantially downgraded, and the author even stated that "the bush is not eaten by rabbits".[456] The conclusion was then that overstocking

[446] Osborn et al., On the Climate and Vegetation, p. 403.
[447] Ibid., pp. 392-393.
[448] Ibid., pp. 397; 403.
[449] Ibid., p. 403.
[450] Ibid.
[451] Osborn et al., On the Climate and Vegetation, p. 403.
[452] Ibid.
[453] Ibid., p. 424.
[454] Ibid., p. 425.
[455] Ibid.; Wood, Regeneration of the Vegetation, p. 96.
[456] Wood, Regeneration of the Vegetation, p. 104.

was the primary cause for the degeneration of the natural vegetation and that "provided the equilibrium between the plants and their environment is not upset by overstocking, saltbush will withstand prolonged drought and regenerate readily".[457] The assessment in 1936 was truly alarming as much of the arid lands had been caught up in a vicious cycle:[458] Once overgrazed, the removal of the vegetative cover led to sand drift. Even if the seasons were favourable and annual plants could establish themselves, the sand began to immediately drift again after once the annual plants disappeared, until practically all soil was removed and the hard sub-soil was exposed. On such soil, regeneration was practically impossible.[459] These findings gave certainly a pessimistic outlook for the future of Australia's pastoral regions and they sounded warnings given by the international community. In the Adelaide *Advertiser* of the 22nd March, 1935, T.B. Paltridge stated that his observations at the Koonamore Reserve had shown that given the denudation of the vegetation "the whole of the arid country may in a comparatively short time be changed to a desert".[460] This, of course resonated with international ecological concern about wind erosion as for example expressed in Paul Sears *Deserts on the March*.[461]

Thus, when the CSIR appointed Ratcliffe in 1935 to investigate into the sand drift problem in the pastoral areas of Australia, he could draw not only on a substantial amount of international literature on wind erosion in arid regions, but also on a decade of observations into the South Australian sand drift problem by the Botany Department of the University of Adelaide.[462] As Ratcliffe's engagement in the wind erosion problem of South Australia is the best researched chapter of Australia's history of soil erosion, there is no need to recount his appointment or research tour in detail; however, some doubt is in order about the assumption that Australia needed "Ratcliffe's observant, open mind" to fully apprehend the problem of its marginal areas, as Stephen Powell suggests.[463] Even before Ratcliffe was assigned the job, the underlying causes for the deterioration of South Australia's pastoral lands were well-known, not only by those involved directly into the research at the Koonamore Reserve, but also by experts at the Waite Institute. When in December 1934, Rivett informed Richardson about the possible involvement of the CSIR in a soil erosion investigation, the latter promptly

[457] Ibid.
[458] Ibid., p. 102.
[459] Ibid.
[460] T.B. Paltridge in an article of the *(Adelaide) Advertise*, 22 March 1935; referred to in the CSIR Summary of information on soild drift, 1935, see: CSIR. Standing Committee on Agriculture. Soil Drift – Summary of Information (1935), in: [NAA: A9778, C30/5/80, Papers and abstracts on soil erosion].
[461] Sears, Deserts on the March, pp. 91-92, 167.
[462] Powell, Francis Ratcliffe's First Impressions, n.p.
[463] Ibid.

forwarded a short statement summarising the causes of the problem in his eyes.[464] Richardson attributed the erosion in the dry pastoral country to the impact of the white settlers, namely the introduction of sheep and rabbits whose overgrazing had caused the removal of vegetative cover. He warned if no resolute action was taken in this matter "it would seem inevitable that the drier pastoral areas must become like the Sahara".[465] The ecological underpinning of Richardson's approach appears in a paper that he presented in 1935 about *Shifting sands: the growth of the menace in Australia*. In the paper, he stated that before the arrival of the Europeans, the vegetation of the pastoral areas had been in equilibrium with the light grazing marsupial population.[466] Then the white man had come "to colonize the country and to exploit the vegetation with his grazing animals. With axe, firestick, and plough, together with their sheep and cattle, the white settlers upset the age-old balance of vegetation".[467] In his assessment of the problem, Richardson referred as well to international expertise and examples, namely from the US, as to the local experiments undertaken at the Koonamore Reserve, thus exemplarily illustrating the interwoven network of ecological erosion knowledge of the period.[468]

After Ratcliffe arrived at CSIR in Melbourne in June 1935, it was soon decided that he would greatly benefit from a visit to Adelaide, where he arrived in the beginning of July 1935.[469] There, he was briefed on the erosion topic of the northern pastoral areas by members of the staff of the Waite Institute, namely Richardson, and personnel from the CSIR and the Botany Department.[470] After Ratcliffe had met several members of the South Australian Pastoral Board and other pastoralists in the north-eastern districts, among them the owners of the Koonamore reserve, Wilcox and Hamilton, he remarked in a memo for the CSIR: "The opinion of the more thoughtful and observant men is that overstocking is the most important factor in the initiation of drift and the degeneration of the arid pastures".[471] During his visit in Adelaide, Ratcliffe decided to start his investigation in the northern areas of South

[464] Letter from A.E.V. Richardson (Waite Institute) to David Rivett (CSIR), 15 December 1934, in: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[465] Ibid.
[466] Arnold E. Richardson (1934-35): Shifting Sands: The Growth of the Menace in Australia. In: *Proceedings of the Royal Geographical Society of Australasia. South Australian Branch* 36, pp. 43-51.
[467] Ibid., p. 45.
[468] Ibid., pp. 43-51.
[469] Letter of A.C.D. Rivett to A.E.V. Richardson, 21st June 1935, in: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[470] Letter of Francis Ratcliffe to Lightfoot, 6th July 1935, in: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[471] Memo of Ratcliffe on 'Soil Drift', in: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].

Australia.[472] When he started his field trip, which largely focused on the pastoral districts of the North-East, delimited in the south by the Murray Mallee and Lake Frome to the north and to a lesser degree to the Far North district, situated roughly between Lake Frome, Lake Eyre and Lake Torrens,[473] Ratcliffe had already largely made up his mind about the real causes for erosion.[474] Ratcliffe's observations, published in a CSIR Pamphlet in 1936 and in *Flying Fox and Drifting Sand* (1938) contained many valuable observations on the vegetation of arid Australia.[475] As part of his research trip, Ratcliffe also visited the Koonamore Vegetation Reserve in the company of its director of the time, Prof. Joseph Garnett Wood, so he was well up-to-date on the local studies undertaken there during the previous ten years.[476] That he was well acquainted with international research is evident in his references to soil conservation methods developed on the windswept western rangelands of the US as well as in some African regions.[477]

In regard to the causes of the drift problem, however, his conclusions were largely a confirmation of knowledge already presented to him, as he declared himself:

> The information contained in this report [...] is merely the product of the careful observation of things which are available for any travellers to see. The conclusions arrived at would appear to be the inevitable deduction from certain facts which are not only easily verified, but which have already been widely recognized. In setting out these conclusions, the author feels strengthened in the knowledge that they are shared in the main by the great majority of men with long experience of the arid country who have given careful thought to the problem.[478]

Ratcliffe's general conclusion was that the main causes for wind erosion in the arid pastoral areas were clearing, injudicious cultivation, and overgrazing through overstocking[479] so that "man must share the blame with providence for the dust-storms which have increased to plague his existence".[480] Drawing on the classical ecological explanatory pattern and vocabulary, Ratcliffe declared that the deterioration of the inland pastoral country was "nothing more nor less than a revolt of the vegetation and the soil against a treatment that asked too much of the plants at a time when their very survival was in the balance".[481] The

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[472] Ibid.
[473] Ratcliffe, Soil Drift in the Arid Pastoral Areas, pp. 9-10.
[474] A fact that Powell observes, but without drawing the conclusions, see: Powell, Francis Ratcliffe's First Impressions, n.p.
[475] For example: Ratcliffe, Soil Drift in the Arid Pastoral Areas.
[476] Letter from Ratcliffe to Rivett (containing informal progress report), 19 August 1935, in: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[477] Ratcliffe, Soil Drift in the Arid Pastoral Areas, pp. 48-51.
[478] Ibid., p. 9.
[479] Ratcliffe, Flying Fox and Drifting Sand, pp. 196-197.
[480] Ibid., p. 205.
[481] Ibid., p. 330.

destruction of the saltbush-bluebush vegetation groundcover was the main cause for the drift, as "the wind was given *carte blanche* to play with the land, and began to blow surface soil away".[482] It was, according to him, beyond all doubt that stock was responsible for the destruction of the perennial groundcover.[483] Drought and rabbits, which were in Ratcliffe's eyes often cited as the reason of the sand drift by those who wished to clear human action from responsibility, had only a minor part in the occurrence of wind erosion.[484] The rabbits did not actually destroy the saltbush, but through their general rivalry with sheep for feed, they were an important accessory factor.[485] The droughts were not responsible for the wind erosion either, as even if they killed some of the vegetation, the plant roots still remained in the soil and fixed it to some extent.[486] Ratcliffe stated that natural re-establishment of the native vegetation was not to be hoped for and artificial reseeding on such low value land was too costly.[487] The biologist therefore concluded that settlement on a permanent and stable basis was only possible if stocking was in equilibrium with the vegetation.[488] An urgent adjustment of the present stocking policy to the prevailing climate and vegetation was crucial to prevent an increase of wind erosion.[489] Ratcliffe's merit was not so much to have diagnosed that there could "only be one criterium of correct stocking: is it in equilibrium with the vegetation?"[490] It was rather the conclusions he drew that were radical for his time:[491] Ratcliffe came to the conclusion that given the climatic conditions of arid Australia, where drought was the rule rather than the exception, stocking in equilibrium with the vegetation translated into such low stocking rates that on much of the land it was simply unprofitable.[492] Methods used in other countries with similar problems, for example the US method of 'rotational grazing' were not deemed applicable for the more arid Australian pastoral lands.[493] As Ratcliffe ruled out any simple scientific fix for the problem,[494] the logical consequences was a complete retreat from those areas:[495] [...] "the essential features of white pastoral settlement [...] are a heritage of life in the reliable kindly climate of Europe. In the drought-

[482] Ibid., p. 315.
[483] Ratcliffe, Soil Drift in the Arid Pastoral Areas, p. 20.
[484] Ibid.
[485] Ibid., pp. 20-21; Id., Flying Fox and Drifting Sand, pp. 314-315.
[486] Ratcliffe, Soil Drift in the Arid Pastoral Areas, p. 21.
[487] Ratcliffe, Flying Fox and Drifting Sand, p. 315.
[488] Ibid., p. 316.
[489] Ibid.
[490] Ratcliffe, Soil Drift in the Arid Pastoral Areas, p. 64.
[491] See also: Griffiths, Going with the flow, pp. 161-165.
[492] Ratcliffe, Flying Fox and Drifting Sand, pp. 317-323.
[493] Ratcliffe, Soil Drift in the Arid Pastoral Areas, pp. 48-49.
[494] Ibid., p. 66; Id., Flying Fox and Drifting Sand, p. 316.
[495] Ratcliffe, Soil Drift in the Arid Pastoral Areas, p. 67.

risky semi-desert Australian inland they tend to make settlement self-destructive".[496] This, of course, was an inconceivable conclusion in the minds of most Australians at the time, and much effort in the years to follow was targeted toward finding the scientific fix that Ratcliffe had tagged as imaginary.

One of the centres for such scientific investigations in the mid-1930s became the Waite Institute, which had been loosely associated with soil erosion research through its involvement with the CSIR Division of Soils.[497] In 1936, the Waite Institute received a grant of £25,000 for research into soil erosion and pasture regeneration, particularly in arid and semi-arid pastoral areas. The money was provided by the Mortlock family, a wealthy South Australian Pastoral family already renowned for several generous donations to the University of Adelaide.[498] The grant, in memoriam of William Ranson Mortlock,[499] should, according to his brother John T. Mortlock, be directed "toward real efforts in combating this terrible and encroaching menace"[500] of wind erosion. At least £10,000 of the gift was to be spent on a laboratory – that would become the Ranson Mortlock Laboratory – at the Waite Institute for investigations and studies complementary to the relevant field experiments.[501] In order to investigate soil erosion and the regeneration of pastures under the terms of the Mortlock fund, the Waite Institute, in cooperation with the CSIR Division of Soils, established in 1938 a research station at Yudnapinna, situated approximately 400 km north-west of Adelaide.[502] Lying in the North-West Pastoral District, the annual average rainfall at the station was less than 250 mm, and the native vegetation of salt- and bluebush (Atriplex and Kochia) had been strongly depleted through sheep grazing.[503] In October 1938 a meteorological research station was established that recorded daily temperature, humidity, wind mileage, evaporation and

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[496] Ratcliffe, Flying Fox and Drifting Sand, p. 323.
[497] Wells/Prescott, The Origins, pp. 9-10; Edgeloe, The Waite Agricultural Research Institute, p. 36.
[498] A first major sum was given by the Mortlock family in 1926 for the development of facilities and equipment for studies in agricultural chemistry, see: Edgeloe, The Waite Agricultural Research Institute, pp. 27, 36; 'Soil Erosion. Research Gift of 25000', *Sydney Morning Herald* , 28 August 1936; Valmai A. Hankel (2000): Mortlock, John Andrew Tennant (1894–1950). ADB Online: http://adb.anu.edu.au/biography/mortlock-john-andrew-tennant-11182/text19927. [Accessed 27 August, 2014]; Waite Agricultural Research Institute (1939): Report 1937-38, Adelaide, Hassel Press, pp. 24-25; 'Soil Erosion the Cancer of the Earth', *The (Adelaide) Mail*, 11 September 1937.
[499] Kempe, H (1974): Mortlock, William Ranson (1821–1884). ADB Online: http://adb.anu.edu.au/biography/mortlock-william-ranson-4259. [Accessed 30 March, 2016].
[500] N.N. (1939): Soil Erosion and Pasture Regeneration. The New Ranson Mortlock Laboratory at the Waite Agricultural Research Institute. In: *The Pastoral Review and Graziers' Record*, 49, pp. 661-663.
[501] Edgeloe, The Waite Agricultural Research Institute, p. 36. In his speech during the laying of the foundation stone in May 1937, John T. Mortlock spoke about the US experience and critisised the breaking up of the great pastoral estates, see: N.N. (1939), Soil Erosion and Pasture Regeneration, pp. 661-663.
[502] Waite Agricultural Research Institute (1939): Report 1937-38, pp. 27-30; H. C. Trumble/K. Woodroffe (1954): The Influence of Climatic Factors on the Reaction of Desert Shrubs To Grazing by Sheep. In: John Cloudsley-Thompson (ed.), Biology of Deserts: The Proceedings of a Symposium on the Biology of Hot and Cold Deserts, London, Institute of Biology, pp. 129-147, here p. 129.
[503] Ibid.

rainfall,[504] and the same year quadrats for research into plant regeneration were established.[505] John T. Mortlock, who had visited the Yudnappina station in April 1938, provided further grants in 1940 and 1941 for a total sum of £2,000 in order to facilitate the commencement of the field work and to establish a residence at Yudnapinna for the field researcher.[506] Two further donations by Mortlock followed in 1943 and 1948 of about £500 and £2,000 respectively.[507] The problem already observed at the Koonamore reserve was that the perennial shrubs did not regenerate naturally, while artificial seeding was too costly and hazardous, owing to low and uncertain rainfall.[508] Experiments at Koonamore had, however, given some promising indications that a certain amount of controlled heavy grazing might instead of damaging these shrubs even increase the health and vigour of the bush by pruning and might, therefore, be favourable for their regeneration.[509] Consequently, the main aim at Yudnapinna was to learn more about the natural regeneration of the saltbush and bluebush plants under grazing conditions.[510] In April 1941, investigations of the ecological factors concerned with the grazing management of Kochia sedifolia and associated species were commenced.[511] To that end, 13 plots of roughly 65 hectares each were established and subjected to different stocking rates.[512] After observations of about a dozen years, the results suggested that in favourable seasons, bluebush in heavily grazed paddocks was healthier and more vigorous than it was in more lightly grazed paddocks, probably due to a combination of increased circulation of nutrients via the animals, a reduction of annual plants as competitive herbage and better moisture use by the plants through pruning.[513]

More ecological surveys into South Australia's pastoral lands were conducted after the Second World War by the Soil Conservation Branch of the South Australian Department of Agriculture: From 1948-49 a detailed ecological study was undertaken at Wirraminna in the far north-west of the state, which was then extended to all sheep station in the north-western pastoral areas.[514] A further ecological study was done by R. W. Jessup from 1945-1950 in the

[504] Trumble/Woodroffe, The Influence of Climatic Factors, p. 129; K. Woodroffe: 'Saltbush and Bluebush. Waite Research Work at Yudnapinna', *(Adelaide) Chronicle*, 21 August 1947.
[505] Waite Agricultural Research Institute (1939): Report 1937-38, p. 27.
[506] Edgeloe, The Waite Agricultural Research Institute, p. 45.
[507] Ibid.
[508] Trumble/Woodroffe, The Influence of Climatic Factors, p. 129.
[509] Theordore G. Osborn/Joseph G. Wood/Terence B. Paltridge (1932): On the Growth and Reaction to Grazing of the Perennial Saltbush Atriplex vesicarium, *Proceedings of the Linnean Society of New South Wales* 57 (1932), pp. 377-402, here p. 400.
[510] Trumble/Woodroffe, The Influence of Climatic Factors, p. 133.
[511] Ibid., p. 129.
[512] Ibid., p. 133.
[513] Ibid., p. 147.
[514] South Australia, Report of Advisory Committee on Soil Conservation 1949, p. 3.

North Western Pastoral Region of South Australia. It focused on both soil and vegetation conservation under sheep grazing in a very arid environment.[515]

While South Australia was leading in ecological research into the sand drift problems of the arid pastoral regions, one of the earliest ecological surveys of arid Australia was done in New South Wales by Marjorie I. Collins. In the early 1920s, Collins went on a two year investigation covering over 480 km (300 miles) in the western part of New South Wales, more precisely the regions of the Barrier Range in the far west and Grey Range in far north-west of New South Wales.[516] Collins focused on the question of plant associations and successions; even if she was not primarily interested in wind erosion, she could not help but notice the problem. Similarly to what Osborn, with whose work she was well acquainted, had observed for South Australia, Collins noted the disappearance of the perennial shrub as well as the evident failure of natural regeneration of certain perennials, notably the mulga.[517] According to Collins, the reasons for the failure of the natural establishment of their seedlings were, next to the successive droughts, the "biotic factor", namely the rabbit and overstocking which had seriously disturbed the natural balance of vegetation.[518] In conclusion, Collins cautioned that the western lands should be strictly supervised "in order to check retrogression of vegetation and the consequent encroachment of desert conditions upon what is now shrub-steppe".[519] For over a decade, Collins extensive study remained the sole ecological work for the western part of New South Wales, except for some brief ecological sketches. It was only in the 1930s that accounts of dust storms and sand drift initiated new public interest and scientific research into the natural environments of the arid parts of New South Wales. This research was carried out under the guidance of the newly established Soil Conservation Service. The SCS primarily targeted land degradation on the high value coastal regions, but the notorious and long-standing erosion problems of the Western Division put it on the SCS's agenda from the very beginning: In 1939, a position for a Research Officer and Botanist was advertised who would investigate the vegetation of the Western Division, its reactions to grazing, and how it was linked to soil erosion.[520] The position was taken up by Noel C.

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[515] R. W. Jessup (1951): The Soils, Geology and Vegetation of North-Western South Australia. In: *Trans. Roy. Soc. S. Aust.* 74 (2), pp. 189-273.
[516] Marjorie I. Collins (1923): Studies in the Vegetation of Arid and Semi-Arid New South Wales. Part 1: The Plant Ecology of the Barrier District. In: *Proceedings of the Linnean Society of New South Wales* 48, pp. 229-266; Ead. (1924): Studies in the Vegetation of Arid and Semi-Arid New South Wales. Part 2: The Botanical Features of the Grey Range and its Neighbourhood. In: *Proceedings of the Linnean Society of New South Wale*s 49, pp. 1-18, here p. 13.
[517] Collins, Studies in the Vegetation Part 2, p. 13.
[518] Ibid., p. 14.
[519] Ibid.
[520] Breckwoldt, The Dirt Doctors, p. 114.

Beadle,[521] who established his headquarters at Condobolin, situated in an area of ca. 350 mm to 430 mm average annual rainfall.[522] Beadle, botanist to the core, put most of his attention into studying the vegetation of western NSW, but never lost sight of the erosion problem. Encouraged by Professor Ashby from the Department of Botany at Sydney University, he submitted the results of his work undertaken in the Western Division as a doctoral thesis in 1943.[523] The thesis was published in 1948 by the government printer with the title *The Vegetation and Pastures of Western New South Wales with Special Reference to Soil Erosion.*[524]

As SCS officer, Beadle supervised and conducted experiments into the reclamation of severely eroded areas. The first experiment was started in 1940: At the request of the Condobolin Pastures Protection Board, a severely eroded area was fenced off in order to observe regeneration of the natural vegetation.[525] In December 1944, a second area was fenced off by the SCS of NSW and plant succession studies undertaken with the then well-established method of quadrats.[526] Beadle's assessment of the erosion problem was clear and fell in with earlier voices: "The cause of all erosion in western New South Wales can be traced ultimately to either over-grazing or timber removal or to a combination of these two factors".[527] The problem observed by Beadle was very similar to those of arid South Australia:

> Since the introduction of stock into the west the density of palatable saltbushes has been reduced considerably; at the same time the density of less palatable or undesirable species has increased. Regeneration of saltbush is one of the major problems in the west since the loss of perennial bush is invariably accompanied by a decrease in carrying capacity and increased rate of wind erosion and a greater frequency of dust storms.[528]

The removal of the soil by the wind produced bare areas, called 'scald', where the subsoil was exposed and which was relatively impermeable to water.[529] Several years of observations showed that even if the stock was removed from the scalded areas, natural regeneration was very slow, due mainly to the scarcity of natural seed and the inability of the water to infiltrate

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[521] For an account of his appointment and career see: ibid.
[522] Noel C. Beadle (1948): Studies in Wind Erosion Part 3. In: *Journal of Soil Conservation NSW* 4 (3), pp. 123–134, here p. 123.
[523] Breckwoldt, The Dirt Doctors, pp. 115, 118.
[524] Noel C. Beadle (1948): The Vegetation and Pastures of Western New South Wales: With Special Reference to Soil Erosion, Sydney, Soil Conservation Service N.S.W., Government Printer.
[525] Breckwoldt, The Dirt Doctors, p. 117.
[526] Beadle, Studies in Wind Erosion Part 3, p. 123.
[527] Noel C. Beadle (1945): Soil Erosion in Western New South Wales. In: *Journal of Soil Conservation NSW* 1 (1), pp. 25-26, here p. 26.
[528] Noel C. Beadle (1946): Saltbushes. In: *Journal of Soil Conservation NSW* 2 (1), pp. 124-129, here p. 125.
[529] Noel C. Beadle (1948): Studies in Wind Erosion Part 1. In: *Journal of Soil Conservation NSW* 4 (1), pp. 30-35, here p. 30.

the soil.[530] A couple of experiments were therefore conducted that targeted these two causes. The sowing of seed on the untreated scalds was ineffective, just as was the breaking of the soil surface through ploughing or furrowing.[531] Only the combination of both, that is the breaking of the soil surface through checkerboard furrowing (single furrow ploughed at half chain intervals and crossed at right angles by a second set of furrow) and the broadcasting of suitable colonising species by sowing seed along the furrows had a real regenerative effect.[532]

Part of the task of the Soil Conservation Service Research Station at Condobolin was to find suitable plants for the arid west for such purpose, so a plant nursery was established.[533] The growth characteristics of many native grass and herbage species were studied, of which the saltbush family showed the best results (Atriplex).[534] The SCS also distributed a selection of plants, including saltbush seed to the pastoralists in order to encourage natural regeneration.[535] In 1946, the head office of the SCS of NSW under Kaleski decided that the next step was to conduct a series of grazing trials in order to assess the effects of different sorts of grazing on the natural vegetation.[536] Beadle, however, was not interested in this kind of applied research and consequently resigned from his position.[537] His place was taken over in 1947 by Dick Condon, under whom the grazing trials commenced.[538]

5.3.2 Saving Soil on Cultivated Lands

As we have seen, wind erosion on cultivated lands especially affected the marginal wheat belt of south-eastern Australia. On the cultivated lands, the removal of native flora had, of course, predated any farming operations, and going back to a pre-settlement status was not an option if one wanted to assure the economic viability of the cereal growing regions. As shown in the first part of the thesis, economic depression, drought, and erosion had then proved wheat growing as largely uneconomic and ecologically dangerous. Unlike in pastoral countries where the wind erosion problem engendered a series of fundamental ecological studies into the natural arid environments, scientific research on the cereal areas was largely a matter of looking for farming operations that reduced wind erosion as much as possible while assuring the agricultural production. As this was a problem similarly encountered in other

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[530] Noel C. Beadle (1948): Studies in Wind Erosion Part 4. In: *Journal of Soil Conservation NSW* 4 (4), pp. 160-170, here pp. 160-161.
[531] Ibid., pp. 163-170.
[532] J. W. James (1956): The Soil Conservation Service: Western Division. In: *Australian Geographer* 6 (6), pp. 20-26, here pp. 21-22.
[533] Breckwoldt, The Dirt Doctors, p. 118.
[534] James, The Soil Conservation Service, p. 22.
[535] Breckwoldt, The Dirt Doctors, p. 118.
[536] Ibid.
[537] Ibid.
[538] Ibid., pp. 119-120.

countries, mainly the US and Canada, Australian soil experts could draw on a large amount of expertise, as South Australian government soil expert Spafford pointed out in 1944/45:

> So much soil conservation work has been carried out in various countries of the world and for very long periods of time that it is only necessary to adapt proved methods to similar sets of natural conditions to attain successful control; Fortunately for us, the United States of America is undertaking the job in districts where extensive agriculture is practiced and where climatic conditions are similar to ours, and much of the work is carried out with modern machinery also quite suitable for our conditions.[539]

As a result of the obvious wind erosion problems of the marginal areas, the conversion of farms with sandy, erodible soils to only a minimum of cultivation and instead a maximum of livestock had been promoted since the end of the 1920s: In 1929, Spafford proclaimed there was an axiom that "sandy farms should be livestock farms" in order to minimise cultivation and thus disturbance of the soils and resulting sand drift, an argument repeated later by R.L. Griffiths.[540] As a consequence of the problems encountered, much of these areas, often Mallee lands with sandy soils of light texture with a low rainfall, were in the process of being converted to mixed farming or livestock farms during the 1930s.[541] Of course, this was easier said than done. As a matter of fact, the areas that were transformed from cultivation to sheep fallow were among those with the greatest wind erosion hazard.[542] After the destruction of the native vegetation and the cultivation of the land for a series of years, there was no way that the natural vegetation might recover naturally. Besides, the low feeding capacity of native vegetation would have been uneconomic anyway. The result was that much of the areas lay completely bare and, therefore, presented areas of high erosion hazard. For those areas, research focused on ways to find pasture plants that would grow under the adverse climatic conditions and combine a low erosion rate with a high stocking rate.

In those areas were the continuation of cereal growing was considered possible and even desirable, research focused on practical agronomic measures of wind erosion control that would allow a land management system integrating cultivation techniques in such a way that the erosion hazard was minimised. Experiments were therefore conducted in the use of living vegetation to protect the soil cover, and in different methods of tillage, either to minimise the disturbance of the vegetative cover or to increase the roughness of the soil surface through the

[539] Walter J. Spafford (1944/45): Controlling Soil Erosion in South Australia. In: *Journal of Agriculture of South Australia* 48, pp. 327-330, here p. 328.
[540] Griffiths, Wind Erosion of Soils, p. 28.
[541] As has been described earlier in the thesis.
[542] Robert Herriot (1944/45): Soil Erosion. The Present Position and what it Means. In: *Journal of Agriculture of South Australia* 48, pp. 331-334, here pp. 332-333; H. L. Hore (1945): Soil Drift and Control Measures. In: *Journal of Agriculture of Victoria* 43, pp. 233-240, here p. 240.

ploughing of ridges.[543] In addition to these relatively practical methods, more general surveys on soil erosion in connection with land use were initiated with the support of the CSIR(O) in the wheat lands of South Australia, for example a study of the Port Pirie region commenced in 1941 with the cooperation of the South Australian Advisory Committee on Soil Erosion[544] and the Department of Agriculture.[545] The war-time restrictions, particularly shortages of photographic material, however, limited the extent of the survey and thus it did not include the drier northern areas affected by wind erosion.[546] These Northern Marginal Lands were only studied more extensively in the first half of the 1950s by Blackburn and Baker.[547]

An important part of soil conservation research was the quest for fodder plants that grew well on low rainfall areas with sandy soils and for sand-fixing plants that could be used to fix sand dunes. In both Victoria and South Australia, plant nurseries were established in which seeds of different plants were tested for their local suitability. In Victoria, a pasture plant nursery was established at the Mallee Research station in 1934 and seeds of drought-resistant species tested for their local suitability.[548] In South Australia, a sand binding plant nursery was established at Streaky Bay, Eyre Peninsula, in August 1939.[549] On the recommendation of the Advisory Committee on Soil Conservation, more plant nurseries for soil conservation work were established in most erosion affected districts of the state after the war.[550]

In Victoria, tests with pasture plants were undertaken at the Mallee Research station starting in the mid-1930s.[551] Several species, in particular cereal rye, Lucerne, Wimmera rye grass, Lupins, and early strains of clovers and medics were tested to assess their ability to grow on sandy soils with low rainfall and to provide a dense vegetative cover and good pasture.[552] In South Australia, the Experimental Branch of the Department of Agriculture started a similar experiment with a series of promising plants in the season 1936-37, in the

[543] Middleton, Wind Erosion and Dust-storm Control, pp. 92, 102-104.
[544] Stephens et al., A Soil, Land-Use and Erosion Survey.
[545] Charles G. Stephens (1981): Soil Survey and Associated Investigations in Relation to Resources Management. In: Barry O'Rourke (ed.), Perspectives on Resource Management and Planning in Australia, Dept. of Geography, University of Sydney, pp. 1-16, here p. 9.
[546] Stephens et al., A Soil, Land-Use and Erosion Survey, pp. 7-8, 32.
[547] Blackburn/Baker, Survey of Soils, see: Stephens, Soil Survey, p. 9.
[548] Hore, Experimental Research, pp. 106-107.
[549] South Australia, Report of Advisory Committee on Soil Conservation 1944; N.N. (1941): Wind Erosion of Soils. Work of the Experimental Branch of the Department of Agriculture, *Journal of Agriculture of South Australia* 44, pp. 353-357.
[550] Spafford, Controlling Soil Erosion, p. 329; South Australia, Report of Advisory Committee on Soil Conservation 1944.
[551] Hore, Experimental Research, pp. 106-107.
[552] Ibid.

badly eroded Bute district in the South Australian Mallee.[553] As far as pasture plants were concerned, ryecorn (cereal rye) was soon attested to be an outstanding species for combining soil conservation and fodder properties. The positive characteristics of this plant against sand drift had already been noted by agronomists in the 1920s,[554] and the South Australian and Victorian studies confirmed its positive characteristics.[555] Thanks to its vegetative character, ryecorn quickly established a dense plant cover on windblown land and gave high yields for green fodder, thereby being at the same time economically viable and the cereal that best withstood "the onslaught of the sand blast".[556] Consequently, it was highly promoted as a pasture plant by the state authorities of both states.[557] In the season 1943/1944, the South Australian Department of Agriculture started to distribute rye seed for sand drift purposes to farmers free of charge on condition that they followed certain defined conditions of land control.[558] The scheme was somewhat hampered during the final war year when the supply of superphosphate and ryecorn seed collapsed, but was then continued after the war.[559] In the six-year period from 1943/44 to 1948/49, a total of ca. 1,560 hectares of rye seed was sown on farms liable to wind erosion at a cost of £1,299.[560] A total of 355 farmers benefited from the scheme.[561] Additionally, in the same period, around 295 hectares were sown on South Australian Railways properties along the railway lines at an overall cost of £589.[562] The Victorian Soil Conservation Board copied the South Australian scheme and started in 1946 to distribute ryecorn seed and superphosphate for wind erosion control to farmers free of charge, again under certain conditions.[563] Acting on a recommendation from its Mallee Regional Advisory Committee, the Board continued this scheme in the years to follow, supported by the staff of the SRWSC and the Lands and Agriculture Departments.[564] During the five seasons from 1946 to 1950 inclusive, the Soil Conservation Board distributed a total of 3,492

[553] N.N. (1941), Wind Erosion of Soils, p. 353.
[554] Spafford, The Control of Drifting Sand, p. 706.
[555] N.N. (1941), Wind Erosion of Soils, pp. 353-357; Henry J. Sims (1944): Ryecorn - A Cereal for Winter Grazing and Drift Control in the Mallee. In: *Journal of Agriculture of Victoria* 42, pp. 151-154; Henry J. Sims (1949): Rye for Drift Control & Grazing in the Mallee. In: *Journal of Agriculture of Victoria* 47, pp. 465-472.
[556] Sims, Ryecorn, pp. 151-154; Colin G. Webb (1945): Vegetative Cover on Mallee Soils. An Erosion Control Measure. In: *Journal of Agriculture of Victoria* 43, pp. 97-99.
[557] To plant ryecorn for grain was, however, not recommended by the Department of Agriculture of Victoria, as livestock did not like it and the yields were not good under Victorian conditions, see: Sims, Rye for Drift Control, p. 465.
[558] South Australia, Report of Advisory Committee on Soil Conservation 1949, p. 3.
[559] Herriot, Soil Erosion. The Present Position, p. 333.
[560] South Australia, Report of Advisory Committee on Soil Conservation 1949, p. 3.
[561] Ibid.
[562] Ibid.
[563] Victoria, Soil Conservation Board, Sixth Annual Report 1945-1946, p. 6. The landholders agreed not to burn the ryecorn stubble nor to allow stock to graze the planted areas before the cereal had sufficiently grown, and thereafter not to overstock it.
[564] Victoria, Soil Conservation Board, Seventh Annual Report 1946-1947, p. 5.

bags of cereal rye and 369 tons of superphosphate to a total of 539 farmers.[565] In so doing, a total of more than 6,150 hectares of sand dunes and eroded areas were sown at a cost of £7,895.[566] The Soil Conservation Board hoped that the success of the scheme would motivate other farmers to sow rye as drift control on their respective lands.[567] This apparently worked, as the ryecorn had a spectacular success in Victoria during the 1940s: At the opening of the decade, the area sown to ryecorn was in the vicinity of 400 hectares, in 1945/46 the area had grown to more than 3,200 hectares, and in 1948/49 it had reached more than 6,700 hectares. Most of the increase was due to sowing ryecorn for erosion control in the Mallee.[568] With such acreage, Victoria was the second state in rye planting in Australia; the first rank by far was held by South Australia.[569] The practice of using ryecorn to protect sandy soils as developed in the 1930s and 1940s is still to the present day an acknowledged soil conservation technique in the Mallee.[570]

Next to ryecorn, Lucerne was considered another useful plant in the battle against sand drift. A perennial leguminous plant of the medic family, Lucerne had been promoted as "the king of fodder" since the late 19th and early 20th century.[571] In the 1920s, its properties for the control of sand drift were well known and advocated by, among others, Spafford.[572] Lucerne was a little more demanding than rye in regard to soil fertility, but still grew well under low rainfall conditions and, as a perennial plant, was better suited for long term stabilisation.[573] At the Mallee Research station in Walpeup, Lucerne gained special attention in the plant research programme established under Colin Webb, and in 1939 field experiments with Lucerne were commenced.[574] It was promoted as a soil conservation plant by the Victorian and South Australian Departments of Agriculture during the 1930s and 1940s and was widely used as a cover plant after the Second World War.[575] A range of other pasture plants were also tried, and next to cereal rye and Lucerne, Wimmera rye grass, barrel clover, and saltbush were

[565] Victoria, Soil Conservation Authority, First Annual Report 1950, p. 8.
[566] Ibid.
[567] Ibid.
[568] See graph on area of rye sown in Victoria, in: Sims, Rye for Drift Control, p. 466.
[569] In 1945/46, of a total of roughly 25,000 ha in Australia, about 21,000 ha were sown in South Australia, 3,200 ha in Victoria, 810 ha in WA and 200 ha in NSW, in: Sims, Rye for Drift Control, p. 465.
[570] Mallee Catchment Management Authority (2010), Land and Biodiversity Incentive Program, Mildura, Vic.: Fact sheet 5: Dune reclamation. Online: http://www.malleecma.vic.gov.au/resources/fact-sheets/5-dune-recl.pdf. [Accessed 30 March, 2016].
[571] 'In the Lucerne Land', *The Australasian*, 2 March 1895, p. 6.
[572] Spafford, The Control of Drifting Sand, pp. 702, 706.
[573] Griffiths, Wind Erosion of Soils, p. 30.
[574] Webb, Vegetative Cover on Mallee Soils, p. 97; Sims/Webb, Mallee Sand to Gold, pp. 44-46.
[575] Griffiths, Wind Erosion of Soils, p. 30; Hore, Experimental Research, pp. 106-107; Webb, Vegetative Cover, p. 97.

deemed suitable.[576] At the Victorian Rutherglen experiment station, tests in top-dressing with subterranean clover showed good results in the 1930s, but it needed large amounts of fertilizer in order to grow on the nutrient-deficient soils.[577] It was only after the Second World War that the use of subterranean clover, sown with superphosphate, was spread in the wake of the so-called 'sub and super revolution'.[578]

Besides experiments with pasture plants, research was also directed towards plants able to fix the sandy dunes that were part of much of the landscape of the Mallee regions of South Australia and Victoria. When the vegetative cover of these sand hills was removed, they transformed into razor-backs or 'weeping ridges', which could not be worked by ordinary implements.[579] For this specific problem, soil conservationists of the 1930s and 1940s could of course draw on a long history of research into sand binding plants for coastal sand dunes. As James Beattie has illustrated, sand drift at some of the coastal sand dune regions of New South Wales and Western Australia had created concern among botanists since the mid-19th century.[580] Australian botanists, Maiden for example, referred largely to French reclamation methods in order to find ways to stabilise the shifting sands.[581] In South Australia, experiments were undertaken by the Department of Agriculture with a series of grasses in order to find out which might work best to stabilise moving sand dunes, namely Marram Grass, Buffalo grass, cereal rye, Lucerne, hairy blue lupin, evening primrose, pig face, and pyp grass.[582] The last proved to be particularly promising.[583] In 1937, the Waite Institute conducted an ecological experiment studying the ability of more than 30 species to grow on and to reclaim an actively drifting sandhill at Pallamana; the experiment showed the superiority of cereal rye compared to all other plants, for example barley or Wimmera ryegrass.[584] In Victoria, the Mallee Research station also tested a number of sand fixing plants to stabilise the sandy hilltops, and tested plants such as spinifex, porcupine grass, marram

[576] Griffiths, Wind Erosion of Soils, pp. 25-40; Webb, Vegetative Cover on Mallee Soils, 97-99; Spafford, The Control of Drifting Sand, p. 702.
[577] Barr/Cary, Greening a Brown Land, p. 135.
[578] Barr/Cary, Greening a Brown Land, p. 35; Dingle, Settling, pp. 196-197.
[579] Sims, Rye for Drift Control, p. 467.
[580] Beattie, Empire and Environmental Anxiety, pp. 182-183, 192-193.
[581] Maiden, The Sand-Drift Problem, pp. 95-96; Beattie, Empire and Environmental Anxiety, pp. 187-188.
[582] Spafford, Sand Drift, pp. 422-423; Id., The Control of Drifting Sand, pp. 706-708; Griffiths, Wind Erosion of Soils, pp. 11-13; N.N. (1941), Wind Erosion of Soils, pp. 353-357. In 1903, botanist Maiden discussed for example the ability of different grasses, namely marram grass, but also native grasses like spinifix and other plants for fixing sand drift around Sydney and Newcastle, see: Maiden, The Sand-Drift Problem, pp. 83-97.
[583] N.N. (1941), Wind Erosion of Soils, p. 356.
[584] Waite Agricultural Research Institute (1939): Report 1937-38, pp. 27-30; Herriot, Soil Erosion. The Problem in South Australia, pp. 115-116; 'Rye Corn May Check Soil Drift in the Marginal Areas. Experiments of Waite Research Institute', *The (Adelaide) Mail*, 1 October 1938.

grass, and pyp grass.[585] Their common problem was that they were difficult to establish as they had to be planted by hand.[586] Again, ryecorn was found to be the most appropriate cereal for growing on loose sand banks and hills depleted of surface soil and fertility by wind erosion.[587] In 1944, the Soil Conservation Board of Victoria and the Mallee Research Station cooperated in a reclamation work of sand dune drift at Paignie near Walpeup, where the area was badly drifting on to the Ouyen-Murrayville road and railway line.[588] Another co-operative project involving the Research Station, the Soil Conservation Board and the local farmers was to initiate a series of demonstration areas that showed the reclamation of badly eroded sand dunes using rye.[589]

Endeavours to mitigate the problem of wind erosion in a scientific manner mainly targeted soil management techniques, most of all tillage. Tillage is, of course, the basic mechanical technique used to prepare the soil for seed and control weeds, but it is also among the chief factors in increasing the soils' erodibility.[590] In regard to wind erosion, experiments were mostly undertaken by the Walpeup Station in Victoria, and to a lesser degree by South Australia. In New South Wales, water erosion on cultivated land was the much bigger problem, so most efforts of the soil conservation service were directed towards conservation of water eroded lands. Much of such soil conservation research consisted in taking methods from other countries, primarily the US and Canada, and to adapt them to the specific local conditions, as agronomist Hore of the Walpeup Research station explained in 1940:

> The methods of control of sand drift used in other parts of the world are of considerable assistance in the development of control methods in this country, but owing to differences in soil types, climate, topography, farming practices, and the machinery available &c., few of them can be adopted here without some modification.[591]

The importance of vegetative cover for soil conservation was well-recognised, so experiments were conducted into ways of using plants or plant residues to protect the soil surface. As a matter of fact, plant litter on the ground decreases the erodibility of the soils by furnishing organic cements to the soils and reducing the shear force of the wind on the soil surface.[592] In large tracts of Australian agricultural areas, it had been custom to burn the

[585] Webb, Vegetative Cover on Mallee Soils, pp. 97-99.
[586] Ibid.
[587] Victoria, Soil Conservation Board, Sixth Annual Report 1945-1946, p. 6.
[588] Ibid.
[589] Victoria, Soil Conservation Board, Sixth Annual Report 1945-1946, p. 6; Sims/Webb, Mallee Sand to Gold, p. 56.
[590] Middleton, Wind Erosion and Dust-storm Control, p. 102.
[591] Hore, Experimental Research, p. 101.
[592] Middleton, Wind Erosion and Dust-storm Control, pp. 92, 101.

stubble after harvest as a method of controlling weeds.[593] In the context of the soil erosion years of the 1930s, this practice of stubble burning was generally condemned as chief culprit in wind erosion and was vigorously discouraged by soil conservation experts.[594] Instead, the experts recommended either grazing the stubble by stock or leaving it on the soil to protect its surface and add organic material to it.[595] This latter technique, known as 'stubble mulch farming', had been developed primarily in North America; in the US, research into ways of leaving cover on the paddocks had been under way since the opening of the century and had been boosted by the *Dust Bowl*.[596] The stubble mulching technique counts among the classic soil conservation repertoire today.[597] It aims at maintaining the crop residues, a sort of half-decaying organic material, on the field surface at all times.[598]

While Australians particularly adopted the stubble mulching technique as devised by US experts to protect their soils from water erosion,[599] it was the Canadian research by wind erosion pioneer William S. Chepil that became especially relevant to protect Australian soils from wind erosion.[600] The method of leaving the stubble on the soil was of course diametrically opposed to earlier ideas of the model paddock that was ideally clean and covered by a superfine mulch, seen as proof that the farmer was respectable and hardworking.[601] The new method, therefore, needed some time to overcome mental hurdles and to be accepted by the rural population.[602]

At the Mallee Research Station, tests were run to establish the effects on yields and sand drift of different sorts and times of ploughing, weed control by grazing and cultivation,

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[593] R. G. Thomas (1945): Wind Erosion in the Mallee. Leaflet No. 5. Soil Conservation Board Victoria, Melbourne, Government Printer, p. 5.
[594] Hore, Soil Drift and Control Measures, pp. 234, 239; Griffiths, Wind Erosion of Soils, p. 27; N.N. (1939), The Depreciation of Soil Productivity, p. 6.
[595] Hore, Soil Drift and Control Measures, pp. 237-238; Id. (1941): Soil Drift Control. Results of Competition. In: *Journal of Agriculture of Victoria* 39, pp. 357-365, here pp. 357-359; 'New farming methods. Expert discusses stubble mulch system & ploughless plan', *The Land*, 9 February 1945.
[596] Philip J. Nelson (1997): To Hold the Land: Soil Erosion, Agricultural Scientists, and the Development of Conservation Tillage Techniques. In: *Agricultural History* 71 (1), pp. 71-90, here pp. 73-74.
[597] Middleton, Wind Erosion and Dust-storm Control, p. 101.
[598] Middleton, Wind Erosion and Dust-storm Control, p. 101; F. L. Duley/J. C. Russell (1947): EC171 Stubble Mulch Farming. Historical Materials from University of Nebraska-Lincoln Extension. Paper 2149. Online: http://digitalcommons.unl.edu/extensionhist/2149. [Accessed 30 March, 2016].
[599] See for example: Robert I. Herriot (1942/43): Stubble Mulching - A New Development in Cultivation. In: *Journal of Agriculture of South Australia* 46, pp. 163-165; Id. (1941/42): Factors Affecting the Rate of Soil Erosion. In: *Journal of Agriculture of South Australia* 45, pp. 403-408, here pp. 406-407.
[600] Robert I. Herriot (1946-47): Recent Developments in Soil Conservation. The Efficient Use of Straw and Stubbles to Prevent Wind Erosion. In: *Journal of Agriculture of South Australia* 50, pp. 239-240; Id. (1944/45): Soil Conservation in Relation to Methods of Production. In: *Journal of Agriculture of South Australia* 48, pp. 349-351, here p. 351; Goudie, Aeolian Processes and Forms, pp. 777-778; see also Table 16.2 'The work of Chepil and collaborators on wind erosion of agricultural lands', ibid., p. 780; Pye, Aeolian Dust and Dust Deposits, p. 6.
[601] Barr/Cary, Greening a Brown Land, p. 131.
[602] Williams, The Making of the South Australian Landscape, p. 311.

comparing burning and non-burning of stubble and rotation of crops and the use of different implements.[603] In order to cultivate the soil with the crop residues left on its top, special equipment was necessary to get through the unusually large quantities of straw. The ploughing implements devised in the US, like knife bars and rod weeders, proved to be largely inappropriate for Australian conditions, as the tractors necessary to pull these ploughs were rarely available, and the condition of the soils as well as the presence of stumps in large areas of Australia's wheat belt prevented their operation.[604] Experts therefore recommended the use of a scarifier or disc furrow.[605] By the mid-1940s, it was generally recognised in Australia that stubble should be left on the soils, but there were not enough plants to treat the soil accordingly.[606] In the dust storm summer 1944/1945, the McCormick-Deering tractor extensively advertised the disc furrow model on the Australian market, using for example the slogan: "Save the Soil. Stubble disced in will improve fertility and check drift".[607] The downside of the stubble mulch technique was and still is, of course, the reduction in yields which is caused by insects that eat the crops, by weeds that compete with the crop for nutrients and finally by plant diseases – all of which had previously been kept in check by burning and tillage.[608] Since the 1960s and 1970s, this problem has been overcome with the wide application of pesticides and herbicides; while this was a positive evolution in regard to soil conservation, it caused a whole different set of ecological problems.[609]

Changing techniques of tillage was only one step on the long road to soil conservation on farming lands, however. Periods of fallow, namely bare fallow, were identified as the other main cause of wind erosion, and much research went into ways of reducing this erosion hazard while at the same time assuring reasonably good yields.[610] As has been described in the first chapter of the thesis, the usual fallow method propagated well into the 1920s had been the (long) bare fallow, with the burning of the wheat stubble and ploughing of the paddock immediately after harvest and then frequent ploughing during the fallow time.[611] These methods were now disfavoured, and experts advised against early cultivation of the fallow and against dry working, since this would break down the soil clods and accelerate the

[603] Hore, Experimental Research, pp. 105-106; Sims/Webb, Mallee Sand to Gold, p. 44.
[604] Hore, Sand Drift and Control Measures, p. 225; Barr/Cary, Greening a Brown Land, p. 133.
[605] Hore, Sand Drift and Control Measures, p. 225; N.N. (1939), Sand Drift Control, pp. 545-546.
[606] Hore, Sand Drift and Control Measures, p. 225; Thomas, Wind Erosion in the Mallee, p. 7.
[607] 'Don't burn stubble. McCormick-Deering Tractor Disc Harrows Advertising', *Swan Hill Guardian*, 6 March 1945; 'Save the Soil. Stubble Disced in will improve fertility and check drift', *Sunraysia Daily*, 22 February 1945.
[608] Middleton, Wind Erosion and Dust-storm Control, p. 101; Sims/Webb, Mallee Sand to Gold, p. 55.
[609] Middleton, Wind Erosion and Dust-storm Control, p. 101; Barr/Cary, Greening a Brown Land, pp. 137-138.
[610] Griffiths, Wind Erosion of Soils, pp. 33-34.
[611] Richardson (1925), Wheat and its Cultivation, p. 196; see also: Barr/Cary, Greening a Brown Land, pp. 130-131.

natural tendency of the soil to become fine and powdery.[612] Extensive ploughing of the fallow was discouraged, and the underlying theory that the frequent ploughing broke the capillary channels was debunked as a scientific myth.[613] The official recommendation was now that the initial ploughing of the fallow should be delayed until spring or even autumn, thus shortening the period when the soil was bare.[614] At the Mallee Research Station at Walpeup, where cultivation trials had run since 1933 to assess the relation between different ways of fallowing and yields, additional trials to integrate the aspect of wind erosion were started in the season 1937/1938.[615] An area of approximately 40 hectares (100 acres) of typical Mallee land was subdivided and treated using five different methods of fallow.[616] The trials showed that while the normal fallow clearly gave the highest yields, the best result in matters of prevention of soil drift was obtained through the so-called spring cover crop fallow.[617] The basic idea of this method was that instead of leaving the fallow bare during the summer months, a cover crop was sown after harvest in spring that was then grazed off by sheep so that the remaining stubble held the soil.[618] While the wheat yields grown on such fallow were lower than on the normal fallow, some of this negative economic effect was possibly compensated by the fact that a certain amount of grazing for sheep was provided.[619] After years of promoting bare fallow and even long fallow, the conversion to cover crop fallow as official recommendation for the lighter Mallee soils by the Department of Agriculture was quite a shift. The method came, moreover, with some hurdles: In dry years, the cover crop – usually oat – was not likely to germinate, so the staff tested various alternative plants.[620] Experiments were made, for example, with ryecorn as cover crop, but the decreasing impact on the successive yields were too high to be a real alternative for oat.[621]

Another US technique propagated in Australia was the practice of farming land in narrow strips, again a standard technique of today's soil conservationists' arsenal:[622] The idea was to sow the paddocks with altering parallel strips of crop and fallow at a right angle to the

[612] Hore, Soil Drift and Control Measures, p. 237.
[613] For example designated as "fantastic capillray tubes", in: Herriot, Stubble Mulching, p. 163; Samuel Wadham et al. (1946): Climate and Soils in Relation to Agriculture, Ministry of Post-war Reconstruction, Rural Training Notes, Melbourne, Government Printer, p. 98; see also: Williams, The Making of the South Australian Landscape, p. 298.
[614] Hore, Soil Drift and Control Measures, p. 237.
[615] N.N. (1939), Sand Drift Control, pp. 543-546; Hore, Experimental Research, p. 103; see also: Sims/ Webb, Mallee Sand to Gold, p. 44.
[616] Hore, Experimental Research, p. 105.
[617] Ibid.
[618] Ibid., p. 103.
[619] Ibid., p. 104; Id., Soil Drift and Control Measures, pp. 236-237.
[620] Hore, Experimental Research, p. 104; N.N. (1939), Sand Drift Control, p. 545
[621] Sims, Ryecorn, pp. 151-154.
[622] Middleton, Wind Erosion and Dust-storm Control, pp. 101-102.

prevailing wind direction.[623] Over the years, the use of the strips rotated. In this way, the growing crop provided protection from the wind and also caught and arrested any sand drift.[624] The method had its kinks, however: the widespread custom of mixed farming on Australia's wheat lands meant that sheep usually grazed on the stubble of the previous year's crop, so the method was not always suitable.[625]

Besides methods to protect the soil surface with the help of vegetation, further mechanical methods that refrained from the use of plants were tried and tested in the south-eastern states, namely the ploughing of ridges or furrows. Today, these methods are still a common emergency anti-erosion method as they create a short-term barrier to the wind flow, and the ridges trap the soil particles on their leeward side.[626] Experiments on creating ridges or furrows of different length and depths in the paddocks to roughen the surface and create surface corrugations in which the sand was caught were again undertaken at the Walpeup Research Station.[627] The recommendation to farmers after several years of experiments was to create deep ridges (by using special attachments to the usual cultivating machinery or by ploughing furrows) and to orient the ridges at right angle to the prevailing winds.[628] It was considered an efficient measure to reduce drift on cultivated land for the Wimmera district and the heavier soils in the southern Mallee in years of average rainfall.[629] Soil conservationists stressed, however, that for the lighter soils in the drier northern parts of the Mallee, it should be considered as only a temporary relief measure for urgent cases.[630]

5.3.3 Green Belts Against Wind Erosion

Among the mechanical soil conservation techniques that work on the principle of reducing the forces of the wind on the soil surface is the establishment of wind barriers in the form of fences, wind breaks, and especially vegetative shelter belts, particularly trees.[631] Shelter belts are part of today's classic soil conservation measures against wind erosion. As all windbreaks, they decrease the surface shear stress on their leeward side and additionally

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[623] H. L. Hore (1940): Sand Drift and Control Measures. In: *Journal of Agriculture of Victoria* 38, pp. 219-228, here p. 226; R.G. Thomas, M. Agr. Sc., Technical Officer (CSIR), 'Strip Cropping', 19 Jan. 1944 [NAA: A9778, C30/5/162, Soil erosion, strip cropping in USA (United States of America), application to Vic (Victoria)]; Barr/Cary, Greening a Brown Land, p. 133.
[624] Ibid.
[625] Hore, Sand Drift and Control Measures, p. 226; H. C. Forster (1937): Soil Erosion. The Problem in America. In: *Journal of Agriculture of Victoria* 35, pp. 434-440, here pp. 439-40; Barr/Cary, Greening a Brown Land, p. 133.
[626] Middleton, Wind Erosion and Dust-storm Control, pp. 102-104.
[627] Hore, Experimental Research, pp. 104-105.
[628] Hore, Soil Drift and Control Measures, pp. 237-239.
[629] Ibid.; N.N. (1939): Sand Drift Control, pp. 545-546.
[630] Ibid.
[631] Middleton, Wind Erosion and Dust-storm Control, pp. 102-103.

act as trap to moving soil particles.[632] On the other hand, such barriers can also create turbulences in their lee which can reduce their protective effect.[633] For shelterbelts made of trees, the interaction between height, density, porosity, shape, and width is important in creating optimum protection.[634] In addition to the usual trees, windbreaks composed of a combination of shrubs, tall-growing crops, and grasses are also used to control wind erosion.[635] The most effective barriers are situated at right angles to the predominant winds and can reduce the wind forces by more than 50 per cent from the barrier leeward up to 20 times its height.[636] On the downside, however, vegetative windbreaks on agricultural lands can reduce yields as they occupy space and compete with crops for water and plant nutrients.[637]

Tree planting as a protective measure against wind erosion in semi-arid or arid regions has a long history.[638] The first half of the twentieth century saw an international boom in tree planting as a remedy against wind erosion.[639] In Canada, for example, shelterbelts on the prairies were part of soil conservation endeavours from the mid-1930s onwards, and the scientific information in regard to reductions of wind velocity were made available to the international scientific community.[640] The most extensive and widely known shelterbelt scheme in the 1930s was, of course, the US Shelterbelt tree planting program of the U.S Forestry Service, inaugurated by President Franklin D. Roosevelt in 1934 as reaction to the severe wind erosion and drought in the Dust Bowl.[641] Between 1934 and 1942, nearly 220 million trees were planted as a windbreak of about 160 km width and 1,600 km length between Texas and the Canadian border.[642] It was established in close conjunction with the US Civilian Conservation Corps (CCC), which was inaugurated in 1933 and especially targeted unemployed young men.[643] In Australia, the CCC's involvement with afforestation

[632] Middleton, Wind Erosion and Dust-storm Control, p. 104.
[633] Ibid.
[634] Ibid.
[635] Ibid.
[636] Ibid.
[637] Ibid.
[638] Gray, Men against the Desert, pp. 24-26; Moon, The Plough that Broke the Steppes, pp. 173-205.
[639] Ibid.
[640] Gray, Men against the Desert, pp. 154-155; Jacks/Whyte, The Rape of the Earth, pp. 167-168.
[641] Cf. for example: William H. Droze (1977): Trees, Prairies and People, Tree Planting in the Plains States, Denton.
[642] Worster, Dust Bowl, pp. 220-224.
[643] John F. Sears (2005): Grassroots Democracy: FDR and the Land. In: Henry L. Henderson/ David B. Woolner (eds.), FDR and the Environment, New York [et al.], Palgrave Macmillan, pp. 7-17, here pp. 10-11; Neil M. Maher (2009): Nature's New Deal. The Civilian Conservation Corps and the Roots of the American Environmental Movement, Oxford [et al.], Oxford University Press, p. 164; Thomas R. Wellock (2007): Preserving the Nation. The Conservation and Environmental Movements 1870-2000. Wheeling, Il., Harlan Davidson, pp. 100-101.

was closely followed in Canberra, and in early 1935, the Australian federal government decided on a three-year afforestation plan, whose financial contributions were split between the Commonwealth and the states, broadly on a pound-for-pound basis.[644]

The role of trees for soil conservation purposes and more precisely the idea to plant shelterbelts as remedy against dust storms, sand drift and drought was widely discussed in the popular press and among Australian scientists. The only actual experiments into the effects of shelterbelt planting seem to have been undertaken at the Walpeup research station in Victoria, where tests were started in 1939.[645] The density and height of the shelterbelt was taken into account to test its protective properties for the land on their leeward side.[646] The results showed that the actual protective effects were relatively small:[647] The effect of the windbreak in reducing wind velocity extended to approximately 120 metres from the tree belt[648] which corresponded to approximately 13 times the height of the belt and was therefore well within the range suggested by experiments in other countries.[649]

All in all, most experts seem to have been rather sceptical about the idea of planting large-scale shelterbelts to mitigate wind erosion: South Australian soil conservator Robert I. Herriot was especially exasperated by the popularity of the idea and repeatedly railed against it:[650]

> The majority of people have a wind-break complex and are prepared to attribute all sorts of advantages to wind-breaks. Some are prepared to believe that if we reserved belts of scrub right across the mallee all our drift troubles would be settled. The idea, presumably, comes from a similar suggestion that was much publicised, without scientific foundation, in America some years ago.[651]

[644] See archival file: [NAA: CP103/11, 750 Reafforestation (General) (Correspondence reports and newspaper cuttings)]. In December 1934, a national afforestation plan had beforehand been discussed at a conference of State and Commonwealth forestry officials held in Melbourne, see, for example the note of Charles E. Lane Poole, Inspector-General of Forests from 30 Jul. 1934 about the planned 'Forestry Employment Schemes for youth', who draws on the C.C.C. example; the archival file also contains an extract from 'American Forests' dated July 1934 entitled 'C.C.C. Work Accomplishments for the First Year'.
[645] Hore, Experimental Research, p. 107.
[646] Ibid.
[647] Ibid.
[648] Henry J. Sims (1945): The Effect of Shelter Belt on Wind velocity. In: *The Australian Journal of Science* 8, pp. 19-20, here p. 19.
[649] Ibid., pp. 19-20.
[650] Another example: Herriot: "A glaring example of misconception is a very general belief in the value of windbreaks for controlling erosion", in: Id. Soil Conservation in Relation to Methods of Production, p. 351; cf. also: Wadham et al., Climate and Soils, p. 101.
[651] Robert I. Herriot (1943/44): The Place of Mallee in a Soil Conservation Programme. In: *Journal of Agriculture of South Australia* 47, pp. 377-380, here pp. 379-380.

Herriot pointed to the disadvantages of eddies created by the shelterbelts and the limited range of their protective effect.[652] For Herriot it was therefore "extremely absurd"[653] to project any planting across the countryside; tree planting was only useful for small distances or local use.[654] Other Australian experts shared in the opinion that trees played a role in wind erosion control on locally limited areas, especially on farmsteads and around towns where they were supposed to protect houses, buildings and water storage from dust and sand drifts.[655] In the mid-1940s, they propagated, for example, the planting of farm woodlots as protection against wind and water erosion, again following the model of the USA.[656]

While there was no classical government founded shelterbelt programme in Australia, there was one remarkable project of tree planting that can be rightfully considered as Australia's biggest green belt scheme against the dust menace. It was established at Broken Hill, in the Far West of New South Wales thanks to cooperation between a passionate amateur botanist and an observant mining company. Even if it was not a scientific endeavour in the limited sense of the term from the outset, it was based on scientific ecological assumptions on soil conservation and soon attracted the interests of wind erosion experts.

Broken Hill is located far away from all major capitals, the nearest being Adelaide at over 400 km distance – in a region with a mean average rainfall of only 236 mm and summer temperatures that regularly reach 40°C.[657] The reason why a city flourished at this inhospitable site were its extensive resources in metals, namely silver, zinc and lead, which had been extracted in large quantities since the 1880s and which had led to an explosion of population.[658] By 1908, Broken Hill had 40,000 inhabitants and was the third largest city of New South Wales. However, its population suffered strongly from the 'dust nuisance'.[659] Even before the era of mining, pastoralists around Broken Hill had probably denuded the soil; the mining operations then accelerated the stripping of vegetation around the city.[660] The

[652] Herriot, The Place of Mallee, pp. 379-380. He relied on US-American research, especially the works on windbreaks by C. G. Bates (Bates (1911): Windbreaks: Their Influence and Value, USDA Forest Service Bull. 86) and on plant ecology by Weaver and Clements, eid. (1938): Plant ecology, McGraw Hill.
[653] Herriot, Soil Conservation in Relation to Methods of Production, p. 351.
[654] Ibid.; Id., The Place of Mallee, p. 380.
[655] Sims, The Effect of Shelter Belt, p. 20.
[656] R. Powles (1945): Tree Planting on Farms. In: *Journal of Soil Conservation NSW* 1 (3), pp. 87-90.
[657] David Jones (2011): Re-greening 'The Hill'. Albert Morris and the Transformation of the Broken Hill Landscape. In: *Studies in the history of gardens & designed landscapes* 31 (3), pp. 181-195, here p. 181; Robert J. Solomon (1959): Broken Hill: The Growth of the Settlement, 1883–1958. In: *Australian Geographer* 7 (5), pp. 181-192, here pp. 181-182.
[658] Solomon, Broken Hill, p. 182; Horace Webber (1992): The Greening of the Hill: Revegetation around Broken Hill in the 1930s, Melbourne, Hyland House, p. 16.
[659] Webber, The Greening of the Hill, p. 16.
[660] Webber, The Greening of the Hill, pp. 8-9; Robert J. Solomon (2008): The Richest Lode. Broken Hill 1883-1988, Sydney, Austral Books, p. 41.

annoying presence of dust in the city was reported in the local newspapers as early as 1886 and in March 1888, the *Argus* stated: "The dust of Broken Hill is the ivy without style - it clings to you and nothing but soap plentifully applied will disencumber you from its embrace".[661] One of the bigger dust storms that occurred in December 1907 has been immortalised by a much replicated photograph by the Borkenshore brothers.[662] As the prevailing winds come from the west and south, wind erosion affected especially the inhabitants at the south-eastern corner of the city, who saw their homes repeatedly getting half-buried by sand.[663]

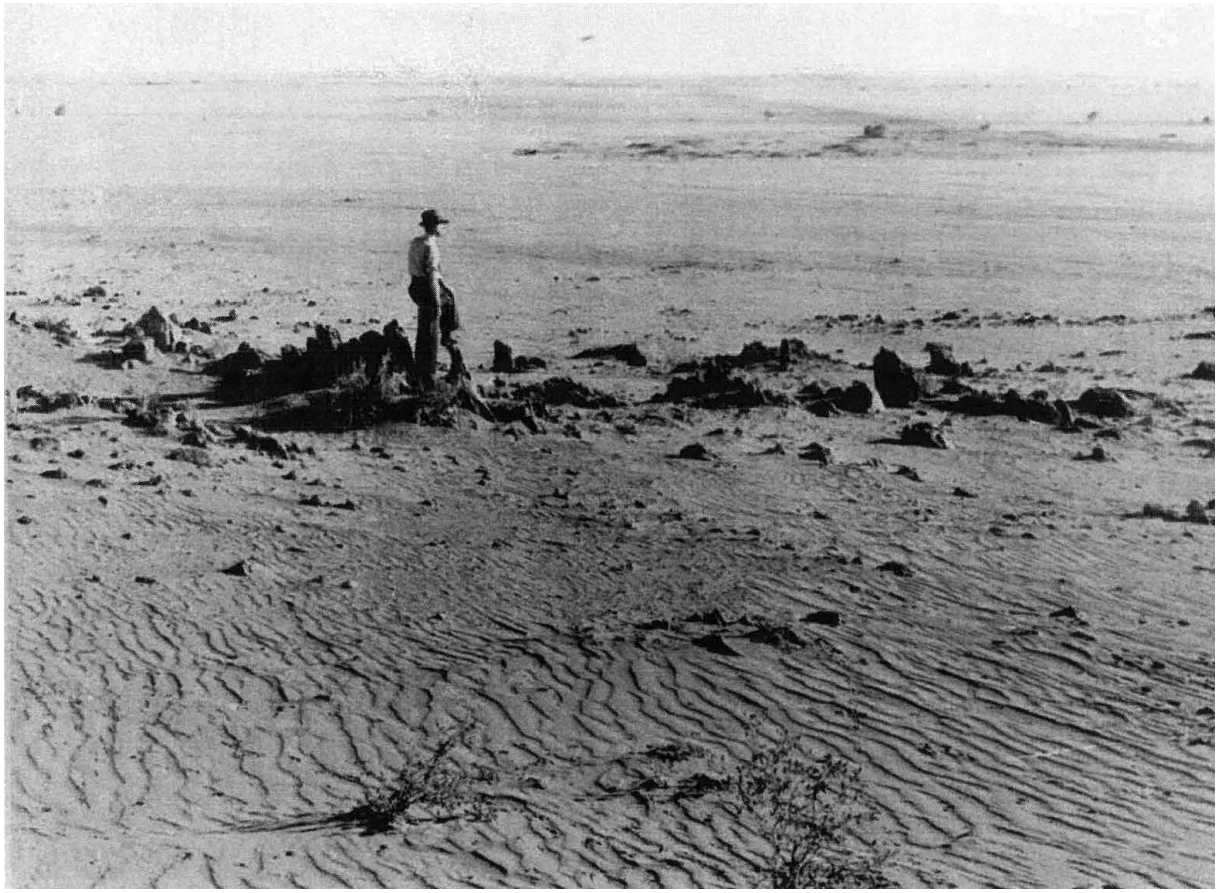
The original idea for the green belt scheme at Broken Hill came from amateur botanist and Field Naturalist secretary Albert Morris. Born in Bridgewater (SA) in 1886, Albert Morris had grown up at Broken Hill and, by profession metallurgist and assayer – had since his early days been keenly interested in botany.[664] Growing up in the western outskirts of the city of Broken Hill, Morris also had from his childhood a first-hand experience of the problem of sand drift.[665] After marrying his wife Margaret in 1909, Morris started a large collection of trees and shrubs from the arid regions of Australia, America, and Africa and undertook experiments to see which plants were best suited to protect his own home from the ever-present sand drift.[666] As engaged member and co-founder of the Barrier Field Naturalist's Club, Morris was especially interested in the flora of the region; his observations on *The Flora between the Darling River and Broken Hill*, published in 1923, was considered a valuable contribution at the time by professional botanists.[667] The idea for a revegetation scheme in Broken Hill stemmed at latest from late 1935, and was directly influenced by the US shelter belt program: In December 1935, the Field Naturalists' Club approached the NSW Minister of Forests with the idea of establishing a reserve as a "preliminary step in the checking of the dust nuisance".[668] In its proposal, the club was "being guided by an experiment in America where a strip of land a thousand miles wide [was] being utilised in an

[661] Quoted in: Solomon, The Richest Lode, p. 43.
[662] Ibid., p. 41.
[663] Albert Morris (1938): Broken Hill Fights Sand-Drift. In: *Walkabout* 4, pp. 33-36, here p. 34; Jones, Re-greening 'The Hill', p. 181.
[664] Webber, The Greening of the Hill, p. 39.
[665] Margaret Morris (1939): Plant Regeneration in the Broken Hill District. In: *The Australian Journal of Science* 2 (2), pp. 43-48, here p. 44.
[666] Morris, Plant Regenration, p. 44; Jones, Re-greening 'The Hill', pp. 185-187; Webber, The Greening of the Hill, p. 42.
[667] Albert Morris (1923): The Flora between the Darling River and Broken Hill. Guide-book to the Excursion to Broken Hill, Sydney. Botanist Beadle refers, for example, to Morris' study, see: Beadle, The Vegetation and Pastures, p. 15. Cf. also: Webber, The Greening of the Hill, pp. 45, 52.
[668] 'Reducing the Dust Nuisance', *Barrier Miner*, 7 December 1935, p. 7.

attempt to prevent soil erosion and dust storms".[669] Albert Morris was apparently well acquainted with the details of the US scheme.[670]

The spark for action came in 1936, when the Zinc Corporation mining company, one of the biggest mining companies in the city, extended its plant in the south-westerly direction, opening to "a sand-scored and wind-swept area without a vestige of anything growing on it" that "on a windy day was almost always a mass of dust".[671] The severe wind erosion caused major concern among the management, as the mine's new works and buildings were "in the direct line of onslaught by sand drift".[672] The management approached Albert Morris in order to find a solution to the problem.[673]

Fig. 13: Typical wind eroded country outside Broken Hill.
[Albert Morris (1938): Broken Hill Fights Sand-Drift, *Walkabout,* 1st November, p. 33].



[669] Ibid.
[670] Ibid.
[671] Notes on Planting by Zinc Corporation Ltd and Methods Employed by Mining Companies to Stop Sand Drift at Edge of Broken Hill, (n.d.), p. 1, in: [NAA: A9778, C30/5/150 Soil Erosion Committee, South Aust [Australia]]. Cf. also: Angela Denton (1988): Albert Morris and the Broken Hill Revegetation Scheme. In: *Landscape Australia* 10 (4), pp. 369-373, here p. 370.
[672] Quote from: Asdruebal J. Keast (1974): Straws in the Wind: Recollections, Canterbury, Vic., p. 106; see also: Morris, Broken Hill Fights Sand-Drift, p. 33.
[673] Morris, Broken Hill Fights Sand-Drift, p. 33; Jones, Re-greening 'The Hill', p. 187.

This was the occasion to go ahead with the idea to plant a green belt as a soil conservation measure. Within the mining company, Morris' main ally was Asdruebal James Keast (1892-1980), the newly appointed manager of the Zinc Corporation Mine.[674] Keast had lived for almost seven years in Broken Hill before he enlisted in the army in 1914 during the First World War and left for the United States in the early 1920s with a British postwar training scheme.[675] In the recollections of his early time at Broken Hill, he remembered the poor living conditions, especially the lack of precautions against lead dust poisoning, a health hazard which was largely aggravated through the dust storms that "swept over the large mine waste dumps that contained a percentage of lead and zinc" and then spread the dust over the community.[676] Keast was willing to put Morris' plan into action: In June and August 1936, an area of about 9 hectares (22 acres) on the south-west side of the mine was fenced against stock and rabbits, and in October 1936, seedlings were planted in what was then called the Albert Morris Park.[677] The first planting comprised no less than a thousand old man saltbush seedlings (Atriplex nummularium), placed in a row inside the erected iron fence in order to build a hedge that would provide shelter against the wind and hold any eventual sand drift at bay.[678] To hasten the process, the samplings for this first planting all came from Albert Morris' private garden, but a plant nursery was soon constructed on the mine's land, where eventually more than 120 varieties of trees would be raised, all from locally collected seeds and, therefore, best adapted to the climatic conditions.[679] The plantation was also furnished with a simple irrigation system, using waste-water from the mine which was pumped to a tank located on a high point from which it was run through channels by gravity.[680] In January 1937, another 1,400 scrubs and trees were planted on this area, mostly eucalypts.[681] All work was planned and managed by Morris and executed by the mine's employees.[682]

Albert Morris had a larger vision, however, an idea that he himself described as the dream of his life: "If only we could get an area a mile wide fenced around the town to keep stock and rabbits off, to allow the natural vegetation to come back, we could stop sand

[674] D. F. Fairweather (1996): Keast, Asdruebal James (1892–1980). ADB Online: http://adb.anu.edu.au/biography/keast-asdruebal-james-10664/text18953. [Accessed 23 June, 2015]; Webber, The Greening of the Hill, pp. 60-61.
[675] Webber, The Greening of the Hill, pp. 34-35; Keast, Straws in the Wind, p. 6; Fairweather, Keast, Asdruebal James.
[676] Keast, Straws in the Wind, pp. 6-7.
[677] Morris, Broken Hill Fights Sand-Drift, p. 34; Webber, The Greening of the Hill, p. 62.
[678] Morris, Broken Hill Fights Sand-Drift, p. 34; Morris, Plant Regeneration, p. 45.
[679] Morris, Plant Regeneration, pp. 43-48; Denton, Albert Morris, p. 371; Webber, The Greening of the Hill, p. 62.
[680] Morris, Plant Regeneration, p. 45; Denton, Albert Morris, p. 371.
[681] Morris, Plant Regeneration, pp. 45-46.
[682] Jones, Re-greening 'The Hill', p. 190.

drift".[683] The idea was after some hesitation supported by Keast, who took the initiative to get the three big mining companies (the Zinc Company, the North Broken Hill, and the Broken Hill South) on board for a revegetation scheme conceptualised as a social welfare project.[684] Backed by the NSW Soil Erosion Committee[685] and with the Town Council's permission, five paddocks of a total area of roughly 650 ha (half a mile wide and about five miles long) were fenced against stock and rabbits on an area of the Common at the southern and western flanks of Broken Hill during the period from July 1937 to February 1938.[686] As Keast remembered, the establishment of these 'regeneration reserves' on the Common first encountered hostility from the community, some of whom thought their civil rights to graze there for free were being violated.[687] But the results at the end must have been convincing, as citizens called for the establishment of further reserves, one at the south end and one at the western end, so that along with the original reserve, eight paddocks sheltered the town in a semi-circle along its south-western side.[688] Promoted by the Fields Naturalists, the initial resistance among citizens against the scheme gave way to a strong support, and many citizens helped in planting thousands of trees in and around the city.[689] The cost for the three companies amounted to a total of about £ 2,500.[690] Later, probably in 1939, the New South Wales government provided funds for a ninth reserve to the south.[691] The treatment of the areas varied: native seeds were freely scattered in some paddocks, while others were left to nature alone. In some especially bare patches where the topsoil had been blown away, furrows were ploughed to facilitate the natural regeneration, or additional planting was done.[692] The idea of the Broken Hill green belt spread out, and Albert Morris undertook another revegetation project at Silverton, roughly 26 km west of Broken Hill, where an area of roughly 30 hectares was fenced and over 4,000 trees and shrubs planted at what then became Penrose Park.[693] After Albert Morris died in 1939 at the age of fifty-three, his work was continued, assisted substantially by his wife

[683] Morris, Broken Hill Fights Sand-Drift, p. 34.
[684] Ibid.; Morris, Plant Regeneration, p. 46; Webber, The Greening of the Hill, pp. 75-77.
[685] MacDonald Holmes, Soil Erosion, p. 206.
[686] Denton, Albert Morris, p. 372; Morris, Broken Hill Fights Sand-Drift, p. 34; Morris, Plant Regeneration, p. 46.
[687] Keast, Straws in the Wind, p. 109; Webber, The Greening of the Hill, pp. 75-78.
[688] Morris, Plant Regeneration, p. 46.
[689] Denton, Albert Morris p. 372; Webber, The Greening of the Hill, pp. 76-79.
[690] Morris, Plant Regeneration, p. 46.
[691] Ibid.; MacDonald Holmes, Soil Erosion, p. 206.
[692] Morris, Broken Hill Fights Sand-Drift, p. 36; Denton, Albert Morris, p. 372.
[693] Morris, Broken Hill Fights Sand-Drift, p. 36.

Margaret.[694] The green belt was renowned among Australian soil conservationists of the time, who considered it as a worthy ecological endeavour to mitigate the erosion problem.

Recently, landscape architect David Jones has wondered if the 'Garden City Movement' might have played a role in the conception of the Broken Hill green belt, and has suggested that the Adelaide Park Lands green belt had been influential for the scheme.[695] The numerous plantings for beautification at Broken Hill's cemetery, schools and playgrounds that accompanied the establishment of the revegetation reserves indicate that a pragmatic and aesthetic motif joined together with ecological soil conservation concerns.[696]

There is, however, no doubt that the latter – the ecological soil conservation concern – was the driving idea of the project. Especially Margaret's writing clearly ties the project into the larger ecological soil conservation context when she speaks, for example, about the sand drift as resulting from the disturbance of the "balance of nature" as the "trees near at hand fell victim to the axes".[697] In regard to Keast, it is likely that his main concern in the scheme was the improvement of the living conditions of the city dwellers, regardless any soil conservation vision.[698] But there is no doubt that as time passed he adopted a larger ecological concept of the scheme:

> Offhand it would appear to have only local significance. A little more green to look at in a drab mining town. A little less dirt to eat and breathe. Well, there is that. But we have learned that we may also have contributed toward saving the central portion of the Australian Continent from becoming the man-made desert that it has threatened to become…because of wind erosion and overstocking.[699]

Just as Margaret, Keast also used the typical semantic register of the ecological soil conservation debate when he spoke about the sand drift being caused through overgrazing by sheep and rabbits, which had disturbed the "balance that had been established between animals and vegetable life, and climate".[700] He also put the wind erosion at Broken Hill in the greater context of the erosion menace:

> That is the threat: that our soil will go, and then our grass never can come back, or at least not without expenditures and long delays. [...] That is why regenerative work in Broken Hill is being watched very closely by our agricultural experimentalists. Many of them have visited the area to see what is being accomplished. Already, if nothing more has been done, a method has

[694] Jones, Re-greening 'The Hill', p. 192; Denton, Albert Morris, p. 372; Webber, The Greening of the Hill, p. 80.
[695] Jones, Re-greening 'The Hill', p. 187.
[696] Webber, The Greening of the Hill, p. 73.
[697] Morris, Plant Regeneration, p. 43.
[698] Webber, The Greening of the Hill, p. 92.
[699] Asdruebal J. Keast (1939): Saving Soil at Broken Hill. In: *The Rotarian* 55 (1), pp. 27-29, here p. 28.
[700] Ibid., p. 29.

> been explored and a fact has been established: this land, threatened, has amazing recuperative powers if protected and let alone.[701]

As a matter of fact, the Broken Hill scheme aroused great interest among soil conservationists and ecologists. The only ecological study into the regeneration of Australia's semi-arid or arid environments at the time other than the one done at the Koonamore reserve, was undertaken at Broken Hill.[702] In 1940, Eric Ashby, Professor of Botany at the University of Sydney, conducted together with Ilma M. Pidgeon a statistical analysis of regeneration following protection of grazing on the Broken Hill regeneration reserves.[703] The main interest lay in the question of the nature and regeneration of the land, mainly the exact species of the 'colonising' plants and their resistance to drought and competition. It was also the question of whether the practice of protecting land by fences was enough to allow for natural revegetation of the depleted pastoral lands, or if artificial seeding or planting was necessary.[704] The result showed that the fencing-off had led to an increase of vegetative cover, and that perennial plants were relatively more frequent than annuals both in respect to the species number and to the size of individual plants.[705] These findings differed from those of the experiments at Koonamore, where the fencing-off had not restored the perennial flora.[706] The reason was seen in the lower rainfall at Koonamore compared to the favourable years at Broken Hill, the ineffectiveness of the fencing at Koonamore against rabbits, and the fact that at Koonamore the reserve had been grazed more heavily than at Broken Hill, with the result that the seed bed had been destroyed.[707]

For soil conservationists, the Broken Hill regeneration reserves were an instructive object of study: In June 1937, for example, the Soil Erosion Committee of South Australia, headed by Walter J. Spafford, Director of Agriculture, visited Broken Hill and spoke lengthily with Albert Morris.[708] Samuel Clayton, from the New South Wales Soil Conservation Service, visited the city in June 1938 and then again in September the same year, when – impressed by the work done by the Morris couple and the mining companies – he spoke in favour of the

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[701] Ibid.
[702] Eric Ashby/Ilma M. Pidgeon (1940): Studies in Applied Ecology I: A Statistical Analysis of Regeneration Following Protection from Grazing. In: *Proceedings of the Linnean Society of New South Wales* 65, pp. 123-143, here p. 124.
[703] Ashby/Pidgeon, Studies in Applied Ecology I.; see also: Webber, The Greening of the Hill, pp. 83-85.
[704] Ibid.
[705] MacDonald Holmes, Soil Erosion, p. 206.
[706] Ashby/Pidgeon, Studies in Applied Ecology I., p. 141.
[707] Ibid.
[708] 'Broken Hill's Brilliant Botanist', *Barrier Daily Truth*, 19 June 1937(?) in: [NAA: A9778, C30/5/150 Soil Erosion Committee, South Aust [Australia]]; see also: South Australia (1938): Report of the Soil Conservation Committee, p. 3; the photographs taken during the visit can be consulted at: [NAA: A9778, C30/5/85A Photographs taken during visit of Soil Erosion Committee to Broken Hill, June, 1937].

establishment of further regeneration reserves.[709] In his publications on soil conservation, the regeneration scheme at Broken Hill was named as an example of the recuperative forces of nature in those cases where erosion had not yet gone too far, and Albert Morris was praised for his work.[710] The involvement of the New South Wales government continued after the war: In October 1946, the Minister for Conservation, George Weir, opened a conference to consider the enlargement of the regeneration area around Broken Hill.[711] The plan was not only to surround the city completely but also to widen the areas in order to increase the vegetative cover and "to minimise the local dust storms and filter those originating from distant areas".[712] An executive committee was formed, consisting of representatives of local interest, the Forestry Commission and the Soil Conservation Service.[713] The majority of funds were intended to come from the Department and complemented by funds from local organizations.[714] In 1951, in close cooperation with the Broken Hill City Council, a first strip of land covering over 10 km in length was fenced-off[715] and a second strip in 1953.[716] The regeneration reserves still exist today and were recently rejuvenated by the Landcare Broken Hill Inc. group in 2011.[717]

5.4 Wind, Rainfall and Drought

Wind, rainfall, and by implication also drought, are the main climatic factors in wind erosion, presenting themselves as a complex set of variables involving wind velocity, (wind speed, turbulence, and wind direction) and soil moisture, (amount of rainfall, humidity, and air temperature).[718] Lack of rainfall is among the most significant factors contributing to wind erosion, as low soil moisture increases the likelihood that soils will be eroded by wind.[719] Additionally, drought reduces the vegetation cover, which results in greater exposure of soil surface to the forces of wind as well as to other exterior forces like raindrops or trampling by

[709] 'Regeneration Area Work Praised. Soil Expert Here on Official Duties', *Barrier Miner*, 21 June 1938; 'Soil Conservation Service', *Barrier Miner*, 22 September 1938.
[710] Eric S. Clayton: 'Menace of Soil Erosion in Western Division. Pests and Overstocking Blamed', *The Farmer and Settler*, 22 December 1941, p. 7.
[711] 'Broken Hill Regeneration Scheme', *Barrier Daily Truth*, 24 February 1948, p. 1.
[712] Clayton (rev. ed. 1948), Soil Erosion and its Control, p. 95.
[713] Clayton (rev. ed. 1948), Soil Erosion and its Control, p. 95; 'Broken Hill Regeneration Scheme', *Barrier Daily Truth*, 24 February 1948, p. 1.
[714] Clayton (rev. ed. 1948), Soil Erosion and its Control, p. 95.
[715] 'Regeneration Strips at Broken Hill', *The Land*, 9 February 1951, p. 8.
[716] 'Regeneration Area Fenced', *Barrier Miner*, 4 July 1953, p. 5.
[717] Landcare Australia (November 2011): *The Land*. Online: http://www.landcareonline.com.au/wp-content/uploads/2011/11/Landcare-in-Focus-November-2011-compressed.pdf. [Accessed 30 March, 2016].
[718] Middleton, Wind Erosion and Dust-storm Control, p. 88; G. H. Burgess et al. (1989): Aridity, Drought and Dust Storms in Australia (1960-1984). In: *Journal of Arid Environments* 16 (1), pp. 11-22, here p. 14; Khan T. Osman (2014): Soil Degradation, Conservation and Remediation, Dordrecht, Springer, p. 109.
[719] Marshall, Drought, Land Use and Soil Erosion, p. 69.

stock which further deteriorate the soil aggregates and increases their erodibility.[720] Drought was well acknowledged as major culprit in the occurrence of wind erosion, but Australian interest of the 1930s and 1940s focused rather on the human factor, as soil conservator Herriot outlined:

> On the surface the problem appears to be one of conditions brought about by the drought, and it is certain that the drought is mainly responsible. But for the underlying cause it is necessary to look much deeper. From the earliest day of settlement the natural bush cover has been eliminated from this country and unfortunately the process is still going on.[721]

The leading scientific investigations into the climatic factors influencing wind erosion were at the time undertaken in the US and Canada.[722] In Australia, the erosion crisis did, however, provoke interest in closely recording the occurring dust events, and it led to the first comprehensive meteorological analysis of Australian dust storms. Moreover, during the dust bowl years, dreams to alter the climate of Australia's interior more permanently and thereby to get to the root of the wind erosion problem were reawakened.

5.4.1 Dust Event Records and Research

In regard to the physical movement of soil particles by wind, namely in forms of surface creep, saltation or aerial suspension, Australians drew mainly from the classic British work on the transport of desert sands by wind: Ralph A. Bagnold's *The Physics of Blown Sand and Desert Dunes* (1941).[723] When it came to wind erosion processes on agricultural lands, Australians referred largely to the work of Canadian William S. Chepil and his colleagues, who are considered pioneers of modern wind erosion studies.[724] Chepil started in the 1930s to work on the different factors causing soils to be blown by wind, using wind tunnels to evaluate wind erosivity and soil erodibility.[725] Several decades of research resulted, in 1962, in the establishment of a wind erosion equation that contains a local wind erosion climatic factor combining the elements of wind velocity, precipitation and temperature.[726] This equation has been the starting point for many subsequent wind erosion calculations and

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[720] Ibid.
[721] 'Sheep the Problem Animal', *The (Adelaide) Advertiser*, 15 December 1944.
[722] Pye, Aeolian Dust and Dust Deposits, p. 6.
[723] Bagnold, The Transport of Sand by Wind, pp. 409-438; Id., Physics of Blown Sand and Desert Dunes. Cf. also: Leon Lyles (1988): Basic Wind Erosion Processes. In: *Agriculture, Ecosystems and Environment* 22/23, pp. 91-101, here pp. 91-92;Young/Young, Soils in the Australian Landscape, pp. 112-113; Goudie, Aeolian Processes and Forms, pp. 787-794.
[724] Chepil/Milne, Comparative Study of Soil drifting; Pye, Aeolian Dust and Dust Deposits, p. 6. Since its establishment in 1947, Chepil worked at the United States Department of Agriculture's Wind Erosion Research Center at Kansas State University, cf. Goudie, Aeolian Processes and Forms, pp. 777-778.
[725] Gray, Men against the Desert, pp. 80-81.
[726] Osman, Soil Degradation, p. 110.

for further attempts to determine the multiple factors that contribute to the occurrence of wind erosion.[727]

In Australia, there was nothing similar in research done at the time, and experts relied largely on the theoretical work done overseas, which was then applied to local conditions. In order to do so, the gathering of local data was important, such as, for example, the various climate maps established by Prescott at the CSIR Division of Soils.[728] As has been described above, meteorological research in general and research on wind erosion in particular was strongly limited in Australia before the Second World War. The discipline of meteorology developed markedly during the 1930s and 1940s but still lagged behind the advancements in Great Britain and the US.[729] It was only in the second half of the 20th century that there was a strong increase of research in fields of meteorology relevant to the analysis of wind erosion, namely atmospheric science, hydrological science, and climatological studies.[730] This process was important for later developments in meteorological research in wind erosion: Today, in the context of growing concern about climate change and its effects on more extensive wind erosion, meteorologists are at the forefront when it comes to explaining and predicting the relevant processes.[731] Australian research on climatic factors contributing to wind erosion is not only important on a national scale, but also highly visible in the international scientific community, as is for example the research undertaken by Grant McTainsh and his co-workers at the Atmospheric Environment Research Centre, Griffith University.[732] The enduring importance of the Canadian research for Australians is illustrated in the fact that Grant McTainsh and his colleagues used Chepil's work as a basis to calculate an index of wind erosion potential based on climatic factors, using the mean annual wind run (estimate of wind velocity) and the soil moisture (precipitation minus evaporation).[733]

Even if original Australian research into climatic factors of wind erosion was limited before the Second World War, the wind erosion crisis brought about a first wave of interest in the phenomenon of dust events that resulted in their systematic recording as well as in a first

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[727] Ibid.
[728] Cf. MacDonald Holmes, Soil Erosion, pp. 189-190.
[729] Gibbs, A Mini-history of Meteorology, p. 98; Day, The Weather Watchers, pp. 162, 170, 194.
[730] Priestley, Reminiscences, pp. 19, 25-26; Day, The Weather Watchers, pp. 253-255.
[731] For example: WMO, Climate and Land Degradation, p. 26; Andrew S. Goudie (1993): Human Influence in Geomorphology. In: *Geomorphology* 7, pp. 37-59.
[732] Grant McTainsh completed a PhD at the School of Earth Sciences, Macquarie University on aeolian dust processes and soil formation in West Africa, then held a research position with the Soil Conservation Service of New South Wales. He is now at the Atmospheric Environment Research Centre at Griffith University, Brisbane. Grant McTainsh has published widely on wind erosion of soils, aeolian dust processes, present and past, and their role in soil formation (see bibliography). For the international reputation of McTainsh and colegues, see, for example: Pye, Aeolian Dust and Dust Deposits, p. 7.
[733] McTainsh/Leys, Soil Erosion by Wind, p. 221.

comprehensive scientific analysis of Australian dust storms. In the mid-1930s, meteorologists commented from time to time on the dust storms in the newspapers, relating the occurrence of dust storms to the wind velocity, but systematic records only began at the end of the decade.[734] At the Mallee research station in Walpeup, intensive meteorological observations of wind erosion phenomena started in 1939, comprising daily weather observations as well as records of the wind velocities, temperatures, and humidity before and during dust storms.[735] The information on the dust storms collected at the Walpeup research station from 1939 onwards is the only complete record of dust storm activity in the Mallee region for this early period.[736] The staff noted the intensity of the dust events by applying three categories: firstly and least severe when they observed "some dust including dust haze" in the atmosphere, secondly when they saw a "dust storm of moderate intensity" and thirdly when they witnessed a "severe dust storm".[737] The moisture of the surface soil during such dust events was measured, and estimations of the amount of soil moved were made.[738] Equipment was developed that allowed the collection of dust in the atmosphere at various heights above the ground in order to analyse the collected particles with regard to their mechanical and chemical nature.[739] By this means, the researchers wanted to learn more about the role of wind velocity in wind erosion as well as to get clues on how to develop measures for reducing wind velocity near the surface.[740] More wind erosion observations were directed by the Commonwealth Bureau of Meteorology, whose earliest records date back to the year 1941, when observations on dust storms were made at 15 stations throughout the country. In the 1940s, the observers usually noted the occurrence of a dust event, rather than describing the intensity or visibility (the 0-100 code now in use was only introduced in 1960).[741] For the decade of the 1940s, dust storm data was collected at over thirty stations and their records are held at the Dust Event Database (DEDB) at Griffith University.[742] With some methodological strings attached, these records have been crucial for assessments in regard to changing frequencies and intensities of dust events in Australia since the 1940s.[743]

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[734] For example: 'Duststorms from North', *The (Adelaide) Advertiser*, 9 January 1935; 'Damage by Gale', *The (Adelaide) Advertiser*, 14 September 1936.
[735] Hore, Experimental Research, p. 102.
[736] Holt, Wheat Farms of Victoria, p. 146.
[737] Ibid.
[738] Hore, Experimental Research, p. 102.
[739] Ibid.
[740] Ibid.
[741] McTainsh, et al., Wind Erosion and Land Management, p. 6.
[742] McTainsh/Tews, Soil Erosion by Wind – Dust Storm Index (DSI), pp. 8-9.
[743] McTainsh et al., Wind Erosion and Land Management.

In addition to the mere observation and recording of dust events, the erosion crisis also prompted the first extensive scientific discussion of Australian dust storms. Up to the 1940s, there were only descriptions of the great dust storms of November 1902 and February 1903 in *Climate and Weather of Australia* (1913),[744] as well as two brief and non-technical descriptions of two 1930s dust storms by Lindsay.[745] In 1943, meteorologist Fritz Loewe, a Jewish refugee from Nazi Germany appointed to the Department of Meteorology at Melbourne University, investigated Australian dust storms for the first time more extensively.[746] Loewe looked into the phenomenon of the Australian dust storms as part of a Commonwealth funded programme for meteorological research relevant to aviation.[747] As already mentioned earlier, dust storms were a serious impediment to aviation because they interrupted the usual air traffic. In summer 1944, airports at Sydney, Melbourne, Adelaide, and Mildura had to be repeatedly closed because of dust storm occurrences.[748]

In his paper, Loewe listed these negative effects in the following way:

> Duststorms are a serious hindrance to flying; the horizontal visibility is frequently just as effectively reduced as with normal fog, and the vertical visibility may sometimes be completely blotted out over distances of several hundred miles. For instance on 31st March, 1938, the plane flying from Broken Hill to Melbourne found between Mildura and Melbourne the ground invisible on account of dust clouds. Moreover, the dust particles may affect the running of the aeroplane engines by the grinding effect upon the cylinder.[749]

Loewe summarised the meteorological data available on dust storms at the time: He found dust storms more frequent during dry than during wet years and noted a greater frequency of dust storms in the summer months.[750] He drew a map of the main occurrences of dust storms in the semi-arid parts of the south-east, namely parts of the Wimmera, the Mallee, and Riverina.[751]

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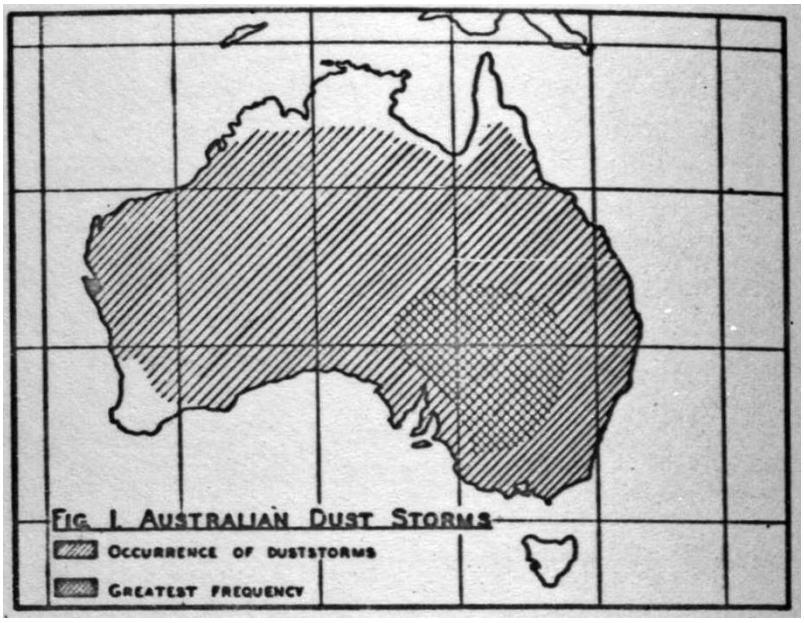
[744] Henry A. Hunt et al. (1913): The Climate and Weather of Australia. Australia, Bureau of Meteorology, Melbourne, A. J. Mullett, Government Printer, pp. 84-85.
[745] H. A. Lindsay (1933): Typical Australian Line-squall Dust Storm. In: *Quarterly Journal of the Royal Meteorological Society* 59, pp. 350-351; Ead. (1936): Three Photographs of the Advance of a Line-squall Dust Storm at Moolawatana Sheep Station, South Australia. In: *Quarterly Journal of the Royal Meteorological Society* 62, pp. 48-49; see also: John Garratt (1997): Major Dust Storms. In: Eric K. Webb (ed.), Windows on Meteorology: Australian Perspective, Collingwood, Vic., CSIRO Publishing, pp. 236-241, here pp. 236-237.
[746] Loewe, Duststorms in Australia; see also: Gibbs, A Mini-history of Meteorology, p. 98; Garratt, Major Dust Storms, pp. 236-241.
[747] Loewe, Duststorms in Australia.
[748] For example: 'Heavy Gales and Dust', *The (Melbourne) Age*, 18 December 1944; 'Swan Hill's trying saturday', *Swann Hill Guardian*, 22 December 1944; 'Rain follows severe duststorms', *Sun News Pictorial*, 31 January 1945.
[749] Loewe, Duststorms in Australia, p. 6.
[750] Ibid., p. 16.
[751] Ibid., p. 7.

Fig. 14: The first map showing the Occurence of Dust Storms in Australia.
[Loewe (1943): Duststorms in Australia, p. 7.]



This probably reflected the drought condition over much of south-east Australia at the time.[752] In regard to the location of the dust storm areas, Loewe's findings differ from more recent observations that see the main dust storm frequency in the arid central parts of the continent.[753] Loewe acknowledged that the state of the surface, including the vegetation and precipitation, was important for the occurrence of dust storms, but focused on the air masses and wind velocities.[754] His main interest was to reveal under which atmospheric conditions dust storms arose and – second in importance – to suggest how to forecast them. For this purpose, he analysed the weather conditions connected with six dust storms of large extent that moved across several states in the period between April 1938 and January 1940 and found that the main factor affecting their occurrence was a sufficiently strong wind flowing for a period over the drier regions of the inland.[755] Even though Loewe's results have been modified and partly discarded by meteorologists in recent times, they remained the classic reference point for Australian wind erosion experts well into the 1980s.[756]

[752] McTainsh/Leys, Soil Erosion by Wind, p. 221.
[753] Middleton, Dust Storms in Australia, pp. 46-47.
[754] Loewe, Duststorms in Australia, p. 16.
[755] Ibid.
[756] Andrew S. Goudie (1983): Dust Storms in Space and Time. In: *Progress in Physical Geography* 7, pp. 502-530, here p. 512.

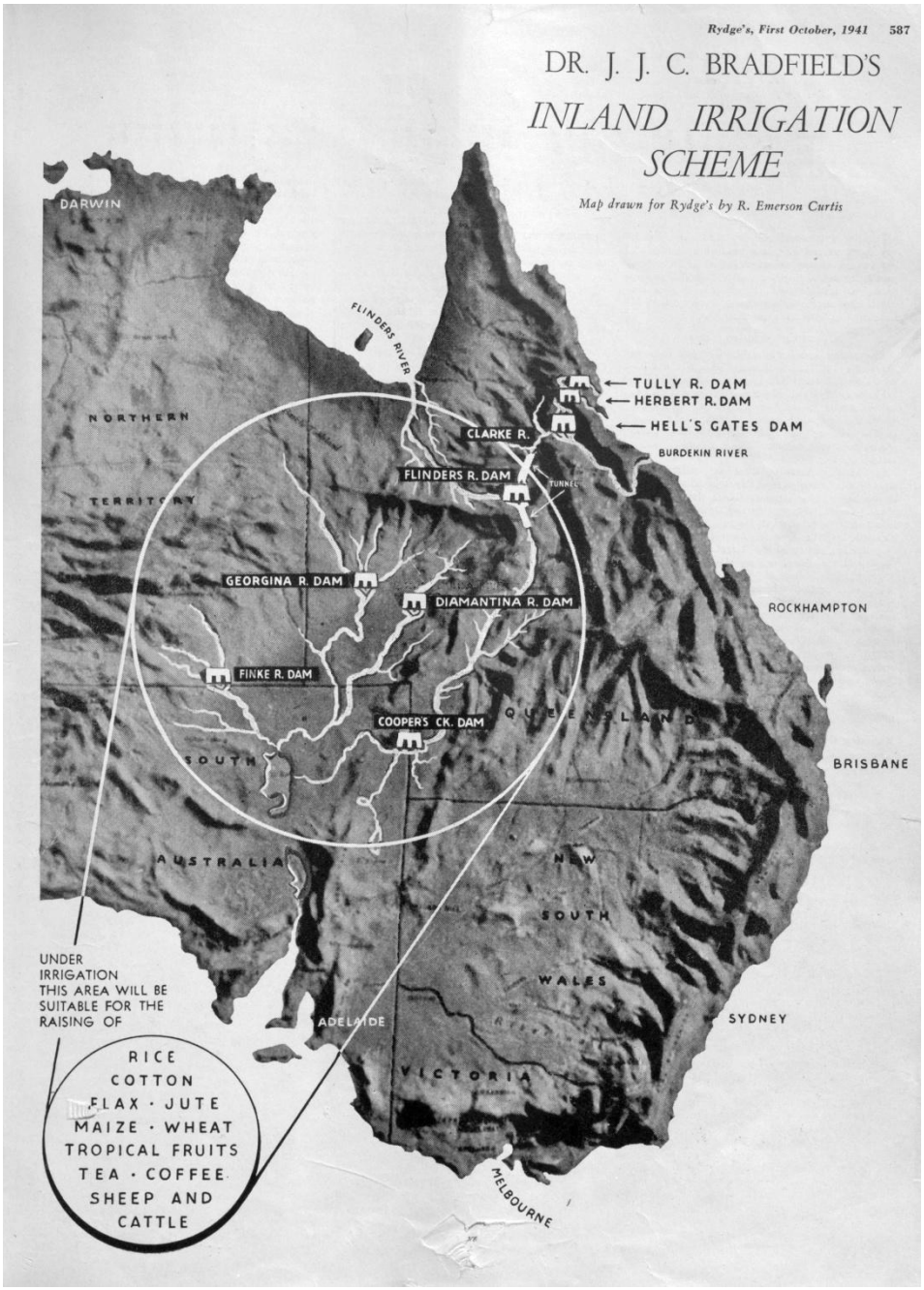
5.4.2 Irrigation and the Dream to Alter Australia's Climate

When dust storms swept the continent from the 1930s to the mid-1940s, long-standing dreams to convert the climate of the Australian continent were rekindled. Several public figures saw the problem of wind erosion in the general aridity of Australia's interior and were convinced that the solution to the problem required a greater vision than proposed by the majority of soil conservationists. These visionaries projected an irrigation scheme on a large scale that would take water from the humid coastline of Queensland to the semi-arid and arid regions of Australia's centre: the large amount of water would increase the rainfall, alter the climate, and thereby stop the dust storms. Even though the irrigation schemes of the 1930s and 1940s were conceptualised by laypeople rather than by scientifically qualified experts, their ideas were partly based on scientific theories and they were widely discussed (and mainly refuted) by the scientific community. These schemes, the most popular being the Bradfield-Idriess scheme (named after its main proponents) were enormously popular in the years of the erosion crisis and for a long-time after: Since its inception, the Bradfield plan has been periodically reactivated in periods of drought, for example in the early 1980s and again in the 2000s.[757] The scheme joins the ranks of a number of fantastical plans to alter Australia's climate and create rainfall, as for example the idea to pull icebergs from Antarctica to water Australia's interior or ideas to shoot rockets, kites, balloons, or even atom bombs into the atmosphere to induce rainfall and break drought.[758] The longevity and popularity of the Bradfield scheme has prompted a series of publications in the last decades: historians have shed light on its inception and reception among Australians,[759] while hydrologists and meteorologists have reinvestigated the scientific assumptions of the scheme

[757] John Williams (2003): Can We Myth-Proof Australia? In: *Australasian Science* 24 (1), pp. 40-42; Andrew Gillanders (2009): Mirage of the Inland Sea: the Bradfield Scheme. In: *Journal of the Royal Australian Historical Society* 95 (1), pp. 38-51, here p. 45.
[758] Robin, How a Continent Created a Nation, p. 101; Nicholls, Climate and Culture Connections, p. 314; Tim Sherratt (2005): Human Elements. In: Id. et al. (eds.), A Change in the Weather: Climate and Culture in Australia, Canberra, National Museum of Australia Press, pp. 1-17, here p. 15.
[759] The classic being: Joseph M. Powell (1991): Plains of Promise, Rivers of Destiny: Water Management and the Development of Queensland, 1824-1990, Brisbane, Boolarong Publications, pp. 154-164. The recent interest is reflected in a series of publications, for example: Michael Cathcart (2009): The Water Dreamers: The Remarkable History of Our Dry Continent, Melbourne, The Text Publishing Company, pp. 232-238; Gillanders, Mirage of the Inland Sea, pp. 38-51; Robert Wooding (2008): Populate, Parch and Panic: Two Centuries of Dreaming about Nation-building in Inland Australia. In: John Butcher (ed.), Australia Under Construction: Nation-building - Past, Present and Future, Canberra, ANU E Press, pp. 57-70, here p. 60. The most unusual contribution is the counterfactual history told by Tom Griffiths and Tim Sherratt, in: Eid. (2006): What if the Northern Rivers Had Been Turned Inland? In: Stuart Macintyre/Sean Scalmer (eds.), What if? Australian History as it Might Have Been, Carlton, Vic., Melbourne University Press, pp. 234-254.

with modern data and methods.[760] Even if many historians make mention of the context of the wind erosion crisis for the conception as well as for the popularity of the scheme, this has been done in a rather cursory manner up to now.[761]

Fig. 15: Bradfield's Inland Irrigaton Scheme.
[Bradfield (1941): Watering Inland Australia. In: *Rydges* (October 1941), p. 587].



[760] Fereidoun Ghassemi/Ian White (2007): Inter-Basin Water Transfer. Case Studies from Australia, United States, Canada, China, and India, Cambridge [et al.], Cambridge University Press, pp. 125-134, 147-150; Pandora K. Hope et al. (2004): The Rainfall Response to Permanent Inland Water in Australia. In: *Aust. Met. Mag.* 53, pp. 251-262, here p. 260.
[761] Powell (in Plains of Promise) does, for example, not mention the erosion crisis; it is, however, mentioned by Gillanders, Mirage of the Inland Sea, pp. 39, 44.

Plans to irrigate the arid parts of Australia had existed since the 19th century; in the face of the drought and wind erosion that scorched the continent in the 1930s and 1940s, however, they reached unprecedented popularity.[762] The most famous of such schemes, first published in 1938, was developed by renowned civil engineer John J.C. Bradfield.[763] Bradfield proposed establishing a series of dams, channels, and tunnels to turn the flood waters of the northern Queensland rivers – which were wastefully running into the Pacific and the Gulf of Carpentaria – across the Great Dividing Ranges towards the interior.[764] According to his plan, the water would be diverted into the old watercourses of dried up rivers, finally permanently filling Lake Eyre, Australia's largest and most of the time dry lake, with water.[765] This outstanding engineering effort would make water available for large-scale irrigation of the semi-arid regions.[766] Even more importantly, the hydrological cycle of Australia's climate would be positively altered: The water from the reservoirs and rivers would evaporate and fall back as rain, rendering the climate over large tracts of land generally more humid.[767] For this climatological argument, Bradfield drew on the research of E.T. Quayle of the Commonwealth Meteorological Department, who had worked in the early 1920s on ways to influence the climate.[768] In his article *Possibilities of Modifying Climate by Human Agency, with Special Application to South-Eastern Australia* (1921) Quayle claimed that large areas of surface water could increase evaporation and thereby precipitation.[769] Bradfield's following deduction was deceptively simple:

> Four such schemes inland would provide a water surface, of, say, 20,000 square miles in so called desert country as the floods came. The evaporation - 100 inches per annum - from such a water surface could cause a fall of rain of 4 inches over 500,000 square miles of the dry inland. That rain after refreshing the vegetation would evaporate and fall again as rain.[770]

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[762] Joseph M. Powell (2005): The Empire Meets the New Deal: Interwar Encounters in Conservation and Regional Planning. In: *Geographical Research* 43 (4), pp. 337-360, here p. 350; Ian Tyrrell (1999): True Gardens of the Gods. Californian-Australian Environmental Reform, 1860-1930, Berkeley [et al.], University of California Press, p. 172; Powell, Plains of Promise, pp. 154-164.
[763] John J. Bradfield: 'Augmenting Queensland's Inland Water Resources', *The Courier-Mail*, 1 October 1938; see also: Gillanders, Mirage of the Inland Sea, p. 42.
[764] For the most comprehensive description of the technical details of the Bradfields plan(s), see: Ghassemi/White, Inter-Basin Water Transfer, pp. 125-131.
[765] John J. Bradfield (1941): Watering Inland Australia. In: *Rydges* (October 1941) pp. 586-606; Id. (1942): Restoring Australia's Parched Lands. In: *The Australian Quarterly* 14 (1), pp. 27-39.
[766] Bradfield, Restoring Australia's Parched Lands, p. 28
[767] Ibid.
[768] Ghassemi/White, Inter-Basin Water Transfer, p. 131.
[769] E. T. Quayle (1921): Possibilities of Modifying Climate by Human Agency, with Special Application to South-Eastern Australia. In: *Proceedings of the Royal Society of Victoria* 33, pp. 115-132; Bradfield, Restoring Australia's Parched Lands, pp. 29-31; see also: Nicholls, Climate and Culture Connections, p. 314; Hope et al., The Rainfall Response, p. 252; Ghassemi/White, Inter-Basin Water Transfer, p. 131.
[770] Bradfield, Watering Inland Australia, p. 586.

The rainfall thus generated was in Bradfield's eyes the best remedy to combat Australia's Dust Bowl: "Wind erosion will cease, our great dust bowl will be clad anew with verdure, a bowl of utility and beauty, and upwards of 500,000 square miles of our parched inland will again pulsate with new life and vigour".[771] Thanks to Bradfield's involvement in a series of outstanding engineering projects, most famously the Sydney Harbor Bridge, but also the construction of the Cataract and Burrinjuck dams, he possessed high credentials that he used to propagate his scheme.[772] In 1938, Bradfield suggested the project to the Queensland government who rejected it, however, as too expensive.[773] Unperturbed, Bradfield continued to promote his plan, which he further developed in the following years, supported by a series of popular writers.[774]

The greatest advocate of the scheme was Ion Jack Idriess, a journalist and bestselling author who thought of Bradfield's plans to fill Lake Eyre as a "wonderful scheme".[775] Idriess, who had had similar ideas about watering inland Australia, took up Bradfield's scheme and further developed it, namely in the books *The Great Boomerang* (1941) and *Onward Australia: Developing a Continent* (1944). The books, which were very popular at the time,[776] proposed to divert the coastal rivers of Queensland into ancient river beds and channels in order to fill Lake Eyre Basin and other dried-up lakes.[777] Again, the climatic argument was at the heart of the scheme: Through the filling of the lakes evaporation would increase and regular rains would fall over thousands of square miles of very dry country, transforming more than half of South Australia into a "flower garden", massively improving the climate in south-west Queensland and north-west New South Wales and increasing agricultural production and population of these regions.[778] Idriess was convinced that by these means "the growing menace of the dust bowl would be checked and erosion over a vast area would be ended. A vast area of rich land capable of supporting millions more people would be added to Australia".[779]

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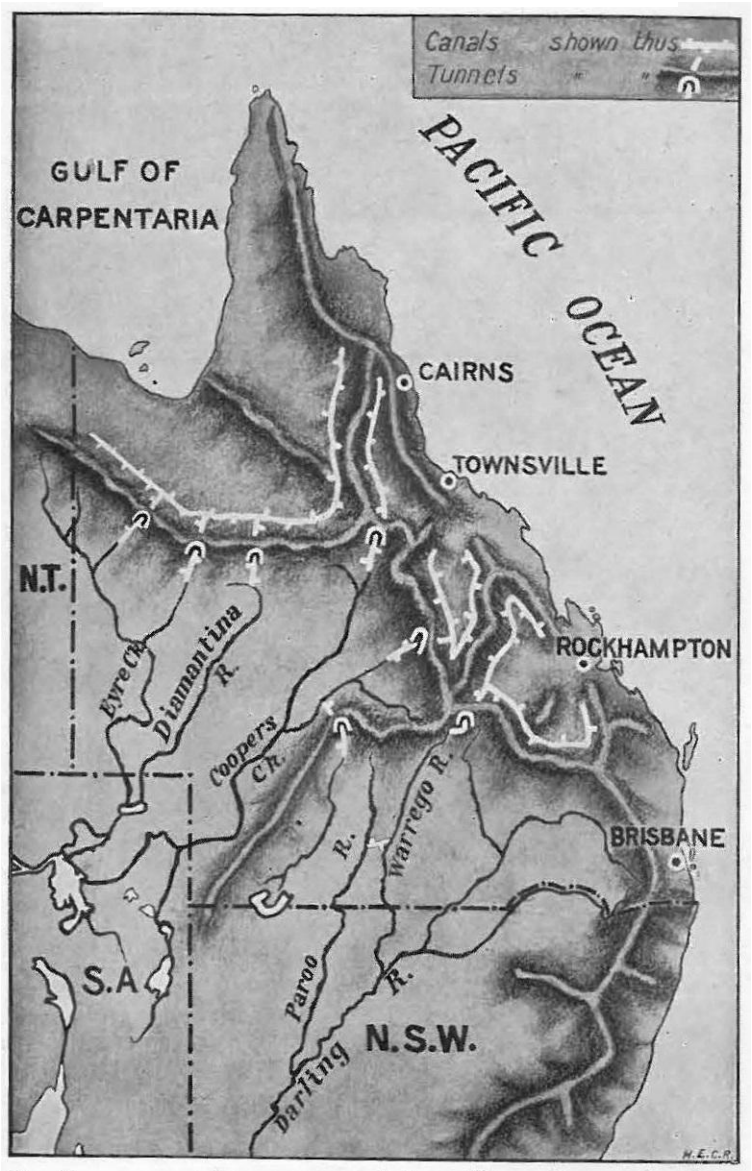
[771] Bradfield, Restoring Australia's Parched Lands, p. 28.
[772] John J. Bradfield (1938): Queensland: The Conservation and Utilization of Her Water Resources, Sydney, Dr. J.J.C. Bradfield&Son Consulting Engineers; see also: Ghassemi/White, Inter-Basin Water Transfer, pp. 125, 129; Powell, Plains of Promise, pp. 155-159.
[773] Ibid.
[774] Wooding, Populate, Parch and Panic, p. 62.
[775] Idriess, The Great Boomerang, p. 247; see also: Wooding, Populate, Parch and Panic, p. 62.
[776] Including Mallee farmer Charles Coote: "Reading L. Idriess's book 'The Great Boomerang' dealing with the Dead Heart of Australia and its possibilities under water or if given water. Australian people in large cities are not interested in such national matters – following mostly 'leaders' such as ambitious politicians, who are apparently quite unconcerned about anything but their own personal aggrandissment". Charles Coote Diaries, 26 December 1943.
[777] Idriess, The Great Boomerang, pp. 217-218; see also: Tyrrell, True Gardens of the Gods, p. 173.
[778] Idriess, The Great Boomerang, pp. 212-213.
[779] Ibid.

Fig. 16: The Idriess Plan to Water Australia.
[Idriess (1941), The Great Boomerang, n.p.].



The Bradfield-Idriess plan, as it was soon called, stirred the public imagination and was further propagated by a range of public persons, notably Fred Timbury, then mayor of Roma in south-western Queensland.[780] In his book *The battle for the inland: The case for the Bradfield and Idriess plans* (1944), Timbury argued that a vast irrigation scheme as suggested by Bradfield was the only adequate response to the great problem of wind erosion in Australia. Had not experts like Ratcliffe conceded that "none of the methods of restoration known to science could effect a cure" to the problem?[781] For Timbury it was therefore only logical that "some new method, some new remedy never used before must be found"[782] and

[780] Wooding, Populate, Parch and Panic, p. 62.
[781] Fred R. Timbury (1944): The Battle for the Inland: The Case for the Bradfield and Idriess Plans, Sydney, Angus&Robertson, p. 13.
[782] Ibid., pp. 13-14.

that was the visionary scheme proposed by Bradfield. The Bradfield-Idriess scheme was widely and positively discussed in the newspapers[783] and found its way into political debate, for example in the South Australian Parliament where the scheme was mentioned in 1943 in the context of the soil conservation bill.[784]

The inland sea was apparently an *idée fixe* of many Australians during the drought and wind erosion years as is reflected in the large public debate it triggered as well as the number of books that suggested similar ideas. Among the long list of popular writers that favoured the scheme were the journalists Frederic Morley Cutlack (1886-1967)[785], (Mary) Ernestine Hill[786] and William Hatfield. The latter championed the Bradfield scheme in his book *Australia Reclaimed* (1944)[787] as he was convinced that "irrigation must now be used to grow trees again, and reclaim the dust bowl".[788] Another advocate of an irrigation scheme was W. H. Mather. In his book *Wool. Australia's Great Awakening* (1944) he projected the future of a great inland sea that would cover 40,000 square miles and supply irrigation for 5 million farms, 60 million head of cattle and 360 million head of sheep.[789] The massive waves engendered by the idea to water Australia's interior is also reflected in the fact that Brisbane engineer L.B.S Reid proposed a rival version of the Bradfield scheme in 1946.[790] Further plans to water the inland were proposed by pastoralist J. C. Warren[791] and Michael Sawtell, a former cattleman in the Kimberleys. Both claimed the truth of having the experience of the arid interior.[792]

The Australian proponents of such large irrigation schemes were inspired by major hydrological schemes in other nations, namely the dam building and hydroelectricity projects in India, Egypt, Russia[793] and most importantly the irrigation schemes of the US Tennessee

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[783] For example: 'Plans to arrest erosion at Australia's 'red heart'', *Sunraysia Daily*, 28 October 1944; 'The land of opportunity. Australia's untold wealth', *Swan Hill Guardian*, 12 December 1944.
[784] PD, Legislative Council South Australia, Soil Conservation Act Amendment Bill, 7 September 1943, pp. 222-223; 21 September 1943, p. 267; 9 December 1943, p. 997. It was also mentioned as remedy for the wind erosion problem at the Federal Parliament, for example by member Riordan (Kennedy): PD, Federal Hansard, House of Representatives, Governor-General's Speech, 14 March 1945, pp. 582-586.
[785] Powell, Plains of Promise, pp. 161-162.
[786] Tyrrell, True Gardens of the Gods, p. 173.
[787] William Hatfield (1944): Australia Reclaimed, Parramatta, Sydney, Current Book Distributors, pp. 12-13, 32, 38, 41.
[788] Ibid., p. 36.
[789] W. H. Mather (1944): Wool. Australia's Great Awakening, Sydney, Angus&Robertson, p. 96.
[790] Advocated by former policeman Alfred Noakes, see: Alfred W. Noakes (1947): Water for the Inland: A Brief and Vivid Outline of Conditions of the Out-back of Queensland in which is Embodied the Reid and the Dr. Bradfield Water Schemes, South Brisbane, Rallings&Rallings. See also: Ghassemi/White, Inter-Basin Water Transfer, pp. 135-136.
[791] Described in detail by Ion L. Idriess: Id. (1945/ 1st ed. 1944): Onward Australia. Developing a Continent. Sydney [et al.], Angus&Robertson, pp. 70-76.
[792] Described in: Timbury, The Battle for the Inland, pp. 92-98.
[793] Idriess, The Great Boomerang, p. 248; Timbury, The Battle for the Inland, p. 26.

Valley Authority.[794] The TVA was conceived as a multi-purpose regional programme showing a path to modernisation in a democratic way: it included, among other things, the building of dams for flood control, hydroelectric power generation and a way to combat soil erosion.[795] Idriess' writings that laud the TVA as a successful model for reclamation of eroded lands, reveals a strong 'American pull', as US historian Ian Tyrrell has stated:[796]

> [...] all tree life had been cut from the land, the land had been heavily overstocked, and man's greed started erosion which in time ruined every-one, drove the homeless people away *en masse*, and turned most of the valley into a desert … That desert valley again supports a few million people, the erosion is no more, new industries have started, and power generated by the water not only serves the whole valley but seven States as well.[797]

The TVA was also the lodestar for Timbury, who stated that the development of the two great Australian basins required "the same large-scale regional planning as the TVA and Columbia River projects".[798] As Joseph Powell has highlighted, the erosion years were crucial for the boost of (bio) regional planning in wartime Australia as embodied by the TVA.[799] In Timbury's eyes, Australians were "a nation of lunatics" if they would not make use of the "invaluable knowledge and experience gained by the TVA over the last decade".[800]

Faced by the enormous popularity of the Bradfield-Idriess scheme, experts had a hard time convincing the larger public that the scheme was not based on scientifically proven facts and would most probably not obtain the expected results. On the front line of the opponents were meteorologists, who denied that the filling of Lake Eyre or similar large scale irrigation schemes would have a real effect on changing the climate or increasing rainfall on lands at any distance from the created water surface. Ann Marshall, assistant Lecturer in Geography at the University of Adelaide, having discussed the proposals with Treloar and Foley of the

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[794] Joseph M. Powell (1997): Enterprise and Dependency: Water Management in Australia. In: Tom Griffiths/Libby Robin (eds.), Ecology and Empire, Environmental History of Settler Societies, Edinburgh, Keele University Press, pp. 102-121, here p. 117; Gillanders, Mirage of the Inland Sea, p. 44; Wooding, Populate, Parch and Panic, p. 65.

[795] David Ekbladh (2009): The Great American Mission: Modernization and the Construction of an American World Order, Princeton, Princeton University Press, pp. 48-76. On processes of large-scale planning and social engineering as a signature of the 'age of modernity', see: Thomas Etzemüller (2009): Social engineering als Verhaltenslehre des kühlen Kopfes. Eine einleitende Skizze. In: Id. (ed.), Die Ordnung der Moderne: Social Engineering im 20. Jahrhundert, Bielefeld, Transcript, pp. 11-39; Dirk Van Laak (2008): Planung. Geschichte und Gegenwart des Vorgriffs auf die Zukunft. In: *Geschichte und Gesellschaft* 34, pp. 305–326.

[796] Tyrrell, True Gardens of the Gods, p. 173.

[797] Idriess, Onward Australia, p. 63.

[798] Timbury, The Battle for the Inland p. 58; see also: 'Erosion Lesson From the U.S.', *The (Melbourne) Age*, 1 February 1945.

[799] Powell, The Emergence of Bioregionalism, pp. 48-49; Id., Enterprise and Dependency, p. 117; Id., An Historical Geography, pp. 187-8; Id., The Empire Meets the New Deal. See also for example: Herriot 'Regional Planning'. A talk by Robert I. Herriot, Discussion Group series following ND Black, Lessons from America, TVA, Monday March 26th 1945. Station 5An-CK. In: [State Records of South Australia (SRSA) GRS 1818/1 unit 1, Texts of public addresses and radio broadcasts , R.I. Herriot, Soil Conservator, Department of Agriculture].

[800] Timbury, The Battle for the Inland, pp. 58-59.

BoM,[801] dismissed Quayle's assumptions that underlay Bradfield's scheme.[802] In 1945, a committee of meteorologists from the Melbourne University and the BoM, consisting of Loewe, Treloar, Foley, and Quayle, examined the scheme, using Australian data as well as international evidence.[803] Their conclusion, published in a majority report under the direction of Warren, was that even if from an engineering point of view, the larger water storages of Lakes Eyre and Frome were filled, there might be an improvement of rainfall over strictly limited areas in their vicinity, but there appeared to be "no clear prospect of the enormous benefits to rainfall and climate envisaged by Dr Bradfield 'over 500,000 square miles of the interior'".[804] Not surprisingly, Quayle, also member of the committee, submitted a more positive dissenting minority report.[805]

In addition to meteorologists, the scheme was also criticised by a series of other scientists who had no direct competence in the field of climate research. C. T. Madigan, lecturer in geology at the University of Adelaide and famous writer of outback literature, stated in his popular book *Crossing the dead heart* (1946) that meteorologists were "unanimous in the opinion that the presence of water in Lake Eyre would not have any noticeable effect on the rainfall"[806] and suggested that Bradfield's scheme was "merely good journalism, with no more foundation in fact than the fiction of Ion Idriess".[807] Additional critical voices were sounded by agricultural chemists such as Geoffrey W. Leeper at Melbourne's school of agriculture, who gave a damning review of Bradfield's article as lacking in scientific foundations,[808] or Ernest G. Hallsworth, lecturer in agricultural chemistry in Sydney, who argued similarly and banished the scheme into the realm of utopia.[809] In Sydney, James MacDonald Holmes, Professor for Geography, was also sceptical about the

[801] Ann Marshall (1944): Climatic Aspects of the Bradfield Scheme. In: *The Journal of the Australian Institute of Agricultural Science* 10 (4), pp. 165-168, see footnote on p. 166.
[802] Ibid., p. 167; Day, The Weather Watchers, p. 254.
[803] Nicholls, Climate and Culture Connections, p. 314; Hope et al., The Rainfall Response, p. 250; Ghassemi/ White, Inter-Basin Water Transfer, p. 131.
[804] Herbert N. Warren et al. (1945): Bradfield Scheme for 'Watering the inland'. Meteorological Aspects, Commonwealth Meteorological Bureau, Bulletin No. 34, Melbourne, Bureau of Meteorology, p. 5.
[805] Warren et al., Bradfield Scheme, Appendix D, pp. 25-30; Nicholls, Climate and Culture Connections, p. 314; Hope et al., The Rainfall Response, p. 250. Ghassemi/White, Inter-Basin Water Transfer, p. 131.
[806] Cecil T. Madigan (1946): Crossing the Dead Heart, Melbourne, Georgian House, p. 163.
[807] Ibid., p. 164.
[808] Geoffrey W. Leeper (1942): Restoring Australia's Parched Lands, A Comment. In: *Australian Quarterly* 14 (2), pp. 50-52, here p. 51.
[809] Australian Broadcasting Commission (1945): Watering the Inland of Australia. With contributions of H. D. Black/M. Sawtell/C. T. Madigan/F. R. Timbury/ E. G. Hallsworth. The Nation's Forum on the Air 1 (15), Sydney, Booth&Son.

Bradfield-Idriess plan,[810] and attested that much of the "argument cannot be reasonably substantiated, though it makes interesting reading".[811]

Despite such critical voices, the scheme was seriously considered both by Queensland and Commonwealth governments in their plans for post war reconstruction.[812] The Commonwealth Rural Reconstruction Commission considered the Bradfield scheme in its eighth report along with other irrigation schemes such as the Snowy Mountain scheme and the Ord River scheme.[813] It followed Warren's expert opinion that there was no positive climatic effect to be expected.[814] In 1947, William H. R. Nimmo, who was the Chief Engineer of the Stanley River Works, again reviewed the Bradfield Scheme, now focusing on the engineering side of it.[815] He likewise rejected the scheme as he found that the some of the basic assumptions on river flows, evaporation, as well as on the topographic outlay of the Bradfield scheme were faulty.[816] The water dreamers were not ready to wake up, however. Another group of visionaries, among them Labor politician Eddie Ward, came up with one more plan to flood the Lake Eyre Basin with waters of the Southern Ocean.[817] Again, the BoM formed a committee, including Warren, Treloar, Loewe and J. C. Foley who refuted the scheme, pointing to the fact that it had not only the same uncertainties as the Bradfield scheme but additionally would lead to dramatic salination.[818]

The dream was just too good to give up, however: The unsuccessful experiments by the CSIROs Radiophysics Division to create rainfall through cloud seeding in the years immediately after the war were the continuation of water dreams by other means.[819] During the major drought of 1982/83 the scheme was reinvestigated by Cameron McNamara Consultants on behalf of the Queensland government; the main focus was on the engineering side and the extent of area that could be irrigated through the diversion of the Queensland rivers.[820] The investigation found that the scheme would be able to supply only a limited

[810] MacDonald Holmes, Soil Erosion, pp. 234-242.
[811] Ibid., p. 234.
[812] Wooding, Populate, Parch and Panic, pp. 62-63.
[813] For the work of Commonwealth Rural Reconstruction Commission, see section 4 Responding.
[814] Commonwealth of Australia, RRC (1945): Irrigation, Water Conservation and Land Drainage: The Commission's Eighth Report, pp. 50-58.
[815] Ghassemi/White, Inter-Basin Water Transfer, p. 126.
[816] Ibid., pp. 126-129; Gillanders, Mirage of the Inland Sea, p. 42.
[817] Day, The Weather Watchers, p. 253.
[818] Ibid., p. 254.
[819] Day, The Weather Watchers, pp. 270-271; Roderick W. Home (2005): Rainmaking in CSIRO. The Science and Politics of Climate Modification. In: Tim Sherratt/Tom Griffith/Libby Robin (eds.), A Change in the Weather: Climate and Culture in Australia, Canberra, National Museum of Australia Press, pp. 66-79, here especially pp. 66-67.
[820] Cameron McNamara & Partners (1982): The Bradfield Concept Preliminary Study: A Report prepared for the Coordinator General, Brisbane, Cameron McNamara Consultant.

amount of water west of the Dividing ranges, for about 72,000 ha of irrigated land.[821] During the dry 2000s, the Bradfield scheme was once again discussed in the media[822] and revived by the Queensland government of Premier Peter Beattie in 2007.[823] Again, experts reassessed the scientific assumptions of the scheme: Australian meteorologists Pandora K. Hope, Neville Nicholls, and John L. McGregor came to the conclusion that it seemed likely that the scheme would induce some cooling over the lake and the area adjacent to it, but that there were no indications that a major, widespread increase of rainfall was likely.[824] This result was not only consistent with related international studies, but also endorsed the conclusion made by Warren et al. in 1945.[825]

As the fifth chapter of the thesis has shown, the wind erosion crisis of the 1930s and first half of the 1940s caused a proliferation of research into wind erosion in Australia and the emergence of the discipline of soil conservation. It was largely driven by interests that emerged out of the domestic experience with wind erosion, namely in the wheat growing lands of the south-eastern wheat belt and the sand drift problems of the pastoral areas, and was embedded within the international scientific community. Australian soil science had just come of age in the late 1920s, so research on Australia's soil was still fundamental; in regard to wind erosion, Australian scientists, therefore, resorted largely to international research. All in all, scientific research in Australia was largely drawing from soil conservation concepts and developments in North America, and thus contributed to reposition the scientific landscape. Even if Australians contributions were not significant on the international level, the period brought about important findings in regards to Australians climate and ecosystem. Moreover, the knowledge production on wind erosion diffused largely outside the circle of science and helped to popularise ecological ideas within the wider society.

The second section of the thesis has shown that scientific research was engendering important concepts on how Australians understood wind erosion. In the next section, the question of how these concepts impacted on other cultural concepts within the wider Australian society will be asked. The research depended as well on the domestic scientific landscape, as well as on knowledge exchange within the international scientific community. In the period under consideration, the scientific landscape in Australia experienced significant

[821] Heather Brown, 'Visions of a fertile outback', *The Weekend Australian Magazine*, 4 December 1982; Gillanders, Mirage of the Inland Sea, pp. 42, 44-45; Ghassemi/White, Inter-Basin Water Transfer, pp. 131-134.
[822] Williams, Can We Myth-Proof Australia?, pp. 40-42.
[823] Gillanders, Mirage of the Inland Sea, p. 45.
[824] Hope et al., The Rainfall Response, p. 260.
[825] Ibid.

changes: The colonial structures continued to be important, reflected in the strong role of the states in scientific research, the alignment of science to the needs of the export industry and the concentration of research in public agencies. Consequently, much of Australia's wind erosion research was undertaken within the states, namely at the Departments of Agriculture and the newly established soil conservation authorities. But the interwar years and especially the period of the Second World War brought some fundamental changes: The federal level became important in the scientific landscape and science became gradually more theoretical. The wind erosion crisis of the 1930s and first half of the 1940s caused a proliferation of research into wind erosion in Australia and the emergence of the discipline of soil conservation. It was largely driven by interests that emerged out of the domestic experience with wind erosion, namely on the wheat growing lands of the south-eastern wheat belt and the sand drift problems of the pastoral areas and was embedded within the international scientific community. Australian soil science was just professionalising in the late 1920s, so that research on Australians soil was still fundamental; in regard to soil factors relevant for erosion, Australian scientists resorted largely to international research. The mapping and survey of soil erosion became a major mission of soil science, and scientists used the system developed by the US Soil Conservation Service. Consequently, the already strong orientation of Australian soil science towards the US increased further. Most Australian research focused on the studies of the vegetative cover, as it was there were the anthropogenic factor came into play, and where immediate solutions were hoped to be found. As a result of the public debate on the menace of wind erosion, the 1930s saw a boost in ecological research into wind erosion in the arid pastoral regions of South Australia and New South Wales. Experts in the 1930s could, however, relied on valuable information from ecological studies on Australia's natural vegetation that had begun a decade earlier. In regard to wind erosion on cultivated lands, experts focused on drawing methods from the soil conservation arsenal of other countries and applying them to the specific conditions and requirements of the fifth continent. Original meteorological research was likewise limited, even though drought and wind were acknowledged as significant factors contributing to wind erosion. The most fantastical idea in regard to combating the Australian wind erosion problem was the plan to alter its climate through large irrigation schemes and thus attack the major problem of wind erosion, namely the continent's arid climate. Once more, US influences were marked in such ideas of 'watering Australia's inland'. All in all, scientific research in Australia at this time drew largely from soil conservation concepts and developments in North America, and thus contributed to reposition the scientific landscape. Even if Australian contributions were not

significant on the international level, the period brought about important findings on Australia's climate and ecosystem. Moreover, the knowledge produced on wind erosion was widely diffused outside the circle of science and helped to popularise ecological ideas within the wider society. The concepts of wind erosion as they spread into the Australian society during the wind erosion crisis will be analysed more closely in the next section of the thesis.

III Conceptualising

As we have seen in the previous part of the thesis, natural sciences were bustling to offer ways to approach and understand the phenomenon of wind erosion and to search for solutions to mitigate it. Science was, however, by no means the only domain of Australian society that provided concepts on wind erosion; in reality, natural sciences were but one part of a larger construction of (white settlers) cultural concepts on the phenomenon. The third section of the thesis will therefore open the view from the narrow domain of science to broader cultural concepts on wind erosion as they were developed in the 1930s to the mid-1940s by a wide range of historical actors from different spheres of Australian society: laypeople and artists, as well as scientists. Since the 1980s at latest, when Benedict Anderson wrote his ground-laying book *Imagined Communities*, historians have convincingly argued that cultural concepts, far from merely being a reflection or by-product of political or economic developments, should be considered as determining historical forces.[1] This section of the thesis focuses, therefore, on explaining in depth some important cultural concepts on wind erosion that Australians adopted in the wake of the erosion crisis, while the last section will illustrate how these concepts in turn influenced further developments. The analysis has been limited to those concepts of wind erosion that were publicly communicated – for example in newspapers, journals, radio broadcasts or even art exhibitions – and can therefore be assumed to have been influential within the wider Australian society. Two important ways in which Australians conceived wind erosion phenomena have appeared from the analysis: The first is the multi-leveled threatening character of wind erosion. The second is the 'ecological vision', which is the understanding of wind erosion as being the result of human disturbance of nature's balance.

6 Wind Erosion: The Menace

Anxiety about wind erosion is deeply rooted in the Judeo-Christian world of thought. Deserts appear as the opposite to Paradise, and dust storms as an impending punishment for disobeying God: "The earth that is under thee shall be iron. The Lord shall make the rain of

[1] Benedict Anderson (2006): Imagined Communities: Reflections on the Origins and Spread of Nationalism, London [et al.], Verso, pp. 5-6. Following Anderson's proposal, Helen Irving has emphasised for the Australian case that rather than political processes, the "cultural forces", for example nationalist literature or art, were the driving element for Australia's nation-building process, see: Helen Irving (1999): To Constitute a Nation. A Cultural History of Australia's Constitution, Cambridge [et al.], Cambridge University Press, pp. 33-36.

thy land powder and dust. From heaven dust shall come down on you until you are destroyed".[2] The convict transports in Australia's earliest settler history echoed the expulsion from Eden into a desert-like place.[3] The prevalent reading of Genesis, postulating that Humans should subdue the earth and have dominion over all living things also implied a mission to transform deserts into fertile and productive land.[4] The underlying idea of the British settlement of the Australian continent had been the mission to bring progress and civilization by putting the unproductive 'wastelands' to good use.[5] With such preconceptions in the back of their minds, Europeans set foot on the shores of *Terra Australis*. That the desert was a very real threat became obvious in the nineteenth century when many expeditions into Australia's interior ended in a deadly fashion, and some, like the famous expedition from Burke and Wills, entered the realm of national legends.[6] Roslynn Haynes, who analysed the image of deserts in Australian art, film and literature, points to the fact that the desert was not only conceived as a physical threat, but was also seen as an "implacable agent of existential terror demonstrating the fragility and absurdity of the human condition", thus adding psychological terrors to the physical ones.[7] This mental fear probably contributed to the fact that Australians were so reluctant to acknowledge that large parts of the continent actually were deserts.[8] Throughout the history of European settlement in Australia, fears of spreading deserts resurged periodically, as historical geographer Ronald L. Heathcote has shown.[9] Those fears were always linked to the occurrence of droughts and wind erosion and the ensuing economic depression in the affected areas.[10] Influences from international discourse about desertification also played a part in their emergence.[11] As wind erosion thwarted intentions to put the land to productive use, which was considered the basis for any progress and civilization, the drifting sands appeared as a genuine menace.[12] Periods of increased wind erosion therefore triggered what environmental historians like Richard Grove or most recently James Beattie have called 'environmental anxiety', namely moments when "environments failed to respond in ways Europeans anticipated, refused to meet normative expectations of

[2] Deuteronomy 28:23-24; cf. Haynes, Seeking the Centre, p. 26.
[3] Ann Curthoys (2000): Mythologies. In: Richard Nile (ed.), The Australian Legend and its Discontents, Brisbane, University of Queensland Press, pp. 11-41, here pp. 16-18.
[4] Genesis 1:28; cf.: Haynes, Seeking the Centre, p. 26.
[5] Heathcote, Images of a Desert, p. 4; Haynes, Seeking the Centre, pp. 26-27.
[6] Robin, How a Continent Created a Nation, p. 101; Haynes, Seeking the Centre, pp. 36-40; Curthoys, Mythologies, pp. 23-24.
[7] Haynes, Seeking the Centre, p. 196.
[8] Walker, Anxious Nation, p. 157.
[9] Heathcote, Images of a Desert.
[10] Ibid., p. 10.
[11] For example during the drought from 1864 to 1866, cf. Beattie, Empire and Environmental Anxiety, pp. 178-188.
[12] Haynes, Seeking the Centre, p. 26.

natural productivity or deteriorated when intended improvements actually produced the opposite effects".[13] Such moments of 'environmental anxiety' on wind erosion usually induced more or less significant changes of human behaviour.[14]

6.1 Communicating a Sense of Threat

During the 19th century, several periods of fears of 'deserts outbreaks' have been recorded, notably during 1865 in South Australia or during the Federation drought.[15] James Beattie has illustrated that the 1920s were likewise a period of heightened wind erosion concern.[16] Differing from earlier fears of spreading deserts, the 'environmental anxiety' about wind erosion reached a new quantity and quality in the period from the mid-1930s onwards and peaked in the dust storm summer 1944/45. For the first time, the fear of wind erosion was communicated Australian-wide, and it operated on a series of overlapping levels. This communication was supported by widespread media attention to the topic, be it through the numerous newspapers or the radio, which had a crucial part as vectors of information. Several factors contributed to raising public attention. First, there was the physical experience of the wind erosion, which affected several Australian regions around the same time.[17] The occurrence of the dust storms themselves played a crucial role in raising alertness, as they were the highly visible symptom of wind erosion processes. South Australian soil conservator Robert I. (Bob) Herriot noticed, for example, the great imprint that the dust storms had on the South Australian public:

> During the last few months the imagination of the public has been fired by the frequent and spectacular dust storms which have been experienced in South Australia. Soil erosion has been elevated to first class news status. Newspapers tell the story, the wireless tells the story and generally speaking, the public are more anxious than they have ever been before to learn something about it.[18]

The specific economic and political circumstances of the 1930s were also crucial in sounding the alert about the 'menace of erosion': As will be illustrated in length in the next sub-chapters, Australians' actual economic situation as well as their concerns about foreign and home affairs were crucial in elevating the erosion of soils to such a topic of signal importance.

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[13] Beattie, Empire and Environmental Anxiety, p. 10.
[14] Grove, Green Imperialism, p. 14; Beattie, Empire and Environmental Anxiety, p. 9; Heathcote, Images of a Desert, p. 10.
[15] And a fourth period for the years 1982 to 1983, see: Table 1: 'Outbreaks of the 'Desert'', in: Heathcote, Images of a Desert, p. 10.
[16] Beattie, Empire and Environmental Anxiety, pp. 205-210.
[17] See Figure 2, chapter 1.
[18] Herriot, Soil Erosion. The Present Position, p. 331.

Another, equally important factor that contributed to the high public attention to soil erosion was the international debate about the menace of wind erosion, fueled by images of the US-Dust Bowl.[19] As a matter of fact, the notorious US-Dust Bowl of the Southern Plains gave rise to an unparalleled international alarm in the 1930s.[20] At the peak of the US dust disaster in the winter of 1935-1936, an expert estimated that 20,234,300 ha of land were 'mobile'.[21] When the soil blew away, men, women and children left the Dust Bowl region: During the 1930s, around 3.5 million people left the Plains, 2.5 million of them from 1935 onwards, when the dust storms were at their worst, taking the shape of 'black blizzards'.[22] Even though the reasons for their departure were multiple and not always linked to farm failure, in the public opinion, they were all environmental refugees, subsumed under the term 'Okies'.[23] The 'Dust Bowl' had a powerful and lasting impact on American society.[24] At the behest of the New Deal government, the wind erosion landscapes were captured in impressive photographs and films, such as the educational film *The Plow that Broke the Plain* (1936).[25] Not least, the environmental catastrophe was also a source of inspiration for writers, the most famous being, of course, John Steinbeck, whose *Grapes of Wrath* erected a literary monument to the 'Okies'.[26] Under the impression of these Dust Bowl images that were diffused internationally, the fear of encroaching deserts spread out in the 1930s.[27] The news of the US Dust Bowl had its greatest impact on the settler societies of the British Empire in East and South Africa, Canada, and Australia, which had themselves experienced major droughts and acute wind erosion in the early 1930s.[28]

Australia was particularly susceptible to images of the US-Dust Bowl, as is illustrated by the fact the term 'dust bowl' was readily transferred from the American Plains to Australia.[29] In contrast to the US, wind erosion in Australia was less centered on a geographically defined region, as a range of agricultural and pastoral areas were affected, so

[19] Radkau, The Age of Ecology, pp. 52-55; Stein/Gestwa, Gone With the Wind, pp. 239-242.
[20] Ibid.
[21] R. J. Martin (1939): Duststorms of 1939 in the United States. In: *Monthly Weather Review* 67 (2), pp. 446-451, here p. 447; quoted in: Heathcote, Perception of Desertification on the Southern Great Plains, p. 37.
[22] Worster, Dust Bowl, pp. 49-51.
[23] Ibid., p. 51.
[24] William E. Riebsame (1986): The Dust Bowl: Historical Image, Psychological Anchor and Ecological Taboo. In: *Great Plains Quarterly* 6, pp. 127-136.
[25] Worster, Dust Bowl, p. 96; Christophe Masutti (2005): 1935-1938: Photographies du Dust Bowl. In: René Favier/Anne-Marie Granet-Abisset (eds.), Récits et Représentations des Catastrophes depuis l'Antiquité, Grenoble, Maison des Sciences de l'Homme-Alpes, pp. 247-269.
[26] Worster, Dust Bowl, pp. 47, 54-58.
[27] Radkau, The Age of Ecology, pp. 52-55; Stein/Gestwa, Gone With the Wind, pp. 239-242.
[28] N.N. (1939), Dust Bowls of the Empire; see also: Showers, Soil Erosion and Conservation, p. 373; Radkau, The Age of Ecology, p. 53.
[29] On US influences on Australia, see my recent articles: Sauter, Lessons from the US, pp. 298-299; Ead., Australia's Dust Bowl, pp. 353-354.

that several Australian 'dust bowls' existed.[30] By the middle of the 1930s, at a time when the American dust storms were becoming more frequent, Australian newspapers recurrently reported on the crisis of American soils.[31] At times, the largely publicised US events even overshadowed the local experiences and domestic warnings of Australian erosion experts. In 1942, the South Australian soil conservator Herriot deplored that the "American propaganda has been so intense that it is not unusual to find an Australian farmer, with his own farm riddled with gutters, who still considers that soil erosion is a peculiar American phenomenon".[32] In most cases, however, the US was considered as a benchmark for the Australian experience with soil degradation. The news of the US Dust Bowl powerfully conjured images of Australians' own experience with wind erosion and the problems it had caused in some of the rural settlement areas in the semi-arid regions. The similarities in settlement history[33] and the shared erosion experience therefore prompted Australians to follow the US attempts at mitigation closely. The frequent comparison with the US in soil erosion matters was further supported by the fact that the US, as the oldest and most prestigious of the British settler societies, had traditionally been a fascinating, ambiguous role-model for many Australians.[34] As a matter of fact, since the beginning of Australia's European settlement, the United States had played an important part in Australians' imagination, providing a ground for identification or demarcation of Australia as 'another America'.[35] Some Australian politicians first rejoiced about the American problems as they hoped that the demand for Australian agrarian export products would increase,[36] while others were quicker in taking the American case as a cautionary tale for what could and would possibly happen in Australia very soon: an environmental disaster that would cause an

[30] Muir, The Broken Promise, pp. 128-131.
[31] For example: 'Devil dust takes charge', *Sunraysia Daily*, 23 March 1935; 'Dust's heavy toll. American storms', *Sunraysia Daily*, 25 March 1935; 'America's Lost Acres', *The Central Queensland Herald*, 15 August 1935.
[32] Herriot 'Soil Erosion in South Australia', 27 July 1942. In: [SRSA: GRS 1818/1 unit 1, Texts of public addresses and radio broadcasts , R.I. Herriot, Soil Conservator, Department of Agriculture].
[33] For a broad overview, see Joseph M. Powell (1986): Abideth Forever? Global Use of Semiarid Lands in the Interwar Years. In: *Great Plains Quarterly* 6, pp. 151-170.
[34] Richard White (1981): Inventing Australia. Images and Identity 1688-1980, Sydney, Allen&Unwin, pp. 49-56; Philip Bell/Roger Bell (1993): Implicated. The United States in Australia, Oxford [et al.], Oxford University Press, pp. 1-16.
[35] White, Inventing Australia, pp. 47-53.
[36] The Prime Minister of New South Wales Bertram Stevens was for example quoted with the following words: "Farmers should have very little difficulty in disposing of every ounce of their crops at the right price. I have been right through the prairies and I have seen the dust bowl, as they call it in America. They have very poor crops there", in: 'A Message of Good Cheer', *The West Australian*, 25 September 1936; see also: 'Wheat Should Bring Good Prices', *The (Melbourne) Argus*, 25 September 1936; this statement caused indignation in other parts of the press, cf. 'A Message to the Women and Children of Rural America', *The Land*, 2 October 1936.

economic and social tragedy.[37] Thus, Australian soil erosion discussions since the mid-1930s have been deeply embedded in international debates on the menace of soil erosion and have constantly referred to the US experience.[38]

As has been stated in the introduction, the public communication about soil erosion was characterised by being emotionally charged and displaying a high sense of urgency.[39] As we have already seen in numerous examples, soil erosion was mainly couched in terms of war and illness. Coupling the experience of the Second World War with the fight against soil erosion, the sand drift was compared to "a foreign army advancing across the country"[40] and wind erosion as "this other enemy, just as dangerous" that threatened to apply "a 'scorched earth' policy".[41] Erosion was compared to a "cancerous growth which fixes itself on the soil and causes a wasting away" and therefore was considered as bringing a downright "war on humanity".[42] The martial semantic is also apparent in the movie that the New South Wales Soil Conservation Service co-produced in 1942, entitled *Enemy Within* that impressively added sound as further dimension to the repertoire of menacing representations.[43] Consequently, the advocates of soil conservation rose to lead an "attack"[44] on erosion and emphasised the necessity for "fighting"[45] this menace.[46]

Australia's society reacted typically for a society that feels threatened. In such moments of perceived threat, time seems to run out and action to counter the menace becomes pressing, so societies typically construct discourses which are characterised by urgency and emotionality.[47] This sense of urgency was often built through comparisons with the US Dust Bowl. The fact that the US events *just happened* pointed out the need for immediate action in

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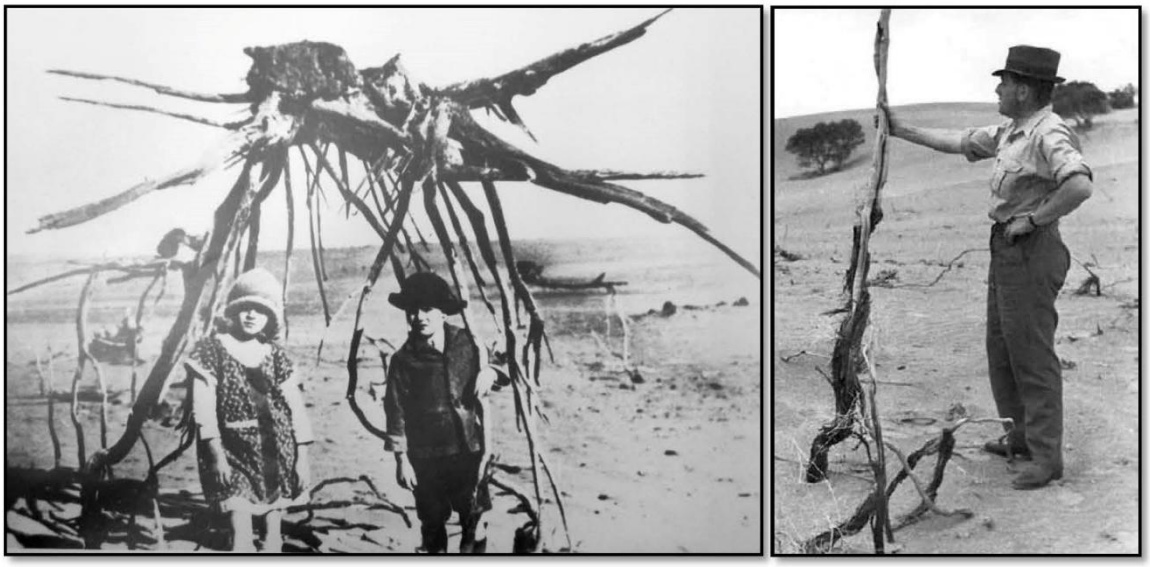
[37] Prof. Richards: "Alarming effects of soil erosion in the USA. Warnings that Australia should heed", in: *The Courier-Mail*, 24 October 1935; Dewar W. Goode: "Will Australia become another Sahara? Arid Areas Must be Closed to Stock", in: *The (Adelaide) Mail*, 27 April 1935.
[38] Powell, Mothering, Husbandry and the State, pp. 62-64.
[39] Environmental historian James Beattie has noted a similar sense of urgency and high emotionality in earlier discourses about spreading deserts, see: Beattie, Empire and Environmental Anxiety, pp. 208-209.
[40] PD, Legislative Council Victoria, Governor's Speech. Address-in-Reply, 27 June 1944, pp. 14-15.
[41] W. V. Roediger (1942): Erosion of Farms Lands – Cause and Control. In: *Journal of Agriculture of South Australia* 46, pp. 102-104, here p. 102.
[42] Hon. C.P. Gartside, in: PD, Legislative Council Victoria, Soil Conservation and Land Utilization Bill, 25 June 1947, p. 5868.
[43] Breckwoldt, The Dirt Doctors, p. 140.
[44] 'Plan now for post-war attack on soil erosion', *The Land*, 27 February 1942.
[45] 'Fighting menace soil erosion', *The Sun*, 4 February 1939.
[46] In NSW, the Agricultural Bureau declared that the soil conservation service should be considered as "an important part of our national defence", the responsible Minister as "the commander-in chief" and the Director of the Service, Clayton, as "chief-of-staff", see: 'State-wide attack on Erosion. New Research Station at Cowra', *The Land*, 26 April 1940.
[47] For the Collaborative Research Centre 923 'Threatened Order. Societies under Stress', Eberhard Karls University Tübingen, such a 'communication of threat' appears as a basic characteristic of a society under stress, cf.: Frie, 'Bedrohte Ordnungen' zwischen Vormoderne und Moderne, p. 104; Fechner et al., 'We are gambling with our survival', pp. 161-162.

Australia.[48] Expert Harold Hanslow was, for example, quoted in the *Herald*: "It was not too late yet to do something but it soon would be. Then the same thing would happen in Australia as had already happened in parts of the United States, where people were driven from the ruined farms of the Dust Bowl".[49] The sense that wind erosion was an important menace was not only cast in drastic words, but also pictured in impressive images. Soil erosion was often slow and indiscernible, so a specific repertoire of motifs evolved to illustrate its destructive effects. For water erosion, this was often the impressive gullies that sliced through the landscapes.[50] As far as wind erosion was concerned, black and white photographs of windswept and barren landscapes were often unimpressive in their monotony and their dimensions difficult to assess for the human eye. The dust storms therefore provided a striking epitome and attained a symbolic character. Equally impressive were pictures of mallee roots that had been exposed by the erosive forces of the wind, and were now sticking out of the landscape, sometimes more than a meter high.

Fig. 17: The Symbol of Australian Wind Erosion: Exposed Mallee Roots.
[*Left*: Griffiths (1936), Wind Erosion of Soils in the Agricultural Areas, *Journal of Agriculture of South Australia*, 40, p. 15.
Right: Showing Robert (Bob) Herriot (First Soil Conservator in South Australia), in: Tideman (2008), The Struggle for Landcare, p. 8.]



[48] For example: "Tragedy of Soil Erosion in United States. Fate from which Australia Must be Saved. The tragic conditions to which the mid-western farming areas of the United States have been reduced by soil erosion is a constant reminder of the urgent necessity for close investigation of soil erosion in Australia", in: *Queensland Country Life*, 5 November 1936. Some of the US photos also found their way into Australian newspapers, for example the picture of a farm house covered in sand, cf. 'Soil Erosion the Cancer of the Earth', *The (Adelaide) Mail*, 11 September 1937.
[49] 'Duststorms Show Soil Loss Menace. Solemn Warning On Erosion', *The (Melbourne) Herald*, 18 December 1944.
[50] For example: 'Vanishing Farmlands', *The Land Farm & Station Annual*, 14 July 1937.

As an anthropomorphised symbol of wind erosion, the mallee roots were depicted as monsters that grabbed the land, and thus became part of a specific Australian iconography of soil erosion.

Fig. 18: The Australian Iconography of Wind Erosion.
[*Left*: Charles Tate Clark (1945/46): Soil Erosion: R.A.A.F. Discussion Group Series, 156 (cover).
Right: Commonwealth of Australia, Ministry of Post-War Reconstruction (ed.) (n.d.), Discussion Bulletin 'Soil Erosion' (cover).]

Australia had several areas that were seriously affected by wind erosion, and therefore designated as 'dust bowl'.[51] Some regions were, however, more closely associated with wind erosion in the public eye than others. When the term 'Dust Bowl' was transferred from the American Plains to Australia, it applied most often to the Mallee region.[52] Even though wind erosion only affected some regions of the continent, Australians considered the phenomenon as a national menace. This expression was much more than a borrowing of US soil conservationists Hugh H. Bennett's and William R. Chapline's 1928 expression from the

[51] For example the Central Australian desert, often designated as Australia's 'dust bowl' by those who favoured large irrigation schemes as solution, see: Idriess, The Great Boomerang, p. 165-166; or the Western Division of NSW, see: 'Plans for N.S.W. 'Dust Bowl', *Sydney Morning Herald*, 27 January 1944.
[52] For example: "Little is being done about dust erosion – it seems that we will not see the end of it until all the surface soil has been lifted off the mallee 'dust bowl' and the land ruined for cultivation", in: *The (Adelaide) Advertiser*, 17 November 1938; "Mallee Major Problem 'Dust-bowl' fears. Why is Victoria's far north-west becoming a dust bowl?", in: *The (Melbourne) Argus*, 28 December 1940; the British press also entitled Australia's dust storm regions as 'dust bowl', cf.: 'Australia's 'Dust Bowl' Problem', *The Illustrated London News*, 21 January 1945.

classic American circular entitled *Soil Erosion a National Menace*.[53] As will be demonstrated below, the menace of soil erosion aimed at the Australian nation on several levels. Even though the more direct concerns usually related to particular problems of a specific state or a specific region, these arguments were often linked to the question of the destiny of Australia as a whole. This trend was inscribed in the growing nationalism since Federation that knew periods of surge after the First World War and of course during the second one.[54]

6.2 'Doomed by Dust': Wind Erosion as Menace to Australia's Economy

The fact that wind erosion was endangering the agricultural production of Australia became a major concern in all of the south-eastern states during the 1930s and 1940s. As has been shown, drought and erosion in several parts of Australia's wheat belt had already led to collapse of the agricultural production and to a readjustment of the land settlement. Dust storms seemed to be an omen "of the slow but sure advance of erosion to the farm lands of the north-west of Victoria and the west of NSW".[55] Additionally, the carrying capacity of some of the pastoral areas was likewise affected, and sand drift appeared as a sign "of the advance of the inland desert areas towards the once fertile grazing areas".[56] Wind erosion thus threatened Australia's most valuable resource and the basis for the nation's economic survival: the land.

As we have seen in the first section of the thesis, the decades that immediately preceded the erosion crisis were characterised by a public development rhetoric about the supposed unlimited resources of the land associated with the slogan of 'Australia Unlimited'.[57] Public opinion and political action were united in the conviction that Australia's seemingly endless land resources were the key to the nation's economic progress. The wind erosion crisis now shockingly demonstrated that such assumptions had been misguided, and that the current agricultural production and economic wealth thereof where literally built on sand.

As has been illustrated earlier, the economic costs caused by off-site erosion, particularly the clogging of water channels and the blocking of roads and railways, reached

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[53] Bennett/Chapline, Soil Erosion. A National Menace.
[54] Stuart Macintyre (1986): The Oxford History of Australia Vol. 4, 1901-1942: The Succeeding Age, Melbourne, Oxford University Press, pp. 179-182; on recent historical research on Australia's nationalism, see f. ex.: John Hirst (2008): Empire, State, Nation, in: Deryck Schreuder/Stuart Ward (eds.), Australia's Empire, Oxford, Oxford University Press, pp. 141-162; Stephen Alomes (1988): A Nation At Last? The Changing Character of Australian Nationalism, 1880-1988, North Ryde, N.S.W., Angus& Robertson; Neville Meaney (2001): Britishness and Australian Identity: The Problem of Nationalism in Australian History and Historiography. In: *Australian Historical Studies* 32 (116), pp. 76-90.
[55] Samuel Clayton on the actual dust storms, in: 'Red Rain an Omen from the Sky', *The Land*, 24 September 1937.
[56] Ibid.
[57] Joseph M. Powell (1993): Griffith Taylor and 'Australia unlimited', St. Lucia, Qld., University of Queensland Press, p. 8; Walker, Anxious Nation, pp. 4-5.

tremendous proportions in some severely affected regions like the Victorian Mallee. In regard to the actual losses of topsoil through wind erosion and the resultant economic repercussions, there was no reliable scientific data, but this did not prevent the circulation of alarming estimates in the newspapers; also, Australian experts repeatedly highlighted that wind erosion affected the long-term fertility and consequently the productivity of the soils.[58] Despite the lack of more precise data, some experts forwarded broad estimates on the economic losses: In 1940, John A. Aird, from the SRWSC, at a symposium on soil erosion arranged by the Victorian Institute of Surveyors, admitted that all estimates on the economic costs had to be very approximate as no real surveys existed so far.[59] For Victoria's north-west, as far as the economic losses for the wheat grower and grazier brought about by wind erosion were concerned, he ventured the estimation of a minimum loss of the income-producing capacity of one shilling per acre per year, which would amount to £500,000 per annum.[60] As the total agricultural and pastoral income of Victoria was assumed to be in the vicinity of £50 million per annum, this represented a loss of productivity of one per cent.[61] In Victoria, Aird's estimates were frequently referred to, for example during debates of the Soil Conservation Bill.[62] At the same symposium, H. A. Mullett of the Victorian Department of Agriculture was preoccupied with the goal of conserving the present soil resources in order to increase primary production.[63] For him, the problem was not so much the actual loss of productivity, but the "potential danger" of having to abandon large areas of cultivation of cereals to less profitable pasture.[64]

Professor Gordon Wood, dean of the Faculty of Commerce at the University of Melbourne drew the following picture of the economic and social repercussions of wind erosion for the Australian nation in a broadcast in the dust storm summer of 1944:

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[58] 'Victoria is being robbed! Wind reduces Soil fertility', *The Countryman*, 2 December 1938; 'Duststorms Show Soil Loss Menace. Solemn Warning On Erosion', *The (Melbourne) Herald*, 18 December 1944.
[59] John A. Aird (1940): The Economics of Soil Erosion. In: Charles T. Clark (ed.), Soil Erosion in Victoria. A Symposium arranged by the Victorian Institute of Surveyors. Melbourne, Department of Lands and Survey Victoria, pp. 37-41, here p. 39.
[60] Ibid., p. 40.
[61] The losses of water erosion were estimated much higher at 5s per acre, or £2,500,000 per annum, being about 5 per cent of the total income, see: Aird, The Economics of Soil Erosion, p. 40.
[62] PD, Legislative Assembly Victoria, Soil Conservation Bill, 13 November 1940, p. 1551; PD, Legislative Assembly Victoria, Soil Conservation Bill, 19 November 1940, p. 1658; see also: 'Millions Lost to State By Erosion. Experts Deal with Economics of Evil', *The Countryman*, 8 December 1939.
[63] A. Mullett (1940): Soil Erosion and Agriculture. In: Charles T. Clark (ed.), Soil Erosion in Victoria, Melbourne, Department of Lands and Survey Victoria, pp. 18-21, here p. 20.
[64] Ibid.; another example: "[...] even a brief survey of the histories of other countries shows that soil erosion is not merely an academic problem, but an active economic danger", in: Victoria (1938): Report of Committee Appointed to Investigate Erosion in Victoria, p. 1.

> I cannot put into precise terms, and I doubt if anyone could, the money value of this vital loss. The value of all crops from the land in 1943 was about £250 000 000 but what millions of man-hours of effort settlers put in to make the production possible! That is the fund which pays our debts and maintains our standards of living, yours and mine. Even if one tenth of that total were lost by soil erosion we should lose £25 000 000 in direct production and about £75 000 000 in national income. [...] The indirect costs of the loss are measured in the ruin of farmers, in the heartbreak of frustrated endeavour in the countryside, in the wiping out of homesteads, in the destruction of public works, in the slow break-up of all our productive mechanisms. Irrigation systems, railways, roads, telephone systems, all of which have cost us thousands of millions of man-hours and thousand of millions of pounds, are all threatened, threatened to be doomed by dust.[65]

As the above quote indicates, Australia's interwar economy was structurally very much dependent on the export of its primary produce. It also still struggled with the consequences of the Great Depression, which hit the Australian economy in 1929: The prices of Australia's main export products, wheat and wool, had plunged so far that Australia's balance of payments had been deeply in deficit.[66] The flow of capital into Australia had been halted and the country had had difficulties meeting interest payments on its foreign debts.[67] As a consequence, unemployment rose and reached a peak of about 22 per cent in the financial year 1931-32.[68] After 1932, the economy recovered slowly. Capital inflow was still small and while unemployment fell relatively steadily, it remained at around 8 per cent until 1940/41, when the work force requirements of the war economy started to absorb more labour.[69] The percentage of export earnings required to pay the net amount due to foreign creditors, which had reached a staggering 40 per cent in the financial year 1929/30 and even nearly 48 per cent in the following year, also decreased, but it never fell to much less than 25 per cent during the rest of the decade.[70]

Yearbook Australia 1939 indicates that in the ten-year period from 1928-29 to 1937-38, of the total value of Australian production, 63.1 per cent was classified as primary produce (mainly pastoral, agriculture, dairy and farmyard) and only 36.9 per cent as manufactured articles.[71] Exports of primary produce during this ten year period represented 95.8 per cent of the total exports while the manufacturing group only amounted to 4.2 per

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[65] Australian Broadcasting Commission (1944): Erosion. The Menace to Australia's Soil. With contributions of S.M. Wadham/G. L. Wood/H. Hanslow. The Nation's Forum of the Air 1(10), Sydney, Booth&Son, pp. 4-5.
[66] Cf. Fig. 7 'Wool, Wheat and export prices, monthly, 1928-1930' in: Schedvin, Australia and the Great Depression, p. 111; Dyster/Meredith, Australia in the International Economy, pp. 123-124; Dunsdorfs, The Australian Wheat-growing Industry, p. 268.
[67] Ibid.
[68] Fig. 6.1. 'Estimates of unemployment in Australia, 1913/14-1940/41', in: Dyster/Meredith, Australia in the International Economy, p. 127.
[69] Ibid., see also pp. 145-146.
[70] Table 6.1. 'Burden of Australia's foreign debt servicing 1928/29-1940/41', in ibid., p. 124.
[71] Yearbook Australia 1939, p. 539.

cent.[72] Nearly half of the total primary production during the period (namely 47.3 per cent) was exported, a great part (about 50 per cent) to the United Kingdom.[73] This clearly reflects the closer economic ties to Britain as a result of the Ottawa Agreement of 1932, which had defined preference in terms of Empire membership.[74]

The beginning of the Second World War brought several changes to Australia's economy.[75] On the one hand, it secured employment – especially after 1941.[76] On the other hand, the exports of Australia's primary products were hampered by the closing of oversea markets and a shortage of shipping.[77] Before the drought year of 1944/45, which caused a slump in wheat production, Australia produced more grain than could be absorbed by the remaining overseas markets, and the Wheat Board (established in 1939), intervened to regulate the acreage sown.[78] Demand for Australia's second major export product, wool, was low, and Australia's export earnings fell.[79] As import costs declined even further, there was a trade surplus.[80] Consequently, throughout the whole period under consideration, Australia relied heavily on its primary produce, and the menace of erosion loomed continuously, as R. P. Day pointedly noted in 1944/45:

> Australia is very dependent for her solvency on primary produce. Actually the whole vitality of Australia depends on her agricultural and pastoral resources. To this extent it is only natural that we should look upon Australia as a farm and not a factory. This valuable national asset is now being menaced by soil erosion.[81]

The economic argument was primordial for those Australians who called for soil conservation. The serious concern for the economic losses prompted for example a group of Melbourne business men in 1939 to issue a public warning that "erosion was a nation wrecking cancer" as it caused assets to shrink; production costs to go up; the farm income to decline and therefore would "sound the death knell of agriculture".[82] In New South Wales, Sam Clayton from the SCS drew on a parallel to the United States to make his point: There was no doubt that Australians were "in process of transforming the semi-arid inland areas into

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[72] Ibid.
[73] Ibid., pp. 510, 539; see also: Dyster/Meredith, Australia in the International Economy, p. 148.
[74] Dyster/Meredith, Australia in the International Economy, p. 149.
[75] Ibid., p. 175.
[76] Table 8.1. 'Estimates of workforce and unemployment 1940/41-1948/49', in: ibid., p. 173.
[77] Ibid., p. 182.
[78] Wadham, Australian Farming, pp. 62-63; Dyster/Meredith, Australia in the International Economy, pp. 155, 181.
[79] Dyster/Meredith, Australia in the International Economy, p. 182.
[80] Ibid., pp. 179-182.
[81] R. P. Day (1944-45): The National Value of Australian Land and the Menace of Soil Erosion. In: *Journal of Agriculture of South Australia* 48, pp. 360-361.
[82] 'Erosion a Nation-Wrecking Cancer', *The Countryman*, 3 February 1939.

desert in a more rapid rate than in U.S.A."[83] As the Australian soils were more fragile and its climate was more arid, Australia could afford even less than the USA to lose any of its fertile top soil, a point that not only Clayton highlighted fervently:

> The United States has allowed over 100 million acres to be destroyed by erosion or abandoned; we have nothing like the resources of USA; our area is so limited that we cannot face with equanimity the loss of even one million acres of good country. It is a problem that we should tackle immediately.[84]

If such a highly industrialised country had recognised that they could not afford to lose their soil through erosion, he argued, then Australia, which was "so largely dependent on primary production", should take the problem even more seriously.[85] Many soil conservation advocates thus propagated the conservation of the soil in order to assure the future production of food.[86] Interestingly enough, the fact that Australia had an important role, or even a duty, to produce food for the Empire was rather subordinated within the arguments, even during the Second World War. Examples like that of Vincent, Minister for Mines and Forests in NSW, who stated that "in view of the fact that Britain, as a result of war conditions, has urgent need for all the foodstuffs and wool which Australia can produce" and that this clearly demonstrated the "necessity for effective conservation to prevent the destruction of Australian soils by erosion" were comparatively few.[87] On the contrary, some people critiqued that the "present war-time food drive" was conducted at terrible cost to the future of Australia as it caused erosion.[88] The immediate impact of erosion on agricultural production was, however, by no means the only concern for Australians at the time. The problem was also the loss of rural population willing to live a life in the rural areas and to till the soil and graze the fields. Moreover, the loss of rural population was not only an economic threat, but also a strategic one.

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[83] Eric E. S. Clayton (1937): Soil Erosion. Mr. E.S. Clayton's Investigations Overseas. Extracts from his Reports. In: *Agricultural Gazette of NSW* 48, pp. 181-185, 194, 243-247, 254, 312-316, here p. 312.
[84] Ibid., p. 313. For further examples, c.f. various Parliamentary debates: Mr. Zwar, in: PD, Legislative Assembly Victoria, 19 November 1940, p. 1665; Mr. Christian, in: PD, Legislative Assembly South Australia, 22 August 1944, p. 212.
[85] Another example: Clayton: "If the highly industrialised United States realized that it could not afford the losses from erosion of its soil, all the more should Australia, which was so largely dependent on primary production, realize the same problem", in: 'Deserts Made by Man. History's Lesson to Australia', *The Sun*, 12 April 1937.
[86] For example: 'Need to Learn New Agriculture. Appeal by State Soil Conservator 'Preserve Food Source'', *(Adelaide) Chronicle*, 11 October 1945.
[87] 'War illustrates need for soil conservation', *The Land*, 29 September 1939.
[88] 'Soil Erosion. Cost of Wartime Food Drive', *Western Mail*, 20 January 1944 (reprinted from *The Land).*

6.3 Losing Ground: Wind Erosion as Menace to Australia's Population and Security

The negative impacts of soil erosion on Australia's primary sector implied not only an economic threat; it involved a whole set of other related fears about the future of the nation. In ruining the livelihood of the farmers, in making living in the countryside unpleasant and destroying the infrastructure of some of the rural areas, wind erosion contributed to the degradation of the rural areas already under way. This reality violently clashed with expectations that Australians had put on to their environment in the period of 'Australia Unlimited'.[89]

The expression came from Edwin James Brady's book *Australia Unlimited* (1918), the most prominent of a series of popular scientific works championing expansionist ideas in the first decades of the twentieth century.[90] It is worthwhile taking a closer look at Brady's volume in order to understand the backdrop against which the environmental anxiety on erosion developed. Brady asserted that the story of Australia's settlement was that of a growing understanding of the land's real potential: The part of the continent considered as uninhabitable or 'deserts' had continuously shrunken until "in the first decade of the twentieth century thoughtful people [would] have come to doubt the existence of one actual desert within the wide borders of the Commonwealth".[91] In reality, Brady asserted, instead of a "Dead Heart of Australia" there was a "Red Heart, destined one day to pulsate with life".[92] Tellingly, Brady took the successful settlement of parts of the South Australian and Victorian Mallee as proof for his optimism.[93] In his eyes, to evaluate the enormous potential of this region was as simple as a math exercise for schoolchildren: "As the physical composition of the Mallee country is monotonously similar, if one acre or one hundred acres will produce a profitable crop of wheat, the whole of it, given transport, can be converted into farms!"[94] After all, he continued, "the good old Australian 'desert' only waited to be tickled and it laughed – into baker's loaves!"[95] For Brady, this success in parts of the Mallee area was reason to rejoice in the assumption that "the country from sea to sea is one vast Continent [sic!] of undeveloped

[89] Powell, Griffith Taylor, p. 8; Walker, Anxious Nation, pp. 4-5.
[90] Powell, Griffith Taylor, pp. 9-11. For a reassessment of the influence of Brady's 'Australia Unlimited' see: Sarah Mirams (2012): The Attractions of Australia: E. J. Brady and the Making of Australia Unlimited. In: *Australian Historical Studies* 43 (2), pp. 270-286.
[91] Edwin J. Brady (1918): Australia Unlimited, Melbourne, G. Robertson, p. 628.
[92] Ibid., p. 630.
[93] Ibid., p. 631.
[94] Ibid., p. 633.
[95] Ibid., p. 634.

riches".[96] Optimism like Brady's was based on Australia's mere land mass, which seemed to be boundless and to harbor a wealth of resources ready to be exploited. Underlying the development rhetoric was the conviction of progress and of the successful 'conquest of the land'.[97] As Joseph Powell has argued, this confidence was so strong that it even pushed aside doubts that had been caused through the traumatic experience of depression and drought in the 1890s.[98] The land therefore took on, at least in the public rhetoric,[99] the key role for the development of the nation: It was through settlement on and working of the land that Australia as a nation would prosper and also contribute to the wealth and stability of the Empire.[100] The belief in Australia's unlimited land resources was closely linked to the idea of Australia's population growth.[101] Before the First World War, when Australia had only around four and a half million people,[102] William M. Hughes, later the Labor Prime Minister, had already argued that Australia should endeavour to reach a population of at least 100 million by the end of the 20th century.[103] Stanley Bruce, Australia's Prime Minister from 1923 to 1929, summarised this idea under the rallying cry of 'Men, Money and Markets'.[104] Immigration programs as well as closer settlement schemes were part of a policy that focused on the imperial connection based on the principle that Australia traded products against labour and capital.[105] Population estimates for the future often reached between 100 to 500 million.[106] While some voices, like the one of geographer Griffith Taylor, questioned the validity of 'Australia Unlimited' during the 1920s,[107] the majority of popular and expert opinions was convinced of Australia's development potential.[108]

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[96] Ibid., p. 636.
[97] Powell, Griffith Taylor, p. 15.
[98] Ibid., p. 7.
[99] Even if the practical governmental economic policy in the 1920s was not restricted to promote the rural sector, as David Pope argues, in: id. (1985): Australia's Development Strategy in the Early Twentieth Century: Semantics and Politics. In: *Australian Journal of Politics and History* 31 (2), pp. 218-229, here pp. 218-219.
[100] Powell, Griffith Taylor, pp. 8-9; Robin, How a Continent Created a Nation, p. 103.
[101] Powell, Griffith Taylor, p. 11.
[102] Table 1: 'Australian Population Growth and Net Immigration, 1788-1950', in: Greenwood, Australia: A Social and Political History, p. 448.
[103] Walker, Anxious Nation, p. 4.
[104] Pope, Australia's Development Strategy, pp. 218-219; Powell, Griffith Taylor, p. 9.
[105] Dyster/Meredith, Australia in the International Economy, pp. 106-115; Powell, Griffith Taylor, p. 11; Powell, Patrimony of the People, p. 20.
[106] Powell, Griffith Taylor, p. 13.
[107] Griffith Taylor spoke of a population of only about 20 million that would be reached until the end of the 20th century, cf. Powell, Griffith Taylor, pp. 25-26; Walker, Anxious Nation, pp. 156-161; Powell, An Historical Geography, pp. 129-149.
[108] And Taylor was attacked for his opinion: Taylor's introductory textbook on Australia was for example banned by West Australian education authorities in 1921 because it emphasised the dominating climatic influence of aridity, see: Powell, Griffith Taylor, pp. 25-32; also: Robin, How a Continent Created a Nation, p. 102.

During the 1930s, however, Australians' obsession with population increase clashed sharply with reality: The depression crushed most of the optimism, and the figures spoke for themselves:[109] The decade from 1931-1940 recorded the lowest population growth (0.86 per cent per year) in at least a hundred years.[110] This was the result of a combined fall in birthrates and low levels of net immigration: In the years 1930 to 1932 and in 1935, more people even turned their back on the country than arrived.[111] Against this background, it is not surprising that the reports about the choking dust storms, the news of the Mallee and other regions of rural Australia transforming into deserts, as well as reports of farmers leaving the rural areas dramatically unsettled Australians. As Nelson Lemmon (Forrest) articulated in the federal parliament at the height of the dust storm summer 1945:

> We have heard during this debate many references to the declining birthrate in Australia, and the need for a greater population. Some speakers have asserted that Australia could support a population of as many as 100,000,000. I believe that if there is a continuation of dust storms – which arise from wind erosion – and of water erosion, which is the washing away of the soil in our fertile valleys, and the silting up of our rivers we shall be fortunate if, *50 years hence*, Australia can support a population of 10,000,000 people. It is possible that soil erosion, unless something be done to check it, will eventually convert much of the fertile wheat lands of South Australia, Victoria and New South Wales into a sandy waste. Soil erosion is much more dangerous to the future of Australia than are the bombs falling on Berlin to the future of Germany.[112]

Parting from the rationale of an intimate link between the rural life and an elevated birthrate, the fact that wind erosion played a part in the abandonment of some of the rural settlements was especially appalling, as Albert E. Smith (Wakefield), another member of federal parliament expressed:

> We live from our soils. Depleted soil vigour means depleted human vigour and unfertile soil an unfertile people. Destroy the soil and you destroy the nation. A nation with 60 per cent of its population living in cities under artificial conditions of life, will not reproduce in sufficient numbers to maintain a natural life. Keep only sufficient on the land to feed the population in the cities and then denature the foodstuffs by refining and preservation, and the result must be national extinction. Rural areas are the only sure source of population increase.[113]

In the face of Australians' excessive preoccupation with population, the news of the mass exodus from the US-Dust Bowl added fuel to the fire. In the preceding decades, the United States had always been a model of what a future Australia's population might become. Maps

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[109] White, Inventing Australia, p. 145.
[110] Dyster/Meredith, Australia in the International Economy, p. 127.
[111] Ibid., p. 146.
[112] Mr Lemmon, in: PD, Federal Hansard, House of Representatives, Governor-General's Speech, 14 March 1945, p. 581. For more examples see: James Weir McLachlan, in: PD, Legislative Assembly Victoria, 5 July 1938, p. 74; Albert E. Smith, in: PD, Federal Hansard, House of Representatives, 4 May 1945, p. 1421; N. Brookman, in: PD, Legislative Council South Australia, Soil Conservation Bill, 7 September 1943, p. 222.
[113] Albert E. Smith, in: PD, Federal Hansard, Governor-General's Speech, 14 March 1945, p. 574.

of Australia and the USA were compared to show the similar size of the land and to demonstrate that Australia could one day carry the same population as the USA.[114] The following statement of William G. McKenzie during the debates of the Victorian Soil Conservation Bill in 1940 illustrates the strength of the argument:

> In four years 160,000 persons have left the "Dust Bowl" in the United States of America. They were driven from their holdings because of the depredations of erosion. The settlement of the Mallee is of comparatively recent date, but if something is not done in the near future to check erosion a similar exodus may take place from that area.[115]

When Victoria's parliamentarians discussed the uncertain future of the rural areas of the Northern wheat belt in the early 1930s, voices rose to assert that "it would be a disaster to the country if there were an exodus of farmers from the land"[116] and that "without a prosperous yeomanry no country can succeed".[117]

Debates about population and economic development were furthermore closely linked with questions about defense of the nation and imperial security.[118] Historian David Walker has reviewed interwar debates on the 'peopling of Australia' within the context of racial fears of an invasion from Asia. From the 1880s onwards, Asia appeared as a geo-political threat to the seemingly underpopulated Australian continent.[119] Had Europeans not colonised the continent in order to put it to a better use than the indigenous population? After over a century of European settlement, Australians had apparently proved incapable of using the big land masses and had thus failed in their colonial mission.[120] The First World War painfully demonstrated how thinly populated Australia was and worries about an alien invasion of Asians grew.[121] Being aware of the grave problems of soil erosion in Australia, New South Wales farmer Hugh S. Roberton was persuaded that "of all the calamitous effects that come from the savage overloading of the land, the depopulation of the country [was] not only the most serious, it [was] the most tragic. Without people, we are impotent".[122]

It was not only, however, military invasion that Australians feared, but also international pressure: In the first three decades of the twentieth century, increasing

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[114] Maps of Australia and the USA showing their similar size were compared to demonstrate that Australia could one day carry the same population as the USA, cf. Powell, Griffith Taylor, p. 13; Dunlap, Nature and the English Diaspora, pp. 173-179. For a typical comparison of both states, see: Jacks/Whyte, The Rape of the Earth, p. 76.
[115] PD, Legislative Assembly Victoria, Soil Conservation Bill, 19 November 1940, pp. 1646-1647.
[116] William McKenzie, in: PD, Legislative Assembly Victoria, Cultivation Advances Bill, 18 November 1932, p. 2448.
[117] Mr. Everard, in: PD, Legislative Assembly Victoria, Cultivation Advances Bill, 18 November 1932, p. 2452.
[118] Powell, Griffith Taylor, p. 8.
[119] Walker, Anxious Nation, p. 98.
[120] Ibid., p. 4; Heathcote, Images of a Desert, p. 6.
[121] Walker, Anxious Nation, pp. 116, 124.
[122] Hugh S. Roberton (1945): Now Blame the Farmer, Sydney, Angus&Robertson, p. 67. For more details on Roberton's book, see section 4 Responding, chapter 10.

international concern was raised about Australia's incapability to settle its large land masses properly, as this was conceived as an overt provocation.[123] Voices rose suggesting that Australians should renounce those territories in the interest of overpopulated nations.[124] Australia's fear of low population were thus intrinsically linked to international neo-Malthusian fears of world overpopulation, as historian Alison Bashford has highlighted some years ago.[125] Carrying on Bahsford's work, historian Russell McGregor even argued that this international pressure on Australia was the main impetus for Australians' gradual reassessment of the environmental attributes of its arid north, namely the acknowledgement of its aridity.[126] The Victorian newspaper, *The Countryman*, expressed a common view among conservative rural circles:

> In spite of the suicidal slowing-down of the population of the white races, the population of the world is rapidly increasing. […] If Australia is under the impression that her empty spaces are going to remain much longer as is the case to-day, then she is more to be pitied than blamed, because of her inability or disinclination to look to the future and prepare accordingly. She may not be interfered by war, but something far more powerful and effective – world opinion. Australia must either utilize her territory or allow someone else to do so.[127]

As this quotation illustrates, population concerns and fears of invasion were deeply rooted in racism. Australia, which had followed a vigorous 'White Australia' policy since 1901, considered itself as the defender of the pure white British race.[128] Again, this concern was fueled in the interwar period through international discourses about the weakening of the white race. Harvard historian and race theorist Lothrop Stoddard's book, *The Rising tide of Color* from 1919 was well received in Australia and influential well into the 1930s.[129] Stoddard argued that the Great War had profoundly weakened the white race and strengthened the 'yellow race'.[130] A high white population was seen as necessary for protection against an invasion flooding in from the Asian nations to Australia's north.[131] The fact that the Australian Natives Association (ANA), a friendly society founded in 1871 that had been a

[123] Walker, Anxious Nation, pp. 113-114, 125-126.
[124] Ibid.
[125] Alison Bashford has highlighted that there was a strong international strand of demographical expertise that argued in favour of a redistribution of world population in order to secure world peace and especially targeted the land masses of Australia, cf.: Alison Bashford (2007): World Population and Australian Land: Demography and Sovereignty in the Twentieth Century. In: *Australian Historical Studies* 38 (130), pp. 211-227, here p. 213; Ead. (2007): Nation, Empire, Globe: the Spaces of Population Debate in the Interwar Years. In: *Comparative Studies in Society and History* 49 (1), pp. 1-32.
[126] According to McGregor, the international pressure put on Australia was also the main reason for changes in Australian perceptions of their natural environment in the interwar years. McGregor, however, ignores the crucial role of the wind erosion crisis for such changes of perceptions, see: Russell McGregor (2012): A Dog in the Manger: White Australia and its Vast Empty Spaces. In: *Australian Historical Studies* 43 (2), pp. 157-173.
[127] 'Menace of Our Empty Spaces', *The Countryman*, 6 September 1935.
[128] Walker, Anxious Nation, p. 11; Powell, Griffith Taylor, p. 8.
[129] Walker, Anxious Nation, p. 168.
[130] Ibid.
[131] Ibid.

main promoter for federation and was a fervent advocate for 'White Australia', started to engage in a campaign for soil conservation in 1937 reflects how the concern for the soil merged with concerns for sustaining the white race.[132] That the impending abandonment of the settlement of the Mallee through drought and erosion was closely linked to fears of the weakening of Australia and fears of invasion becomes obvious in the parliamentary debates: When in 1936 Hon. W. J. Williamson spoke in the Victorian parliament in light of the economic and environmental problems of the area of the "madness to have put settlers in the northern Mallee",[133] he provoked Esmond L. Kiernan to answer:

> If the sizes of the holdings in the Mallee are too small, it will be easy to double the areas. We must not forget, however, that before all else we must keep our people on the land. Sooner or later our country will have to defend itself and its White Australia policy. It is most important that we should keep our population on the land if Australia is to continue to exist. There is no part of the world that is in more dire need of population, and there is no part of the world that is so seriously menaced by the proximity of coloured races.[134]

Similar opinions were expressed in the South Australian parliament, when during the debates of soil conservation legislation, Michael O'Halloran (Frome) argued:

> I agree, with other members, that there is an urgent necessity for doing something effective to solve it [the soil erosion problem], because if it is not solved we shall find that not only will it be impossible to substantially increase our country population, which is imperatively necessary if we are to hold Australia for the white race, but the ravages of soil erosion will not permit us to sustain those we now have.[135]

Racial fears of Asian invasion permeate the soil erosion literature in different shapes, not only in Australia: G.C. Watson, writing from Southern Rhodesia, was anxious about the future of the British Empire if erosion were not checked, as it would possibly bring about the "invasion of the yellow races of the East with their ultimate dominance and consequence disintegration of the Western social order".[136] Australian pastoralist Jock H. Pick feared in his book *Australia's Dying Heart. Soil Erosion in the Inland* (1942) that soil erosion in overpopulated Asia could induce a Chinese assault.[137] Similar preoccupations did not end with the Second

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[132] Robin, How a Continent Created a Nation, p. 13; Bryan J. Kelleher (1963): Australian Natives' Association: Its Aims and Influence on the Australian Scene, Melbourne, Australian Natives Association, p. 2. For the campaign of the ANA, see section 4 Responding, chapter 10.
[133] PD, Legislative Council Victoria, Land (Crown Leases Adjustment) Bill, 18 December 1936, p. 4212.
[134] Ibid.
[135] Mr. O'Halloran, in: PD, Legislative Assembly South Australia, Soil Conservation Act Amendment Bill, 4 December 1945, p. 1180. For another example see Mr. Breen (Calare): "Unless something is done to repair the damage [by erosion], and to prevent further injury, Australia will soon be unable to feed, clothe and house a population of more than 7,000,000 people. How shall we be able to justify the White Australia policy in these circumstances?", in: PD, Federal Hansard, House of Representatives, Budget 1945-46, 19 September 1945, p. 5606.
[136] G.C. Watson (1938): The Soil and Social Reclamation, London, P.S. King & Son Ltd., p. 159.
[137] Pick, Australia's Dying Heart, p. 8.

World War. Francis Ratcliffe's *Flying Fox and Drifting Sand*, which described in detail the problems of soil erosion in Australia's semi-arid regions, was picked as one of the 'Cheap Books Scheme for Asia' within an anti-communism program in the late 1950s, most likely with the veiled purpose of showing the unsuitability for settlement of large parts of Australia and hence discourage Asian interest in the continent.[138]

6.4 Under Attack: Wind Erosion as Menace to National Identity and Social Order

Economic development, population guarantee, national and imperial security were not the only promises the land held for Australians. Many people considered rural life as sacrosanct, the embodiment of national virtues. As a matter of fact, since the second part of the nineteenth century, life on the land was idealised by large parts of Australia's society and played a key role for Australia's emerging national identity in the closing decades of the century.[139] This is a surprising fact considering Australia's high urbanization during all of its history.[140] Because soil erosion impaired rural life, it threatened a cherished national ideal. It especially troubled those conservative parts of the society who considered the countryside as the embodiment of the true Australian spirit.

Historians have identified a set of myths or legends, publicised through popular literature and newspapers that glorified country life and raised the independent small-scale farmer, the yeoman, to the place of a national hero.[141] Dubbed 'agrarian myth' or 'agrarian ideal', they were among the most powerful narratives shaping Australians' national identity.[142] The superiority of small-scale farming had been a powerful ideal since the beginning of colonial settlement, but then faded somewhat before the economic reality of the squatting system.[143] It resurged forcefully in the second half of the nineteenth century in the

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[138] Griffiths, Going with the flow, p. 166.
[139] On the concept of 'national identity' see: Graeme Davison (2001): National Identity. In: Id. et al. (eds.), Oxford Companion to Australian History, South Melbourne, Vic. [et al.], Oxford University Press, pp. 456-458; Id. (2012): Rethinking the Australian Legend. In: *Australian Historical Studies* 43 (3), pp. 429-451, here esp. pp. 446-447; John Carroll (1982): National Identity. In: Id. (ed.), Intruders in the Bush: The Australian Quest for Identity. Melbourne, Oxford University Press, pp. 209-225.
[140] Cf. Graeme Davison (1995): Australia. The First Suburban Nation? In: *Journal of Urban History* 22 (1), pp. 40-74, here p. 40.
[141] Bruce D. Graham (1966): The Formation of the Australian Country Parties, Canberra, Australian National University Press, p. 39.
[142] Ibid., pp. 38-39; about the use of expressions like 'legend' and 'myth' as a way to create a national consciousness, see: Davison, Rethinking the Australian Legend, pp. 446-447.
[143] Graeme Davison (2005): Country Life. The Rise and Decline of an Australian Ideal. In: Graeme Davison/ Marc Brodie (eds.), Struggle Country. The Rural Ideal in Twentieth Century Australia. Melbourne, Monash University ePress, pp. 01.1-01.15, here p. 01.1; Powell, The Public Lands of Australia Felix, pp. 3-31; Richard Waterhouse (2005): The Vision Splendid. A Social and Cultural History of Rural Australia, Fremantle, W.A., Curtin University Press, pp. 22-25.

wake of the gold rushes when radicals demanded the unlocking of the lands and the breakup of the large pastoral holdings. Their ideals then influenced many official land policies.[144] Historian Bruce Graham argued that the agrarian myth was chiefly constructed by the Australian farmers themselves as a way to build their identity in demarcation from the pastoral worker and the city dweller alike and to give strength to their political claims.[145] Even though the concept of small scale farms soon had to be adapted, as the example of Victoria has shown, it remained powerful in the first decades of the twentieth century when it guided policies of closer settlement.[146]

The agrarian myth visualised the yeoman as independent, democratic, and as morally and physically superior to all other social groups.[147] As farming was not only the basis of the nation's economy, but also furnished the best citizens, the yeoman was considered the veritable backbone of the nation.[148] In this conception, the economic doctrine of the small freehold, family-operated life of the cultivator was intimately linked to its moral character:[149] The assumption was that his close relationship with nature and his experience with physical labour would develop a man's full potential.[150] The agrarian myth went hand in hand with anti-urbanism: The city was considered a non-productive parasite that had negative effects on its population, morally as well as physically.[151] The city dwellers were seen as effeminate, lacking the manly strength to defend the nation if required.[152] Linked with this conception was the neo-Darwinian idea that the land would produce a healthier and more reproductive population, which in turn was one of Australia's main preoccupations.[153]

Among the farmers, one particular group, namely the pioneers, were especially exalted for their forceful character, gained through a life on the frontier of the bush, battling against the adversities of a harsh environment.[154] In the early twentieth century, this 'pioneer legend'

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[144] Powell, The Public Lands of Australia Felix, pp. 59-88, 259-260; Waterhouse, The Vision Splendid, pp. 22-25; Powell, Patrimony of the People, pp. 15-20.
[145] Graham, The Formation of the Australian Country Parties, pp. 39-40, 43.
[146] See also: Powell, The Public Lands of Australia Felix, pp. 177-182; Id., Patrimony of the People, pp. 15-20.
[147] Graham, The Formation of the Australian Country Parties, pp. 39-40; 43; Powell, Patrimony of the People, p. 17.
[148] Graham, The Formation of the Australian Country Parties, p. 39.
[149] Ibid.
[150] Ibid.
[151] Ibid., p. 40.
[152] Walker, Anxious Nation, p. 111.
[153] Davison, Country Life, p. 01.3. Probably a misguided thought: After his survey in the Victorian wheatbelt in the 1940s, Alan Holt stated that "the crude birth rate is very low; the wheat farmers are certainly not the 'rural hatchery' of Victoria". According to him, the reason was mainly the low percentage of young women living in the wheatbelt, see: Holt, Wheat Farms of Victoria, pp. 42-43.
[154] John Hirst (1978): The Pioneer Legend. In: *Historical Studies* 18 (71), pp. 316-337, here pp. 316-318; also related to fears of Asia, that resulted in charging Australian nationalism with concepts of race and masculinity, cf. Walker, Anxious Nation, p. 5.

as historian John Hirst has called it, broadened: Now, it no longer exclusively referred to the earlier generations that had first settled the land,[155] but also incorporated people that were working the land at the present and in this way fused them into the agrarian myth.[156] The 'ANZAC legend', which exalted the experience of the First World War as coming-of-age of the nation and glorified its soldiers as national heroes, integrated elements of the pioneer legend and the yeoman ideal, as the implementation of the soldier settlement schemes illustrates.[157] Additionally, it incorporated elements of the bush legend,[158] which had emerged in the nineteenth century and centered on the figure of the itinerant pastoral worker in the outback. While it also exalted living in the countryside, it sharply contrasted with the ideal of the yeoman farmer, for whom family life was desirable and permanent settlement on his holding was an imperative.[159]

During the 1920s and 1930s, a strand of the agrarian myth gathered political power under the contemporary term 'countrymindedness' that now explicitly included farmers *and* pastoralists.[160] Don Aitkin, the author of the seminal work on this strand of thought, argues that its origin lay in the difficult economic situation the farmers and graziers faced at the beginning of the twentieth century and especially after the First World War, which induced them to rally against city interests.[161] The "struggles of country people to tame their environment and make it productive" elevated them to a model figure for the nation and made them deserving of political support.[162] As the basic ideology of the conservative Country Party, it gained sustained influence after 1920 in all of the Australian states, especially in

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[155] Hirst, The Pioneer Legend, pp. 316-319.
[156] Ibid., p. 332.
[157] Fedorowich, Unfit for Heroes, pp. 145-146.
[158] Ibid.; Waterhouse, The Vision Splendid, pp. 192-193; Hirst, The Pioneer Legend, pp. 333-334. For the Australian historian Geoffrey Serle, the Australian soldier or digger was only a new version of the bushman, see: Geoffrey Serle (1965): The Digger Tradition and Australian Nationalism. In: *Meanjin* 24 (2), pp. 149-158, here p. 149; Bill Gammage (1982): ANZAC. In: John Carroll (ed.), Intruders in the Bush: The Australian Quest for Identity, Melbourne, Oxford University Press, pp. 54-66, here pp. 61-63.
[159] The 'Bush legend', or 'Australian legend' was according to Russel Ward the most important narrative to shape Australian's identity. The pastoralists' life in the wilderness of the bush and the masculine entourage at the pastoral station was thought to invest him with attributes that, according to Ward, would become typical for Australians identity: mateship, independence, egalitarianism, anti-authority etc., see: Russell Ward (1966): The Australian Legend, South Melbourne, Vic., Oxford University Press, pp. 1-3. Other historians pointed to the fact that the so-called 'Australian legend' was just one among several powerful legends that shaped the national identity, see: Graham, The Formation of the Australian Country Parties, p. 38; Powell, The Public Lands of Australia Felix, p. 182. About the controversy on the origin of the 'Australian legend' see: Ward, The Australian Legend; Id. (1978/79): The Australian Legend Re-visited. In: *Historical Studies* 18, pp. 171-190; Davison, Sydney and the Bush; Id. Rethinking the Australian Legend.
[160] Don Aitkin (1988): 'Countrymindedness'. The Spread of an Idea. In: Samuel L. Goldberg/Francis B. Smith (eds.), Australian Cultural History, Cambridge, Cambridge University Press, pp. 50-57, here pp. 51-54; Davison, The Exodists, pp. 35.2-35.3.
[161] Aitkin, Countrymindedness, p. 54.
[162] Ibid., p. 51.

Victoria.[163] It was, however, not only from the conservative side of the political spectrum that rural life was extolled, but also from progressive forces.[164] As Graeme Davison has shown, Victorian progressive James Barrett, for example, also propagated the advantages of country life during the 1920s and 1930s, especially praising a more numerous and healthier population.[165] Hence, while at the beginning of the 1920s over 40 per cent of Australia's population lived in capital cities and urbanization steadily increased,[166] a majority of Australians in the interwar years idealised the rural life and strongly believed that a large population of farmers and pastoralists would represent the true Australian spirit and be necessary for the nation's social stability as well as for a numerous and healthy population.[167] The depopulation of the countryside, summarised under the slogan of the 'drift to the city', was, therefore, a major concern during the interwar years.[168]

The demographic dynamics were unambiguous: For most of the interwar years, the number of people leaving the rural areas for the city equaled the number of people born on the land.[169] As Graeme Davison underlined, the word "drift" suggested a moral lethargy of the mostly young migrants and the powerful attraction the city wielded on them.[170] In Victoria, structural problems like the mechanization of the agricultural sector and the economic depression already spurred the depopulation of the countryside.[171] In this respect, the wind erosion and drought that accelerated a process already in full swing was threatening, as the following insult from South Australian Parliamentarian McHugh, representing a rural district, illustrates:

> History shows that the downfall of every civilization has been brought by the starvation of the soil and the denudation of the country of its virile rural population. Country life means a strong life and a virile population, more attuned to nature, but city life is artificial and a weakening of physical and, judging from the interjections of certain hon. members, of the mental capacity of some people.[172]

Moreover, the dust storms that haunted the rural areas and generated stories about mothers covering their infants with wet towels in order to prevent them from being smothered by the

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[163] Ibid., p. 50.
[164] Roe, Nine Australian Progressives, pp. 67-69.
[165] Davison, Country Life, pp. 01.4 -01.5.
[166] See Table II: 'Australia: Population of Capital Cities, 1861-1951', in: Greenwood, Australia: A Social and Political History, p. 448.
[167] Fedorowich, Unfit for Heroes, p. 145; Ward, The Australian Legend Re-visited, pp. 171-190; Joseph M. Powell (1977): Mirrors of the New World: Images and Image-makers in the Settlement Process, Folkstone, Eng. [et al.], Archon Books, pp. 74-83.
[168] Dingle, Settling, p. 202; Davison, The Exodists, pp. 35.2-35.4.
[169] D. T. Merrett (1977): Australian Capital Cities in the Twentieth Century. In: *Monash Papers in Economic History* 4, pp. 23-26, quoted in: Davison, The Exodists, p. 35.3.
[170] Ibid.; Davison, Country Life. p. 01.03.
[171] Dingle, Settling, p. 202; Macintyre, A Concise History, p. 171.
[172] PD, Legislative Assembly South Australia, Address in Reply, 16 July 1941, p. 127.

dust stirred the minds of the population. The health hazards of eye and pulmonary diseases caused by dust storms forcefully collided with images of rural health.[173] As Stephen Powell has shown, governmental concerns about health, especially of women and children, were at least indirectly linked to concerns of soil conservation, in the United States as well as in Australia.[174] Anxiety about soil erosion also became associated with concerns about the nutritious values of the soil and induced the early Australian organic movement to warn of the negative effects of erosion on the health of the Australian population.[175]

At the beginning of the 1930s, when the consequences of the Great Depression made themselves felt in high rates of unemployment,[176] the land seemed the only possible solution to absorb the masses of unemployed.[177] The interior of Australia was conceived as the sponge to absorb those masses, but now wind erosion threatened this prospect, as James Weir McLachlan (Gippsland) reckoned in 1935:

> We have in Australia a continent larger than the United States of America. [...] To the eyes of the visitor, Melbourne has the appearance of great prosperity but there are many thousands of unemployed persons in it. There is room in the interior of Australia for many of these unemployed persons, and we should be able to devise a plan under which they can be settled on the land. […] From time to time we read articles in our newspapers [...] relating to the sterility of the central part of this great continent. The fear is expressed that a very large portion of the continent will be permanently destroyed unless something can be done to prevent the wholesale drifting of the sand.[178]

With Roosevelt's New Deal program in mind, McLachlan suggested the creation of an unemployment scheme in cooperation with all state governments that would furnish occupation for thousands of unemployed in prevention works against "the great menace of this sand drift".[179] Such arguments were often linked with concerns by conservative forces that an accumulation of unemployed people in the city would present high potential for social

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[173] "Soil erosion today is definitely a menace. It is a menace to the land, a menace to roads and water channels, and is even a menace to human life because it makes conditions miserable for those who have to live there", in: 'Action Urged on Soil Erosion. Menace to Human Life', *The (Melbourne) Herald*, 1 March 1945; see also: 'Choking cloud over city', *The (Adelaide) Advertiser*, 23 March 1933. In his book 'Soil and Social Reclamation', C. G. Watson warned for example that "some of the most deadly diseases which afflict mankind are thus brought about by erosion", cf.: Watson, The Soil and Social Reclamation, p. 46.

[174] Powell, Mothering, Husbandry and the State, pp. 4-17, 344.

[175] Jones, Green Harvest, pp. 5-6; Andrea Gaynor (2012): Antipodean Eco-nazis? The Organic Gardening and Farming Movement and Far-right Ecology in Postwar Australia. In: *Australian Historical Studies* 43 (2), pp. 253-269, here 258-259.

[176] Fig. 6.1. 'Estimates of unemployment in Australia, 1913/14-1940/41', in: Dyster/Meredith, Australia in the International Economy, p. 127.

[177] As argued by Mr. Cain and Mr. Dunstan, in: PD, Legislative Assembly Victoria, Closer Settlement Bill, 7 December 1932, pp. 3168-3221.

[178] PD, Legislative Assembly Victoria, Unemployment Relief Loan and Application Bill, 17 September 1935, pp. 2777-2779.

[179] Ibid; for McLachlan's enthusiasm for Roosevelt's New Deal programme see for example: McLachlan, in: PD, Legislative Assembly Victoria, Supplementary Estimates, 18 July 1934, pp. 568-571.

unrest, especially susceptible to the seductions of communism.[180] The prospect that the Mallee would collapse and release even more people seemed in this context especially worrying.[181] The argument that the land should absorb the masses of unemployed disappeared when in the second half of the 1930s, the employment situation eased and then reversed during the Second World War, when full employment was reached.[182] Now, the high wages that were paid in the city attracted the rural youth, and again this migration seemed to be reinforced through drought and wind erosion.[183] Newspapers reported on the problem of the 'drift' from the eroded areas to the cities,[184] and parliamentarians likewise worried that the destructive forces of wind erosion on the rural areas would accelerate their depopulation.[185]

While the power of the agrarian myth resurged on the surface of the erosion debates from time to time, it can be presumed that it was implicit in most discourses about the national menace of soil erosion and did not even have to be made explicit. In the eyes of most Australians at the time, primary production, economic development, population growth and national and imperial security were all factors that were closely interlinked.[186] The environmental anxiety about wind erosion exercised its influence by triggering racial, strategic and economic fears at the same time and questioning Australia's self-conception as a nation. The erosion debates are therefore a reflection of a self-image already well-established in the first decade of the twentieth century while they also served to perpetuate this identity frame of reference.

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[180] Ibid.; see also: Ken Fry (1985): Soldier Settlement and the Agrarian Myth after the First World War. In: *Labour History* 48, pp. 29-43, here p. 41.

[181] Mr. McKenzie, in: PD, Legislative Assembly Victoria, Wheat Growers Relief (Commonwealth Payment) Bill, 22 December 1932, p. 4015.

[182] Macintyre, A Concise History, p. 183; Table 8.1. 'Estimates of workforce and unemployment 1940/41–1948/49', in: Dyster/Meredith, Australia in the International Economy, p. 173; Davison, Rural Sustainability, pp. 47-48; Kate Darian-Smith (2013): World War 2 and Post-war Reconstruction, 1939-1949. In: Alison Bashford/Stuart Macintyre (eds.), Cambridge History of Australia, Tome 2, Cambridge [et al.], Cambridge University Press, pp. 88-111, here p. 105.

[183] Darian-Smith, World War 2, p. 105; Davison, Rural Sustainability, pp. 47-48; Dyster/Meredith, Australia in the International Economy, p. 173.

[184] 'Drift to the Cities. Victoria's Dust Bowl, Mallee Problem', *The (Melbourne) Argus*, 19 April 1941; for another example see: "Letter to the editor. Drift from the Land. Sir, is there not something more fundamental and permanent than war-time activity in industries to account for the drift of the younger generation from the restful happiness of the country to the exhausting frustration of the city? [...] The salt bush and the grass have been destroyed and erosion has almost left the coast defenceless against the ever-advancing sands of the interior. The march to the fertile plains of the inland has been succeeded by the retreat to the coast, and our greatest battle for existence is within Australia, and our own control. Are we not watching in torpid listlessness an affrighting apocalypses? H. Campbell Jones", in: *Sydney Morning Herald*, 8 December 1941.

[185] Mr. Stoneham: "We shall not stem the drift to the city until every country community can boast of a sufficient water supply. […] One of the main factors retarding country water supplies is the rapid deterioration of the countryside through erosion. I ask honorable members to call to mind the dust storm that occurred some ten days ago over the whole of Victoria and in parts of New South Wales and South Australia." in: PD, Legislative Assembly Victoria, Water Supply Loans Application Bill, 29 November 1944, pp. 2510-2511. For SA: Mr. McHugh, in: PD, Legislative Assembly South Australia, Adress in Reply, 16 July 1941, p. 140.

[186] Pope, Australia's Development Strategy, pp. 218-219; Powell, Griffith Taylor, p. 8.

The sixth chapter of the thesis has demonstrated that wind erosion was an important topic within Australian media communication in the 1930s and first half of the 1940s, a communication characterised by a high sense of urgency and strong emotions. Wind erosion appeared as a multi-level threat to the Australian nation. Despite the important international influences in the Australian evolution of an 'environmental anxiety' about soil erosion, the domestic experience with wind erosion along the specific Australian economic and political situation were significant, as were long-standing cultural concepts. In this way, it had a characteristic Australian ring. In the wake of the erosion crisis, Australians largely adopted a new vision of their soils. This was not limited to the scientific community, but included large parts of Australian society, and had far-reaching consequences, as the next chapter will illustrate.

7 The Spread of the 'Ecological Vision'

The second main concept of wind erosion was 'the ecological vision', an understanding of the soil erosion problem in ecological terms. As we have seen in the previous section 'Understanding', the scientific discipline of ecology furnished the basic explanatory framework for the perception of wind erosion in Australia, particularly on its pastoral lands. Ecological ideas, however, not only informed the scientific research about wind erosion, but also became a powerful cultural concept on the relation between humans and nature. As environmental historian Roderick Nash has argued, as a result of its historical emergence from natural philosophy, the modern science of ecology was from its beginnings located at the interface between science and philosophy and was therefore inclined to furnish more general ideas about humans' right way to live.[187] When it comes to cultural concepts, clear definitions are difficult to come by. The 'ecological vision' as I understand it here, is a concept of the natural environment as an ensemble of living entities which are mutually interdependent on each other. As the ecological vision contains a holistic image of the physical environment, it inherently contains a moral claim about humans' behavior towards their natural environment.[188] Historical research on ecology in Australia has so far focused

[187] Nash, The Rights of Nature, pp. 55-59; for an approach of the ecological thought as cultural expression in Australia see also: Mulligan/Hill, Ecological Pioneers.
[188] Nash, The Rights of Nature, pp. 55-59.

mainly on the institutionalised scientific discipline, while the adoption or diffusion of the ecological vision as cultural concept has been largely neglected.[189]

As I argue in this chapter of the thesis, the context of the wind erosion crisis of the 1930s and 1940s was fundamental for spreading the ecological vision within the Australian society.[190] It was no coincidence that the ecological vision on soil erosion appeared at a time of increased 'environmental anxiety'. Historians like Richard Grove and James Beattie have linked such periods to the emergence of endeavours to conserve nature's resources at various times.[191] Analysing the wave of environmental concern of the late 1960s and 1970s in the United States of America, Roderick Nash argues that the emergence of this 'gospel of ecology' was "the result of a catalytic agent: fear".[192] The fact that the ecological vision in Australia spread within the society at a time of heightened fear suggests that perceptions of menace are likely to modify patterns of thinking and behavior and are therefore able to induce mental or social change.[193]

The ecological vision was an essential break with earlier ways of understanding nature. The seminal work on the evolution of how white Australians perceived their natural environment stems from historical geographer Ronald Heathcote. Next to cultural preconceptions, Heathcote affirms the key role of the actual local experience in the emergence and existence of the prevailing vision.[194] At times, one such vision becomes the dominant one, but often several visions coexist or merge into each other.[195] In his analysis, however, Heathcote neglects the significant role of the erosion crisis in the spread of the 'ecological vision' in the 1930s and 1940s and consequently fixes the ecological vision only much later in time, namely in the period from the 1960 onwards.[196]

According to Heathcote, the 19th century had from the 1820s onwards been dominated by a 'colonial vision' that had superseded earlier scientific and romantic visions of the natural Australian environment.[197] This 'colonial vision' was characterised by a commercial interest in land resources which had to be wrested from an environment that was perceived as

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[189] Only cursory mentioned in the past, for example by Powell, in id., Watering the Garden State, p. 199.
[190] A similar process happened in the US, see: Worster, Nature's Economy, p. 220; Nash, The Rights of Nature, p. 98.
[191] Beattie, Empire and Environmental Anxiety, pp. 2, 10.
[192] Roderick Nash (1976): The Gospel of Ecology. In: Id. (ed.), The American Environment. Readings in the History of Conservation, Reading, Mass., Addison-Wesley Pub. Co., pp. 225-227, here p. 227.
[193] Frie, 'Bedrohte Ordnungen' zwischen Vormoderne und Moderne, pp. 99-110.
[194] Ronald L. Heathcote (1972): The Visions of Australia, 1770-1970. In: Amos Rapoport (ed.), Australia as Human Setting, Sydney, Angus&Robertson, pp. 77-98, here p. 78.
[195] Ibid., p. 84.
[196] Heathcote acknowledges some changes during the 1930s and 1940s, but misses the significant role of the period for the spread of the ecological vision, cf. ibid., pp. 95-96.
[197] Ibid., pp. 88-90.

inhospitable.[198] From an aesthetical point of view, colonial Australians conceived nature as deficient: the Australian landscape lacked the pleasant variety of Europe and showed no remnants of past civilizations as was typical of the 'Old World'.[199] Australians consequently sought to transform the landscape according to their needs and wishes.[200] In the second part of the 19th century, another perception of Nature evolved that was based on Australians optimism about their successful settlement and efficient exploitation of the natural resources, parallel with their confidence that nature had been subdued.[201] This went along with the construction of a national identity centered on the countryside at the end of the 19th century, the reason for Heathcote to dub it as a 'national vision'.[202] Typical representations for this 'national vision' are the landscape paintings of the Heidelberg school and the literature by Banjo Patterson and Henry Lawson.[203] Especially after the turn of the century, this 'national vision' was marked by an adamant belief in national development, as epitomised under the slogan 'Australia Unlimited', that largely ignored Australia's climatic or environmental limits.[204] Thus, when the new ecological vision became dominant during the wind erosion crisis of the 1930s to the mid-1940s, nature had been considered chiefly in terms of conquest for over a century. The ecological vision on wind erosion clearly attributed a large part of it to humans' mismanagement of the continent's natural resources, thus infusing it with a clear moralistic appeal.

The ecological vision brought two major shifts in regard to how Australians conceptualised their natural environment:[205] The first was the idea that humans had a negative impact on nature and therefore had a certain moral responsibility to protect or conserve it. The second shift was the notion that Nature, if abused, would unleash her destroying forces, so that it was in human's self-interest to respect her laws, as summarised in the following quotation of the first volume of the *Journal of the Soil Conservation Service of N.S.W*: "Nature, if given a chance, is the kindest of 'taskmasters', and the severest if abused".[206] The confidence that one had successfully subdued nature was unraveled:[207] Battling the land was

[198] Ibid.
[199] Ibid.
[200] Ibid.
[201] Ibid., pp. 91-92.
[202] Ibid.
[203] Ibid., pp. 92-93; cf. also: Dunlap, Nature and the English Diaspora, pp. 98-105.
[204] Heathcote, The Visions of Australia, pp. 94-95.
[205] Ibid.
[206] Frederick McMaster (1945): Our Natural Pastures. In: *Journal of Soil Conservation NSW* 1 (1), p. 10.
[207] Examples can be multiplied: "Because they neglected Nature's laws that the soil must be nourished and protected, great civilizations of the old world have completely disappeared [...].", in: Charles T. Clark (1943): The Story of the Soil, Soil Conservation Board, Victoria, Melbourne, Government Printer, p. 24; "Inedible plants have a big part in the building and protection of the soil. [...] These are Nature's armed soldiers, protecting the

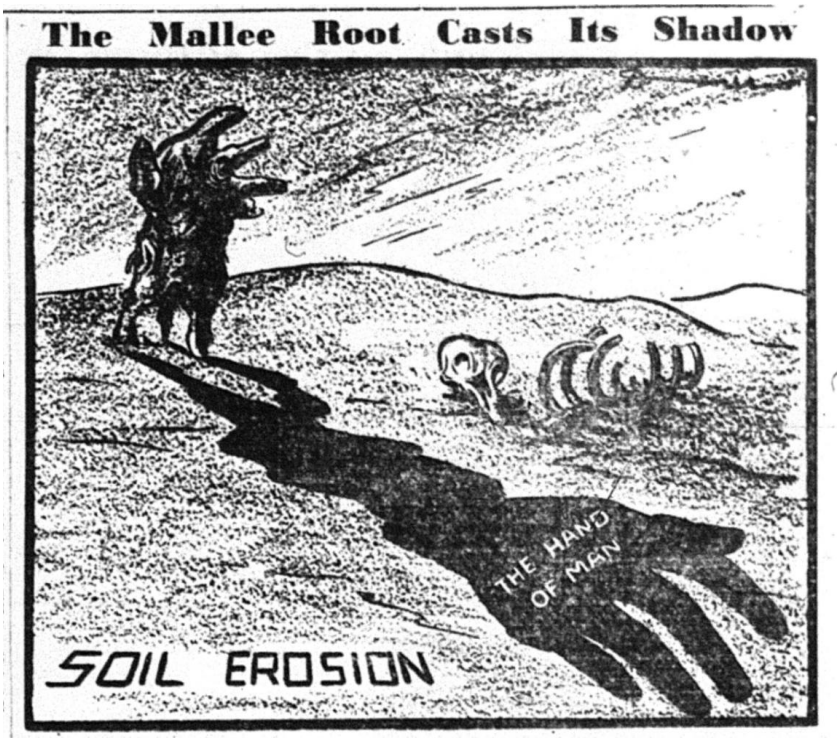
no longer an option: Nature was "fighting back" after the "deluded men" had "attacked" the land with roller and fire:

> Then, with drifting sand and scorching winds, nature hit back. She broke many of her enemies. Those six words cover hundreds of personal tragedies for the broken men walked off their land with nothing but dead hopes and bitter memories of years wasted in fruitless toil.[208]

Instead, the moment had come to support nature in her fight against drought and erosion, as Jock Pick accentuated:

> Nature has, up till now, put up a wonderful battle with the forces of decay. But it is a losing fight. After every round she comes out of the corner a little weaker; whereas Old Man Drought seems to gain in strength as the fight goes on. And do not forget: This is a finish fight. There will be no points decision. Unless nature can be assisted the end is inevitable.[209]

Fig. 19: Humans' Responsibility for Soil Erosion.
[*The (Melbourne) Age*, 5 December 1944].



The adoption of the ecological vision by large parts of the Australian society was of course neither absolute nor uncontested. Moreover, the ecological vision contains in itself a certain contradiction: On the one hand, ecology cautions humans to respect nature's laws, but at the

soil that they are helping to build", in: Charles T. Clark (1945/46): Soil Erosion in Australia. Discussion Group Series 156, Ministry of Post-War Reconstruction, R.A.A.F. Educational Services, p. 4.

[208] 'Nature Fights Back. Settlements Blow Away in sand and dust', *Sydney Morning Herald*, 22 November 1944.

[209] Pick, Australia's Dying Heart, p. 33.

same time, the scientific discipline of ecology enables humans to reveal those laws and to understand them. The better understanding of nature's regularities allows humans to anticipate her reactions and – through ingenuity, science and technology – to manipulate the outcomes.[210] Frederic Clements himself envisaged the role of the ecologist as providing the key to the successful manipulation of nature.[211] This ambiguity of the ecological vision is well reflected in the quotation of Australian soil conservationists Charles Tate Clark: "Civilized man may help Nature's work and coax Nature to greater efforts, may study Nature's laws and make use of them, but may not ignore them".[212] Consequently, the wish to manipulate Nature according to human needs did not disappear with the ecological vision, but it was cast in a different mould. The diffusion of the ecological vision in the context of the erosion crisis in the 1930s and 1940s has – in matters of the evolution of mentalities – to be considered as an important process, as it changed a series of other related cultural concepts and was an important step in the evolution of Australian environmentalism.

7.1 Expertise and Experience

7.1.1 Expertise: The Ecological Vision of Professional Soil Conservationists

In the 'dirty thirties', experts who were concerned with the effects of soil erosion, even those who were not involved in ecological research in *sensu stricto*, adopted an ecological vision of nature that contained elements of an environmental ethic.[213] This ecological vision suggested that nature in its 'virgin state' had reached a status of harmony and balance that had been destroyed by humans, in the American and Australian case, the white settlers. Disturbed by humans' mistreatment, nature had unleashed her destructive forces: wind erosion was the price that white settlers had to pay for their hybris and ignorance of nature's laws. US soil conservation father Hugh H. Bennett, for example, maintained that on their arrival, the first European settlers had found the North American continent "a land of prevailing harmony and balance" where "soil nourished vegetation, and vegetation protected soil, in a compact of mutual advantage and growth".[214] Then the white settlers "in their 'conquest of the wilderness' and their 'subjugation of the West'" had established "a record of heedless destruction that nearly staggered the imagination".[215] US ecologist Paul Sears's *Deserts on the March* (1935) became the preeminent ecological book of the time, as it played a leading role

[210] Similar for the USA, cf. Worster, Nature's Economy, p. 237.
[211] Ibid.
[212] Clark, The Story of the Soil, p. 23.
[213] Worster, Nature's Economy, p. 234; Id., Dust Bowl, pp. 213-215.
[214] Bennett, Soil Conservation, p. 1.
[215] Ibid., p. 3.

in the diffusion of a similar ecological vision on wind erosion on the international level.[216] Sears began his book with an account of "the story of man's destruction upon the face of his own Mother Earth"[217] following the historical evolution of diverse civilizations and their use of natural resources through time and space. He argued that in the past, be it in South America (ancient Mayas), Asia (China), Europe, Africa (Egypt) or the Arabian Peninsula (Mesopotamia), Nature's balance had been destroyed by humans through their exploitation of the natural resources.[218] On those continents, the destructive process had slowly advanced over thousands of years; in North America, however, this development had taken not more than three centuries and in most cases had been only "a matter of decades".[219] Sears took a wide approach on the matter of natural resource depletion, including the topics of water erosion and water pollution, but the problem of wind erosion on the grasslands had a central role.[220] Strongly influenced by Clements' climax theory, Sears agreed with him that the American pioneers had upset the natural balance and were thus responsible for the wind erosion and dust storms.[221] While the disturbance of the balance had already started in 1870 with "the reckless overgrazing"[222] on the plains, the advent of mechanised farm machinery had accelerated the ruinous process through the fundamental destruction of the sod,[223] bringing about the well-known results:

> Thus have come the deserts, so long checked and held in restraint, to break their bonds. [...] With the restraining influence of soil and vegetation broken, the desert moves outward from its proper climatic confine, and because of cultural or artificial conditions comes to occupy the place that rightfully belongs to other provinces. [...] Balance and equilibrium are demanded by nature. If man destroys the old order he must take the consequences. There is no magic which will undo the mischief he has wrought.[224]

Imperial soil erosion literature of the time follows the same ecological arguments, as for example the internationally circulated *The Rape of the Earth. A World Survey of Soil Erosion* by G. V. Jacks and R. O. Whyte, which stated:[225] "For erosion is the modern symptom of maladjustment between human society and its environment. It is a warning that Nature is in full revolt against the sudden incursion of an exotic civilization into her ordered domains".[226]

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[216] Worster, Nature's Economy, p. 233; Id., Dust Bowl, p. 200; Robin, Commentary: Sears, Deserts on the March.
[217] Sears, Deserts on the March, p. 11.
[218] Ibid., pp. 4-9.
[219] Ibid., p. 11.
[220] Especially the chapters 6, 10 and 13 address the problem of wind erosion.
[221] Worster, Nature's Economy, p. 233.
[222] Sears, Deserts on the March, p. 167.
[223] Ibid.
[224] Ibid., pp. 91-92.
[225] Jacks/Whyte, The Rape of the Earth*;* cf. Powell, Development Imperative, p. 256.
[226] Jacks/Whyte, The Rape of the Earth, p. 26.

We have already seen in the last part of the thesis that those Australian soil conservationists concerned with the disappearance of the native vegetation on the pastoral areas and the concomitant wind erosion undertook ecological research in order to understand the interplay of land use, climate, vegetation, and wind erosion. Moreover, the ecological paradigm for the explanation of wind erosion was adopted on a much broader scale by the majority of soil conservation experts, in terms of a general perception of the natural environment: The numerous government reports and pamphlets on soil erosion written by experts reflect this fact.[227] The ecological imprint is for example apparent in the writings of Samuel Clayton from the New South Wales Soil Conservation Service, who – as has been demonstrated in the previous part – was himself not directly involved in ecological soil erosion research:

> Before the advent of the white man there was little or no accelerated erosion. The forces of nature were in equilibrium. [...] Large areas of this land had to be cleared for pasture and for cultivation, but it was neither necessary nor wise to clear it all, as has unfortunately been done in many parts. [...] Lands were depleted [....] and Nature's balance was seriously upset.[228]

Humans' destruction of nature, Clayton feared, would backlash, as humans were deeply dependent on the soil: He therefore urged Australians: "Our destiny is wrapped up with the surface six inches of soil. It is necessary to turn from pioneering and exploitation to conservation".[229] During his overseas tour, Clayton was particularly impressed by Hugh H. Bennett from the American Soil Conservation Service, with whom he developed a deep friendship.[230] It was not only the scientific side of soil conservation in the United States that appealed to him, but also the general change of attitude that he observed in the wider American society:

> The great interest shown in soil erosion during the last few years by almost every section of the population marks the beginning of a new land era, one in which wise land use and soil conservation instead of exploitation will be the prevailing attitude of the community.[231]

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[227] For example: "[...] under natural conditions there is a state of balance between the various factors, rainfall, run-off, wind, soil, aspect, slope, but where this natural vegetative cover is removed by the clearing of the forest or the ploughing up of the sward, that natural balance is destroyed and erosion inevitably commences", in: South Australia (1938): Report of the Soil Conservation Committee of South Australia, p. 5; another example: "The correct approach to the problem therefore seems to be that of ecology. Clements writing in 'Ecology' in reference to erosion in the United States says [...]", in: A. H. E. McDonald (1939): Soil Fertility and Tilth in Relation to Soil Erosion. In: *Agricultural Gazette of NSW* 50, pp. 117-120, here p. 120.
[228] Clayton (1941), Soil Erosion and its Control, p. 43.
[229] 'There must be an end to the making of deserts', *Daily Telegraph*, 25 July 1938.
[230] Breckwoldt, The Dirt Doctors, pp. 38-39; about Clayton's research trip to the USA, see also: Powell, Mothering, Husbandry and the State, pp. 62-68.
[231] Clayton, Soil Erosion. Mr. E.S. Clayton's Investigations Overseas, p. 185.

In the years to come, Clayton would start a big campaign in order to induce a similar change of attitude within the Australian society.

There is no doubt that the scientific discipline of ecology played a fundamental part in the construction and diffusion of the ecological vision, and ecological texts produced by Clayton, Herriot, Ratcliffe and the like were very popular and frequently used as reference point. Still, the spread of the ecological vision should not be reduced to a mere transfer from the domain of science to other parts of the society: the hybrid character of ecology contains from the beginnings elements of scientific and popular knowledge, and the local experience appears as an integral part of it, as the following chapter illustrates.[232]

7.1.2 Experience: The Voice from the Land

Concerns about Australian soils emerged to a large extent from those who directly lived on the land and worked with it on a day-to-day basis, as the examples of pastoralists Dewar Goode and Jock Pick, who both adopted and diffused an ecological vision, illustrate. Both voices took an important place in soil conservation debates of the time, mainly in South Australia. Dewar Goode is an outstanding person of the soil conservation movement in South Australia during the 1930s and 1940s, yet his role during this early period has so far passed unnoticed by historians. Born in 1907, Goode left school at the age of 15 and while being employed in a stock and station firm, took evening classes at the University of Adelaide.[233] After working for a couple of years at the Warraweena Station, Beltana, he bought the property of Malbooma Station, Tarcoola, in 1935, situated some 580 km (360 miles) west of Port Augusta.[234] Alarmed by his own experience with wind erosion at the station and the news about the US *Dust Bowl*, Goode wrote a newspaper article that was published in the (Adelaide) *Mail* on 27 April 1935.[235] The article asked the pertinent question, "Will Australia become another Sahara?" and urged that the "arid areas must be closed to stock".[236] In retrospective, Goode claimed that it was this newspaper article that had prompted Senator McLachlan, the Minister for Development, to ask the CSIR to investigate the problem of soil drift, which eventually resulted in the appointment of Francis Ratcliffe.[237] This affirmation

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[232] Dunlap, Nature and the English Diaspora, pp. 14-15, 140.
[233] Nan Oates (1988): Introducing Dewar Goode. In: Trees and Natural Resources 30 (2), p. 3.
[234] University of Melbourne: Dewar Wilson Goode Guide to Records. Online: http://www.austehc.unimelb.edu.au/guides/good/GDEP001.htm. [Accessed 30 March, 2016].
[235] 'Will Australia become another Sahara?', *The (Adelaide) Mail*, 27 April 1935.
[236] Ibid.
[237] Paper for Speech on Third International Rangeland Congress in Adelaide May 1984, in: [State Library of Victoria (SLV): GOOD 00180, 5, Dewar Wilson Goode Collection, Ms 13586]. The official description of the records held at the State Library of Victoria follows Goode's assertion. Online: http://www.austehc.unimelb.edu/guides/good/GDEP001.htm [Accessed 30 March, 2016].

cannot be confirmed, as other archival information clearly shows that McLachlan's initiative in this matter predates Goode's article.[238] It is, however, well documented that McLachlan and McIntosh, Commissioner for Crown Lands, both read Goode's article and judged it an important contribution on the erosion problem.[239] In the years to follow, Goode undertook a major lobbying campaign for the protection of the arid pastoral lands, using the daily press as his main platform.[240] In 1942 he started a personal crusade for the need to include soil conservation within the South Australian school programme: Soil erosion, Goode insisted, was "an insidious and destructive foe" and its control needed publicity that "should begin in all schools now. Soil conservation is more important than most subjects on the curriculum".[241] His campaign included a letter to the Director of Education and another one to the Legislative Council of South Australia.[242] Prompted by Goode's letter, the Director of Education asked Prescott of the CSIR Division of Soil Research to furnish him suitable information, which was then published as teaching material in the *The Education Gazette of South Australia*. In a child-friendly way, Prescott therein explained:

> It is very important [...] that we should take great care of the soil and avoid doing anything that will destroy it or waste it. Unfortunately, some of the things we have been doing with the soil for many years have been very wasteful. [...] This all means that we must find new and better ways using our land so as to save our soils. [...] Unless we learn to do these things, then we shall not be able to pass on to our children the good land which we have received from our parents and grandparents.[243]

Goode became an acknowledged expert on pastoral areas, as is reflected in the fact that he was appointed as pastoral advisor to the Rural Industries Division of the War Organisation of Industry.[244] In 1943 he presented evidence to the Rural Reconstruction Commission that was also printed in a revised version in the *Stock and Station Journal*.[245] In this evidence, Goode emphasised his ecological vision of a natural balance that had been upset by the "coming of

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[238] The CSIR was already concerned with soil erosion in December 1934, see letter from A. C. D. Rivett (CSIR) to A. J. McLachlan, 22 December 1934, in: [NAA: A 461, B302/1/6 Part 1, Soil drift and soil erosion].
[239] 'Fighting Pastoral Drift', *The (Adelaide) Mail*, 4 May 1935.
[240] Letters to the Editors in: *The News*, 14 October 1942; *The (Adelaide) Advertiser*, 15 October 1942; *The Adelaide Stock and Station Journal*, 4 November 1942, in: [SLV: GOOD 00639, 20, Dewar Wilson Goode Collection, Ms 13586].
[241] *The News*, 28 February 1942.
[242] Reply from the Director of Education to Dewar W. Goode, 11 February 1943, in: [SLV: GOOD 00639, 20, Dewar Wilson Goode Collection, Ms 13586]; PD, Legislative Council South Australia, 16 February 1943, p. 1623.
[243] *The Education Gazette of South Australia*, 15 March 1943, in: [SLV: GOOD 00639, 20, Dewar Wilson Goode Collection, Ms 13586].
[244] University of Melbourne: Dewar Wilson Goode Guide to Records. Online: http://www.austehc.unimelb.edu.au/guides/good/GDEP001.htm. [Accessed 30 March, 2016].
[245] 'Soil is Basic Asset', *Adelaide Stock and Station Journal*, 1944. (n.d.), in: [SLV: GOOD 00639, 20, Dewar Wilson Goode Collection, Ms 13586].

man with axe and fire, and the large-scale cultivation of the land".[246] Through "ignorance or wilful disregard" of nature's laws, humans had brought their own penalties on them: "Man must live in harmony with Nature and according to her laws or she will destroy him". Among the self-induced consequences were the economic costs, but also the "destruction of natural beauty of mountains, rivers, forests, grassy plains and fertile valleys" through erosion so that Australians had "forfeited some of the most real and wholesome joys of life".[247] Here, romantic and aesthetical visions on Nature combine with ecological and utilitarian ones. In Goode's opinion, soil destruction had not only been encouraged by social and economic circumstances like specific financial circumstances or unsuited allotments, but also by the mentality of the past generations of Australians. He therefore made a call for a new land ethic centred on the concept of husbandry: "The only alternative now is to reverse our whole philosophy of land use – to get back to the attitude of our forefathers in the crowded European countries, and to husband our resources carefully and scientifically".[248]

Around the same time, located some 200 km east of Goode's station, another South Australian pastoralist put pen to paper in order to raise awareness of the destruction of Australia's grazing areas: Jock H. Pick of Coondambo and East Well.[249] In 1942, his book was published with the title *Australia's Dying Heart, Soil Erosion in the Inland*.[250] Similar to Goode, Pick became worried about soil erosion through his own observations and the uptake of national and international debates. For Pick, the people with experience of the inland had a special knowledge and therefore a unique legitimacy:

> The truth is, that only the men who have lived their lives in the Inland can comprehend the tragedy which is slowly but surely descending upon that unhappy much-abused land. [...] Only such a man, who has stuck to his post throughout the drought, who has seen the earth, at the breaking of the drought, spring to life and give forth her bounty, only he can understand what a wonderful asset we have in the Inland if only we can preserve it. It is my hope and belief that we can.[251] [...] The men who live in the Inland and have the requisite knowledge and experience are usually inarticulate, and so there the matter rests. It was to give a voice to the thoughts of the saltbush men that the writer first took up a pen.[252]

Pick's view on soil erosion was fundamentally ecological: He referred extensively to ancient civilizations that had been destroyed through erosion as well as to present examples of nations struggling with its disastrous impacts. In the case of Australia, Pick saw "little doubt

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[246] Evidence for Rural Reconstruction Commission 1943, in: [SLV: GOOD 00639, 20, Dewar Wilson Goode Collection, Ms 13586].
[247] Ibid.
[248] Ibid.
[249] Introduction by H. R. Croll to Jock H. Pick, Australia's Dying Heart, n.p.
[250] 'Book that urged Federal Control of Soil Salvage', *Sunraysia Daily*, 26 June 1944.
[251] Pick, Australia's Dying Heart, pp. 49-50
[252] Ibid., p. 56

that, prior to the white occupation, nature had reached a stable balance".[253] This balance had been destroyed, mainly through the impact of stock, when the fringe country had been settled.[254] Unlike Australia's native fauna, the introduced sheep were indiscriminate eaters and had severely damaged the land through overgrazing, while their hard hooves had additionally destroyed the vegetative cover.[255] The introduction of the rabbit had also been catastrophic for the vegetation.[256] Pick took his personal experience as the most important benchmark for his assessment, but he also referred to the work of experts, most importantly to Francis Ratcliffe's *Flying Fox and Drifting Sand*, which he appreciated as a valuable contribution.[257] He also lauded the publications of the US Soil Conservation Service as a "veritable mine of information for anyone who is sufficiently interested"[258] and hoped that a similar outstanding personality like Hugh H. Bennett might take up the fight against erosion in Australia.[259] Behind the direct causes of erosion, Pick detected deeper political and social determinants: The current lease system on croplands encouraged exploitative land use and the overcapitalization of the land had encouraged the practice of overstocking.[260]

Goode's and Pick's examples show that the spread of the ecological vision within Australian society was based on a multilevel net. The local experience of the people who directly lived on the land played obviously a crucial part in rising awareness about the destructive handling of Australia's soils and the adoption of an ecological view. At the same time, Australian scientific research but also the internationally diffused erosion literature, primarily from the US, played a crucial part. The voice from those living on the land was, however, not the only one in the public sphere to take an ecological vision on the wind erosion topic, as the following chapter will illustrate.

[253] Ibid., p. 19.
[254] Ibid., p. 20.
[255] Ibid., pp. 25, 30-33.
[256] Ibid., pp. 34-42.
[257] Ibid., p. 23.
[258] Ibid., p.15.
[259] Ibid., p. 66.
[260] Ibid., pp. 25-29.

7.2 Campaigning with Words: The Literary Voice

As the poem *Dust* (1945) by Henry Weston Pryce (1891-1963)[261] reflects, soil erosion, especially wind erosion, became a relevant topic of Australian poetry in the wake of the erosion crisis.

> Henry Pryce: Dust (1945)
>
> I ringbarked the trees on the hill-top,
> I crowded my stock on the plain;
> For profit I've made me a desert –
> And now I am praying for rain.
>
> I ploughed with no thought save markets,
> To lay the last acre in grain –
> No thought for the sun's and the wind's way –
> And so I am praying for rain.
>
> I looked for two crops in a season,
> And after the harvest its grain;
> Then I pastured the sheep on the stubble,
> And loud are my prayers for rain.
>
> There is death on the downs where life flourished,
> My stock fight to live and are slain,
> Not by God, but by me in my folly,
> Wherefore am I praying for rain.
>
> The rain-cloud gave way to a dust-cloud,
> My years and my efforts are vain;
> Now I sit where a desert rolls red to my door-step,
> And wished I had prayed for a brain.[262]

Literature is an important historical source when it comes to evaluating the contemporary attitudes towards their natural environment as it plays a major part in shaping cultural concepts of the natural world.[263] Despite literature's significance as source for cultural historians, it is still an underestimated and under-theorised source of (environmental) history.[264] Allan H. Pasco has suggested using the frequency of occurrence and the

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[261] 'Pryce, H. W.', in: John Hay/John Arnold (eds.), The Bibliography of Australian Literature P-Z to 2000, St Lucia, Qld., University of Queensland Press, p. 110; AustLit: 'Henry Weston Pryce'. Online: http://www.austlit.edu.au/austlit/page/A9575 [Accessed 30 March, 2016].

[262] Henry Pryce (1946): Dust. In: *The Braidwood Dispatch and Mining Journal*, 8 November 1946, page 1.

[263] See for example: Heathcote, The Visions of Australia, p. 77. On the significance of poetry as a source for environmental history, see: Norbert H. Platz (2007): The Environmental Ethics of Australian Nature Poems. In: Gerd Dose/Britta Kuhlenbeck (eds.), Australia. Making Space Meaningful. Tübingen, Stauffenburg Verlag, pp. 81-101.

[264] When in the wake of the *linguistic turn*, texts have come to the forefront to access the historical past, the earlier concepts of a fundamental difference between fictional and non-fictional texts have been largely abolished. This has engendered extensive theoretical reflections about the specific characters of history in opposition to literature as for example the ground laying work of French philosopher Paul Ricoeur (notably his three-volume work Temps et Récit, Vol. 1-3 (1983-1985), Seuil, Paris.) Despite the stronger tendency for

congruence of content or meaning as criteria if "ideas, images, objects, descriptions, or fantasies" were important and meaningful for the people concerned.[265] Even if the criterion of frequency is always relative and therefore difficult to establish, the fact that wind erosion became a distinct literary topic for a number of Australian writers in the context of the dust storm crisis of the 1930s and 1940s is a clear sign for its high social relevance.[266] The large majority of those authors who chose to write about soil erosion adopted an ecological vision in their writing.[267] While the first ecological ideas appeared in Australian literature starting with the late 1920s,[268] they became much more manifest in the context of the wind erosion crisis of the 1930s and 1940s.

The phenomenon of wind erosion as literary element probably first appeared in the 19th century bush literature as part of the typical Australian landscape: In Paterson's *Australian Scenery*[269] and *With the cattle*, dust storms appear as an integral element of the natural setting of Australia that informs the settlers lived reality.[270] In these poems, the dust storms appear merely as a natural phenomenon that has to be suffered; neither the questions

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interdisciplinary work in the Humanities since the 1970s and the rediscovering of the long despised literature as historical source especially by cultural historians, there still remains a skepticism towards literature from the side of historians as well as a lack of theoretical reflections on how to employ literature as historical sources. For some of the few theoretical reflections, see: Philip Stewart (1994): This is Not a Book Review: On Historical Uses of Literature. In: *Journal of Modern History* 66, pp. 521-538; Lynn Hunt (1994): The Objects of History: A Reply to Philip Stewart. In: *Journal of Modern History* 66, pp. 539-546; Allan H. Pasco (2004): Literature as Historical Archive. In: *New Literary History* 35 (3), pp. 373-394.

[265] Pasco, Literature as Historical Archive, p. 387.

[266] There are also some poems from unknown or anonymous writers on soil erosion which are not discussed in this thesis but clearly indicate the high popular interest and the social relevance of the topic, see: Propalong (S.A.), 'The Flood', in: *The Bulletin*, 31 July 1946; R. H. Webster (R.A.A.F), 'Dust Storm over the Sea', in: *The Bulletin*, 5 September 1945; W. R. C., 'A Song of Erosion', in: *The Land*, 13 October 1944.

[267] The majority of those authors who wrote about soil erosion did it with an explicit ecological message; there exist, however, some few counterexamples: In her poem Sand Drift (1946), Myra Morris, an Australian poetess from the Victorian Mallee town Boort, describes the abandonment of farms due to drought and sand drift: "Farm-houses with their crazy door-steps sunken/ In fine blown sand". While the rabbits are indirectly referred to as one possible cause of the occurrence of wind erosion, anthropogenic factors are not mentioned and the farmers are depicted as victims of erosion rather than culprits. This silence about human responsibility for wind erosion might be linked to Morris' origin from the Mallee, whose settlers, as we will see in section 4 of the thesis, had a specific regional identity that could in times oppose the ecological vision. Cf. D. J. Jordan (1986): Morris, Myra Evelyn (1893–1966). ADB Online: http://adb.anu.edu.au/biography/morris-myra-evelyn-7660 [Accessed 30 March, 2016]; Myra Morris (1946): Sand-Drift. In: Ian Mudie (ed.), Jindyworobak Anthology, Melbourne, Jindyworobak Publications, pp. 47-48.

[268] For example Katharine Susannah Prichard's *Coonardoo* (1929) that addresses the negative impacts of the pioneers' pastoral practices on the natural balance, see: 'Coonardoo', in: William Wilde et al. (eds.) (1994): Oxford Companion to Australian Literature, Melbourne [et al.], Oxford University Press, p. 191; Jennifer Strauss (1998): Literary Culture 1914-1939: Battlers All. In: Ead./Bruce Bennett (eds.), The Oxford Literary History, Oxford [et al.] Oxford University Press, pp. 107-129, here p. 124.

[269] Banjo Paterson: 'The Animals Noah Forgot, Prologue': "Or the dust storms dance on their ballroom floor/ where the bones of the cattle lie", in: Clement Semmler (ed.) (1992): A. B. 'Banjo' Paterson. Bush Ballads, Poems, Stories, and Journalism, St Lucia, Qld., University of Queensland Press, pp. 299-300.

[270] "By the fiery dust-storm drifting/And the mocking mirage shifting/In heat and drought and hopeless pain we take the stock away" in: Andrew B. Paterson (1982/1st ed. 1921): The Collected Verse of A.B. Paterson, London [et al.], Angus&Robertson, p. 107.

about their origin nor their negative effects are asked. This is different in Henry Pryce's *Dust*, which attributes the blame for the drought and dust disaster to the pastoralist and farmer, to their greed and stupidity in exploiting the natural resources. In this way, it clearly adopts an ecological vision.

7.2.1 Popular Soil Conservation Literature

Two of the best read authors of the time, namely William Hatfield and Ion L. Idriess, wielded their pens in the 1930s and 1940s to support the cause of soil conservation. We have already met them in the previous part of the thesis as advocates of the large-scale irrigation schemes to water Australia's interior. Half-journalist, half-writer, riding the fence between fact and fiction,[271] they took an intermediary role in transferring knowledge from the field of science into literature. Despised by other writers as 'commercial writers', Hatfield and Idriess were indeed commercially successful and also very productive: Idriess wrote, for example, on average more than a book a year between 1927 and 1939.[272]

Idriess and Hatfield shared the widespread consensus among writers of the 1920s and 1930s that literature should represent Australian reality.[273] This championship of realism was a way to challenge the alleged cultural inferiority of colonial societies that were supposedly not capable of producing high-standard literature.[274] In order to display a mode of realism, Hatfield and Idriess chose from a repertoire of what they conceived as typical Australian topics, mostly the bush.[275] Their stories therefore often take place in the Australian outback, and they frequently contain autobiographic or documentary elements that provided their writing with a high authenticity.[276] The fact that they grafted their non-fictional texts on classical narrative structures[277] probably contributed to making their writings attractive to a wide audience. Moreover, Hatfield and Idriess were both public persons who regularly contributed articles in newspapers and magazines or held public lectures.

William Hatfield (1892-1969) was the pen name of Ernest Chapman, who used his mother's maiden name for his writing and adopted the name legally in 1938.[278] He had come

[271] Peter Pierce (2009): Australia's Australia. In: Id. (ed.), The Cambridge History of Australian Literature, Cambridge [et al.], Cambridge University Press, pp. 137-155, here pp. 146-147.
[272] Richard Nile (1998): Literary Democracy and the Politics of Reputation. In: Bruce Bennett/Jennifer Strauss (eds.), The Oxford Literary History, Oxford [et al.], Oxford University Press, pp. 130-146, here pp. 140-141.
[273] Strauss, Literary Culture, p. 119.
[274] White, Inventing Australia, p. 58.
[275] Strauss, Literary Culture, p. 119.
[276] Strauss, Literary Culture, pp. 119-120; Pierce, Australia's Australia, pp. 146-147.
[277] Ibid.
[278] 'Hatfield, William', in: Wilde et al., Oxford Companion to Australian Literature, pp. 352-353.

to Australia in 1911 in order to experience and write about life in the outback.[279] Next to the novel *Big Timber* (1936), his travel account *Australia through the Windscreen* (1936) and his personal political manifest *Australia Reclaimed* (1944) all cover the topic of soil erosion.[280] *Big Timber* (1936) combines a discussion about the problem of deforestation and soil erosion with a love story and a narrative of the coming-of-age of a young man. The question of its literary quality put aside, the novel is highly interesting as it puts the topic of soil and forest conservation into a – not all too complex – fictional narration. The storyline is wrapped up in a few lines: Dale Garnett, son of a pioneering farmer, grows up on a modest farm in the Burragorang Valley in the Blue Mountains. At the age of eighteen, Dale starts working at the timber business of Mr. Fortescue, once a friend of his father. A love story unfolds between Fortescue's daughter Helen and Dale, who have known each other from childhood. With the support of Fortescue, Dale climbs the social ladder and becomes a fervent forest conservationist at the Department for Forests. During the Depression, he is faced with a difficult decision: either to support Fortescue, whose business is in serious economic trouble, or to stick to his ideal of forest conservation. Dale chooses the latter, even after Helen gives him an ultimatum to help her father or lose her love. During a reforestation project in his home valley, Dale and Helen are caught by an avalanche of trees, survive against all odds, and declare their ongoing love for each other. The basic message of the book is that forest conservation is indispensable. The narrator emphasises that Dale's enthusiasm for forest conservation was "no maudlin sentiment of 'Woodman, spare the tree!", but a rational, scientifically based realization that "trees were mankind's best friend, if not the key to his existence on the planet" as they provided for fertile soils, and especially "influenced atmospheric humidity, spring seepage and river flow".[281] Tree planting should be done to provide employment, for economic reasons but also "as a scheme for national defence, defence against a threatened aridity in our agricultural districts, against the disappearance of the arable soil itself by erosion".[282] By axe and firestick, the pioneers had already changed the face of country in not much longer than a century, cutting forests which had taken many centuries to grow and thus contributing to the "disappearance of valuable soils".[283] The claim for a purely scientific approach is, however, somewhat subverted by the storyline: Dale's

[279] Ibid.
[280] Ibid.
[281] William Hatfield (1936): Big Timber, Sydney, Angus&Robertson, p. 161. Mark the ongoing popularity of the 'rainfall-tree equation'.
[282] Ibid., pp. 184-185.
[283] Ibid., p.185.

vocation for forest conservation is described in terms of a spiritual revelation,[284] while the seed for this call had already been within him all along.[285] *Big Timber* illustrates the need for forest conservation as an economic resource as well as a part of the ecological balance, combining utilitarian and spiritual motifs for forest conservation with ecological concerns.

In the same year as *Big Timber*, Hatfield published *Australia through the Windscreen* (1936), a travel account of a trip throughout parts of Australia undertaken in 1932.[286] The second-to-last chapter of this book, entitled 'The encroaching desert', deals with the soil erosion problem in Australia. The popularity of *Australia Through the Windscreen* is apparent in the fact that a fourth edition of the book was already published in 1938; it is also referred to at least three times in the Parliamentary debates of Victoria in the context of conservation legislation.[287] Hatfield's contemporary authority on the topic of soil erosion is likewise reflected in the fact that he spoke on soil erosion at the New South Wales Agricultural Bureau Conference at the Hawkesbury College in 1936.[288] In *Australia Through the Windscreen*, Hatfield uses recent scientific reports on soil erosion in order to enhance his credibility, thus actively contributing to the diffusion of scientific ecological ideas into literature. For example, he quotes extensively from the reports of the New South Wales Soil Erosion Committee (1936) and the report of Ratcliffe's research in South Australia.[289] When Hatfield describes wind erosion processes as "silent armies of the marching sand grains",[290] he draws on the semantic field of war to emphasise the menace. This menacing character becomes even more pronounced when he emphatically warns that "another century of occupation on present lines [would] be nearly enough to turn the whole continent to desert".[291] The general reason for wind erosion is, according to Hatfield, the disregard of Nature's balance, which had been upset.[292] The frugality of the natural environment of the continent had been disregarded, as he drastically states: "Australia was creation's most miserable attempt. Conditions were so erratic that no settled life was possible".[293] In Hatfield's opinion, the emptiness of the

[284] "The whole great subject opened up clearly for him in a flash of illumination akin to the spiritual enlightenment of the world's great religious prophets. It was almost a divine revelation", in: ibid., p. 161.
[285] Ibid., p. 160.
[286] Geoffrey Serle (1983): Hatfield, William (1892–1969). ADB Online: http://adb.anu.edu.au/biography/hatfield-william-6598 [Accessed 30 March, 2016].
[287] Harold Cohen (Caulfield): PD, Legislative Assembly Victoria, Water Bill, 30 November 1937, p. 1026; Mr. Zwar: PD, Legislative Assembly Victoria, 9 December 1937, p. 1411; Mr. Zwar: PD, Legislative Assembly Victoria, State Forests Loan Application Bill, 16 October 1940, pp. 1121-1140.
[288] 'The Desert. Australian Problem. Mr. Hatfield's Address', *Sydney Morning Herald*, 17 July 1936.
[289] William Hatfield (1938): Australia Through the Windscreen, Sydney, Angus&Robertson, pp. 282-284, 290-291.
[290] Ibid., p. 293.
[291] Ibid., p. 279.
[292] Ibid., p. 287.
[293] Ibid., pp. 286-287.

continent should have been a warning to the white man that putting large numbers of men and animals on the land could only be done very cautiously, a warning that Europeans had ignored.[294] Hatfield mainly blamed the big pastoral stations and the mindset of the pastoralists for erosion, as they thought themselves too genteel for farming or for providing for fodder reserves for times of drought.[295] The sharp criticism of the pastoral industry also appears in Hatfield's *Australia Reclaimed* (1944), a sort of political manifesto, where the author links his concerns for soil and water conservation with his criticism of capitalism and his suggestions for Australia's reconstruction under socialism.[296] In *Australia Reclaimed*, Hatfield paints a rather ambivalent image of Nature: While erosion was the result of mankind's disturbance of nature's balance, nature is also denoted as "enemy" and as "man's unrelenting foe throughout the ages".[297] Self-assuredly, Hatfield asserts that this enemy was now man's "humble servant since he has mastered its irrevocable laws".[298] Such an image of Nature in terms of conquest is exceptional among Australian soil erosion writing of the 1930s and 1940s. It possibly reveals the influence of Marxist theory, which propagated the conquering of an adverse nature.[299] The fact that the writer refers, among others, to the Soviet Union as a role model of successful soil conservation schemes, supports this suggestion.[300]

Another fervent soil conservationist was popular writer Ion Llewellyn Idriess (1889–1979).[301] Born in Sydney and wounded in Gallipoli, Idriess started a career as a freelance writer in Sydney in 1928.[302] Similar to Hatfield, he drew on his own experience to capture the Australian life in words, and just like Hatfield, he showed an early interest in the effects of soil erosion. His concern for wind erosion stems at the latest from 1935, when he published an article in the travellers Magazine *Walkabout*, warning about the spreading of deserts and the drifting of sand in the dry interior.[303] Idriess warned that the sand drift caused the silting of rivers, that it had already overwhelmed some pastoral stations and that it now even threatened

[294] Ibid.
[295] Ibid., p. 295.
[296] Hatfield, Australia Reclaimed, pp. 5, 65. For another example of eco-socialism in the period 1930 to 1945: Len Fox: 'Australia under socialism will not be so dusty', *Progress*, 22 August 1941.
[297] Hatfield, Australia Reclaimed, p. 18.
[298] Ibid.
[299] McNeill, Something New Under the Sun, pp. 331-334.
[300] Hatfield, Australia Reclaimed, p. 27.
[301] Julian Croft (1983): Idriess, Ion Llewellyn (1889–1979). ADB Online: http://adb.anu.edu.au/biography/idriess-ion-llewellyn-6786/text11739 [Accessed 24 September, 2014].
[302] Ibid.
[303] Ion L. Idriess (1935): Sand. Impressions of a Large Tract of Dry Country in the Interior of Australia. In: *Walkabout*, 1 (11), pp. 22-24. The Walkabout was the monthly magazine of the Australian national travel association that aimed at telling the story of 'the romantic Australia that exists beyond the cities', see: Alec T. Bolton (ed.) (1964): Walkabout's Australia: An Anthology of Articles and Photographs from Walkabout Magazine, Sydney, Ure Smith. Preface, n.p.

to engulf townships.[304] His ecological vision is apparent in his assessment that man had "upset the balance of Nature" by putting many millions of cattle and sheep on areas of little rainfall, by indiscriminately felling trees and by introducing the rabbit.[305] Rabbits and sheep had "not only eaten the herbage but the very roots of the bushes" and "even ringbarked the trees" thus removing the binding roots that had held the sand hills.[306] Idriess declared that nature was "perfect in herself; it is we who make the mistakes".[307] The removal of the highly drought-resistant plants in the arid areas, which he considered as "marvels of life battling against environment", induced erosion and accelerated desiccation, which in turn increased erosion.[308] Just as Hatfield, Idriess was a strong public voice in the soil erosion debates of the 1930s and 1940s.[309] His impact on the public arena is illustrated by the fact that as a reaction to his *Walkabout* article, a reader of the magazine wrote to the managing editor, C. H. Holmes, and suggested that action should be undertaken against the problem of sand drift.[310] Holmes thereafter wrote to G. Lightfood from the CSIR, who, in his reply, pointed to the CSIR's appointment of Ratcliffe for an investigation into the sand drift problem.[311]

Idriess' popularity stemmed, however, mainly from his bestseller *The Great Boomerang* (1941), a scheme to water the interior of Australia in order to "eliminate the dust bowl, the creeping sand, and erosion"[312] as described in the second part of the thesis. *The Great Boomerang* is a strange mixture of personal travel experience, stories, and accounts of people that Idriess met during his journeys and the explanation of a semi-scientific plan of irrigation. Its technical side has been discussed in the last part, but here, the ecological view apparent in Idriess' writings will be illuminated. The *Great Boomerang* largely echoes the ideas of his earlier article in the *Walkabout*: Through the acts of white men, the region around Lake Eyre was on its way to becoming Australia's very own dust bowl.[313] Referring to Aboriginal terminology, Idriess speaks of the "Kadimurka, dread spirit of the aborigines", that would brood there.[314] Before European settlement, "nature for centuries had battled hard and

[304] Idriess, Sand, p. 23.
[305] Ibid.
[306] Ibid.
[307] Ibid., p. 24.
[308] Ibid.
[309] Ion L. Idriess (1936): 'Erosion And Dust Storms', *The Sydney Morning Herald*, 17 January 1936.
[310] Letter from Holmes to CSIR, 26th August 1935. in: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[311] Reply letter from Lightfood to Holmes, 3rd September 1935, in: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[312] Idriess, The Great Boomerang, p. 211.
[313] Ibid., p. 165.
[314] Ibid., p. 204.

had succeeded in keeping the Dead Heart from becoming a desert".[315] But then, through the introduction of stock and rabbit, the clearing of trees, etc. humans had upset the balance.[316] Human activities had destroyed the protective vegetable cover, and thus the fertile topsoil was washed or blown away, causing sand drift, desiccation, and the choking and silting up of streams and watercourses.[317] Before, the land had been naturally irrigated in times of rainfall.[318] But now "man-induced erosion"[319] had caused deserts, so the creeping sands now threatened to smother even the good lands.[320]

Idriess' descriptions of the arid outback created forceful images of wind erosion. One of the most telling passages is that of a dust storm in Milparinka, a small outback town in the north-west of New South Wales:

> That country is mercifully a long way from war. But one afternoon not long ago I heard the low muttering of distant guns, saw the dull glow of flames among gaunt, unroofed buildings, ghostly ruins swathed in drifting clouds of grey and red[321]. With bowed heads we stumbled on into the smoke haze, gasping for breath in a screeching fury of sound. Stumbling on half blinded we drew near the village now smothered in a rosy glow, above which peeped broken walls, smashed chimneys, rubble of fallen stone; now it was blotted out again and red mists blown like reddened smoke in the wind. Again came the rumble of gums. [...] Milparinka in a dust storm! With an electrical storm in the distance. [....] It looks exactly like a shelled village – particularly in the red glow of sunset under a howling storm.[322]

The depiction of the experience in terms of war retakes the typical motif of "erosion as an enemy" and also establishes a parallel to the ongoing war. Another forceful image is that of the mother that covers her baby in order to protect it from being smothered by dust:

> She was silent awhile, then said dreamily: "Do you know, I loved this country, I still love it, but it terrifies me. Years ago with my young baby I crouched in the house (not this one, the sand has swallowed the other one long ago) with the wind howling outside and the iron screeching and shrieking from the showers of pebbles blowing against it. I'd hold a wet handkerchief over baby's face to keep him from breathing the dust that was choking me. And I used to be terrified that the sand would get into him- that he would never leave the country." Her voice had dropped to almost a whisper. I dared not ask her of the boy.[323]

Such descriptions, that were based on the real experiences of those who lived in the areas most affected by the wind erosion as has been illustrated in the first part of the thesis, brought the experience of the rural population home to the city readers and contributed in the creation of a threatening picture of the wind erosion menace. It also gave Idriess the backing for his

[315] Ibid., p. 166.
[316] Ibid., pp. 166, 206.
[317] Ibid., pp. 206-207.
[318] Ibid., p. 166.
[319] Ibid.
[320] Ibid., pp. 204-205.
[321] Ibid., p. 142.
[322] Ibid.
[323] Ibid., p. 178.

argument that irrigation was necessary to bring relief to the erosion plagued areas and to stop the ongoing process of desertification: "The tragedy is that this destruction is still going on, spreading out every year farther towards our good lands. For our own sake and the sake of future generations we must stop it. There seems no other way than by flooding the lakes with water".[324]

7.2.2 Soil Conservation as Topic of Australia's 'High' Literature

Not only popular writers like Hatfield and Idriess engaged with the wind erosion topic, but also a series of more distinguished Australian writers of the period who were considered – or considered themselves – to produce literature with a stronger aesthetical aspiration. Their apprehension of the phenomenon of wind erosion is likewise strongly marked by an ecological vision. The First World War had given new impetus for Australian writers to engage in the creation of national literature and to focus their artistic interest on their own country.[325] Some groups of middle-class writers pursued the explicit goal of creating a national literature, an endeavour that was partly directed against colonialism, against increasing cultural influences of the US, and partly against the commercial literature of writers like Idriess and Hatfield.[326] In order to reach their aim to create a genuine Australian literary œuvre, numerous writers resorted to the specific Australian environment as a wealth of characteristic motifs and topics.

Famous Australian poetess (and later renowned environmental activist) Judith Wright (1915-2000) chose the wind erosion topic as an early literary motif. Born at a pastoral station near Armidale in New South Wales,[327] she wrote many poems that reflect a deep connection to the landscape of New England where she grew up.[328] Her poem *Dust*, published in 1946, offers a clear apprehension of the erosion problem under ecological terms and warrants an unabridged quotation:

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[324] Ibid., p. 207.
[325] Geoffrey Serle (1987): The Creative Spirit in Australia. A Cultural History, Richmond, Vic., William Heinemann, p. 174; Pierce, Australia's Australia, pp. 137, 139.
[326] This, however, did not mean that those nationalist writers turned completely away from Great Britain, on the contrary, many spent time in England or published in London, see Nile, Literary Democracy, p. 131; Pierce, Australia's Australia, pp. 137-138; Strauss, Literary Culture, pp. 117-118; John McLaren (1989): Australian Literature: An Historical Introduction, Melbourne, Longman Cheshire, pp. 117-132
[327] 'Judith Wright' in: Wilde et al., Oxford Companion to Australian Literature, pp. 828-823; 'Judith Wright' in: Arnold/Hay, The Bibliography of Australian Literature, p. 766.
[328] Ibid.

DUST[329]

This sick dust, spiralling with the wind,
is harsh as grief's taste in our mouths
and has eclipsed the small sun.
The remnant earth turns evil,
the steel-shocked earth has turned against the plough
and runs with wind all day; and all night
sighs in our sleep against the windowpane.

Wind was kinder once, carrying cloud
like a waterbag on his shoulder; sun was kinder,
hardening the good wheat brown as a strong man.
Earth was kinder, suffering fire and plough,
breeding the unaccustomed harvest.
Leaning in our doorway together
watching the birdcloud shadows,
the fleetwing windshadows travel our clean wheat
we thought ourselves rich already.
We counted the beautiful money
and gave it in our hearts to the child asleep,
who must never break his body
against the plough and the stubborn rock and tree.

But the wind rises; but the earth rises,
running like an evil river; but the sun grows small,
and when we turn to each other, our eyes are dust
and our words dust.

Dust has overtaken our dreams that were
wider and richer than wheat under the sun,
and war's eroding gale scatters our sons
with a million other grains of dust.
O sighing at the blistered door, darkening the evening star,
the dust accuses. Our dream was the wrong dream,
our strength was the wrong strength.
Weary as we are, we must make a new choice,
a choice more difficult than resignation,
more urgent than our desire of rest at the end of the day.
We must prepare the land for a difficult sowing,
a long and hazardous growth of a strange bread,
that our sons' sons may harvest and be fed.

In her memoirs *Half a Lifetime*, Wright recalls how her own experience of wind erosion during a journey from the family station in Wallamumbi to Sydney in summer 1942/43, prompted her to write the poem.

> [...] the journey through the drought-stricken countryside re-awakened my conscience over the treatment of the land. Dust storms, fires and erosion were more obvious than ever. My rather

[329] Judith Wright (1946): Dust. In: Ian Mudie (ed.), Jindyworobak Anthology, Melbourne, Jindyworobaks Publications, pp. 65-66.

> stumbling, free verse poem 'Dust' was an attempt to express that sense of our greed and lack of knowledge of the land we lived in.[330]

In her early concern for careful land use and conservation, she was probably influenced by her father Phillip Wright, who was befriended with soil erosion expert Macdonald Holmes, Professor for Geography at Sydney University.[331] The ecological message of the poem has recently been highlighted by literary scholar Jennifer Coralie[332] and Kate Rigby, who has also illustrated the biblical references within the poem.[333] Both scholars are, however, largely unaware that Wright's adoption of an ecological vision was part of a much larger process within the Australian society. The ecological concept of the interdependence between man and the soil is apparent in the poem, where the "steel-shocked earth" revolts against its abuse and "turned against the plough". In the third stanza, the poem fuses together the real war experience and the process of wind erosion: "war's eroding gale scatters our sons with a million other grains of dust".[334] The depiction of the problematic relationship between Europeans and the land is not typical of Wright's early poetry, as many of her New England poems paint a much more harmonious relation between humans and nature.[335] Noting those different visions, Shirley Walker has assessed that there was an "obvious duality in Wright's attitude towards nature".[336] Her ecological vision in the context of the soil erosion topic is evident, and it is taken up again in the poem *Eroded Hills,*[337] and *Rain at Night*[338] both published in 1953 in *The Gateway*. In *Eroded Hills*, Wright denounces the act of tree clearing committed by her own ancestors:

> These hills my father's father stripped,
> and beggars to the winter wind
> they crouch like shoulders naked and whipped –
> humble, abandoned, out of mind.[339]

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[330] Judith Wright/Patricia Clarke (1999): Judith Wright: Half a Lifetime, Melbourne, Text Publishing, p. 163.
[331] Gary Clark (2007): Environmental Themes in Australian Literature. In: Nicholas Birns/Rebecca McNeer (eds.), A Companion to Australian Literature Since 1900, Rochester, Camden House, pp. 429-443, here pp. 433-435; Wright/Clarke, Judith Wright: Half a Lifetime, pp. 151-152; Macdonald Holmes, The Meaning of Soil Erosion; Id., Soil Erosion.
[332] Jennifer Coralie (2011): Resonance, Reconnection, Reparation: Judith Wright's Radical 'Green' Writing Project. Doctoral Dissertation (published online). Monash University, Melbourne. Online: http://arrow.monash.edu.au/hdl/1959.1/530744, pp. 44-60.
[333] Kate Rigby (2009): Writing in the Anthropocene: Idle Chatter or Ecophrophetic Witness? In: *Australian Humanities Review* 47, ANU E Press, pp. 1-9.
[334] Coralie, Resonance, Reconnection, Reparation, pp. 44-60.
[335] Shirley Walker (1991): Flame and Shadow: A Study of Judith Wright's Poetry, St. Lucia, Qld., University of Queensland Press, pp. 26-29.
[336] Ibid., p. 29.
[337] Judith Wright (1953): Eroded Hills. From: The Gateway. In: Ead. (1994), Collected Poems, 1942-1985, Sydney, Angus&Robertson, p. 81.
[338] Judith Wright (1953): Rain at Night. From: The Gateway. In: Ead. (1994), Collected Poems, 1942-1985, Sydney, Angus&Robertson, p. 89.
[339] Wright, Eroded Hills.

In *Rain at Night*, Wright speaks about the drought and the blowing-off of the red sand from Australia's interior; the wind that carries the dust blames the poetic persona – a motif that Wright had already used similarly in the poem *Dust*:

> The wind from the desert over mountain and plain
> gathered the loose unhappy dust
> and set it running like a ghost from door to door again –
> like the heart's red ghost
> it ran to accuse me of the murder of the heart.
> O little voice of the dry dust at the windowpane,
> I wept for you before I slept
> till in the night came on the undreamed-of rain.[340]

As the poem *Dust* demonstrates, it is in the context of the soil erosion debates of the 1940s that Wrights first developed her ecological vision, a vision that earmarked not only her later poetry but also her political activism.[341]

In regard to poetry, the group that produced the largest amount of erosion literature was that of the Jindyworobaks. This literary movement had its origin in 1938, when Australian poet Rex Ingamells (1913-1955) founded the Jindyworobak club in Adelaide.[342] Their publication organ was the *Jindyworobak Anthology of poetry*, which was published from the group's inception until 1953.[343] The Jindyworobaks were a relatively short-lived literary movement, as they lost their influence in the 1950s.[344] Even though they held rather a secondary place within the Australian literary scene and were (and still are) often belittled as being backward and anti-modernist, many renowned authors at the time were more or less in contact with them and sympathised with some of their poetical concepts.[345] The Jindyworobaks were strongly influenced by Percy R. Stephensen, the author of *The Foundation of Culture in Australia* (1936),[346] a manifesto of fervent cultural nationalism. Stephensen was also the initiator of the right-wing nationalist magazine *The Publicist* and the

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[340] Wright, Rain at Night.
[341] Robert Zeller (2000): The Double Tree. Judith Wright's Poetry and Environmental Activism. In: *Interdiscip Stud Lit Environ* 7 (2), pp. 55-65. Though Zeller wrongly dates the beginning of Wright's environmental concerns in the mid-1950s, see ibid., p. 56.
[342] 'Rex Ingamells' in: Wilde et al., Oxford Companion to Australian Literature, p. 400; 'Jindyworobak Movement' in: ibid., pp. 408-409.
[343] Ibid.
[344] Strauss, Literary Culture, p. 113; 'Jindyworobak Movement' in: Wilde et al., Oxford Companion to Australian Literature, pp. 408-409.
[345] Ibid.
[346] Percy R. Stephensen (1936): The Foundations of Culture in Australia: An Essay Towards National Self Respect, Gordon, NSW, W. J. Miles; see also: Clark, Environmental Themes, p. 430.

fascist movement of *Australia First!*[347] This opens the question about the relationship between ecological writing and nationalism in Australia, a question that will be addressed below.

The Jindyworobaks sought to create a specific Australian culture that was centred on the recognition of environmental values,[348] as they were convinced that the way people would "express themselves in relation to their environment" was at the core of any culture.[349] As a result of their underlying cultural concept, their poetry contained a resolute ecological vision. This characteristic has been recognised only in the last two decades by Jennifer Strauss, who has labelled the Jindyworobaks "early environmentalists"[350] and Nicholas Birns and Rebecca McNeer who have called Rex Ingamells a "Jindyworobak proto-ecologist".[351] That their ecological vision was closely linked to the soil erosion context has only recently been pointed out by Gary Clark and Jayne Regan.[352] According to literary scholar Gary Clark, Rex Ingamells' *The Great South Land*: *An Epic Poem* was the author's "most ambitious attempt to apply his theory of environmental aesthetics".[353] In twelve books, each comprising several hundred verses, Ingamells relates the history of Australia in ecological terms, starting with the continental drift and tracing the evolution of the Australian soils, flora, and fauna up to the arrival of the European settlers and the following settlement of the continent.[354] Tellingly, it is in the eleventh book 'Invasion', which describes the spreading settlement on the continent that mentions soil erosion as a negative impact of the colonization process:

> [...] Oh, masterful White Man, know what you have won,
> who claim a mighty Continent for your own.
> [...]
> And yet attendant on your large achievements
> are your terrible failures, your brand of blame, your souls'
> dark perjury, your awful infamy.
> Here in the Land of the South are your shining cities,
> your vineyards and your rolling acres of wheat,
> your herds of cattle and your flocks of sheep;
> but here in the Land of the South are your blights -
> erosion

[347] Barbara Winter (2005): The Australia-First Movement and the Publicist, 1936-1942, Brisbane, Glass House Books; Craig Munro (1992): Inky Stephensen: Wild Man of Letters, St Lucia, Qld., University of Queensland Press, pp. 197-202.
[348] Clark, Environmental Themes, p. 430.
[349] Rex Ingamells/Ian Tilbrook (1938): Conditional Culture. A Jindyworobak Publication. Adelaide, F.W. Preece Ltd., p. 6.
[350] Strauss, Literary Culture, p. 114.
[351] Nicholas Birns/Rebecca McNeer (2007): Introduction. In: Eid. (eds.), A Companion to Australian Literature Since 1900, Rochester, Camden House, pp. 1-13, here p. 9.
[352] Clark, Environmental Themes, pp. 430-431; Jayne Regan (2012): Poetic Politics: The Life and Career of Ian Mudie, 1930-1945. Unpublished B.A. honours thesis, Canberra, Australian National University, pp. 58-70. Many thanks to Jayne for granting me access to her thesis.
[353] Clark, Environmental Themes, p. 430.
[354] Ibid.

> extended to death of timber and death of soil,
> your crimes, diseases, and your deeds of blood.[355]

The significance of erosion as symbol of all the evil that the European settlers have brought on the continent is apparent by the exposed position of the word within the stanza, where it alone occupies a single line.

The author who composed the most erosion poems during the 1930s and 1940s was Jindyworobak Ian Mayelston Mudie (1911-1976);[356] he alone wrote about ten poems that more or less explicitly intimate the problem of soil degradation.[357] It was Mudie's friendship with Stephensen that had brought him into contact with Rex Ingamells and the Jindyworobak Club in Adelaide in 1938.[358] As Jayne Regan has shown, Mudie was well informed about the contemporary scientific and popular debates on the erosion problem, as he collected newspaper cuttings on sand drift and soil erosion.[359] In *This is Australia* (1941), Mudie accuses the "greed of sheep or wheat or axe" that had "furrowed and scarred and swept and ploughed" the land "to barreness".[360] "Sheep", "wheat", and "axe" are metonymies and stand for three typical Australian figures of its settler history: the grazier (pastoralist), the farmer, and the tree-feller. Referring to his own role as poet and to the responsibility of the Jindyworobaks in alarming Australia's society to the mischief they had done, the poem optimistically mentions that there would now be a few to "call its visions from the cupboard of neglect" so that the land might at present see "raising new the spirit of its earth". The most explicit criticism of Australians' land use is probably *Wool cheque*, a bitter accusation of the sacrifice of Australia's soil resources for short term, capitalistic reasons, fostered by the greed of farmers and pastoralists.[361] Drawing on the typical semantic fields of war and illness to describe soil erosion, Mudie speaks of an "invasion where the axe and plough and small sharp hooves of ruthlessness are weapons in a war upon the patient earth" and designates erosion as

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[355] Book Eleven 'Invasion', verses 768-787, in: Rex Ingamells (1951): The Great South Land. An Epic Poem, Melbourne, Georgian House, p. 298.
[356] Phillip Butterss (2000) Mudie, Ian Mayelston (1911-1976). ADB Online: hppt://adb.anu.au/biography/mudie-ian-mayelston-11192/text199949. [Accessed 30 March, 2016].
[357] Namely: 'Dust storm'; 'To any Australian'; 'Wool cheque'; 'Sheep to Kangaroo'; 'Landscape'; 'Return'; 'Tomorrow', 'The Path's ending'; 'This is Australia'; 'The Australian Dream'.
[358] Butterss, Mudie, Ian Mayelston; Clark, Environmental Themes, p. 430; Regan, Poetic Politics, pp. 33-34; Munro, Inky Stephensen, p. 193.
[359] Regan, Poetic Politics, p. 64. Thanks to Jayne Regan for granting me access to her draft paper 'Racy of the Soil: Ian Mudie and the South Australian soil erosion crisis' (A.N.U. 2014) where she shows that Mudie had read, among other erosion literature, Jock Pick's Australia Dying Heart.
[360] Ian Mudie (1945): This is Australia. In: Id., Poems: 1934-1944, Melbourne, Georgian House, pp. 38-39.
[361] Ian Mudie (1945): Wool Cheque. In: Id., Poems: 1934-1944, pp. 22-23.

"the fatal plague" and "leprosy".[362] The typical metaphors of the "rape of the earth" are also present; the accusation is very direct, as the fifth and last stanza of the poem illustrates:

> Through clouds of dust and drifting sand I see
> a land once lovely turned to barreness
> made dead by lusts of men
> that raped her wealth, her earth,
> and starved and died well satisfied
> to make one blade of grass to grow
> where millions grew before.

In *Landscape*, Mudie deplores the destruction of the "beauty and age and loveliness" brought about by white Australians, decrying that "no one cares" about the "the red-green eroded hills and the red washaways" forming "a wound across the plain".[363] The ecological vision permeates much of Ian Mudie's poetry. At the same time, Mudie was also eager to depict the beauty of the land despite the man-made ravages, for example in *Flood and Fire and Drought-Scour*, where he explicitly takes position against a vision of the land as sterile, as "arid sand and sere".[364] Mudie was certainly exceptional among the Jindyworobaks, as he made the most explicit accusation of the damage done on the land and those who he thought responsible for it, but he was not the only one to adopt soil erosion as literary topic. One of the most drastic anti-erosion poems is from Jindyworobak Colin Thiele. His poem, *Red Snow*[365] is based on a news item about Australia's dust storms depositing red dust on the Southern Alps of New Zealand. Soil erosion is depicted as a brutal murder of the land and the red coloured snow of the mountain tops are the "bloodied tears" of the land:

> Torn out life by the roots, slashed
> with a vandal's knife the hot furrows, prised and ripped
> Until the long beaded runnels of her blood
> Have slowly dripped [...][366]

The responsibility for erosion is shared between the wind and the man, there is "earth's blood spilt as part of Man's work/ There is blood on his hands". The poem finishes with a pessimistic outlook: "The blood channels grid the ice, and I see the heart of my land

[362] Cf.: Regan, Poetic Politics, p. 69.
[363] Ian Mudie (1945): Landscape. In: Id., Poems: 1934-1944, p. 15.
[364] Ian Mudie (1947): Flood and Fire and Drought-Scour. In: Rex Ingamells (ed.), Jindyworobak Anthology, Melbourne, Jindyworobak Publications, p. 41.
[365] Colin Thiele (1949): Red Snow. In: R. G. Howarth (ed.), Jindyworobak Anthology, Melbourne, Jindyworobak Publications, pp. 11-13.
[366] Ibid.

haemorrhage to death".[367] As Regan has shown, the other Jindyworobaks rather focused on the aesthetic appreciation of the country and also included a positive image of the farmer.[368]

As far as prose is concerned, ecological visions can be found within the writings of (Stella) Miles Franklin, Xavier Herbert, and Eleanor Dark. Here, the ecological vision in relation to the concern of soil erosion is evidently less compact than in the genre of poetry, but scattered throughout the oeuvres. (Stella) Miles Franklin (1879-1954) started her literary career in the first decade of the twentieth century.[369] She was loosely associated with the Jindyworobaks through her friendship with Stephensen and Ian Mudie and was an active contributor to the *Publicist* as well as an attendee of the *Australia First!* meetings.[370] Her concern for resource conservation is, for example, apparent in her novel *All that Swagger* (1936),[371] the story about an Irish pioneer and his wife Johanna.[372] Regan has shown that Miles Franklin was directly concerned with soil erosion, as she wrote to her friend and Jindyworobak member Ian Mudie that it would "be good when our country [was] in our blood – if it hasn't all blown out to sea".[373] Miles Franklin also suggested to Ian Mudie that he should take an airplane over the Mallee to see for himself the ongoing land degradation in order to write about it.[374]

Ecological thoughts are also present in the writings of Xavier Herbert's (1901-1984).[375] Born in Geraldton, Western Australia, Herbert moved to Melbourne after the First World War where he probably started working as a journalist during the 1920s.[376] In the mid-1930s, Herbert was close to Stephensen, who published his novel *Capricornia*, and to the literary circle of the *Publicist*,[377] but he then distanced himself gradually from it as the decade moved on.[378] Notably, the novels *Capricornia* (1938) and *Poor Fellow my Country* (1975), which both take place in the Northern Territory, have an ecological imprint.[379] Herbert began

[367] Ibid.
[368] Regan, Poetic Politics, pp. 67-68.
[369] 'Miles Franklin ('Brent of Bin Bin')' in: Wilde et al., Oxford Companion to Australian Literature, pp. 299-300.
[370] David S. Bird (2012): Nazi Dreamtime. Australian Enthusiasts for Hitler's Germany, North Melbourne, Vic., Australian Scholary Publishing, pp. 143-144, 250-51; Winter, The Australia-First Movement, p. 2 ; Munro, Inky Stephensen, pp. 192, 198.
[371] Munro, Inky Stephensen, p. 124.
[372] Miles Franklin (1943): All that Swagger, Sydney [et al.], Angus&Robertson, p. 101.
[373] Letter of Miles Franklin to Ian Mudie, 27 December 1944, in: [State Library of South Australia (SLSA): PRG 27/9/1, Papers of Ian Mayelston Mudie]; quoted by Jayne Regan, Racy of the Soil (Unpublished draft paper).
[374] Ibid.
[375] Bird, Nazi Dreamtime, p. 163.
[376] 'Xavier Herbert' in: Wilde et al., Oxford Companion to Australian Literature, pp. 361-363.
[377] Bird, Nazi Dreamtime, pp. 159-163.
[378] Ibid., pp. 279-281.
[379] Suzanne Falkiner (1992): Settlement. The Writers' Landscape, East Roseville, N.S.W., Simon & Schuster, pp. 90-91; Clark, Environmental Themes, p. 432.

with the first concept of *Poor Fellow my Country* in 1936, and the inherent ecological vision can probably be dated to this early period.[380] The main character of the novel, Jeremy Delacy, is a staunch conservationist, establishing a native-species nature reserve on his property in the Northern Territory.[381] For Delacy, the process of opening up and settling the land is synonymous with tearing it up and transforming it into a desert,[382] and throughout the text, hints appear about the destructiveness of European settlers with respect to the land.[383] Delacy describes his contemporaries as having "no love for the soil" and as selling out land at any price because all they wanted was "money, beer, sport, a good time".[384]

Another example of someone whose work reveals engagement with an ecological vision is Eleanor Dark (1901-1985) and her trilogy, *The Timeless Land* (1941)[385]. Born and educated in Sydney, she married in 1922 and started her literary career in the 1920s to become one of the most successful novelists of her time.[386] Though no active member, Dark was also associated with 'Australia First!' and a sympathiser with at least parts of their ideology.[387] *A Timeless Land* is the story of the first years of European settlement narrated from the double perspective of the Aborigine Bennilong as well as from European settlers.[388] The relationship between the Europeans and Aborigines as well as between European civilization and the Australian environment appears as highly problematic.[389] Because of the conservationist appeal of the novel, Susan Carson has argued that Eleanor Dark's work fulfilled an important but undervalued role in the development of a national conservation consciousness.[390]

7.3 A Revolution in the Fine Arts: The Erosion Crisis and Russell Drysdale

Opening the pages of their newspaper in the dust storm month of December 1944, Australian readers of the *Sydney Morning Herald* laid eyes on haunting drawings of barren,

[380] Clark, Environmental Themes, p. 431; Falkiner, Settlement, pp. 90-91.
[381] 'Poor Fellow My Country' in: Wilde et al., Oxford Companion to Australian Literature, pp. 620-621.
[382] Xavier Herbert (1975): Poor Fellow My Country, Sydney, Fontana/Collins, p. 650.
[383] Falkiner, Settlement, pp. 90-91; for example: "The long low hill came slanting in, revealing itself as bare not so much by nature as by the hand of man, civilized man", in: Herbert, Poor Fellow My Country, p. 61; "Of course we're all aware of the ravages of well-known pests like rabbits and rats, of weeds, erosion, river-silting, deforestation [...]", in: ibid., p. 1210.
[384] Ibid., p. 666.
[385] Dark, Eleanor (1941): The Timeless Land, New York, The Macmillan Company.
[386] 'Eleanor Dark' in: Wilde et al., Oxford Companion to Australian Literature, pp. 215-216.
[387] Bird, Nazi Dreamtime, p. 302; Winter, The Australia-First Movement, p. 2.
[388] 'The Timeless Land' in: Wilde et al., Oxford Companion to Australian Literature, p. 748.
[389] Mulligan/Hill, Ecological Pioneers, p. 91.
[390] Susan Carson (1997): Conversations with the Land: Environmental Questions and Eleanor Dark. In: Jennifer McDonell/ Michael Deves (eds.), Land and Identity: Proceedings of the Nineteenth Annual Conference of the Association for the Study of Australian Literature, pp. 191-196, here p. 191.

drought-stricken, and sand-eroded landscapes by Australian artist Russell Drysdale.[391] The accompanying texts by journalist Keith Newman were all predominantly concerned with the effects of wind erosion, especially with the question of the human part in it.[392] The series of three articles altogether by Drysdale and Newman triggered strong reactions among the readers which, while not unanimously positive, made Drysdale to an overnight public figure, well-known beyond the circle of art connoisseurs.[393] On the basis of those sketches, Drysdale would then paint a series of oil canvases which became milestones in the art history of Australia and reflect the diffusion of ecological ideas in the context of the erosion debates of the 1940s in the domain of the fine arts.

In opposition to literature, the role of images as historical source has received more theoretical reflections in the past, especially in regard to representations of landscapes.[394] As cultural historian Peter Burke has affirmed, images are an important form of historical evidence, as "they record acts of eyewitnessing" and are a means of accessing "the non-verbal experience or knowledge of past cultures".[395] Especially landscape paintings are a valuable and challenging source for environmental historians. Landscapes are "a cultural image, a pictorial way of representing, structuring or symbolising surroundings",[396] and therefore allow us to draw inferences on the perceptions of past times.[397] However, the multiple levels of mediation of the original meaning render interpretations of the individual, let alone collective, perceptions extremely difficult.[398] Bearing those limits in mind, I suggest that one way to render an interpretation meaningful is the reconstruction of the historical context of the production and the contemporary reception of the paintings.

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[391] Keith Newman: 'An Artist's Journey Into Australia's 'Lost World', in: *Sydney Morning Herald*, 16 December 1944; Id.: 'Drought Lands' Varied Pattern', in: *Sydney Morning Herald*, 18 December 1944; Id.: 'Riddle of the Sands', in: *Sydney Morning Herald*, 19 December 1944. Cf. also: Christopher Heathcote (2013): Russell Drysdale: Defining the Modern Australian Landscape. Kent Town, South Aus., Wakefield Press, p. 18.
[392] Heathcote, Russell Drysdale, p. 17.
[393] Ibid., p. 18.
[394] For representations of landscapes in paintings and architecture, see for example Gina Crandell (ed.) (1993): Nature Pictorialized: 'The View' in Landscape History, Baltimore, Johns Hopkins University Press and the works by Denis Cosgrove.
[395] Peter Burke (2001): Eyewitnessing: The Uses of Images as Historical Evidence, Ithaca, Cornell University Press, pp. 13-14.
[396] Denis Cosgrove/Stephen Daniels (1988): Introduction: Iconography and Landscape. In: Eid. (eds.), The Iconography of Landscape. Essays on the Symbolic Representation, Design and Use of Past Environments, Cambridge [et al.], Cambridge University Press, pp. 1-10, here p. 1.
[397] On the concept of the landscape as cultural construction see also: Denis Cosgrove (1998): Social Formation and Symbolic Landscape, Madison Wis., University of Wisconsin Press, esp. pp. 1-2.
[398] George Seddon (1976): The Evolution of Perceptual Attitudes. In: Id./Mari Davis (eds.), Man and Landscape in Australia: Towards an Ecological Vision. Papers from a symposium held at the Australian Academy of Science, Canberra, 30 May - 2 June 1974, Canberra, Australian Government Publishing Service, pp. 9-17, here pp. 9-10.

As far as the artistic vision on the Australian landscape by European settlers is concerned, the earliest recorded depiction of on Australian wind erosion phenomenon is probably *An Australian Dust Storm* from Henry Davies.[399] The title specifies that the dust storm is "Australian" and in so doing suggests that this phenomenon is considered by the painter as a typical natural phenomenon of the Australian environment. Not much is known about the painting, only that it was displayed during the Melbourne Exhibition in 1854,[400] where, according to the *Argus*, it was part of a group of "some exceedingly clever water-color paintings on landscape subjects".[401] Some thirty years later, the impressionists in the entourage of the Heidelberg School chose to paint their landscapes with atmospheric dust in their endeavour to illustrate a distinctive Australian landscape and a characteristic part of the settler experience, as illustrated by David Davie's *A hot day* (1888),[402] Frederic McCubbin's *The North Wind* (1891),[403] or Tom Robert's *A Break away!* (1891).[404]

In the 1940s, a major change occurred in Australia's landscape painting scene: Russell Drysdale painted wind-eroded and drought-stricken landscapes in a way that is considered as a "complete break" with the tradition of naturalistic landscapes established by the Heidelberg School in the 19th century and which was still influential up to the 1930s.[405] Drysdale's surrealistic paintings incorporate and diffuse an ecological vision and thereby reflect the changing perception of the natural environment. For the development of this ecological vision, Drysdale's personal experience of wind erosion in the semi-arid parts of New South Wales and Victoria was crucial.

Born on the 7th of February, 1912, at Bognor Regis, England, Drysdale and his family immigrated to Australia in 1923, where they first settled in Melbourne.[406] After he had worked for some time as an overseer on a station in northern Victoria, Drysdale began to seriously consider a professional career as an artist, a decision that strengthened after a journey to Europe in 1932.[407] Drysdale drew inspiration from realistic, expressionistic, and surrealistic sources and was particularly influenced by Cézanne, Van Gogh, Matisse, Picasso,

[399] Design & Art Australia: Henry Easom Davies b. 1831. Online: http://www.daao.org.au/bio/henry-easom-davies/biography [Accessed 30 March, 2016].
[400] Jeanette Horne (2007): Australian Pastoral: The Making of a White Landscape, Fremantle, W.A., Freemantle Press, p. 137.
[401] 'The Exhibition', *The (Melbourne) Argus*, 20 October 1854.
[402] Jane Clark/Bridget Whitelaw (eds.) (1985): Golden Summers. Heidelberg and beyond, Melbourne, International Cultural Corporation of Australia, p. 50.
[403] Ibid., p. 141.
[404] Bernard Smith (1962): Australian Painting 1788-1960, London, Oxford University Press, pp. 90-91.
[405] Ibid., p. 244; see also: Daniel Thomas (1976): Visual Images. In: George Seddon/Mari Davis (eds.), Man and Landscape in Australia, pp. 157-166, here p. 163; Haynes, Seeking the Centre, p. 168.
[406] Geoffrey Smith (1997): Russell Drysdale: 1912-81, Exhibition Catalogue, Melbourne, National Gallery of Victoria, p. 17.
[407] Ibid., p. 18.

and Modigliani.[408] When the Second World War broke out, his plans to engage in military service were frustrated by an eye defect, so he settled in Sydney where he soon became a major representative of Australian modern painting.[409] Next to motifs of everyday urban life, he also painted scenes from rural Australia, inspired by his own experiences of drought-stricken Riverina, like *Man feeding his dog* (1941), *Going to the pictures* (1941) or *Man reading a paper* (1941).[410] Bruce C. Ross has pointed to the fact that Drysdale, similarly to the Jindyworobaks but most likely independently from them, found the natural environment a meaningful topic for the creation of a typical Australian art.[411] Those paintings show humans in their daily routines within a monotone and harsh environment. With their surrealist interpretation of the country, the paintings break with the naturalist and impressionist landscape tradition.[412] The impression of estrangement between the humans and the barren landscape is, however, softened through an underlying humoristic tinge.[413] When he displayed several of his paintings in two solo exhibitions in 1942 and 1943 at the Macquarie Galleries in Sydney, then the hub of modern art in the city, Drysdale established himself as one of the most significant painters of his generation.[414]

In November 1944, newspaper proprietor Warwick Fairfax asked Drysdale to accompany journalist Keith Newman of the *Sydney Morning Herald* on a tour through rural Australia in order to furnish drawings on the effects of drought and wind erosion.[415] Maybe he got the idea from the Bush fire painting that Drysdale had painted in 1944.[416] Drysdale accepted the proposal, which proved to be a far reaching decision: The following journey of almost 5 000 km (3 000 miles) through New South Wales and northern Victoria would have a major impact on Drysdale's art. According to art critic and curator Lou Klepac, the artist's experience of the trip "could not have been more dramatic or lasting in its effect on his work".[417] Three articles in the *Sydney Morning Herald* reported about the tour in December 1944 and were illustrated with several of Drysdale's sketches.[418] For Newman as well as for

[408] Smith, Australian Painting, p. 244; Smith, Russell Drysdale, p. 20-21; Mulligan/Hill, Ecological Pioneers, p. 66.
[409] Ibid.
[410] Ibid.
[411] Bruce C. Ross (1985): Landscape and the Australian Imagination. In: Robin Eaden/Francis Mares (eds.), Mapped but not Known. The Australian Landscape of the Imagination. Essays& Poems Presented to Brian Elliott, Netley, S. Aust., Wakefield Press, pp. 224-243, here pp. 234-235.
[412] Smith, Russell Drysdale, p. 20.
[413] Heathcote, Russell Drysdale, p. 11.
[414] Smith, Russell Drysdale, p. 21.
[415] Lou Klepac (2009): Russell Drysdale: 1912-1981, Sydney, Murdoch Books Australia, p. 136.
[416] Ibid.; see also: Heathcote, Russell Drysdale, p. 20.
[417] Klepac, Russell Drysdale, p. 136.
[418] *Sydney Morning Herald*, 16 December 1944; 18 December 1944; 19 December 1944; cf. also: Heathcote, Russell Drysdale, p. 18.

Drysdale, there was no doubt that the settlers were at least partly to blame for the soil erosion they encountered during the trip.[419] The first article written by Newman on the road during a stop at Wentworth, a border town between New South Wales and Victoria, illustrated the general problem of wind erosion and desertification. The experience of a "nightmare journey through a day-long duststorm" is the starting point of Newman's erosion tale in which devegetation of the soil is presented as the main culprit:

> […] the original covering of saltbush and bluebush had been stripped by sheep, rabbits, and by dry years, and areas where the mallee scrub, box, and other timbers had been chopped down and burned. Here the wind did not sweep the country – it came down hard on the unshielded land and scrubbed it. […] Possibly nothing could do more to bring home to people unfamiliar with the land the intensity of this drought and the cumulative effects of soil erosion than to peer at one of these patches of scorched earth through eyes narrowed to slits against the blinding dust and stinging sand blowing from it.[420]

Neman spoke about abandoned farm houses, about the menace of sand drift for creeks and rivers and how the fertility of the soil had "gone with the winds".[421] In contrast to the devastation in the drought stricken areas, the irrigation districts appear in his tale as an oasis in the desert.[422]

The text displays a distinct ecological understanding of the soil erosion phenomenon: The role that man, stock, and rabbits play in the phenomenon of erosion and desertification is highlighted, and human behavior is criticised. According to the journalist, "Nature's purpose was to hold the desert in check, not to provide food for imported animals recklessly multiplied".[423] The other two articles were written by Newman after his return to Sydney and focused on the experience of the settlers and the problem of wind erosion, especially caused by deforestation. In painting the settlers' picture, the reporter mentioned admiringly how they would "retain their sense of humour along with their faith" and sympathised with their struggle through drought, economic hardships, and war restrictions. But he also criticised those settlers whose faith in the regenerative forces of the land was in his eyes overoptimistic and who affirmed that erosion would be "a bugaboo created by officials, scientists, and city newspapers".[424] The second aspect Newman wanted to put across was the problem of the deforestation caused by clearing, wind erosion and a lack of natural regrowth. The "urgent need for scientific assault" on wind erosion is the main topic of the last article, "Riddle of the

[419] Heathcote, Russell Drysdale, p. 17.
[420] Newman, 'An Artist's Journey Into Australia's 'Lost World', *Sydney Morning Herald*, 16 December 1944.
[421] Ibid.
[422] Ibid.
[423] Ibid.
[424] Newman, 'Drought Lands' Varied Pattern', *Sydney Morning Herald*, 18 December 1944.

Sands", as the journalist considers the "lack of knowledge" on wind erosion as "a supreme tragedy".[425]

Drysdale's drawings that cover large parts of each of the pages show a stylised drought-stricken landscape with dead trees and wind-eroded roots, dead animals, and abandoned or isolated housing. They also depict the rural settlers: bare-foot children, down-to-earth women and idle men waiting for rain to start their work. Drysdale was by no means the only one to produce such sketches of wind-eroded landscapes, but he was the most famous.[426] Drysdale's drawings and Newman's text triggered strong reactions among the readers: None other than Ion Idriess took the occasion to thank the *Sydney Morning Herald* in a letter to the editor as "those articles and vivid illustrations, combined with the dust that now envelops our cities must awaken the nation, as nothing else could have done, to the fast approaching ruin of one-third of our continent".[427] While there were other positive responses,[428] there were also some readers that insinuated that the sketches were exaggerated, which reflects the controversial nature of the ecological vision. Some readers of the *Sydney Morning Herald* raised their pen to object to Drysdale's vision: D. P. Macdonald from Sydney acknowledged that soil erosion was a problem, but suggested that artist and reporter should "apply their undoubted talents to feature the phenomenal productivity of Australia and her natural fertility and recuperative power".[429] Jack Tully, acting Minister for Lands in New South Wales, stressed the regenerative powers of the western division of New South Wales. Without denying the problem of erosion and drought, he maintained that "the drawings by Mr. Russell Drysdale bring in touches of exaggeration of the existing desolation".[430] There were more reactions that claimed that the sketches were exaggerated; so on the 20th of December, the *Sydney Morning Herald* published a whole page featuring photographs of erosion in order to demonstrate that this was not the case.[431]

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[425] Newman, 'Riddle of the Sands', *Sydney Morning Herald*, 19 December 1944.
[426] Similar drawings of wind eroded landscapes of the same period exist from Sydney-based Frank Broadhurst, who worked as a caricaturist and illustrator for several Australian newspapers at the time. They also show typical erosion scenes, but in a more realistic way than Drysdale: a farm house half-way covered by sand drift, semi-rotten cadavers of bullocks with a willy-willy in the background or the excavating of a drifted channel or dam by men and their horse team, in: Katharine S. Prichard et al. (eds.) (1945): Australian New Writing 3, Sydney, Current Book Distributors, pp. 31-33; see also: Design & Art Australia: Francis J. Broadhurst. Online: http://www.daao.org.au/bio/francis-j-broadhurst/biography [Accessed 30 March, 2016].
[427] 'Soil Erosion', *Sydney Morning Herald*, 22 December 1944.
[428] 'Drought and Economic Drift', *Sydney Morning Herald*, 26 December 1944; 'Drought and Erosion', *Sydney Morning Herald*, 21 December 1944.
[429] 'Drought and Erosion', *The Sydney Morning Herald*, 23 December 1944.
[430] 'Men still seek land', *The Sydney Morning Herald*, 28 December 1944.
[431] 'Erosion Brings Desolation to Wide Areas of Dry West', *Sydney Morning Herald*, 20 December 1944; see also: Heathcote, Russell Drysdale, p. 18.

Despite positive reactions from large parts of the public and from within the art scene, Drysdale felt unsatisfied with his drawings.[432] He expressed this discontent in a letter to his close friend and art colleague Donald Friend: "The Herald ran great pages with the drawings, which people tell me are good, but which I feel to be inadequate – I want to turn them into paintings. I feel very much like a new man – all this has done something to me which is difficult to explain".[433] Obviously, Drysdale perceived his journey through the drought-scarred and eroded landscapes as a personal watershed experience.

In the following months, on the basis of the sketches, he painted the eroded landscapes in oil. Those oil paintings, rather than his drawings, are considered as his masterpieces and as ground-breaking examples in the genre of landscape painting. Many of those works of art were exhibited in 1945 at the Macquarie Galleries in Melbourne and thus reached a broad public.[434] Among this series of oil paintings was also the *Crucifixion*,[435] described by Hal Missingham, the director of the Art gallery of New South Wales on occasion of its exhibition in 1946, as "the peak of this artist's pictorial study of soil erosion".[436] The oil paintings of Drysdale's 'erosion series' show surrealist desert landscapes. They follow the tradition of surrealist desert paintings, the most famous probably being Salvador Dalí's *La persistencia de la memoria* (1931). It was with the eyes of a surrealist that Drysdale perceived the drought stricken area during his journey, this "devastating reality more frightening than any surrealist could have imagined", as Lou Klepac has maintained.[437] Some of the canvases are very close to the drawings published in the *Sydney Morning Herald*, for example, *Dead Bullock*. Others, like *A Drover's Wife* are modeled on the drawings, in this case on the scene of *A drovers' camp near Denilquin*, but underwent some marked changes.[438] The general scenery depicted in the paintings is that of a flat, barren, monotone, and sterile land, scarred by the destructive forces of drought and erosion.[439] This is obvious in the bare-rooted and sand-covered tree trunks, as for example in *Walls of China*, *Desolation* or *Western landscapes*. But not only the landscape shows signs of destruction, also the remnants of civilization present in some of the pictures are mostly shattered; for example in *Deserted out-station*, *Desolation*, and *Tree form*.[440] Some of the canvases look like the material manifestation of Newman's text. The

[432] Heathcote, Russell Drysdale, p. 18.
[433] Quoted in: Klepac, Russell Drysdale, p. 137.
[434] Ibid., pp. 140-141.
[435] Ibid., p. 144.
[436] 'Drysdale Painting on Exhibition', *Sydney Morning Herald*, 23 February 1946.
[437] Klepac, Russell Drysdale, p. 136.
[438] Ibid., p. 152.
[439] Cf. Haynes, Seeking the Centre, p. 168.
[440] See paintings in Klepac, Russell Drysdale, n.p.

following passage seems to be a perfect caption to Drysdale's *Deserted out-station* or for *Desolation*: "But here and there gaunt houses appear with empty black sockets where the windows were, doors flapping on rusted hinges, the spidery skeletons of windmills from which the iron wind vanes have blown or rusted away".[441] Similar for *Western landscapes* where the following passage from Newman comes to mind: "Dead trees, a tragic number, loom through the hot murk in a variety of fantastic shapes as though they died in an agony beneath the axe or tortured by thirst as the wind blew the soil from their roots".[442]

With these paintings, Drysdale took the break with the naturalistic and impressionistic landscape tradition of the Heidelberg school one step further than anyone before.[443] Paintings up to the 1930s had shown nature mainly in positive terms:[444] The Australian Bush, the favourite theme of the Heidelberg School, might have been presented as wild, rough, and having underlying notes of irrationality, but it was not seen as hostile *per* se.[445] After the First World War, nature was commonly depicted as fertile and benign, complaisant to being used by man in his endeavour for national development.[446] This tendency is epitomised by Elioth Gruner's *Spring frost* (1919) or Arthur Streeton's *Land of the Golden Fleece* (1926).[447] The imperative to represent the Australian environment as kind and generous in the 1920s was so strong, that images of drought affected landscapes were even censored.[448]

In contrast to this vision of the environment, Drysdale shows a land that is neither benevolent nor docile.[449] The relationship between Humans and Nature as depicted in the 'erosion series' is not one of harmony, but of mutual suffering. One of the most significant changes of the vision of Australian landscape promoted by Drysdale is the dominant use of red colours. Traditional Australian landscape painters had mainly resorted to the colours of green, gold, grey, or purple.[450] In the 1930s, they suddenly turned to the colour red, a change linked to the parallel emergence of the topic of desert or arid landscapes.[451] The main advocate of this new landscape motif was Hans Heysen, who had discovered the arid northern

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[441] Newman, 'An Artist's Journey Into Australia's 'Lost World', *Sydney Morning Herald*, 16 December 1944.
[442] Ibid.
[443] Smith, Russell Drysdale, p. 20; Mulligan/Hill, Ecological Pioneers, pp. 38-39.
[444] Haynes, Seeking the Centre, pp. 143-144, 162; Derek J. Mulvaney (1991): Visions of Environment: An Afterview. In: Id. (ed.), The Humanities and the Australian Environment, Canberra, Australian Academy of the Humanities, pp. 111-122, here p. 112; see also: John R. Short (1991): Imagined Country: Environment, Culture, and Society, London [et al.], Routledge, Chapman and Hall, pp. 206-209.
[445] Ross, Landscape and the Australian Imagination, p. 230.
[446] Ibid.; Haynes, Seeking the Centre, pp. 143-144, 162; Mulvaney, Visions of Environment, p. 112; Mulligan/ Hill, Ecological Pioneers, p. 53.
[447] Ibid.
[448] Haynes, Seeking the Centre, pp. 162, 251; Ross, Landscape and the Australian Imagination, p. 230.
[449] Mulvaney, Visions of Environment, p. 112; Short, Imagined country, pp. 211-213.
[450] Thomas, Visual Images, p. 162.
[451] Thomas, Visual Images, p. 163; Haynes, Seeking the Centre, p. 148.

region of the Flinders Ranges as aesthetical inspirations in 1926.[452] Heysen not only influenced Russell Drysdale, but also other artists such as Arthur Murch, Horace Trenerry, Harold Cazneaux, and Jessie Traill.[453] While Drysdale's 'erosion series' of 1944-1946 stood in this tradition, many features were genuinely new – also in regard to his earlier paintings: not only the soil or rocks appeared in a vivid or dark red, but also the sky, as for example in *Walls of China*, *Red landscape* and *Crucifixion*, in this way raising the colour red to a whole new level.[454]

The influence of Drysdale's own experience of Australia's red dust storms for this new vision is obvious: As Newman wrote, their journey through a dust storm was "like driving into a lost world. The dust-laden air plays eerie tricks with the light. The sky appears leaden, like a snow sky in Europe, or is crossed by great bands of black, red, and grey".[455] This context was also established by the contemporary reception of the paintings, for example of *Desolation*, where according to the critique, "the atmosphere [would be] pregnant with the deadly particles of dust. The vast lands are engulfed by the drifting soil, whose power of fertility has dried beneath a careless sun".[456]

A major difference to most of the earlier 'desert' paintings as promoted by other artists, for example Hans Heysen, is that Drysdale's drought images integrated human figures in the arid landscapes.[457] Heysen had encountered settlers in the area of the Flinders Ranges and written about them, but his paintings show no signs of them or their dwellings.[458] Contrarily, many paintings of Drysdale's 'erosion series' show traces of human settlement, be it a slanting fence in the background of *Tree form*, an isolated farm house with laundry in *Red landscape*, the ruins of a pastoral station as in *Deserted-out station*, or the settlers themselves as in *Drover's wife*. This difference to earlier 'desert' paintings is of highest importance: Drysdale's canvases do not show the desert as a kind of aesthetic, yet timeless scenery untouched by men; rather, they depict the interaction between men and their environment. More precisely, they show the very real struggle of Australians settling in the semi-arid rangeland regions of the continent. Drysdale's paintings show that the fate of nature and that of civilization are deeply interwoven. Where nature is destroyed, like in *Deserted out-station*, humans suffer, too. This is a fundamentally ecological vision of the relationship between

[452] Haynes, Seeking the Centre, pp. 164-166.
[453] Ibid.; Thomas, Visual Images, p. 163; Mulvaney, Visions of Environment, p. 111; Mulligan/Hill, Ecological Pioneers, pp. 54-55.
[454] Haynes, Seeking the Centre, p. 168.
[455] Newman, 'An Artist's Journey Into Australia's 'Lost World', *Sydney Morning Herald*, 16 December 1944.
[456] *Sydney Morning Herald*, 21 November 1945; quoted in Smith, Russell Drysdale, p. 86.
[457] Haynes, Seeking the Centre, p. 251.
[458] Ibid., p. 167.

humans and their environment. Drysdale's new ecological vision is epitomised in the anthropomorphic landscape of the *Crucifixion*: Within a barren red landscape, littered by dead and eroded trees stands a mourning human figure that takes the shape of a dead tree trunk.[459] This fusion of land and man evokes some of the verses written by Ian Mudie and resembles the typical Australian iconographic depictions of wind erosion in the form of dead mallee roots. Environmental historian Tim Bonyhady is one of the very few to have pointed out the ecological dimension of Drysdale's paintings. According to him, Drysdale's erosion paintings were a demonstration that Australians were willing "to acknowledge the environmental limits of the land".[460]

This interpretation becomes plausible through the fact that Drysdale's paintings, just as his drawings before, directly took part in a public debate that asked the ecological question about the human responsibility for the destruction of the soils. As Tim Bonyhady has shown, Drysdale's paintings triggered a debate about the artists' methods of adequately presenting the Australian environment. When the *Crucifixion* was exhibited in 1946 in the Art gallery of New South Wales, it prompted conflicting responses. For Hal Missingham, the director of the gallery, the painting symbolised "the soil of Australia crucified on the cross of erosion",[461] an interpretation taken up by several newspapers like the *Melbourne Herald*[462] and the *Northern Times*.[463] In this interpretation, the human responsibility for the wind erosion and drought was apparently implicit, as is suggested by the statements of Drysdale's critics.[464]

Just as with his sketches, his oil paintings triggered opposition among some Australians:[465] Frank F. Forster, an Inspector of Stock with the Milparinka Pastures Protection Board at Tibooburra in far western New South Wales complained to the *Sydney Morning Herald* that Drysdale's erosion paintings would defame the country and the people living there. When he heard about the plans to exhibit the *Crucifixion* in London, he even protested to the New South Wales Department of Agriculture.[466] Forster emphasised that in his opinion, erosion was a natural phenomenon, endemic to the continent, and therefore not caused by European settlers. He feared that the exhibition of the *Crucifixion* in London would have

[459] See painting in Klepac, Russell Drysdale, n.p.
[460] Tim Bonyhady (1997): The Cross of Erosion. In: Australian Humanities Review 6 (June-July), n.p. Online: http://www.australianhumanitiesreview.org/archive/Issue-June-1997/bonyhady.html. [Accessed 30 March, 2016].
[461] Ibid.
[462] Ibid.
[463] 'Surrealism On the Farm', *Northern Times*, 8 March 1946.
[464] Bonyhady, The Cross of Erosion, n.p.
[465] Ibid.
[466] Ibid; also: Letter from Frank F. Forster to the Under Secretary of the Department of Agriculture, 7th March 1946, in: [SRNSW: Department of Agriculture; NRS 54, Agriculture Special files, 1889-1981, [12/3528 pt] Soil conservation policy and administration proposals (ASF 137), 1940-65].

damaging effects on Australia's reputation. Similar to some reactions to the newspaper articles of 1944, Forster instead suggested to commission paintings depicting pastoral properties with limited stock or even revegetation schemes as undertaken by the Zinc Mining Corporation of Broken Hill.[467] He found support with Australia's first Minister for Conservation in New South Wales, William Fraser Dunn, who was also anxious that the *Crucifixion* would "create a false impression" abroad.[468] He agreed with Forster that it would be more suitable for artists to depict the wealth of the land and spoke in favour of a painting showing revegetation.[469] Similar voices rose within Australia's modern art scene: Watercolour painter Kenneth Macqueen captured subjects of his own farming experience in Queensland, for example *The ploughman's view* (1938),[470] and as a farmer, he was well aware of the soil erosion problems in the 1930s and 1940s, as his painting *The washaway* (1932) shows. This, however, was no reason for him to follow the "cult of the ugly" as he accused Drysdale of doing.[471] Consistently, Macqueen focused on the depiction of soil conservation methods rather than the negative effects of erosion, for example in *Countour ploughing* (c. 1945) and *Anti-Erosion Stubble* (c.1948).[472] These compositions, mainly in the colours green, blue, brown, and white, give a much friendlier image of the relationship between man and nature: The underlying vision is that the farmer who cares for the land and uses it wisely can preserve its fertility and enjoy the bounty and beauty of the land. Only later would Macqueen paint *Eroded Farm*, exhibited at the Society of Artists in 1951, a picture that showed the relationship between man and nature in more problematic terms.[473] Although he was a modernist, Macqueen's paintings were especially praised by the conservative parts of the press. The Sydney *Bulletin* joined the (*Adelaide) Advertiser* in applauding Macqueen on having shown the beauty of the land.[474] For Macqueen, soil conservation offered a ready solution that enabled men to continue to use the land as desired, while Drysdale presented a more pessimistic view that challenged the assumption that man and his environment were able to coexist harmoniously under the present conditions. John Duhig, Professor of Pathology of the University of Queensland, who also worked as an art critic for the *Brisbane Telegraph*,

[467] Bonyhady, The Cross of Erosion, n.p.
[468] Ibid.
[469] Ibid.
[470] Tim Bonyhady (1997): The Ploughman's View. In: Geoff Levitus (ed.), Lying About the Landscape, North Ryde, N.S.W., Craftsman House, pp. 52-67, here p. 54.
[471] Kenneth Macqueen, Art in Australia, typescript, private collection, 12 September 1949, pp. 38-39, quoted in: Bonyhady, The Ploughman's View, p. 59.
[472] Ibid., pp. 61-62.
[473] Ibid., p. 61.
[474] Ibid., p. 59.

suggested that Macqueen's rejection of Drysdale's landscape depiction originated in a lack of experience, as Macqueen allegedly had never seen genuine erosion.[475]

In light of the historical context, it is a striking fact that art historians have never pointed out this fundamental ecological idea in Drysdale's 'erosion paintings' of 1944-1946. This is probably linked to the general obliviousness towards the Australian wind erosion disaster and the associated debates about human responsibility for soil erosion of the time. The ignorance is exemplified in the statement of curator Daniel Thomas, who in 1977, while looking for an explanation for the appearance of deserts and the colour red in the landscape paintings of the 1930s, suspected the influence of US-Dust Bowl images as a reason and completely ignored the fact that Australia had had a vivid debate on wind erosion on its own.[476] Derek Mulvaney shows the same lack of knowledge when he suggests that Drysdale and other 'desert' painters of this period would probably have been "unaware that inappropriate land management was responsible for many eroded landscapes".[477] Literary and science scholar Roselyn Haynes acknowledges at least partly an ecological vision in Drysdale's paintings. According to her, the derelicts of broken settlements, the appearance of junk iron and other rubbish would "proclaim the abuse of the land".[478] Yet, in another passage she follows the prevalent opinion that artists and farmers alike would have failed to see the link between human actions and their effects on the environment during the 1930s and 1940s.[479] The most recent work on Drysdale by Christopher Heathcote acknowledges that Drysdale was well aware of the destructive forces of contemporary debates about humans' impact on land degradation.[480] Still, Heathcote considers the media coverage of the desert warfare and the Blitzkrieg of the Second World War as the essential influence for Drysdale's landscape paintings of that period.[481] While such influences are plausible and also reflect the general conceptualization of the soil erosion in terms of "war" and the merging of the motifs of war and erosion as, for example, in Judith Wright's poem *Dust,* Heathcote clearly overlooks the primordial influence of the Australian erosion debates and Drysdale's personal experience of dust storms.

I suggest that there are two interrelated explanations why the ecological aspect of Drysdale's paintings was ignored by most art critics for over half a century. From an

[475] Ibid.
[476] Thomas, Visual Images, p. 163.
[477] Mulvaney, Visions of Environment, p. 113.
[478] Haynes, Seeking the Centre, p. 169.
[479] Ibid., p. 251.
[480] Heathcote, Russell Drysdale, p. 17.
[481] Ibid., pp. 19-20.

aesthetical point of view, his landscapes have generally been subsumed under the category of 'Desert painting'. The desert, as Haynes has shown, is a traditional aesthetical category that offers a wide range of symbolic interpretations.[482] It is beyond any doubt that Drysdale was inspired by earlier desert painters like Hans Heysen as well as by surrealist desert traditions. But the fact that Drysdale's paintings have been too readily put in this category has helped to cover the fact that most of his erosion paintings show *desert-like* landscapes with very distinctive ruins of human occupation. The relics of fences and houses, as for example in *Desolation* or *Deserted out-station*, bear witness to the fact that these areas have not always been a desert, that they were once thought by humans as worthwhile for settlement, for building a home, and for making a living. This aspect is widely lost in those interpretations, which focus too narrowly on the subject of desert. In the desert, in the proper sense, the question of the human impact on the environment is much less urgent than in fringe areas, as the lack of water usually limits the presence of humans. Deserts may then appear as unfertile, hostile or even deadly environments, but they are seen as ancient environments of primeval geological formation. In this way, their origin surpasses the human life-span and appears, therefore, as being beyond the responsibility of human action. This reading is, for example, evident in Lou Klepac's interpretations that consider Drysdale's landscapes to be marked by a nescience of human activity and vision of the Australian landscape "in terms of time, of geological activity, and the presence of immense forces of nature which have shaped the land over millions of years".[483] This might be true for *Walls of China*, which shows an ancient landscape formation near Lake Mungo in south-western New South Wales and depicts no signs of men,[484] and is revealing that, when journalist Keith Newman inquired about the part humans played in the process of the encroaching deserts in one of the 1944 articles, he chose the *Walls of China* as an example for a sand-formation beyond human responsibility.[485] But other paintings like *Deserted out-station*, *Tree form*, or *Red landscape* clearly show signs of past and present human activity and their relation to the environment in highly problematic terms.

A second reason for the neglect of Drysdale's ecological vision so far might be the context of the reading of his paintings in the years following the Second World War. Art critics then were inclined to interpret the paintings as depicting a conflict between nature and

[482] Haynes, Seeking the Centre.
[483] Klepac, Russell Drysdale, p. 144.
[484] Smith, Russell Drysdale, p. 88; unknown to Drysdale, this area (now known as Lake Mungo National Park) is a site of ancient Aboriginal dwelling, see: Mulvaney, Visions of Environment, p. 111.
[485] Newman, 'Riddle of the Sands', *Sydney Morning Herald*, 19 December 1944.

man, in which the heroic settlers would show their "fighting spirit"[486] and resilience and where there was no doubt for Drysdale that man would succeed.[487] This probably set the tone for later interpretations, which seem to reflect Australia's post-war optimism rather than contemporary attitudes, which were much more diversified.

The artist's journey and the ecological vision he gained in that time would be imperative for his further work and for Australia's art in general. In the years following the Second World War, Drysdale pursued his interest in the relationship between man and the environment. He was in touch with biologists and ecologists, and his later paintings, like *Desert Landscape (1952)* and *The ruins, Lake Callabonna* (1965), show the continuity and further development of the ecological vision that he expressed in 1944-1946.[488] Drysdale would also be influential for other landscape painters who, like him, saw the Australian landscape with ecological eyes. One of them was Sidney Nolan, who also took up the subject of arid landscapes as well as the dominant use of the colour red.[489] With his *Desert Storm* series of 1966, Sidney Nolan has followed the tradition of wind erosion depictions in Australian art and given one of the most impressive representations of a dust storm.[490] In the sequence of the seven panels, the storm raises with force until the cloud of dark red dust blurs the view of the landscape and impressively shows the agency of nature that defies human's view and control.[491] Another was Clifton Ernest Pugh, who, just like Drysdale, combined an ecological concern with an interest for wind eroded landscape, as one can see in, for example, *Dust Storm* (1986).[492]

As this chapter has illustrated, the cultural concept of the 'ecological vision' was broadly diffused at the time of the erosion crisis in a number of domains of Australia's society, be it among experts, pastoralists, writers, or artists. This is a significant observation that has been neglected so far by historians. Scientific ecological concepts played an important role in this process of diffusion, but the domestic experience was likewise significant, as the example of pastoralists Pick and Goode, or artists Drysdale have shown. The recognition of the widespread diffusion of the ecological vision is especially crucial when it comes to assess the cultural and intellectual evolution of Australians' thinking in regard to

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[486] Joseph Burke (1951): The Paintings of Russell Drysdale, Sydney, Ure Smith, p.12; quoted in: Smith, Russell Drysdale, p. 92.
[487] Haynes, Seeking the Centre, p. 168.
[488] Ibid., p. 169.
[489] Ibid., pp. 172-174.
[490] Ibid., p. 252; Mulligan/Hill, Ecological Pioneers, pp. 59-64.
[491] Haynes, Seeking the Centre, p. 174.
[492] Haynes, Seeking the Centre, p. 253; Traudi Allen (1981): Clifton Pugh, Patterns of a Lifetime: A Biography, West Melbourne, Thomas Nelson, pp. 21-22; Clifton Pugh/James A. Murray (1986): Drought and Flood in Australia, Exhibition Catalogue, Melbourne, Gallery 499, painting 6, n.p.

their natural environment, a field of environmental history that has met relatively little interest by historians so far.[493] Kevin J. Frawley, who has traced the evolution of environmental thinking in Australia, has ignored the role of the wind erosion crisis in the spread of the ecological thought.[494] When historical geographer Joseph Powell traced back the evolution of modern environmentalism in Australia, commonly dated to the 1960s and the Little Desert Dispute in Victoria, he assessed the lack of research on the mental precursors of modern environmentalism, and found it "unsatisfying […] to write of the seeds of environmentalism without bothering to consider the roots".[495] The mental precursors to this movement in the erosion crisis of the 1930s have been partially acknowledged during the last two decades, especially in the domain of science.[496] The genuine significance of the dust storm crisis and the concomitant diffusion of the ecological vision within the larger Australian society have, however, not been recognised. Historians like David Walker and Warwick Frost have pointed to the change in how Australians looked at their environment in the 1930s and 1940s, but could not clearly pinpoint where these changes originated.[497]

As the seventh chapter of the thesis has established, Australians adopted an ecological vision on wind erosion that explained erosion as the result of the white settlers' disturbance of nature's balance and thus attributed most of the responsibility for its occurrence to humans. Furthermore, the erosion crisis illustrated the interdependence between humans and their environment: humans were not distinct from nature and could interfere with it as they wished, but were fundamentally dependent on it. Far from being limited to the circle of science where the discipline of ecology had its origin, the ecological vision spread throughout various domains of Australian society: Soil conservation experts like Sam Clayton or Bob Herriot adopted and diffused the ecological vision, just as pastoralists, writers or painters. The diffusion of the ecological vision was not peculiar to Australia, but part of a broader international movement, initiated by events in the United States of America. Donald Worster and Roderick Nash have argued that the US Dust Bowl experience was crucial to the diffusion of an ecological vision within the US-American society, which considerably contributed to

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[493] McNeill, Observations, p. 22.
[494] Kevin J. Frawley (1994): Evolving Visions: Environmental Management and Nature Conservation in Australia. In: Stephen R. Dovers (ed.), Australian Environmental History: Essays and Cases, Melbourne [et al.], Oxford University Press, pp. 55-78; Id. (1992): A 'Green' Vision: the Evolution of Australian Environmentalism. In: Kay Anderson/Fay Gale (eds.), Inventing Places. Studies in Cultural Geography, Melbourne, Longman Cheshire, pp. 215-234.
[495] Joseph M. Powell (1993): The Genesis of Environmentalism in Australia. In: Donald Garden (ed.) (1993), Created Landscapes: Historians and the Environment, Carlton, Vic., History Institute, pp. 7-16, here p. 8.
[496] Robin, Defending the Little Desert, pp. 62-67; Ead. (1998): Radical Ecology and Conservation Science: An Australian Perspective. In: *Environment and History* 4 (2), pp. 191-208, here 192-193.
[497] Walker, Anxious Nation, pp. 154, 164; Frost, Australia Unlimited, pp. 287.

the appearance of a new environmental ethic, a prerequisite for the emergence of modern environmentalism.[498] Based on Worster's argument, environmental historian Joachim Radkau has recently suggested considering the 1930s as "an age of 'environmental movements before the environmental movement'".[499] The findings of this chapter support Radkau's proposal. Moreover, much indicates that despite a 'boomerism' in Australia after the Second World War, continuity exists between the early ecological thought and the emergence of modern environmentalism in the 1960s and 1970s.[500] As I have argued recently, Australians like Dewar Goode, Francis Ratcliffe, or Judith Wright, who adopted the ecological vision in the wake of the soil erosion crisis of the 1930s and first half of the 1940s, played an important role in the later Australian conservation movement, which suggests an important personal continuity.[501] Just how important the changes induced by the ecological vision were will be shown in the following chapter of this section that shows how the ecological vision influenced a set of other related cultural concepts of Australians.

8 Impacts of the Ecological Vision: Engendering New Concepts

We have seen in the above chapters how the wind erosion crisis posed a threat to rural productivity and population that were important pillars for the way Australians understood themselves. At the same time, fostered by the sense of threat, substantial parts of the society adopted an ecological vision of the natural environment. This double process had impacts on a range of traditional cultural concepts Australians had held for several decades. Under the impression of the erosion crisis and the ecological vision, Australians began to see the relation between the people and the land in a new light. Likewise, some Australian writers began to consider the Australian soil as the basis for the nation's culture, so the understanding of the relationship between nature and nation was partly reshaped.

8.1 New Concepts of People and Land

A concomitant process of the adoption of the ecological vision was that Australians reassessed the relation between humans and the land they lived on. This concerned first of all the appraisal of the European settlement process, which had direct impacts on the image of the Australian national icon, the pioneer. It was paralleled by a partial reassessment of the

[498] Nash, The Rights of Nature, pp. 55, 64, 68; Worster, Nature's Economy, pp. 232, 285; Id. (1993): A Sense of Soil. In: Id., The Wealth of Nature: Environmental History and the Ecological Imagination, New York, Oxford University Press, pp. 71-83, here p. 75.
[499] Radkau, The Age of Ecology, p. 46.
[500] Robin, Radical Ecology; Ead., How a Continent Created a Nation, pp. 68-70; Dunlap, Ecology and Environmentalism, p. 77.
[501] Sauter, Australia's Dust Bowl.

land use merits of the indigenous people. Finally, it also induced changes in the ways in which Australians considered their land resource.

8.1.1 A New Image of the Australian Pioneer

The new ecological vision of the natural environment had direct consequences on Australians' self-understanding. As Michel Foucault has described in *Les Mots et les Choses*, since Europeans started to pursue the study of natural history in the 17th century, they have conceptualised themselves in opposition to nature, from which they distanced themselves to study and to dominate it.[502] Concepts of nature and humans were thus constructed like two sides of a coin. Consequently, when one side changed, so did the other. The main effect of the new ecological vision was the reconsideration of Australians' pioneering process. In the wake of the Darwinian recognition of nature's malevolent character, the drive to conquer nature and to spread civilization had become an economic as well as a moral obligation for humankind.[503] The erosion crisis now revealed that civilization was largely self-destructive and thereby unsettled the faith that the pioneering process had brought progress and peace.[504] The following quotation of Paul Sears' *Deserts on the March* vividly illustrates this new assessment on the international level:

> Mile-high, these gloomy curtains of dust are the proper backdrops of the tragedy that is on the boards. The lustful march of the white race across the virgin continent, strewn with ruined forests, polluted streams, gullied fields, stained by the breaking of treaties and titanic greed, can no longer be disguised behind the camouflage which we call civilization.[505]

A similar critical reassessment of the pioneering process happened in Australia. It was parallel to and probably intensified by the profound unsettling of the faith in colonial progress caused by the Economic Depression of the 1930s.[506] As we have seen, the pioneer myth had been central to Australians' identity. According to Hirst, pioneering had become the centre of "a nationalistic legend which deals in an heroic way with the central experience of European settlement in Australia: the taming of the new environment to man's use".[507] Battling the land and fighting nature's adversities in the form of droughts and floods had thus become a mental breeding ground for the blossoming Australian national identity; the pioneers were ennobled

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[502] Foucault choses Jonston's *Historia naturelis de quadripedidus* (Amsterdam, 1657) as benchmark for this phenomenon, see: Michel Foucault (1966): Les mots et les choses: une archéologie des sciences humaines, Paris, Gallimard, pp. 140-144.
[503] Worster, Nature's Economy, pp. 170-180.
[504] Worster, Nature's Economy, p. 179; Sears, Deserts on the March, p. 168.
[505] Sears, Deserts on the March, p. 168.
[506] White, Inventing Australia, p. 145.
[507] Hirst, The Pioneer Legend, p. 316.

through their fight against the harsh nature.[508] The ecological vision substantially disputed the sense and purpose of this pioneering effort: The axe and plough, powerful symbols of hard labour and progress of the early settlers, now turned into symbols of human ignorance and recklessness. The legacy of the early pioneers – to have suffered in order to provide prosperity for the later generation as typified in Frederick McCubbin triptych *The Pioneer* – was now twisted right around:[509] Instead of wealth, the pioneers had left their posterity spoiled land resources, as the following quotation from *The (Adelaide) Advertiser* in 1944 pointedly illustrates:[510]

> Clouds of Warning. The white man did not come to this country to make a desert and call it progress; and yet, within about a century and a half of the very beginnings of the process by which we have possessed ourselves of what we describe as our great landed heritage, some once fertile areas of Australia have been so devastated, that, in their present dreadful condition, they are well calculated, not only to alarm us, but to put us to shame.[511]

Such criticism of the pioneering process was especially strong in the Australian ecological literature at the time. Ian Mudie's poem *Retreat of a Pioneer* is a short, but harsh critique on the pioneering effort, and the critique is clearly linked to the wind erosion context:

> Vacant he sits, sucking his yellow teeth;
> hostile to change, sprawling uneasy feet
> that bullock-dray and shuffling camel knew.
> Half-blind from sand; the tribes he stole from dead;
> the land he raped made barren as his mind.[512]

Mudie's *The Australian Dream* is similarly critical about the pioneering process, the pioneering act is described as a "wild rape" of Australia that had spoiled her and plundered her fertility[513] (note the depiction of Australia as woman and the land use of man as the violent act of rape).[514] As a result of the destructive management of the environment, the "suns burn the bare earth of the abandoned runs" and "millions of acres from the sheephoof's

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[508] Ibid., pp. 316, 319-320.
[509] Ibid., p. 330.
[510] Examples could be multiplied: W. P. Thornton: 'Let's blame it on the pioneers', in: *Sydney Morning Herald*, 7 February 1948; also in official sources: "Unfortunately it must be said that the pioneers helped, as they did in America and Africa, to set in train the destruction which now threatens, in many places in Victoria, the fortunes of their descendants", in: Victoria/Stretton, Leonard E. (eds.) (1946): Report of the Royal Commission to Inquire into Forest Grazing, together with Minutes of Evidence, Melbourne, Government Printer, p. 8.
[511] *The (Adelaide) Advertiser*, 22 November 1944. For another example, see: PD, Legislative Assembly South Australia, Soil Conservation Bill, 22 August 1939, p. 614.
[512] Ian Mudie (1945): Retreat of a Pioneer. In: Id., Poems: 1934-1944, Melbourne, Georgian House, p. 26; cf. also: Regan, Poetic Politics, pp. 69-70.
[513] Ian Mudie (1945): The Australian Dream. In: Id., Poems: 1934-1944, pp. 84-96, here p. 89.
[514] The depiction of erosion as 'rape' is a classic image in soil erosion literature, see also Jacks/ Whyte, Rape of the Earth; for gendered images of the land as female, see: Haynes, Seeking the Centre, pp. 50-51; Kay Schaffer (1988): Women and the Bush: Forces of Desire in the Australian Cultural Tradition, Cambridge [et al.], Cambridge University Press, esp. pp. 22-23.

blight drift to oblivion".[515] In her poem *Dust*, Wright also reflects on the pioneering act, but she is more sympathetic to the pioneers' motives: "We counted the beautiful money/ and gave it in our hearts to the child asleep/ who must never break his body/ against the plough and the stubborn rock and tree".[516] Here, the basic fundamental idea that the pioneer cleared the land in order to provide a better future for his child is maintained; the pioneer is not fully responsible as he did not know better, while the pronoun "we" indicates the acknowledgement of a shared responsibility of past and present generations. The dream of a better future and the strength that the pioneers had demonstrated so bravely had been, however, misguided: The "dust accuses. Our dream was the wrong dream, our strength was the wrong strength". The poems end with an urgent appeal to reconsider land use in terms of sustainability.[517]

The negative impacts of the pioneering process is likewise denounced by (Stella) Miles Franklin (1879-1954)[518] in her novel, *All that Swagger* (1936).[519] The novel tells the story about an Irish pioneer and his wife Johanna. The pioneering process is described as a period when "no one thought of conserving anything" and when there was "no artistic and scientific realisation that in Australia's living unique flora and avifauna were masterpieces beyond anything she can ever contribute to museum and galleries".[520] All the pioneers had in mind was to "rifle it, exploit it in greedy haste".[521] As has been discussed, this criticism went right into the heart of Australian national identity, which was closely attached to the pioneering process. In this way, the ecological vision probably contributed to the deconstruction of the agrarian myth as basis for national identity and thus contributed to the reconstruction of the self-image of Australians in new terms, now increasingly centered on urban lifestyle.[522]

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[515] Mudie, The Australian Dream, p. 93.
[516] Wright, Dust.
[517] Bird's interpretation that the verses "our dream was the wrong dream, our strength was the wrong strength" would refer to Wright's involvement with the Jindyworobaks and her acknowledgement that this movement and its ultra-nationalist stance were wrong, is obviously at fault, caused by a detachment of the verses from their textual and a neglect of the historical context, cf. Bird, Nazi Dreamtime, p. 370.
[518] 'Miles Franklin ('Brent of Bin Bin')' in: Wilde et al., Oxford Companion to Australian Literature, pp. 299-300.
[519] Munro, Inky Stephensen, p. 124.
[520] Franklin, All that Swagger, p. 101.
[521] Ibid.
[522] A process that, according to Richard White, commenced in the 1930s and intensified after 1945, see: White, Inventing Australia, pp. 151-168.

8.1.2 Aborigines as 'Ecological Noble Savages'

The reassessment by European Australians of their own colonising merits went hand in hand with new conceptualizations they made of the indigenous population.[523] The difference between the 'savages' and 'civilised men' had been constructed in relation to their interaction with nature: 'Civilised men' had detached themselves from nature, achieved their independence, and even conquered it, while the 'savages' had failed to achieve this fundamental cultural accomplishment and were still an integral part of nature.[524] This understanding had impinged on the concept of the Australian continent as *terra nullius* which had played a crucial part in the dispossession of its native population:[525] The underlying rationale was that the Aborigines did not work the land; hence, they had no right to it. The belief that Anglo-Saxons had a duty to 'colonise the waste places of the earth', as they would make better use of the land, persisted throughout the 19th century.[526] As the concept of civilization was closely linked to the activity of farming and permanent settlement, European settlers sought to civilise Aborigines by settling them and teaching them Anglo-Saxon land management methods.[527]

In the wake of the erosion crisis of the 1930s and 1940s and the associated spread of the ecological vision, the Aborigines were conceptualised as living in harmony with their natural environment and reconstructed in terms of what has been discussed under the concept 'Ecological Noble Savage', namely the idea of native people "living in close harmony with their local environment".[528] The concept was based on mental precursors that considered Aborigines as 'Noble Savages' or as 'primitives'.[529] It had more direct antecedents in earlier ecological US-writings, namely by Nathaniel Shaler, Professor for Geology at Harvard,

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[523] About the highly problematic construction of 'Aboriginality' by European Australians see especially: Jeremy R. Beckett (ed.) (1988): Past and Present: The Construction of Aboriginality, Canberra, Aboriginal Studies Press for the Australian Institute of Aboriginal Studies; Special Issue (1992): Power, Knowledge, and Aborigines. In: *Journal of Australian Studies* 16 (35).

[524] Worster, Nature's Economy, pp. 170-173.

[525] Tim Rowse (2001): Terra nullius. In: Graeme Davison et al. (eds.), Oxford Companion to Australian History, p. 643.

[526] Attwood, Rights for Aborigines, p. 8.

[527] Ibid., pp. 2-7, 60-61.

[528] Anthropologist Ter Ellingson attributes the origin of the term to the American conservationist biologist Kent Redford, who supposedly first introduced it in 1991 in his article 'The Ecologically Noble Savage', only to immediately refute it as a myth (cf. Kent Redford (1991): The Ecologically Noble Savage. In: *Orion* 9, pp. 24-29). Redford defined the 'ecological noble savages' as "living in close harmony with their local environment". Ellingson points to the fact that the label is extremely vague and that no exact or generally accepted definition exists at the moment, see: Ter Ellingson (2001): The Myth of the Noble Savage. Berkeley, Calif., University of California Press, pp. 345-348.

[529] Attwood, The Making of the Aborigines, p. 108; Id. (1992): Introduction to special issue: Power, Knowledge, and Aborigines. In: *Journal of Australian Studies* 16 (35), pp. 1-16, here p. 4; Jeremy R. Beckett (1988): The Past in the Present: the Present in the Past: Constructing a National Aboriginality. In: Id. (ed.), Past and Present: The Construction of Aboriginality, pp. 191-217, here p. 205.

whose writings, influenced by George Perkin Marsh,[530] combined ecological concepts with ideas of Darwinian racism.[531] In the context of the wind erosion crisis, the concept of the 'ecological noble savage' was broadly diffused within the Australian society, a fact that has been neglected up to date.[532] The following thoughts of A. E. Richardson of the Waite Institute on the origins of soil erosion clearly show that the erosion context was fundamental for the association between ecology and Aborigines:

> Primitive man disturbed the condition of the soil no more than did the lower animals, but in the upward march of man he became a devastator. […] To appreciate the Australian problem in proper perspective it is necessary to bear in mind the conditions which existed in Australia prior to the advent of white settlement. […] So far as the fauna is concerned, the Australian continent was at the outset of white settlement thinly populated with a primitive race belonging to the stone age, and grazing herbivorous animals such as wallabies and kangaroos. [...] Under these conditions it is improbable that there was any soil drift, or if so it was probably confined to the interior sandy deserts. Then came the white man to colonise the country, and with axe, firestick and plough in the better rainfall country, he began to upset the age-old balance of vegetation.[533]

Richardson maintains the established opposite between the 'civilised white man' and the Aborigine who – as integral part of nature – is even classified among the native animals. As a primitive race, the Aborigines are conceived as part of untouched, pre-civilised nature. In this way, Richardson clearly applied the racist stereotypes of the interwar-years when Aborigines were generally seen as an inferior primitive race belonging to the Stone Age, thus ascribing them to the past.[534]

Similar concepts of the Aborigines as 'ecological noble savages' were widespread among soil conservationists of the 1930s and 1940s: Charles Tate Clark of the Soil Conservation Board of Victoria, spoke of "a comparatively few wild creatures" that had "roamed these areas in a natural balance between animal and vegetable life".[535] Sam Clayton from the Soil Conservation Service in New South Wales regarded Aborigines as "primitive" and described their actions as "mainly protective rather than destructive".[536] In all of these arguments, the ecological balance of the pre-settlement days had been upset through the

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[530] Sharon E. Kingsland (2005): The Evolution of American Ecology, 1890-2000, Baltimore, Johns Hopkins University Press, pp. 9-14.
[531] Nathaniel Shaler: "To see our position with reference to the resources of the earth it is well to begin by noting the fact that the lower animals, and primitive men as well, make no drain on its stores. [....] With the first step upward, however, and ever in increasing measure as he mounts towards civilization, man becomes a spoiler", in: Nathaniel S. Shaler (1905): Man and the Earth, New York, Fox, Duffield & company, p. 2.
[532] Raymond Hames (2007): The Ecologically Noble Savage Debate. In: *Annual Review of Anthropology* 36, pp. 177-190, here p. 179; Beckett, The Past in the Present, p. 205.
[533] Richardson: 'Soil Erosion Problem. Subject of Great National Importance', in: *(Adelaide) Chronicle*, 2 December 1937.
[534] Attwood, Rights for Aborigines, pp. 66-67.
[535] Clark, Soil Erosion in Australia, p. 12.
[536] Eric E. S. Clayton: 'Soil Erosion. Position in Australia', in: *Sydney Morning Herald*, 28 December 1933.

arrival of white settlers who had destroyed the forests and exploited the soil.[537] Journalists of popular newspapers joined in the interpretation of (pre-European settlement) Aborigines as living in harmony with nature in opposition to the white man as soil destroyer.[538] This way of conceptualising Australia's indigenous population was closely linked to their hunter-gatherer lifestyle and differed from concepts present in other colonial states: In New Zealand and in some African states, the occurrence of wind erosion in the first half of the 20th century was partly blamed on indigenous land management methods and in some African countries, it even resulted in repressive legislation against the indigenous population.[539] In Australia, voices, who suspected that the burning regimes of the Aborigines might have contributed to soil erosion in Central Australia existed, but they were well in the minority.[540]

As a result of the ecological vision, the opposition between white and black impact on the land was increasingly constructed in ecological terms. To make the point clear: The arguments built around the non-management of the land did not lose any of their racial and discriminatory meaning; also, ideas of a supposed opposition between civilised white Australians and the barbarism of Aborigines persisted into the second half of the 20th century.[541] Still, the image of the relation of Aborigines to the land was partly reshaped. In the past, white Australians used the non-cultivation of the land as proof of the Aborigines' inability to possess the land and as a pretext to dispossess them of it; the ecological vision then questioned such reasoning and put the destruction of the soil on equal footing with the murder of the Aborigines.[542]

This twist of the ecological vision on Aborigines appeared most often in the literary genre. At the forefront were again the Jindyworobaks, who, as we have seen, sought to create a distinct Australian literature based on environmental values. In their eyes, the Aboriginal culture inherently contained those environmental values; consequently, identifying with the indigenous culture seemed a convenient way to create a national poetry.[543] It was especially

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[537] Ibid.
[538] Examples: 'The Control of Erosion. Dr. A.E.V. Richardson Makes Suggestions', *Gippsland Times*, 17 July 1939; 'We Face a Battle For our Soil And Water' in: *Pix*, 27 July 1946; 'Appeal by state soil conservator', *(Adelaide) Chronicle*, 11 October1945; 'Natural Resources. Early Settlers were Careless of the Country's Wealth' in: *The Farmer and Settler*, 31 October 1935.
[539] Beattie, Empire and Environmental Anxiety, p. 179.
[540] "Further, it was possible that the aborigines, who frequently burned off large areas, had in the past been responsible for the erosion and dust storm conditions in Central Australia. Scorched areas in the plain country have been traced to the custom of the aborigines in burning off grass country to assist in the hunting of game", in: 'Soil Erosion Danger', *The Canberra Times*, 17 February 1937.
[541] Richard Nile (2000): Civilisation. In: Id. (ed.), The Australian Legend and Its Discontents, St Lucia, Qld., University of Queensland Press, pp. 42-58, here pp. 46-47.
[542] That goes along with the acknowledgement that Aborigines have a special knowledge of the land, as stated by Walker, Anxious Nation, p. 163.
[543] Strauss, Literary Culture, p. 114; Ross, Landscape and the Australian Imagination, pp. 229, 233.

this endeavour that pilloried the movement and exposed them to harsh criticism.[544] Many poems of the Jindyworobaks indirectly claimed that the Aborigines' way of life was more appropriate to the Australian environment than the one of white Australians. We have already seen the ecological vision on soil erosion in Rex Ingamells' *The Great South Land*: *An Epic Poem*. If we take the stanza some lines further, the link between the mistreatment of the soil and the indigenous population is apparent:

> [...]
> your herds of cattle and your flocks of sheep;
> but here in the Land of the South are your blights -
> erosion
> extended to death of timber and death of soil,
> your crimes, diseases, and your deeds of blood.
> The few remaining Aborigines
> sing their sad monodies beside the creeks...
> hoof-desecrated sacred waterholes.[545]

The close link between the misuse of the land and the harm of the Aborigines is evident, and it is further emphasised in the later verses 811-812 quoted here: "We, the White Oppressors, are in control/ Of a Land whose Aborigines we murdered".[546] The same link between the misuse of soil and the oppression of the indigenous population appears in Ian Mudie's *The Australian Dream*: "For death we brought, death to all things that stood against the ravage of our greed".[547] Therein as in other poems,[548] Mudie stylised indigenous Australia as a role model of a harmonious relationship with the environment: "The great land slept, with its dark sons and daughters well content to leave its soil unraped, and cherish it as mother-goddess of their hero-gods".[549] In Mudie' poem, *Belong*, which appeared in the same series as his soil erosion poems, the speaker of the poem leaves no doubt as to whom the land really belongs: "Dam it, Jacky, you know it too; the whole damn country belongs to you; they never belong for even a day; for Europe is only a dream away".[550]

Some Australian prose writers likewise adapted the view of Aborigines as living in greater harmony with Nature and having a better understanding of the land – and perhaps even a better claim to it: In Miles Franklin's *All that Swagger*, the ecological vision marries Edenic concepts: Before the European settlement, Australia was a "wonder continent, a vast

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[544] Namely by the opposing literary group, the Angry Penguins, see: Strauss, Literary Culture, p. 114; Serle, The Creative Spirit, pp. 171-174.
[545] Book Eleven 'Invasion', verses 768-787, in: Ingamells, The Great South Land, p. 298.
[546] Ibid., p. 300.
[547] Mudie, The Australian Dream.
[548] Regan, Poetic Politics, pp. 81-85.
[549] Regan, Poetic Politics, p. 79; Mudie, The Australian Dream.
[550] Ian Mudie (1945): Belong. In: Id., Poems: 1934-1944, Melbourne, Georgian House, p. 30. The term 'Jacky' is a discriminatory designation for Aborigines by white settlers, see for example: Chris Healy (2008): Forgetting Aborigines, Sydney, University of NSW Press, pp. 96-99.

garden of Eden free from sin and disease, left intact by the aborigines".[551] Xavier Herbert similarly adopted such a vision: Following the lifeline of half-caste Norman Shillingsworth, the novel *Capricornia* recounts the violent acts of European pioneers towards the Aborigines and their misuse of the natural environment.[552] In *Poor Fellow my Country*, the ecological vision of the environment likewise goes along with the understanding that Aborigines have a specific understanding of the land.[553] In *The Timeless Land*, Eleanor Dark describes the story of the first years of European settlement from the double-perspective of the Aborigine Bennilong and of European settlers.[554] The relationship between the Europeans and Aborigines on the one hand, and between Europeans and the environment on the other is characterised as highly problematic.[555] That Dark's ecological vision is linked to her concern about soil erosion appears in an essay of 1944 about 'Australia and the Australians', a reflection about the Australian national character.[556] While Dark acknowledges the progress that Australians had made on the continent, she also points to the dark sides of the settlement process:

> Against them must be set the ignorance and greed that used the land too recklessly, overstocking it till pastures become deserts; denuding the earth of its vegetation till the precious soil eroded, and the still more precious rivers silted up; felling trees irresponsibly, without knowledge or forethought using valuable timber for posts and rails, or even for firewood; building barbarously with no thought for beauty. And, darkest of all blunders, heaviest upon our conscience, the blunder of our dealings with the black Australians whose land we stole.[557]

Here, the link between the acknowledgement of the destruction of the land through white settlers and their destruction of the indigenous population is again explicit, as is the acknowledgement of the Aborigines as the original and rightful possessors of the land that had been stolen from them.

If there was a partial re-imagining of the relation between the Aborigines and the land, this acknowledgement apparently did not have any practical political consequences. The Aborigines themselves certainly did not subscribe to the vision of the 'Ecological Noble Savage'; quite the contrary. In their fight for civil rights, Aboriginal activists of the 1930s and 1940s focused on assimilation and used arguments that went right against the ideas that underlay the ecological vision. They vehemently refuted the idea of being a race belonging to

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[551] Franklin, All that Swagger, p. 101.
[552] Laurie Clancy (1992): Australian Fiction. Melbourne [et al.], Oxford University Press, p. 153; 'Capricornia' in: Wilde et al., Oxford Companion to Australian Literature, pp. 148-149.
[553] Clark, Environmental Themes, p. 432.
[554] 'The Timeless Land' in: Wilde et al., Oxford Companion to Australian Literature, p. 748.
[555] Mulligan/Hill, Ecological Pioneers, p. 91.
[556] Eleanor Dark (1944): Australia and the Australians. In: Australia Week-end Book 3, pp. 9-18; Mulligan/Hill, Ecological Pioneers, p. 91.
[557] Dark, Australia and the Australians, p. 10.

the Stone Age and claimed that Aborigines could and should actively participate in the present society and were apt for civilization on similar lines as white Australians.[558] However, influences of the ecological vision might be found in the suggestions from some Aboriginal activists as well as anthropologists of the time that Aborigines were better suited to live in the arid interior of the continent,[559] as the following quote by Aboriginal activist William Cooper in June 1937 illustrates: "We claim that, given a trial, we are capable of producing yeomanry that can open up and develop the outback better than anyone else".[560] As historian Russell McGregor has shown, such arguments were indeed linked to a better acknowledgement of the specific climate of Australia's interior and a reassessment of the capacities of its population as well as to the acknowledgement that Aborigines might be better adapted to such difficult environments[561]. Far from emphasising the potential superiority of their indigenous land use, those activists who called for the granting of land emphasised rather that they could put the land to a productive agricultural use by imitating European practices.[562] It is interesting to note that on both sides, the idea inscribed itself in the contemporary debates about populating the inland as means of gaining economic wealth and national security.[563] Even if there were no immediate practical consequences, the new concept of Aborigines in ecological terms and the more critical self-assessment of European settlement might have changed the mentality of some European Australians. Richard White has, for example, noted that the "cautiously sympathetic press reaction" on the occasion of the Day of Mourning in 1938, might indicate that "the confident racism of the earlier years was beginning to recede".[564]

Even if the immediate impacts of the concept of the 'Ecological Noble Savage' on the Australian society were limited, it revealed itself as long-lasting. The idea of Aborigines living in greater harmony with the environment was in an upswing in the 1960s and 1970s, when nature conservationists advertised the ecological vision and anthropologists increasingly pointed to the spiritual and cultural relation of the Aborigines to their land, which was considered as the basis for a special ecological land ethic.[565] Tim Flannery, born in 1956, remembers the prevalence of this concept when growing up: "I learned also that Aborigines had not had any impact on Australian flora or fauna … these views were common in the

[558] Russell McGregor (1993): Protest and Progress: Aboriginal Activism in the 1930s. In: *Australian Historical Studies* 25 (101), pp. 555-568, here pp. 555-557.
[559] Russell McGregor (2004): Develop the North: Aborigines, Environment and Australian Nationhood in the 1930s. In: *Journal of Australian Studies* 28 (81), pp. 33-45, here pp. 37-38.
[560] Quoted in: McGregor, Protest and Progress, p. 566.
[561] Ibid.
[562] Attwood, Rights for Aborigines, p. 6; McGregor, Protest and Progress, p. 566.
[563] McGregor, Protest and Progress, p. 566.
[564] White, Inventing Australia, p. 146.
[565] Attwood, Rights for Aborigines, p. 292.

1960s".[566] Flannery's book *The Future Eaters*, published in 1994, illustrates the shift of view on aboriginal land management during the 1980s and 1990s:[567] Flannery greatly helped to popularise the idea that the fire regime of the Aborigines led to substantial modifications of Australia's natural environment, but he was also highly criticised for the lack of reliable data he used for his arguments.[568]

It is important to historicise the concept of the 'Ecological Noble Savage' for two reasons: First, it sheds light on conceptions of race that may indirectly inform the discipline of environmental history.[569] The racist ideology that informs parts of the concept, especially if one considers the closeness of the Jindyworobaks and many of the quoted ecological prose writers with Stephensen's *Australia First!* movement, makes it essential to understand the history of the concept. This is even more important as the 'noble ecological' argument has been largely used by the modern international conservation movements.[570] Even if analytical research on this link for the Australian case is sparse, multiple examples can be found: When in the early 1980s, dust storms swept again over the continent, the Australian Conservation Foundation initiated a soil conservation campaign that included a poster stating:

> Although soil is perhaps Australia's greatest natural resource, much of it has been lost or degraded since the arrival of Europeans 200 years ago. […] The soils of the continent fed some 300,000 Aborigines for many hundreds of generations in a hunter-gatherer lifestyle that developed a **harmonious relationship** with the various ecosystems. [...] Will we too, make the effort to **understand and care for the land like our predecessors?**"[571] [Emphasis mine]

It is therefore not surprising that conflicts arose between Australian conservationists and some Aboriginal Australians when the latter were not prepared to follow the stereotyped image painted of them and preferred instead to exploit the natural resources on their lands in order to gain economic independence. This was, for example, the case when in 1987, a local Aboriginal group fought the World Heritage nomination of north Queensland's West Tropic Rainforests.[572]

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[566] Tim Flannery (1994): The Future Eaters. An Ecological History of the Australasian Lands and People, New York, Grove Press, pp. 13-14.
[567] In 1981, Hughes and Sullivan suggested that Aboriginal fire regimes led to increased soil erosion, see: P. J. Hughes/M. E. Sullivan (1981): Aboriginal Burning and Late Holocene Geomorphic Events. In: *Search* 12, pp. 277-278; see also: Barr/Cary, Greening a Brown Land, p. 8.
[568] Flannery, The Future Eaters; Kohen, Aboriginal Environmental Impact; Barr/Cary, Greening a Brown Land, p. 8; Garden, Australia, New Zealand, and the Pacific, pp. 16-22; Libby Robin/ Tom Griffiths (2004): Environmental History in Australasia. In: *Environment and History* 10 (4), pp. 439-474, here pp. 458-459.
[569] Following the call of Carolyn Merchant (2003): Shades of Darkness. Race and Environmental History. In: *Environmental History Review* 8, pp. 380-394, here p. 381.
[570] Hames, The Ecologically Noble Savage Debate, p. 185.
[571] Australian Conservation Foundation (ed.) (1982): Conserving our Soil. Soil Degradation – the Problem: Educational Backgrounder.
[572] Phillip Toyne/Ross Johnston (1991): Reconciliation, or the New Dispossession? In: *Habitat Australia* 19 (3), pp. 8-10.

Second and even more importantly, concepts of the 'Ecological Noble Savage' also informed the international indigenous land rights movement.[573] Again, research on the Australian case is lacking, but the following quote from 1988 in the *Canberra Times* suggests that the link between the land right movement and ecological arguments was strong:

> Research into early Aboriginal impact on the environment cast doubt **on the main argument for land rights**, the congress was told yesterday. The idea of Aborigines being in harmony with nature was naïve, a researcher from the University of Wollongong, Dr Lesley Head, said in a paper on Aboriginal impact on vegetation. […] The idea of Aborigines as being in harmony with nature and thus having absolutely no impact on the environment suited a naïve view of wilderness that was prevalent in the 60s and 70s' he said.[574] [Emphasis mine]

As the 'Ecological Noble Savage' concept refers to some of the most crucial questions of Australians self-understanding, it goes right into the socio-political battlefields of today, as archaeologist Mike Rowland has pointedly illustrated.[575]

8.1.3 A Reassessment of Land as a Resource

As a result of the bitter experience of drought and wind erosion, and the spread of the ecological vision, Australians partially reassessed their expectations in the land as a resource. Again, this process was discontinuous and met significant opposition. Even those soil conservationists who acknowledged in principle the ecological vision sometimes had difficulties grappling with its full meaning: If one was ready to accept that the pastoral and agricultural land use had destroyed the soil in the past, the logical consequence would have been to retreat from the land and to limit agricultural production. This, of course, was unimaginable for most Australians at the time.[576] Australian soil conservationists were therefore struggling to reconcile the ecological vision with the economic reality. Charles Tate Clarke, for example, stated that there was "no shadow of doubt that, since the clearing of the Mallee, the rate of erosion has been very greatly accelerated".[577] He then continued in an illuminating way:

> [...] merely to blame the clearing for the acceleration of erosion is to say that we should not have done any clearing, while the real fact is that, if we had not cleared Mallee country, we should not have had nearly as much wheat as we now grow; and much less wool and mutton would be produced.[578]

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[573] Hames, The Ecologically Noble Savage Debate, p. 183.
[574] 'Fire-stick farming "destroyed forests"', *Canberra Times*, 17 May 1988, p. 11.
[575] Mike J. Rowland (2004): Return of the 'Noble Savage': Misrepresenting the Past, Present and Future. In: *Australian Aboriginal Studies* 2004 (2), pp. 2-14.
[576] Similar quandary stated by Worster for the American case, see: Worster, Nature's Economy, p. 237.
[577] Clark, Soil Erosion in Australia, p. 20.
[578] Ibid.

This reasoning might be the result of bad editing, but it looks much like a classical case of denial, faithful to the maxim of German poet Christian Morgenstern: **"**For that which must not, cannot be".[579] Robert (Bob) Herriot, the South Australia's first soil conservator, was obviously more self-aware about where the shoe pinched:

> All the great lessons on soil conservation have been learnt from nature, but, whilst lasting conservation would undoubtedly result from a retreat to nature, such a step is obviously impracticable. We must, however, arrange our land use to approach as near to this ideal as possible and yet produce the needs of our population. It is of fundamental importance that we recognize certain limits, beyond which we dare not go for each piece of land, if conservation is our aim.[580]

The practical consequence for most conservationists was the compromise that Herriot suggested: Trying to use the land as well as possible while acknowledging certain limits and providing maximum conservation.[581]

Even if Australians continued to prioritise their own needs over those of an intact ecosystem, the ecological vision had important impacts on how Australians thought about their land resources, namely the potential of the continent's 'vast open spaces' and the country's development capacity. As we have seen, Australia's arid centre, the 'outside country', had an ambiguous status for Australians. It was the Australian 'frontier', having the ambiguous status of being at the same time the 'Never-Never' – a looming place of non-existence – and a place of promise and progress.[582] In the years after the First World War, the inland masses were the surface on which Australians projected their hopes and dreams in regard to economic growth and population increase. The bitter experience of the 1930s then revealed that encroachment towards the interior, be it through pushing the pastoral areas into the desert fringe or the advance of cultivation in the semi-arid marginal areas, had come to an end. The erosion crisis brought the acknowledgement that the geographical and climatic 'frontier' was now closed, as Professor Gordon Wood from the Department of Agriculture at Melbourne University explained in 1947:

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[579] Christian Morgenstern "Die unmögliche Tatsache": "Weil, so schließt er messerscharf, nicht sein kann, was nicht sein darf. "

[580] Robert Herriot (1941): Soil Conservation. Reprinted from: *Journal of Agriculture of South Australia*, December 1941, in: [SLV: GOOD 00163, 5, Arid Zone, 1941 - 1943], Dewar Wilson Goode Collection, MS 13586]. For another example see: Robert I. Herriot (1942/43): Soil Conservation – A Community Problem. In: *Journal of Agriculture of South Australia* 46, pp. 376-379, here p. 376.

[581] Similar to the soil conservationists in the USA, cf. Worster, Nature's Economy, p. 234.

[582] About these specificities of Australia's 'frontier', see: Tom Griffiths (2001): The Outside Country. In: Tim Bonyhady/Tom Griffiths (eds.), Words for Country: Landscape and Language in Australia, Sydney, University of New South Wales Press, pp. 223-244, here p. 223.

> The frontiers had changed. It was no longer wise to push agriculture further into the erratic rain belts, or to march further into the desert margins in the hope that profits could be made from ephemeral pastures. The problem was how to use the proven areas more efficiently.[583]

Land was now often seen in a different light. Griffith Taylor, who had been an early critic of the population rhetoric after the First World War and had been sharply attacked for his view in the past, noticed in 1937, not without satisfaction, a change of the public mind when he declared that "the forecast made by the writer over twenty years ago is now generally accepted by Australians. It was to the effect that the future millions of Australia are going to find their dwelling places and occupations in the lands already known by 1865".[584] We have already seen in the second part of the thesis that British botanist Francis Ratcliffe was one of the expert voices that warned about the environmental limits of Australia's land as a resource.[585] From his research trip in South Australia in 1935/36, he came back "a fervent believer in the 'dead heart'" of the continent.[586] As stated before, Ratcliffe judged large areas of arid Australia to be unsuitable for pastoral use, and consequently propagated retreat from those regions.[587] Ratcliffe dismissed the popular idea that Australians would not use their land mass to its full potential. In his popular book *Flying Fox and Drifting Sand*, he gave the following verdict: "Australians have every reason to be intensely proud of their record in settling the great spaces of the inland. They are to be blamed only in that they seem to have done the job too thoroughly".[588] In light of the long-standing hopes Australians had put in the land resources and the pride of their pioneering effort, it is not surprising that Ratcliffe's suggestions encountered some resistance among Australians. In February 1939, R. W. A. Warren of Kalannie, Western Australia, wrote a letter to the editor of (*Adelaide) Advertiser* in February 1939, tagging Ratcliffe as "a young Oxford graduate, who had not been born at the time, and so never saw the country before it was ravaged".[589] He dismissed Ratcliffe's assumption that the rabbit did not play a major part in the occurrence of wind erosion and claimed the truth of experience for himself.[590] Warren also wrote to Spafford, the chairman of

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[583] Gordon L. Wood (1951/1st ed. 1947): The Australian Achievement. In: Id. (ed.), Australia. Its Resources and Development, New York, Macmillian, pp. 7-19, here p. 17.
[584] Taylor, Possibilities of Settlement, p. 225.
[585] Walker, Anxious Nation, p. 164; Robin, How a Continent Created a Nation, pp. 68-69.
[586] Letter from Francis Ratcliffe to David Rivett, 11 November 1935. In: [NAA: A9778, C30/5/148, Miscell [Miscellaneous] 2, soil erosion, to end of 1935, soil drift, correspondence on (miscellaneous), to end 1935].
[587] Ratcliffe, Flying Fox and Drifting Sand, pp. 317-323.
[588] Ibid., p. 332.
[589] 'Soil Erosion in N.E. Wholly Due to Rabbits', *The (Adelaide) Advertiser*, 25 February 1939; see also: Powell, Francis Ratcliffe's First Impressions, n.p.
[590] Ibid.

the South Australian Soil Conservation Committee, with about the some content.[591] Warren felt that after all their "sufferings" from developing "that inhospitable country" it was "pretty hard [...] to have it continually thrown up at us that our pioneering efforts only resulted in [...] ruining the country".[592]

A similar line as Ratcliffe was taken by Australian geologist and explorer Cecil Thomas Madigan (1889-1947).[593] In 1937, in his presidential address to the Australian and New Zealand Association for the Advancement of Science, he assessed the potential of interior Australia. Madigan pointed to the fact that the idea of vast empty spaces of Australia which were capable of absorbing huge numbers of people and thus relieving world over-population was a myth and should finally be rejected.[594] While he thought that a total population of about 60 million could be reached in the course of the next 200 years, this population increase would have to be attained essentially through concentration on the secondary industries. In addition to economic arguments, he also spoke of the limits of the land as a resource: "Far from there being any valuable unused lands, however, development had, in many cases, gone too far, and heroic efforts had been made to make more of the country than Nature would allow".[595] Madigan also argued that immediate action to stop soil erosion was necessary in order to reach the high population numbers Australia hoped for.[596]

In 1942, William Douglass Forsyth, research fellow at the school of commerce at the University of Melbourne, addressed the question of Australia's population numbers in his book *The Myth of Open Spaces. Australian, British and World Trends of Population and Migration*.[597] Forsyth analysed actual global migration patterns and came to the conclusion that "certain illusions about Australia's capacity to receive immigrants should be destroyed".[598] Countries like Britain no longer had the need to release population pressure; equally important, Australia did not have the 'vast open spaces' to absorb high population numbers.[599] This was largely due to environmental limits:[600] The fact that just a small

[591] Letter from R.W.A. Warren, to Spafford, 12th February 1939, in: [NAA: A9778, C30/5/150 Soil Erosion Committee, South Aust [Australia]].
[592] Ibid.
[593] L. W. Parkin, L. W. (1986): Madigan, Cecil Thomas (1889–1947). ADB Online: http://adb.anu.edu.au/biography/madigan-cecil-thomas-7455/text12985 [Accessed 30 March, 2016]; Cecil T. Madigan (1937): Review of the Arid Regions of Australia and their Economic Potentialities. In: F. J. A. Brogan (ed.), Report of the Twenty-Third Meeting of the Australian and New Zealand Association for the Advancement of Science, Wellington, pp. 375-397.
[594] Ibid.
[595] 'Addresses at Science Congress. Australia's Arid Regions', *Sydney Morning Herald*, 14 January 1937.
[596] Ibid.
[597] Walker, Anxious Nation, p. 166.
[598] William D. Forsyth (1942): The Myth of Open Spaces. Australian, British and World Trends in Population and Migration, Melbourne [et al.], Melbourne University Press, p. 68.
[599] Walker, Anxious Nation, p. 166.

percentage of the continent was populated and an even smaller part of it was cultivated was not "due to indolence or greed on the part of Australians" but was the result of "the permanent facts of geography".[601] Forsyth claimed that 42 per cent of the area of the continent could be regarded as desert and was unsuited for permanent settlement.[602] He argued that the tropic part of the country suffered from an irregular spread of rainfall, poor agricultural soils, and a climate difficult for supporting white people.[603] The temperate part of Australia was in large parts either economically or ecologically unsuitable for cultivation:

> Before considering the possibilities of closer settlement in the favoured regions, we should notice the extent to which in some areas agricultural expansion has overshot the bounds of safe cultivation, and in others cultivation has resulted in serious erosion and soil deterioration. Both facts place limitations upon new settlement.[604]

When he spoke of the agricultural areas where expansion had "overshot the bounds safe for cultivation", Forsyth referred to the marginal lands in parts of South Australia, New South Wales, Victoria, and Western Australia. The retreat from parts of these regions in the second half of the 1930s was, according to him, caused in some places by lower prices for cereals, yet, in other places it was "due to lessened soil productivity brought about by erosion, over-grazing or exhaustion of the soil by unscientific cultivation".[605] He therefore concluded that "erosion and soil-deterioration must be recognized as factors which make it more difficult to increase the productivity capacity of the pastures and farms, and consequently their capacity to support new population".[606]

A comparable reasoning is found in the writings of Clive Melville Hambidge, South Australian Surveyor-General and president of the South Australian Branch of the Royal Geographical Society of Australasia. In 1945, he likewise refuted the idea of Australia having large open spaces ready to absorb great population numbers and emphasised that Australia's future population increase would have to take place in the secondary industries.[607] In the past, cereal growing had caused "soil impoverishment and erosion"[608] and had revealed that the limits of agricultural expansion had been reached. If there was to be any development of the

[600] Ibid.
[601] Forsyth, The Myth of Open Spaces, p. 68.
[602] Ibid., p. 70.
[603] Ibid., pp. 73-75.
[604] Ibid., p. 85.
[605] Ibid., p. 87.
[606] Ibid., p. 89.
[607] C. M. Hambidge (1945): Some Problems of Land Settlement in Post-war Years. In: *Proceedings of the Royal Geographical Society of Australasia. South Australian Branch* 46, pp. 22-30, here p. 29.
[608] Ibid., p. 28.

state's primary industries, this had to be limited to good rainfall areas or irrigation settlements.[609]

The shift in the assessment of Australia's natural resources in the years after the Second World War is well reflected in a collective volume on Australia entitled *Australia. Its Resources and Development*, edited by Gordon L. Wood in 1947. The theme of the changed frontiers, as stated by Wood in the introduction, ran like a common thread through many of the papers. When discussing the future of pastoral areas in Australia, Griffiths J. Davies and C. S. Christian, made clear that the limits had already been reached or even over-stepped. No scientific studies indicated that an increase of grazing animals could be expected, quite the opposite seemed more likely:

> [...] for the animal-land ratio to fall as a result of deterioration of the plant cover owing to over-grazing during droughts and to the wind erosion following the denudation of the surface. Recovery of the 'eaten-out' areas is slow; and the outstanding problem of these areas is to prevent exploitative grazing.[610]

The underlying argument for the limits of pastoral development was an ecological one: "The delicately poised balance of nature, already rendered unstable by the introduction of sheep" had been additionally upset by the rabbits, denuding the soil surface of its vegetative cover and inducing soil drift, thus bringing "tragedy [...] on that unhappy and much abused land".[611]

W. S. Kelly, who assessed the potential of Australia's wheat growing areas in the same volume, designated the soldier settlement schemes after the First World War as "an unwise expansion into areas unsuitable for wheat growing".[612] While the farmers had done everything in their power, had even been "reckless in taking risks",[613] the result had often been economic failure and sometimes land degradation through wind erosion.[614] The conclusion was unambiguous: "There is certainly room for much intensification of production in many of our areas; but as regards wheat, there is no area of any significance where there is a dog's chance of success where Australians have not already given wheat-growing a good go".[615] Therefore, Kelly resumed, any insinuations that Australia would not make good use of her land resources were unjustified.

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[609] Ibid., pp. 24-29.
[610] Griffiths J. Davies/C. S. Christian (1951/1st ed. 1947): Pasture and Fodder Resources. In: Gordon L. Wood (ed.), Australia: Its Resources and Development, pp. 59-75, here p. 60.
[611] Ibid., p. 86.
[612] W. S. Kelly (1951/1st ed. 1947): The Australian Wheat Industry. In: Gordon L. Wood (ed.), Australia: Its Resources and Development, pp. 119-128, here p. 123.
[613] Ibid., p. 128.
[614] Ibid., p. 125.
[615] Ibid., pp. 127-128.

In the same reader, Patricia McBride was charged with an article on 'Climate and the Peopling of Australia'. She likewise joined in the criticism of those voices that accused Australians of not developing its land resources properly and refuted population estimations of about 120 or 200 million people as "worthless".[616] McBridge considered that "in the face of sustained efforts to develop it more intensively", three quarters of Australia were sparsely settled, because of climatic factors.[617] The Australian desert was not a myth, but reality, and as a consequence, one-third of Australia would remain almost unpeopled.[618] The experience of the erosion crisis was one important factor informing her moderate estimations about the continent's population potential: As far as the pastoral areas in the south were concerned, wool growing had been "pushed as far as possible into the drier regions".[619] The carrying capacity had been reduced by over-grazing and soil erosion so that the pastoral frontier was even in retreat instead of advancing. The same was true with the "inland boundary of the wheat belt", which had already been pushed into territory with largely unsuitable climate.[620] The increase in population, she concluded, would therefore be in the lands already under pastoral or agricultural occupation, and no more land would be added on the interior fringes.[621]

The reassessment of the resource land in the context of the erosion crisis was a significant conceptual change. It brought about the recognition that Australia's future would lie in the cities and industries rather than in the countryside and the agrarian sector. This assertion, of course, also meant greater autonomy from Great Britain, the main importer of Australians' primary products. In light of the strength of the agrarian myth in the years after the First World War, Richard White even speaks of an "ideological offensive" since the 1930s undertaken by those who propagated the image of Australia as an industrial nation.[622] There is no doubt that the argument of the environmental limits of an 'agricultural Australia' espoused such efforts. In this way, the re-evaluation of the land resources in ecological terms was part of the more general trend of a reorientation of Australia's economy towards its industrial sector, which had already begun in the 1920s and was then accelerated by the experience of the Second World War.

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[616] Patricia McBride (1951/1st ed. 1947): Climate and the Peopling of Australia. In: Gordon L. Wood (ed.), Australia: Its Resources and Development, pp. 20-38, here pp. 21-22.
[617] Ibid., pp. 22, 25.
[618] Ibid., p. 29.
[619] Ibid., p. 30.
[620] Ibid., p. 35.
[621] Ibid., p. 31.
[622] White, Inventing Australia, p. 149.

8.2 New Concepts of Nature and Nation

As we have seen in the sixth chapter, wind erosion was seen by large parts of Australia's society as a genuine menace, not merely to the farmer or pastoralist, but to the nation as a whole. As the spread of the ecological vision was closely tied to this concept of 'erosion as a national menace', ecological ideas merged with nationalism. This fusion was especially promoted by those who considered the Australian soil itself as part of the nation's fundament, namely a range of Australian writers, and consequently adopted a fervent cultural nationalism. Among them was the group of the Jindyworobaks, but also writers like Judith Wright, Eleanor Dark, (Stella) Miles Franklin, and Xavier Herbert. They were to some degree influenced by Percy R. Stephensen,[623] who thought that "the culture of a country [was] the essence of nationality, the permanent element in a nation".[624] The basis of the culture of every nation in turn, was deeply anchored in what he called the 'Spirit of the Place', namely the "intellectual and emotional expression of the *genius loci"*.[625] Stephensen considered the settlement process in critical terms, as the immigrants had "merely raped the land, or 'settled' it, as we say, with unconscious irony in our choice of a word to describe the process of destroying its primitiveness".[626] Now it was time to develop an Australian culture in accordance with the environment. In Stephensen's eyes, poet and writer should play the key role in creating the culture as the basis of the Australian nation.[627] The same year that Stephensen wrote the *The Foundation of Culture in Australia*, he also founded the magazine *The Publicist*, which propagated social nationalism, anti-Semitism, anti-communism, and racism and sympathised with the German and Japanese governments.[628] Based on the nucleus of writers around the *Publicist*, Stephensen then founded the fascist 'Australia First!' movement in October 1941.[629] He succeeded in reassembling most of the Jindyworobaks behind the movement, most notably Rex Ingamells and Ian Mudie, who became active members.[630] The movement was short-lived: 'Australia First!' was dissolved after only four months when Stephensen, along with fifteen other members and associates of the movement,

[623] Bird, Nazi Dreamtime, pp. 143-144, 159-163, 250-251, 279-281, 302; Winter, The Australia-First Movement, p. 2; Munro, Inky Stephensen, pp. 192, 198; Clark, Environmental Themes, pp. 432-433.
[624] Stephensen, The Foundations of Culture, p. 25.
[625] Ibid., p. 13; see also: Clark, Environmental Themes, p. 429.
[626] Stephensen, The Foundation of Culture, p. 11.
[627] Ibid., pp. 14-15, 26-27.
[628] Bird, Nazi Dreamtime, pp. 54, 68-76; Winter, The Australia-First Movement, pp. 22-24; Munro, Inky Stephensen, pp. 197-202.
[629] Bird, Nazi Dreamtime, pp. 311-315; Winter, The Australia-First Movement, pp. 98-101.
[630] Bird, Nazi Dreamtime, pp. 168-175, 278-310; Winter, The Australia-First Movement, pp. 100-101; Munro, Inky Stephensen, pp. 207-208.

was arrested by the Australian government as a sympathiser with the enemy while Ian Mudie and Rex Ingamells eluded internment.[631]

8.2.1 Jindyworobaks

As we have seen, the Jindyworobak movement was founded in 1938 by Rex Ingamells, who in turn was strongly influenced by P. R. Stephensen and his *The Foundation of Culture in Australia* (1936), a vehement manifest of cultural nationalism.[632] Much of Stephensen's ideas were absorbed by the Jindyworobaks, as reflected in the groups manifesto *Conditional Culture,* penned by Rex Ingamells.[633] The term 'Jindyworobak' was intended to designate "those individuals who are endeavouring to free Australian art from whatever alien influences trammel it, that is, to bring it into proper contact with its material".[634] The Jindyworobaks adapted and further accentuated the idea of the key role of the specific Australian environment for the creation of a national culture suggested by Stephensen.[635] Ingamells insisted that the most important step towards a national culture was the clear recognition of environmental values.[636] Up to now, a "pseudo-Europeanism" would clog "the minds of most Australians, preventing a free appreciation of nature".[637] The immigrants might have become used to their new environment, but they had never "become one with it".[638] In order to capture the true Australian environment, poets and writers should develop genuine tools and renounce the use of images and expressions from European languages.[639] As has already been stated, the Aboriginal culture was conceived of as being at one with its environment, and writers and poets should thus identify with it and assimilate it.[640]

Ian Mudie espoused the fundamental ideas of *Conditional Culture*, that respect of the environment should be the basis for every nation, as expressed in his poem *Urgent is the Need,* whose two last stanzas are quoted:

> Urgent is the need before destruction
> envelops our listless minds,
> urgent is the need for building
> here this permanent dream,
> this oneness with environment,
> this people-spirit,

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[631] Bird, Nazi Dreamtime, p. 342-344; Winter, The Australia-First Movement, p. ix; Munro, Inky Stephensen, pp. 223-224.
[632] Stephensen, The Foundations of Culture.
[633] Clark, Environmental Themes, p. 430.
[634] Ingamells/ Tilbrook, Conditional Culture, pp. 4-5.
[635] Clark, Environmental Themes, p. 430.
[636] Ingamells/Tilbrook, Conditional Culture, p. 6.
[637] Ibid., p. 5.
[638] Ibid.
[639] Ibid., p. 6.
[640] Strauss, Literary Culture, p. 114.

this spirit of the Land,
this permanent idea
fused to a permanence
of nationhood.

Urgent is the need for that vitality of mind
that shall build here upon this mighty soil
a nation that shall stand
steadfast against the ages and the world,
steady with rock-like mind and will,
virile with devotion like a flame,
purged with vast seas of loyalty,
a singing nation, a nation
dedicated to its destiny,
a nation that shall be
loyal to its environment,
one with its soil,
building in beauty,
rooted for all time
in indivisible permanence
of unity.[641]

That the land is the basis for every nation and that a permanent nationhood requires "oneness with environment" and needs to "be loyal to its environment, one with its soil", is apparent, so it is not surprising that the erosion of the soil alarmed Mudie.[642]

DUST STORM – TO ANY AUSTRALIAN

'A man is not born of his native country for nothing. I wish I might persuade you.' – HOWELLS.
Might I persuade you that this shrouded sun
that spins unrayed from this dust-pall of sky
Shines on each acre of your continent,
that your unplanted bread now dissipates
into this roaring warmth of gritted air
and drifts forever into far Pacific deeps,
down, down, until the cool green no more
turfs the wide paddocks and the hills
but the red earth-layers spread beneath the sea
– might I persuade you this it would mean much to me.

Might I persuade you that this heritage
is yours in trust for sons of sons of yours
who wish to see no mess of quick-spent pottage
purchased with their patrimony . . .
Might I persuade you – oh, forsake the dross –
Might I persuade you of this bitter loss,
that dust of your greed too long has hid
stars of your Southern Cross . . .
Might I persuade you – then being persuaded you
might rise in strength to build this land anew.[643]

[641] Ian Mudie (1945): Urgent is the Need. In: Id., Poems: 1934-1944, Melbourne, Georgian House, pp. 66-67.
[642] Ibid.

Mudie's poem is a pressing appeal – voiced through a repetitive appellative urge – to all Australians to acknowledge that the dust storms are a sign of the destructiveness of the exploitative, short-term profit orientated land management methods, insinuated by the expressions "quick-spent pottage" and "greed" (s2, v3; v7). The Southern Cross, the symbolic image of the Australian nation, is obscured by the dust, which reflects the destroying forces of soil erosion on the nation as such. Such links between the soil and the nation also appear throughout other of his erosion poems. Australia's apparently successful ride on the sheepback and the disastrous impacts on the soil is also the subject of the poem *Sheep to Kangaroo*.[644] The speaker of the poem regrets that most Australians would consider sheep only in their role as deliverer of "wool, mutton, cheques for faraway" while they were unable to see that "their feet, too, destroy earth that is bread to nationhood". This poem, however, ends with the hopeful vision that there will be a change, that one day, a sheep will become "erect" as it transforms into a native animal, thus becomes a "kangaroo".[645] This clearly reflects the ecological knowledge that the native animals, their feet, and their feeding habits are better adapted to the Australian environment. It lends hope to the idea that white Australians might become one with their environment and in this way native to it. A similar hopeful vision is expressed in the poem *Tomorrow*:[646]

> The soil – that has long paid tribute
> to the blindness of the unloving –
> dreams now of tomorrow.
>
> The eroded land, the raped land,
> the land bared of its trees, its growth,
> is our spirit lost to nationhood.
>
> As the raped land thirsts for trees,
> for growth, so do our spirits thirst
> to be born again of the soil.
>
> Now in our hearts, strong,
> triumphant, the bush is growing again,
> revivifying the yesterday-barren land.
>
> Today new growth starts, tomorrow
> our spirits shall be reborn in strength,
> and from this land our nationhood shall spring.

[643] Mudie, Dust storm – to any Australian.
[644] Ian Mudie (1945): Sheep to Kangaroo. In: Id., Poems: 1934-1944, Melbourne, Georgian House, p. 18.
[645] Ibid.
[646] Ian Mudie (1945): Tomorrow. In: Id., Poems: 1934-1944, Melbourne, Georgian House, p. 41.

Here, the soil is anthropomorphised, again reflecting the ecological interdependence between humans and their environment; the abuse of the land is in reality a violation of Australia's nationhood.[647] This close connection between the soil and the Australian spirit becomes even more explicit in *Path's Ending*, when Mudie uses absolute metaphors, speaking of the "eroded paddocks of our hearts" or the "pastures of our souls".[648] This rhetorical device reflects the ecological vision of a deep interdependence between man and nature. *Path's Ending* closes with the hope of Australians becoming one with the land in form of a "contended husbandry".[649]

8.2.2 Elyne Mitchell

Another Australian writer that chose the topic of soil erosion as a central theme for her literature was Elyne Mitchell (1913-2002).[650] Born in Melbourne, she moved to the Victorian Alps after having married Tom Mitchell.[651] Known for her children's books, mainly the popular Silver Brumby series of the 1950s, her engagement in the soil erosion debates of the 1940s is less known.[652] Unlike the Jindyworobaks, she did not draw her ideas on cultural nationalism from Stephensen, but was rather influenced by ideologies of the British organic movement. It was mainly with the 140-page book *Soil and Civilization*, that Mitchell took part in the soil erosion debates of the 1940s.[653] The book appeared in 1946, but several chapters were published beforehand in the *Sydney Morning Herald*, among them the eponymous first chapter "Soil and Civilization" which appeared in September 1944.[654] Further soil conservation concerns appear in her essay, *Books and the Soil* (1944), and in the literary almanac, *Speak to the Earth* (1945), about the writer's life in 1942-43 at the Towong station in the Victorian Alps. In this latter book, Mitchell gives a personal account of her soil conservation work in the form of tree planting, apparently started by her husband Tom during the mid-1930s.[655] Her writings show a deep ecological conception, blended with mystical ideas of a spirited nature and a nationalism borrowed in parts from British far-right organic activists of the time.

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[647] Ibid.
[648] Ian Mudie (1947): Path's Ending. From Exploration of the Heart. In: Rex Ingamells (ed.), Jindyworobak Anthology, Melbourne, Jindyworobak Publications, pp. 41-42.
[649] Ibid.
[650] 'Mitchell, Elyne', in: Wilde et al., Oxford Companion to Australian Literature, p. 536; 'Elyne Mitchell' in: John Arnold/John Hay (eds.) (2007): The Bibliography of Australian Literature K-O, St Lucia, University of Queensland Press, p. 442.
[651] Ibid.
[652] Ibid.
[653] Elyne Mitchell (1946): Soil and Civilization, Sydney, Angus&Robertson.
[654] Elyne Mitchell (1944): Soil and Civilisation. Nations Die As Desiccation Sets In, in: *Sydney Morning Herald*, 9 September 1944.
[655] Elyne Mitchell (1945): Speak to the Earth, Sydney [et al.], Angus&Robertson, pp. 127-128.

As far as the ecological vision goes, Mitchell shares the basic assumption of many soil conservationists of the time: For centuries, Nature had maintained a perfect balance and the Aborigines had lived in harmony with the land.[656] The arrival of the Europeans had upset this balance, exposing them as "destroyers instead of creators".[657] The failure to understand Nature's laws, the widespread ignorance among past and present Australians, the greed and the "strange pride in 'conquering nature'" had caused wind erosion and dust storms.[658] Taking up the explanatory models of the period, Mitchell identifies deforestation, overstocking, and overcropping as reasons for sand drift and encroaching deserts.[659] Through the removal of the vegetative cover, humans would actively change the climate and contribute to desiccation.[660] Moreover, her concern for soil erosion was closely linked to concern about the loss of organic content of the soil.[661]

But it was not that scientific side of the soil erosion problem that prompted Mitchell to urge that Australians needed to live their life within "the wisdom of an ecological unity"[662] but a larger, mystic concern for the losses of energy and organic contents of the soil through erosion. She professed that Nature and land were animated through a universal spirit or 'cosmos' which was important for the physical as well as for the mental health of the people.[663] The connection with this spirit, the 'land geist', was assured through rural life[664] and through "integration with our environment – through wholeness".[665]

It is difficult to follow Mitchell through her often nebulous passages that reflect her mystic aspiration. Geoffrey W. Leeper, soil chemist at the Melbourne University, aptly wrote in his book review of *Soil and Civilization*:

> Cosmic, organic, integral, daedal, chase one another through the pages. It is difficult to find any clear meaning in these words. It is clear, however, that the author is a natureworshipper. She hates erosion, not because erosion means dearer clothes, fewer books and poorer transport, but because it seems to her an affront to the land with which she feels a mystical union.[666]

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[656] Mitchell, Soil and Civilization, pp. 29, 32, 91-93.
[657] Mitchell, Soil and Civilization, pp. 30-31.
[658] Ibid., p. 54.
[659] Ibid., p. 30.
[660] Mitchell, Soil and Civilisation. Nations Die; Ead., Speak to the Earth, p. 129.
[661] Mitchell, Soil and Civilization, p. 25; see also: Gaynor, Antipodean Eco-nazis, pp. 264-265.
[662] Mitchell, Soil and Civilization, p. 11.
[663] Ibid., p. 129.
[664] Ibid., p. 2.
[665] Ibid., p. 66.
[666] Geoffrey W. Leeper (1946): Book review: Elyne Mitchell: Soil and Civilization, Sydney, Angus&Robertson, 1946. In: *Meanjin* 5 (3), pp. 257-258.

The mystical imprint of the book consequently prompted Leeper to dismiss its scientific value; the fact that he was willing to write a book review in the *Meanjin Paper* illustrates, however, the fluent border between scientific and popular writing once more.

Mitchell's spiritual understanding of the soil fuses with nationalistic and racial ideas and was clearly influenced by the writings of the British 'Kinship in Husbandry'.[667] She refers to its members Rolf Gardiner, H. J. Massingham, Gerad Wallop (ninth Earl of Portsmouth, Lord Lymington) and Lord Northbourne, as well as to grassland ecologist Sir George Stapledon, who was associated with the 'Kinship'.[668] The 'Kinship' advocated organic farming and defended the traditional English countryside.[669]

According to Mitchell, the soil is the physical and spiritual basis for the Australian nation, and is therefore necessary to put the nation's roots deep into the land, as was also advocated by the 'Kinship':

> The Australia that was outside, being slowly illuminated by a quarter-moon, the Australia that was all around me, the Australia of which I was a part, seemed to be roused from its dreams; and a question formed itself in my mind. How long could a nation's appearance conform to a veneer laid on by a large city population when, behind and around, there is the land itself, the land that moulds its people even though they may drastically change its every aspect? Does not the strength of a nation need roots in the soil? And this land could reject a people who are without understanding and who rob its soil of all good, cut down its forests, let silt fill its streams.[670]

Soil erosion therefore threatened Australia, as "all our nation's greatness of which we dream has been, by us, laid open to the attacks of the wind and the rain".[671] In contrast to the German 'Blood and Soil ideology' and to British authors she quotes, Mitchell defends nomadism to a certain degree, for example the itinerant way of life of the Aborigines, who had allegedly lived in harmony with nature.[672] Mitchell understands the concept of 'rootedness' not so much in terms of physical but rather as spiritual connectedness to the land.[673] When it comes to anti-urbanism, Mitchell again shares the conviction of British organic advocates when she states, for example:[674] "When civilization turns towards city life the changes are profound –

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[667] Dan Stone (2004): The Far Right and the Back-to-the Land Movement. In: Julie V. Gottlieb/Thomas P. Linehan (eds.), The Culture of Fascism: Visions of the Far Right in Britain, London [et al.], I. B. Tauris, pp. 182-198, here p. 187.
[668] Ibid.; Elyne Mitchell (1944): Books and the Soil. In: *Australian Quarterly* 16 (4), pp. 64-73.
[669] Stone, The Far Right and the Back-to-the Land Movement, pp. 186-192.
[670] Mitchell, Speak to the Earth, pp. 212-213; another example: "We in the Murray Valley, year after year, can see the gleam of the snow dull by the wind-carried Mallee dust. And drifting dust will not support living beings. In carelessness for the soil we are turning the physical world into a waste land and wonder why the 'dead land' 'The cactus land' is within us too", in: Mitchell, Soil and Civilization, p. 26.
[671] Mitchell, Speak to the Earth, p. 98.
[672] Mitchell, Soil and Civilization, pp. 91-97.
[673] Ibid.
[674] Philip Conford (2005): Organic Society: Agriculture and Radical Politics in the Career of Gerard Wallop, ninth Earl Of Portsmouth (1898–1984). In: *Agricultural History Review* 53 (1), pp. 78-96, here p. 76.

metaphysically as well as physically and Nature's balance is overloaded towards decay".[675] City people lived off the land without returning anything to it[676] and city-born "economics" had forced the land man to exploit the soil,[677] thus creating soil exploitation and exhaustion. Drawing on a passage from Lord Northbourne's *Look to the Land*, Mitchell argued that only land life and a biological self-sufficiency of a nation would bring wholeness and health to its people. This would be essential for increasing Australia's population and for distributing more settlers into the rural areas, which would be crucial for the nation's defence and, therefore, vital for Australia's future.[678] Here, we see the concerns about the nation's population and security, which was shared by large parts of Australians at the time. Mitchell directly links wind erosion with racist arguments, underlining that this erosion was the beginning of a process that would lead to even greater ignorance, to further soil depletion and finally, to decadence of the race.[679] As Andrea Gaynor has highlighted, Mitchell was influenced in this racial conception by the ideas of far-right French eugenist Alexis Carrel, who Mitchell quotes by name.[680]

The land took on a key role in Mitchell's poetical concepts. In the British authors around the 'Kinship in Husbandry', she found a "conception of human ecology that finds poetry, literature and the 'dear delight' of philosophy the close companions of agriculture – finds that agriculture is the mainspring of civilization".[681] In order to "create genius", man had be linked to the land.[682] Thus, she came to a conclusion similar to the Jindyworobaks, that culture in Australia must be built on the land. In *Books and the Soil*, Mitchell speaks admiringly about the idea that art springs from the country in form of folksongs and dances, and mentions Scandinavian and pre-Hitler German folk movements as well as Rolf Gardiners Springhead and Gore farms.[683] Soil erosion, caused by Australians' ignorance that the soil was "an integral part of the unity which is our bodies and our deeper selves, our thoughts, and inspiration"[684] would consequently lead to the destruction of the human creative spirit.[685] The fact that a substantial number of those writers who adopted an ecological vision in the context

[675] Mitchell, Soil and Civilization, pp. 24-25.
[676] Ibid.
[677] Ibid., p. 54.
[678] Mitchell, Books and the Soil, p. 72.
[679] Mitchell, Soil and Civilization, p. 26.
[680] Mitchell, Soil and Civilization, p. 5; Gaynor, Antipodean Eco-nazis, p. 265.
[681] Mitchell, Books and the Soil, p. 64.
[682] Mitchell, Soil and Civilization, pp. 91-93.
[683] Mitchell, Books and the Soil, pp. 67-69.
[684] Mitchell, Soil and Civilization, p. 2.
[685] Ibid., p. 56.

of the erosion crisis were advocates of a staunch cultural nationalism poses questions about the deeper relation between ecology and nationalism.

8.2.3 Marring Ecology and Nationalism?

In Australian historiography, nature has been assigned an important place in theories about nation-building.[686] Questions of the "historical co-development of Australian environmentalism and nationalism" have been discussed under the term 'eco-nationalism', most recently by Nicholas Smith.[687] Yet, while bearing the stagy title *Blood and soil*, Smith's article does not mention the Australian soil erosion crisis of the 1930s and 1940s or other problems of land degradation with a single word.[688] Historical studies of Australian eco-nationalism have asked the question how Australians began to consider their environment not as adverse and deficient, but as something valuable and characteristically Australian, something one could identify with, possibly more easily than with other social, economic, or political aspects that were not as distinctively Australian.[689] In the past, several historians, most prominently Libby Robin, have analysed the complex relation of nature and nation in Australia without, however, paying much attention to the wind erosion crisis of the 1930s and 1940s.[690]

In the lead up to Federation, Australians increasingly discovered their natural environment as an object to project nationalist ideas. Literature and fine arts played an important part in this process, for example the texts written by Henry Lawson and Banjo Patterson or the works of the Heidelberg school, which discovered the bush as a specific Australian motif.[691] As environmental historian Thomas R. Dunlap put it, "Australian nature became a matter for national pride, and Australians began to celebrate their landscape".[692] The link between nation and nature strengthened after Federation, when Australians discovered that the celebration of special days for nature could be an important tool to morally educate future citizens. Australia's unique flora and fauna offered specific symbols for a new nation that still lacked a political or military element to distinguish themselves within the Empire.[693]

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[686] Robin/Smith, Australian Environmental History, pp. 137-139.
[687] Nicolas Smith (2011): Blood and Soil: Nature, Native and Nation in the Australian Imaginary. In: *Journal of Australian Studies* 35 (1), pp. 1-18, here p. 3.
[688] Ibid.
[689] Robin, How a Continent Created a Nation, p. 6.
[690] Ibid.
[691] Heathcote, The Visions of Australia, p. 93; Thomas Dunlap (1993): Australian Nature, European Culture: Anglo Settlers in Australia. In: *Environmental History Review* 17 (1), pp. 25-48, here p. 30; Smith, Blood and Soil, p. 11; Robert Birrell (1987): The Social Origin of Australia's Conservation Movement. In: *Journal of Intercultural Studies* 8 (2), pp. 22-39, here p. 30.
[692] Dunlap, Australian Nature, European Culture, p. 30.
[693] Dunlap, Nature and the English Diaspora, p. 98.

Arbor Day, Bird Day, or Wattle Day were such events that were celebrated nationally by all of the Australian states to some extent and which fused the idea of preserving birds and replanting trees with the emphasis of national civic duty.[694] It is no coincidence that the Australian Natives Association (ANA) played a leading role in the promotion of these days.[695] Established in 1871 as a friendly society, the ANA was from the 1880s on an enthusiastic supporter of federation; among its first concerns was the aim to establish 'a national flower or emblem' for Australia.[696] As we will see in the fourth section of the thesis, the ANA was also engaged in a public campaign to establish a national soil conservation policy in the 1930s. In the 1920s, progressive intellectuals like James Barrett linked nature and nation closer than ever before.[697] In *Save Australia: A Plea for the Right Use of Our Flora and Fauna,* edited by Barrett in 1925, two papers on Australian forests and on water conservation indirectly touched the question of soil conservation.[698] Barrett was convinced that a life in the countryside in close contact to nature endorsed the virtue and health of Australians and that nature was an important cultural asset that had to be protected urgently.[699] He therefore committed himself to the promotion of Bird Day, Wattle Day, and Arbor Day in Victorian schools and was influential for the early Victorian national park reservation history.[700] Michael Roe, the leading author on Australian progressives in the interwar period, has highlighted that progressives like Barrett not only affiliated with democratic liberalism, but also with vitalism, nationalism, racial welfare, and even that in some ways they adopted a fascist-like style.[701] For Nicholas Smith, this has been reason enough to put Barrett and other progressives in proximity to the eco-nationalists of the German Third Reich.[702] While this conclusion seems somewhat far-fetched, a similar statement is much more fitting for the works of ecological writers like the Jindyworobaks and Elyne Mitchell – a connection that has been largely neglected so far.[703] Their writings show more direct influences of the 'Blood and Soil' (Blut und Boden) ideology as propagated during the German Nazi regime, being but the most

[694] Robin, How a Continent Created a Nation, pp. 21-23.
[695] Ibid., p. 13.
[696] Ibid.
[697] Roe, Nine Australian Progressives, p. 69.
[698] Owen Jones (1925): Our Forests. In: James Barrett (ed.), Save Australia: A Plea for the Right Use of Our Flora and Fauna, Melbourne, Macmillan, pp. 55-68; E. G. Ritchie (1925): Water Conservation. In: James Barrett (ed.), Save Australia, pp. 159-173.
[699] Roe, Nine Australian Progressives, pp. 68-70; Griffiths, Hunters and Collectors, p. 156; Powell, An Historical Geography, pp. 153-154.
[700] Smith, Blood and Soil, p. 11.
[701] Roe, Nine Australian Progressives, p. 13.
[702] Smith, Blood and Soil, p. 11.
[703] Jayne Regan has recently highlighted the eco-nationalist stance of Ian Mudie's poetry without, however, asking the question what it means for the broader evolution of Australian environmentalism, cf. Jayne Regan, Poetic Politics, p. 5.

flourishing radical form of a broader intellectual movement in the interwar years that propagated a special relationship between the land and the people living on it.[704]

The origins of 'Blood and Soil' date back to longer traditions of agrarian romanticism during the nineteenth century that stressed the organic unity of soil and people.[705] During the Nazi time, it received its racist significance[706] of that of a mystic union of a race with the land of their ancestors.[707] In the way that 'Blood and Soil' ideology criticised 'unrootedness' and an urban lifestyle, it was explicitly directed against the nomadic urban Jewry.[708] The British authors around the 'Kinship in Husbandry' were influenced by those ideas,[709] and especially Rolf Gardiner and Lord Lymington had close links to Nazi Germany.[710] As we have seen, the writings of the Jindyworobaks and Elyne Mitchell show many similarities between such ideological concepts, namely the unity of people and soil, the idea of rootedness (not in a geographical sense), and anti-urbanism.

The close link between ecology, racism, and Nazism has engendered much controversial scholarly research about the continuity between these ecological strands of thought with the later Green movement, not only in Germany, but also in other countries.[711] For Australia, this link has not yet engendered major scholarly interest. The most significant contribution to that question is the recent work of Andrea Gaynor who has analysed the far-right influences within the early Australian organic movement of the 1940s. She finds some extreme nationalist and racist positions among early members of the organic movement, but comes to the conclusion that this was only a minority stream within Australian ecological thought.[712] While a more thorough analysis of this question is beyond the scope of this thesis, the acknowledgement of a far-right eco-nationalist stanza in the ecological thoughts of the 1930s and 1940s is fundamental, and further research into the question of continuity within Australia and the links to international ideology is desirable. At first glance, the extreme eco-nationalist stanza seems to have been rather limited to the relatively small circle of literary people. The Jindyworobaks were a marginal literary group, and their influence in the wider

[704] Roderick Stackelberg (2007): Routledge Companion to Nazi Germany, London, Routledge, p. 259.
[705] Gesine Gerhard (2005): Breeding Pigs and People for the Third Reich: Richard Walter Darré's Agrarian Ideology. In: Franz-Josef Brüggemeier et al. (eds.), How Green were the Nazis? Nature, Environment and Nation in the Third Reich, Athens, Ohio University Press, pp. 129-146, here p. 131.
[706] Anna Bramwell (1989): Ecology in the 20th Century: A History, New Haven, Yale University Press, p. 191; Stackelberg, Routledge Companion to Nazi Germany, p. 259; Gerhard, Breeding Pigs and People, p. 131.
[707] Stackelberg, Routledge Companion to Nazi Germany, p. 259.
[708] Ibid.; Bramwell, Ecology in the 20th Century, p. 191.
[709] Bramwell, Ecology in the 20th Century, p. 161.
[710] Bramwell, Ecology in the 20th Century, pp. 112-114.
[711] See for a first overview: Frank Uekoetter (2006): The Green and the Brown. A History of Conservation in Nazi Germany, Cambridge [et al.], Cambridge University Press, esp. pp. 1-16, 202-209.
[712] Gaynor, Antipodean Eco-nazis, p. 254.

society as well as on other artists is regarded as being minor.[713] Elyne Mitchell's works on soil and nation can likewise be regarded as marginal and were surely less popular than her later writings that seem at first glance free of any of her earlier extreme eco-nationalists visions. This said, there is no doubt that the link between nature and nation further strengthened during the erosion debates when ecological soil conservation was linked with concerns about national population, health and national defence, often containing eugenic thoughts and xenophobic strands.

The eighth chapter of the thesis has shown how the erosion crisis and the diffusion of the ecological vision changed other related cultural concepts that Australians had held for several decades. A major change was the reassessment of the pioneer, Australia's long cherished idol that was now seen in more negative terms. Linked with the reassessment of the pioneering merits, was a new vision on the indigenous population, who were now painted as 'ecological noble savages' that allegedly had lived in great harmony with their environment. The ecological vision also brought a new understanding about land, which was no longer considered as unlimited and ready to be exploited. As the wind erosion crisis linked concern for the nation with the ecological vision, the period has to be considered as a major phase of Australian eco-nationalism.

Starting from the assumption that cultural concepts are important historical determinants, the third section of the thesis has analyzed in depth some important cultural concepts on wind erosion that Australians adopted in the wake of the erosion crisis. The analysis of the public debate on wind erosion has shown that there were essentially two major ways Australians conceptualised the erosion disaster: the first was that of wind erosion as a national menace; the second was an interpretation of wind erosion in ecological terms, which I have called the 'ecological vision'. The public discourse, characterised by a high sense of urgency and emotions, has shown that wind erosion appeared as a menace to the Australian nation as a whole. The understanding of soil erosion as a multi-level threat to the nation was historically contingent: It was embedded in international fears of encroaching deserts, but was also anchored in the domestic experience with wind erosion as well as the specific Australian historical situation. Environmental, economic, and foreign and domestic anxieties combined to elevate wind erosion to a topic of highest importance. The second major concept was that of the ecological vision that spread into various domains of the Australian society in the context of the erosion crisis, a fact largely neglected up to date. Scientific ecological concepts

[713] See also Birrell, The Social Origin, p. 233.

played a crucial part in this process of diffusion, but domestic experiences with wind erosion were equally important. The ecological vision contained an essential break with the earlier vision, as it explained erosion as the result of the white settlers' disturbance of nature's balance and illustrated the interdependence between humans and their environment. As it proclaimed a moral responsibility to protect nature, it was an important step in the emergence of a new environmental ethic that has to be considered a crucial intellectual step in the evolution of modern Australian environmentalism. The ecological vision brought a series of changes to a range of other related cultural concepts that Australians had held for a number of decades, for example a reassessment of the pioneer, the indigenous population, and the potential of land as resource. As the following section will illustrate, these concepts on wind erosion were the basis for various direct responses of Australians to the erosion problem.

IV Responding

This fourth and last section of the thesis focuses on the social and political responses that Australians adopted to combat the problem of soil erosion in the context of the ecological crisis. The part shows that the local experience with erosion, as well as the scientific and cultural concepts of wind erosion that Australians had espoused, impacted how they reacted to the problem. In addition to these domestic aspects, international influences once more played a fundamental role in shaping Australians' reactions. It shows that the occurrence of erosion and the perception of it as a multi-dimensional menace to the nation's survival engendered calls for immediate political action, resulting in extensive soil conservation legislation. Likewise, the 'ecological vision', which asserted human responsibility for the occurrence of soil erosion, was the prerequisite for the adoption of soil conservation legislation. This link becomes apparent in the fact that an ecological vision is dominant in the arguments of those who favoured legislation, while its opponents claimed that erosion was generally due to climatic factors and therefore beyond human reach, which meant that political steps were unnecessary. The development of Australia's soil conservation legislation from a jurisprudential point of view has been exhaustively summarised by John R. Bradsen in his *Soil Conservation Legislation in Australia. Report for the National Soil Conservation Programme* in 1988.[1]

Political action against soil erosion was first and foremost a matter for the states. In view of the strength of the concept 'erosion as national menace' as illustrated in the last part of the thesis, this is at first glance surprising. However, at the time of Federation, public authority concerning land had stayed in the hands of the former colonies.[2] The various political responses of the three south-eastern states will therefore be analysed in the first chapter of this section. Despite the weak federal role in land matters, the understanding of erosion as a national matter was powerful and engendered multiple calls for a greater involvement of the Commonwealth in soil conservation; the role of the Commonwealth will consequently be in the centre of the second chapter of the section.

[1] Bradsen, Soil Conservation Legislation.
[2] Dunlap, Nature and the English Diaspora, pp. 90-91; Robin, Ecology: A Science of Empire, p. 70; Hutton/ Connors, A History of the Australian Environment Movement, p. 57.

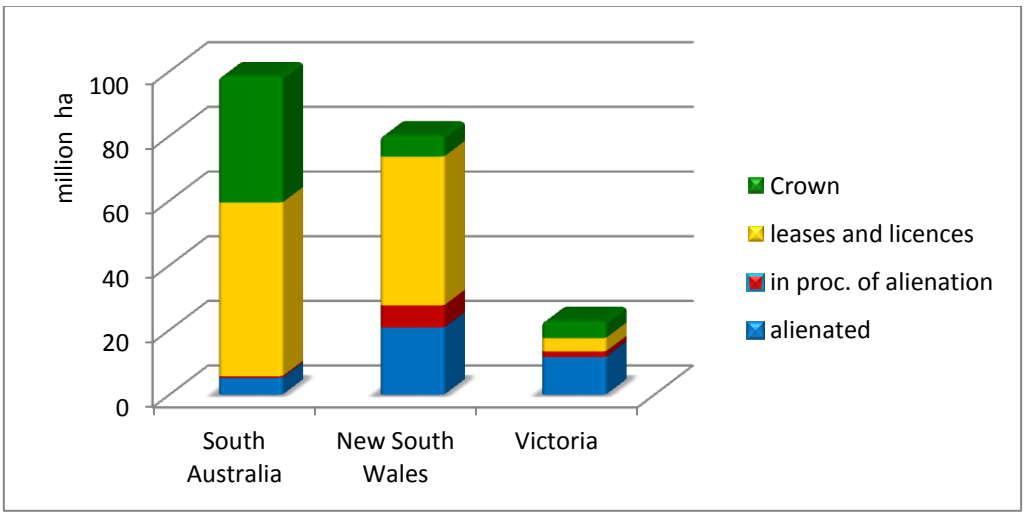
9 Unanimity and Diversity: Soil Conservation Legislation of the States

The period from 1930 to 1945/46 saw a series of economic and political crises in Australia. The Australian states all faced similar problems, namely the economic slump of 1929, whose effects lasted well into the 1930s, and the experience of the Second World War. It is all the more surprising that all of the Australian mainland states established soil conservation legislation during this period, expending much thought, time and money on the protection of soils at a moment when other vital issues called for financial and intellectual resources. This clearly shows that the public rhetorical phrasing 'erosion as a national menace' was not merely a media catchphrase, but that erosion was considered by a significant number of politicians as a great problem that required immediate political action. New South Wales passed the first soil conservation act in 1938, South Australia followed in 1939, Victoria in 1940 and Western Australia in 1945, each of them establishing soil conservation institutions.[3] As a matter of fact, the various soil conservation acts passed the parliaments with a startling unanimity, as Bradsen and Fowler have noted.[4]

In each of the states, the Great Depression and dry years brought distress to the rural sector.[5] The Second World War brought full employment and financial support from the Commonwealth in many matters, thus pouring money into the public purse.[6] On the other hand, the war situation also resulted in a great number of restrictions on personnel and material, as well as on public finances, which limited the expenditure on activities which were not war-related. These were factors that became relevant for the shape and progress of soil conservation in each of the states, but to varying degrees. Great differences existed in regard to the size of land and the kind of land settlement and land tenure system that had historically developed in each state. The following diagram (Fig. 20) gives an overview of the variation in the total land and land tenure for the three south-eastern states in 1943/1944. The land tenure was relevant in regard to the future path soil conservation would take. It was of course much more problematic for the state to intervene in soil management on alienated land than on land still occupied by the Crown or held under licenses and leases.

[3] Bradsen, Soil Conservation Legislation, pp. 26-52.
[4] Bradsen/Fowler, Land Degradation, p. 135.
[5] Gibbs, A History of South Australia, pp. 201-205, 208; Blainey, History of Victoria, pp. 182-190; Beverly Kingston (2006): A History of New South Wales, Cambridge [et al.], Cambridge University Press, p. 142.
[6] Kingston, A History of New South Wales, pp. 159, 162.

Fig. 20: Distribution of land tenure in the three south-eastern states 1944/45.
[Year Book Australia, 1944-45, pp. 101-106.]



Also, the specific historically developed settlement pattern played an important role as did the form of land use on the erosion affected regions. While the states were to a considerable degree influenced by each other in the formation of their respective legislation, the actual shape of the legislation varied significantly.

New South Wales was the most decisive state and established a separate and independent soil conservation authority. Victoria likewise established an autonomous separate soil conservation body, whose powers, relatively weak at first, were later reinforced. The weakest soil conservation body was established in South Australia, where an advisory committee without executive powers was established within the Department of Agriculture.[7] Similarities exist in the states' emphasis on education of the landholders rather than compulsion in order to achieve their goals of soil conservation. This was certainly linked to the fact that in all three states landowners and rural interests, largely opposed to compulsion, were powerful forces in the state governments during the 1930s and first half of the 1940s. But the sources also reveal a high degree of belief in the principle of education itself, a firm conviction that those responsible for the land would apply soil conservation measures if only they had the knowledge and financial or technical means to do so. As will be discussed, the emphasis on education, judged as a serious hindrance to soil conservation progress by experts in the 1980s and 1990s, should be considered in more positive terms, as it contributed substantially to the diffusion of a general ecological consciousness among the population.

[7] Similar to South Australia, the soil conservation bodies in Western Australia and Queensland were also branches of the States' Agriculture Departments, see: Commonwealth of Australia, EHCD, A Basis for Soil Conservation Policy, p. 12.

The histories of the states' soil conservation institutions have been told in the past in the form of institutional brochures or jubilee publications by former members of these bodies. They give an exhaustive review and deep insight into the institutional histories, but have to be treated with appropriate caution for their subjectivity. For New South Wales, Roland Breckwoldt, from 1985 to 1988 member of the NSW Catchment Areas Protection Board within the NSW Soil Conservation Service,[8] provides a comprehensive history of the beginnings and developments of soil conservation in the state with *The Dirt Doctors. A Jubilee History of the Soil Conservation Service of NSW* (1988). For Victoria, George T. Thompson, member of the Soil Conservation Board from 1943 to 1950 and chairman of its successive institution, the Soil Conservation Authority, from 1950 to 1961, wrote *A brief history of soil conservation in Victoria, 1834-1961* (1971/1979).[9] Arthur F. Tideman's *The struggle for Landcare in South Australia: The Story Behind Soil Conservation and the Quest for Natural Resource Management 1939 – 2004*, (2008) is the basic publication for the South Australian state.[10] Tideman was associated with the Advisory Committee on Soil Conservation in South Australia for more than 30 years, first as field officer and later, in the 1980s, as its chairman.[11] All of these brochures offer a wealth of information on the institutional side of soil conservation in the states that has been carefully weighed and complemented with the help of parliamentary debates, newspaper and journal articles, as well as archival material.

9.1 Leading the Way: New South Wales

New South Wales takes the first rank in Australian soil conservation, as it was the earliest state to introduce soil conservation legislation that established a soil conservation service and consequently served as a role model for the other states. During the period under consideration, New South Wales was the most populated state of the Commonwealth with roughly 2.6 million people being counted at the census in 1933.[12] The great majority of these people resided in urban areas, with less than 20 per cent of the state's population living in the countryside.[13] Even though the distribution of population was centered in the cities, the state's economy relied heavily on the rural areas: New South Wales produced more than half of

[8] Papers of Roland Breckwoldt (1944-), Biographical note. Online: http://nla.gov.au/nla.ms-ms9383 [Accessed 30 March, 2016].
[9] For more recent developments, see: Danielle Clode (2006): As if for a Thousand Years, Melbourne, Victorian Environmental Assessment Council.
[10] Tideman, The Struggle for Landcare.
[11] Ibid., p. 3 and Appendix 1, p. 72.
[12] Yearbook Australia 1933, p. 754.
[13] Kingston, A History of New South Wales, p. 140.

Australia's sheep and wool, and the produce of the primary sector accounted for well over 50 per cent of the state's income.[14]

The political constellation during the decades of the 1930s and 1940s was characterised by roughly three periods. The Labor government under Premier John (Jack) Lang, in power starting 1930, was dismissed in May 1932 by the Governor on a legal technicality after Lang had incessantly revolted against the economic policy of Australia's Labor Premier James Scullin, namely against his budget restrictions and retrenchment.[15] The internal dispute about what was the rightful economic strategy to overcome the budgetary crisis finally split the Labor party and led to the foundation of the United Australia Party (UAP). In New South Wales, the provisory caretaker government of the UAP that had been installed after Lang's dismissal was legitimised through the following elections.[16] In the period from 1932 to 1941, New South Wales was consequently governed by a coalition government of the UAP (that had absorbed the Nationalist Party) and the Country Party (lead by Bruxner), first under the Premiership of Bertram Stevens (UAP), then from 1939 onwards under Alexander Mair (UAP).[17] The election of May 1941 saw Labor returning to government benches under a new party leader, William McKell, who skillfully gained back some of the rural electorate lost by Labor in the previous two decades.[18] This started a series of five consecutive Labor governments which guided the political processes in New South Wales for a period of 24 years.[19] As we will see, the passing of the soil conservation legislation was supported by all of the political parties and did not trigger major political disputes. Still, there is no doubt that the cause of soil conservation was pursued with more effort under the Labor government than it had under the UAP/Country Party coalition.

One major driving force behind the attempts to first put soil erosion on the political agenda was Samuel Clayton, senior experimentalist at the Department of Agriculture and involved in soil erosion research since 1930.[20] As early as 1931, Clayton had warned about the "erosion menace"[21] and was one major agent in creating a public awareness of the problem of soil erosion, as described earlier in the thesis. The other main agent pressing ahead with legislation was Roy Stanley Vincent, member of the Country Party and since 1932 New

[14] Ibid.
[15] Ibid., pp. 148-149.
[16] Ibid., pp. 149-151.
[17] Ibid., p. 157.
[18] Ibid., pp. 138, 151, 156, 161-162.
[19] Ibid., p. 156.
[20] Breckwoldt, The Dirt Doctors, pp. 24-25.
[21] 'Erosion menace. How it ruins good wheat lands', *The Land*, 18 September 1931.

South Wales' Minister of Mines and Forests.[22] In 1933, after a range of landholders had approached Vincent in regard to erosion that occurred on their land, the Minister made a submission to the Cabinet which resulted in the establishment of a subcommittee to inquire into the problem of soil erosion.[23] This subcommittee, also known as the 'Erosion committee', consisted of four departmental officers; along with Sam Clayton there were Hamilton Mathews, Surveyor-General, Archibald Morrison, the Chief Hydrographer and Engineer from the Water Conservation and Irrigation Commission, and Baldur Byles of the Forestry Commission.[24] The erosion committee conducted a series of investigations, but, as it was set up under executive authority, it had limited powers.[25] In November 1933, Vincent also convened a conference on the topic of soil erosion to which he invited a range of organizations and individuals interested in the topic.[26] His opening address reflects his ecological understanding of soil erosion as well as his broad perspective of the matter in local and international terms: Vincent stated that erosion was equally severe in Australia as in other badly affected parts of the world where "because of man's destruction of nature's protection against the elements the plain ha[d] become desert and the hill a barren forbidding mass of rock – a monument not to earlier man's wantonness, but rather to his tragic ignorance".[27] Motions were passed at the conference maintaining that the present Erosion Committee should be converted to a permanent advisory committee and receive larger powers. This committee should have the authority to designate other departmental members or public representatives to deal with special features of the subject, as well as the permission to conduct statistical investigations and experiments on methods to combat erosion after consultation with the minister.[28] Furthermore, the President of the Agricultural Bureau, W. Watson, suggested sending Clayton to the United States to obtain first-hand experience of their soil conservation activities.[29] In February 1934 the Cabinet agreed to widen the powers of the Erosion Committee.[30]

Initial soil conservation legislation focused on the protection of catchment areas of the state, which were affected by water erosion. For this reason, soil conservation provisions were

[22] As the initiator of the NSW Soil Conservation Service, Sam Clayton is sometimes compared to Hugh Bennett, the American father of soil conservation, for example: Breckwoldt, The Dirt Doctors, p. 29.
[23] Bradsen, Soil Conservation Legislation, p. 35; Breckwoldt, The Dirt Doctors, p. 26.
[24] Breckwoldt, The Dirt Doctors, pp. 26-29.
[25] Bradsen, Soil Conservation Legislation, p. 35.
[26] Breckwoldt, The Dirt Doctors, pp. 30-32.
[27] Ibid.
[28] Ibid.
[29] Bradsen, Soil Conservation Legislation, p. 35; Breckwoldt, The Dirt Doctors, p. 32; 'Menace of soil erosion. Discussed at Sydney Conference', *The Land*, 17 November 1933.
[30] Breckwoldt, The Dirt Doctors, p. 32.

included in the Crown Lands, Closer Settlement and Returned Soldiers Settlement (Amendment) Act of 1935, as well as in the Forestry Act.[31] These amendments allowed the Minster for Lands or respectively the Minister for Forests to declare certain areas of Crown lands as special catchment areas with specific control of land use methods in order to prevent soil erosion.[32] The Catchment Areas Board, established in 1935 to control this Crown land, consisted of the same body of people as the Erosion Committee, and it was in this function that the Erosion Committee was most active.[33] This does not mean that the Committee ignored the problems posed by wind erosion. In December 1935, chief inspector of Forests Frederick McPherson travelled to the Western Division and reported on the alarming extent of wind erosion.[34] Vincent subsequently announced that the Erosion Committee would visit some of the areas and explained that overgrazing and overstocking had denuded the land of vegetative cover, thus causing accelerated wind erosion. Premier Bertram Stevens publicly supported the work of the Erosion Committee, warning that wind erosion in dry areas could expand rapidly.[35]

The next major step for soil conservation in New South Wales was the overseas tour undertaken by Clayton in 1936.[36] The trip was not only government funded, but it was, on the instigation of Vincent, also officially conceived as a research tour undertaken in the name of the New South Wales government rather than merely on behalf of its Department of Agriculture.[37] In April 1936, Clayton left Sydney for an eight month research tour that would take him to Britain, several European countries, and North America.[38] Among the countries visited, the United States of America had the greatest impact on Clayton: He was well received by the members of the newly formed US Soil Conservation Service (US SCS) and was particularly impressed by its director, Hugh Hammond Bennett, with whom he developed a close friendship.[39] Bennett even offered Clayton a job at the US SCS, which he declined, determined to focus his efforts on Australia.[40] Immediately after his return, Clayton wrote a report on his observations made during the trip, which served as the basis for the first drafts of a Soil Conservation bill.[41]

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[31] Ibid., p. 34.
[32] Ibid., pp. 33-35.
[33] Breckwoldt, The Dirt Doctors, pp. 34-35; Bradsen, Soil Conservation Legislation, p. 35.
[34] 'Erosion damage to windblown lands of the west described as alarming', *The Land*, 6 December 1935.
[35] Ibid.
[36] Breckwoldt, The Dirt Doctors, pp. 38-41; Powell, Mothering, Husbandry and the State, pp. 62-68.
[37] Ibid.
[38] Ibid.
[39] Breckwoldt, The Dirt Doctors, p. 38.
[40] Ibid.
[41] 'Big attack on erosion?', *The Land*, 19 February 1937.

Meanwhile, Clayton was "inundated with requests to deliver addresses" on the topic of soil conservation.[42] His report on the overseas trip had been published in a series of articles in the *Agricultural Gazette of New South Wales* and was widely reported by the daily newspapers, greatly enhancing the popularity of his contributions outside scientific circles.[43] As he emphasised in his report, Clayton was particularly impressed by the general change of attitude he had encountered in the US and was determined to bring about a similar change within the Australian society.[44] Clayton was therefore more than willing to publicly campaign for the necessity of soil conservation legislation, and for this purpose he regularly drew parallels to the US case in order to call for scientific and political action.[45] Clayton gave a great number of lectures to interested rural community groups, for example at the annual conference of the North-Western Agricultural Bureau at Narrabri, the South Western Agricultural Bureau at Grenfell, the annual conference of the Graziers Associations in Sydney, at the Wheatgrowers Union at Dubbo, or the Country Women's Conference at Orange.[46] The degree to which these public speeches played an important part in raising awareness among the rural community and in spawning political pressure is shown by the example of the Graziers Association: As a result of Clayton's address, the Association resolved that the state government be requested to give consideration to the problems of soil erosion and give advice to farmers regarding soil conservation methods.[47] Clayton's cause received further support from some well-known local primary producers, namely from the grazier Sir Frederick McMaster of Dalkeith, Cassilis, who joined in Clayton's warning about the menace of erosion and, by following many of Clayton's recommendations, contributed a great deal to further the cause of soil conservation.[48] The public campaign had a visible effect: A range of important community groups became convinced about the seriousness of erosion and made direct representations to the state government, asking for further action to be undertaken against the menace.[49] In April 1937, for example, a delegation of the Agricultural Bureau of the state approached Vincent in order to demand that the government should take immediate action in regard to the erosion of wheat lands.[50] The delegation spoke of examples

[42] Ibid.
[43] Clayton, Soil Erosion. Mr. E.S. Clayton's Investigations Overseas.
[44] Clayton, Soil Erosion. Mr. E.S. Clayton's Investigations Overseas, p. 185.
[45] Breckwoldt, The Dirt Doctors, pp. 41-42; 'Soil erosion', *Sydney Morning Herald*, 13 July 1937; 'Expert's soil erosion warning', *The Land*, 1 January 1937; 'Erosion expert says state has reached critical stage', *The Land*, 23 July 1937; Clayton, Soil Erosion. Mr. E.S. Clayton's Investigations Overseas, p. 312.
[46] 'Big attack on erosion?', *The Land*, 19 February 1937.
[47] 'Advice is wanted on soil erosion', *The Land*, 5 March 1937.
[48] Breckwoldt, The Dirt Doctors, p. 41; 'Farmlands are "melting away"', *The Land*, 14 May 1937.
[49] Breckwoldt, The Dirt Doctors, p. 41.
[50] 'May legislate to beat erosion', *The Land*, 16 April 1937.

in the north-western district where some wheat areas had been totally destroyed by erosion and abandoned as useless for wheat-growing.[51]

In April 1937, Vincent and Main, the Minister for Agriculture, went in company of Clayton on a tour in the south and south-west of the state, officially acknowledging that erosion was a greater problem than generally thought.[52] The outlines of the planned legislation were reported in the press, including the information that Clayton would probably be at the head of the new service.[53] After the Cabinet had approved the introduction of the soil conservation bill in August, it was first introduced into parliament in December 1937 and, after it had been discontinued due to the rise of parliament and the holding of state elections, again in July 1938.[54]

Before the bill was introduced, however, it made massive waves in the public arena. Harris Carter, Country Party member for Liverpool Plains, who had already opposed the earlier soil conservation provisions in regard to catchment areas, used the budget debate in the Legislative Assembly to speak up against the future bill.[55] According to Carter, the Erosion Committee and the Forestry Commission had abused their powers in the past. In his eyes, soil erosion was generally a natural phenomenon that had been "going on for thousands of years, and probably hundreds of thousands of years".[56] Moreover, some of the best soils of the state were the result of erosion. "Yet," Carter continued with an obvious hint at Clayton, who he called by name a little later during his speech, "smart young men now go to the United States of America and, on the return, give lantern lectures regarding the effects of erosion".[57] He continued that the establishment of an additional soil conservation department was not necessary as the Department of Agriculture had enough information in order to tackle the erosion problem "in a practical, common-sense matter". He especially resented the idea that some "learned young men from their offices in the city" were telling people in the country "what they ought to do, how many sheep their land should carry, that they must limit the stocking of their country and so on".[58] Carter asserted that while many country people had been enthusiastic about soil erosion when the campaign first began two years earlier, they had changed their mind after they had seen that city people were dictating what to do, so at

[51] Ibid.
[52] 'Ministers see serious erosion of farmlands', *The Land*, 9 April 1937.
[53] 'No delay in campaign against soil erosion', *The Land*, 7 May 1937.
[54] 'Soil erosion move by cabinet', *The Land*, 6 August 1937; Bradsen, Soil Conservation Legislation, p. 35; Breckwoldt, The Dirt Doctors, p. 44.
[55] PD, Legislative Assembly New South Wales, 17 November 1937, pp. 1708-1711.
[56] Ibid., p. 1708.
[57] Ibid., p. 1709.
[58] Ibid.

present time many of them were opposed to it.[59] Carter's criticism was extensively published in the country newspaper *The Land*.[60] His claim that many primary producers were opposed to the bill was challenged, however: On the 10th December, the same newspaper headlined that "Producers want[ed] war on erosion" and specified that Carter's criticism concerning the designed erosion control methods had found little support among primary producers' circles.[61] Leading among those groups that pushed for rapid soil conservation legislation was 'The Farmers and Settlers Association',[62] which sternly warned:

> The dissipation of our national wealth in the form of the invaluable surface soil is paving the way for losses of catastrophic proportion. [...] The extreme gravity of the position is becoming more widespread, productive industries are decreasing, pastures and farms are becoming permanently depreciated and land values will inevitably decline.[63]

In this way, the chances for the bill were quite favourable. When Vincent reintroduced the bill in the Legislative Assembly, he announced its main purpose as being "to save the basic resource of the State, that is, the soil".[64] He further highlighted that the "preservation of the soil [was] vital to the economic stability of the community, essential to the maintenance of the present standard of living and indispensable to its general wellbeing".[65] He also stressed that he considered it as being "in no sense a party measure".[66] As a matter of fact, the need for soil conservation legislation was by and large accepted throughout the ranks of the government coalition as well as in the opposing Labor Party.[67] Clearly, the idea that the greater part of soil erosion was man-made and that it posed a real threat to the state and to the nation which justified state intervention was largely accepted among the parliamentarian members. Those voices like Carter who argued that erosion did not require any attempt at a solution in the form of legislation were in the minority.[68] The numerous references to soil erosion in other countries of the world which appeared in the debates clearly reflect the international

[59] Ibid., p. 1710.
[60] 'Erosion sometimes a blessing, says M.L.A.', *The Land*, 26 November 1937.
[61] 'Producers want war on erosion', *The Land*, 10 December 1937.
[62] Ibid.; 'Erosion Bill Should be speeded-up', *The Land*, 26 November 1937.
[63] 'Producers want war on erosion', *The Land*, 10 December 1937.
[64] Roy S. Vincent in: PD, Legislative Assembly New South Wales, Soil Conservation Bill, 14 July 1938, p. 391; cf. also: Bradsen, Soil Conservation Legislation, pp. 35-36.
[65] Roy S. Vincent in: PD, Legislative Assembly New South Wales, Soil Conservation Bill, 14 July 1938, p. 388.
[66] Ibid., p. 391; cf. also: Bradsen, Soil Conservation Legislation, pp. 35-36.
[67] Bradsen, Soil Conservation Legislation, p. 36; Breckwoldt, The Dirt Doctors, p. 44.
[68] Ibid.

embedment of the discussion.[69] Not surprisingly, parliamentarians referred most often to the example of the US to strengthen their arguments.[70]

In essence, the bill provided for the establishment of a permanent Soil Conservation Service modeled on the US example that would replace the existent Soil Erosion Committee and would be headed by a permanent director under the control of a governmental department – which one was still to be decided.[71] The Service should have a number of permanently employed officers (eight or nine) whose main task was to carry out research on soil conservation methods and to pass on their knowledge to landholders.[72] Additionally, the new service should coordinate other departments from which it should draw personnel and services if necessary.[73] The bill also arranged for the creation of a Catchment Areas Protection Board within the Soil Conservation Service that would replace the two year old Catchment Areas Board.[74] The new Board would have representatives from the departments that dealt with the use of natural resources.[75] Its role was to protect catchments on Crown land by controlling its transfer to freehold title and by determining the conditions which should be attached to leases and licenses of it.[76] Also, the Minister could declare any area of Crown Land as an area of Erosion Hazard, in which case all timber clearing would be put under the control of the Catchment Areas Protection Board.[77]

Compulsion was the most controversial point of the debate. The most ferocious disagreement arose about the question of whether the Soil Conservation Service should have any power to oblige landowners to carry out soil conservation works on their land. The bill provided for the Minister to declare "any tract of land subject to erosion or liable or likely to become liable to erosion" an area of Erosion Hazard.[78] This provision covered not only public, but also private land. Once such areas of Erosion Hazard were constituted, the Minister could determine that the owner should perform certain works.[79] If the landholder refused to carry out adequate soil conservation works, the Director of the Soil Conservation

[69] Breckwoldt, The Dirt Doctors, p. 46. For example: Vincent in: PD, Legislative Assembly New South Wales, Soil Conservation Bill, 14 July 1938, p. 391; Davidson, in: Legislative Assembly New South Wales, 3 August 1938, p. 783.
[70] Breckwoldt, The Dirt Doctors, p. 44. For example: Vincent, in: PD, Legislative Assembly New South Wales, 14 July 1938, pp. 390-391; Horsington, in: PD, Legislative Assembly New South Wales, 14 July 1938, pp. 395-396.
[71] Bradsen, Soil Conservation Legislation, p. 35.
[72] Ibid.
[73] Ibid.
[74] Ibid., p. 36; Breckwoldt, The Dirt Doctors, pp. 48-49.
[75] Ibid.
[76] Ibid.
[77] Ibid.
[78] Ibid.
[79] Ibid.

Service could be authorised to perform works on the land and charge the proprietor for the expenses.[80] Obviously in anticipation of opposing voices to this clause of the bill, Vincent pointed out that it was not the intention of the Soil Conservation Service to harass the man on the land,[81] but instead

> [...] to bring about 100 per cent co-operation with the farmers and graziers of the State, because the great bulk of this work will have to be carried out by them. All that we are doing is to carry out the work of education by practical demonstration and by making available to the farmers and graziers the best advice that we can possibly procure as the result of making a complete study of the problem.[82]

As a matter of fact, the outlook of compulsion in soil conservation matters engendered some serious concern among primary producers that prompted Vincent to reiterate in the press the broadly voluntary character, the emphasis on cooperation and the educational side of the Soil Conservation Service.[83] Some Parliamentary Members, however, from the government parties as well as from Labor, were by no means mollified by such promises and were afraid that this clause would intrude upon the rights of private landholders.[84] Carter, who was again the main opponent, repeated his earlier argument that "a great deal of land in New South Wales has been brought into existence by erosion".[85] As the greatest trouble with erosion would anyway be located in Central Australia, the solution was the flooding of the interior.[86] In arguing that the whole climate could be altered by watering the inland, which would be "the greatest imaginable preventative of soil erosion",[87] he drew, as has been shown in the second section of the thesis, on popular ideas of the time. While Carter admitted that there was erosion and overgrazing in the western part of the state, this was in his eyes primarily the fault of the rabbit.[88] Carter therefore concluded that "with the destruction of the rabbit and the education of the people in commonsense methods, erosion will become a thing of the past. At any rate it will not be a very great danger to the people of the State".[89] The parliamentarian fight for and

[80] Ibid.
[81] Bradsen, Soil Conservation Legislation, pp. 35-36.
[82] Breckwoldt, The Dirt Doctors, p. 44.
[83] Breckwoldt, The Dirt Doctors, pp. 44, 48-49; 'No Fascist Methods for Erosion Control', *The Land*, 1 July 1938; 'Soil Erosion Bill. Liability of Land Owners. Graziers' Criticism', *Sydney Morning Herald*, 9 August 1938.
[84] Breckwoldt, The Dirt Doctors, pp. 43, 48-50; cf. f. ex. Dunn (ALP) in: PD Legislative Assembly New South Wales, 14 July 1938, pp. 393-395.
[85] PD, Legislative Assembly New South Wales, Soil Conservation Bill, 28 July 1938, p. 677; cf. also: Breckwoldt, The Dirt Doctors, p. 47.
[86] PD, Legislative Assembly New South Wales, Soil Conservation Bill, 28 July 1938, p. 678.
[87] Ibid.
[88] Ibid.
[89] Ibid., pp. 678-679.

against compulsion was continued in the rural press, which reported extensively on the progress of the bill.[90]

The opposition to the mandatory clauses of the bill finally led to a series of amendments that strengthened the position of the landholder.[91] At the Legislative Council, the maximum fine for a breach of any of the regulations was reduced from fifty to ten pounds. If the owner of the land disputed the final decision of the Catchment Areas Protection Board, he could appeal to the Land and Valuation Court.[92] Moreover, an amendment was passed that provided that the landowner – whether found at fault or not – would not have to bear the costs of an appeal to the Land and Valuation Court, which would be paid by the Crown, except for frivolous or vexatious appellants.[93] Back at the Legislative Assembly, a number of parliamentarians, most importantly William McKell and Jack Lang from the ALP, were frustrated by these changes.[94] Lang feared that the amendments, especially the right to appeal, would render the bill useless and that efforts to check erosion would be "nullified".[95] McKell argued along the same lines, deploring that the bill, as returned from the Legislative Council, was one "in which appeals had run riot".[96] Backed up by the other Labor members, Lang and McKell voted against the acceptance of these amendments, but were outvoted by the members of the UAP and Country Party.[97] Clearly, despite the fact that the bill was introduced as a government bill by the UAP/ Country Party Coalition, Labor was prepared to go a step further when it came to compulsory legislation. In hindsight, the concerns voiced by McKell and others were justified: The process of declaring an area an Erosion Hazard was so complicated and the levels of appeal so numerous that it would never be done.[98] When this malfunctioning became evident in the course of time, amendments to the bill were passed in 1952 that simplified the process of appeals.[99]

Another controversial subject of the bill was the affiliation of the future Soil Conservation Service. For Clayton, it was clear that the service should be located outside the

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[90] 'Control erosion, or wheat lands will be swept away', *The Land*, 15 July 1938; 'Aim of erosion bill is to save state's basic resource', *The Land*, 22 July 1938; 'Compulsory erosion control on farming lands', *The Land*, 5 August 1938; 'Graziers claim state should pay for control of erosion', *The Land*, 12 August 1938; 'Anti-soil erosion act approved by farmers', *The Land*, 18 August 1938; 'Soil Erosion Bill. Farmers' Approval', *Sydney Morning Herald*, 16 August 1938.
[91] Breckwoldt, The Dirt Doctors, pp. 48-50.
[92] Ibid.
[93] Ibid.
[94] Ibid.
[95] PD, Legislative Assembly New South Wales, 5 October 1938, p. 1837.
[96] PD, Legislative Assembly New South Wales, 30 September 1938, p. 1797; cf. also: Bradsen, Soil Conservation Legislation, p. 36.
[97] Breckwoldt, The Dirt Doctors, p. 50.
[98] Ibid., p. 48.
[99] Bradsen, Soil Conservation Legislation, p. 37.

Department of Agriculture. This conviction had strengthened during his trip to the United States, where – despite Bennett's opposition – the US Soil Conservation Service had been integrated into the Department of Agriculture and was now faced with a continuing battle for resources and recognition.[100] Clayton predicted that the aims of soil conservation could be difficult to reconcile with the agenda of the Department of Agriculture, whose main interest was, after all, to increase primary production.[101] Clayton's efforts to establish the SCS outside the ranks of the Department of Agriculture met vigorous opposition from the director of Agriculture, Alexander McDonald.[102] As has been stated in the second part of the thesis, a veritable feud developed between the two experts, in which the link between soil fertility and soil erosion became the bone of contention: In McDonald's eyes, soil conservation was just part of the larger task of agriculturalists to increase primary production, and the SCS was therefore well-placed within the Department of Agriculture.[103] When the bill was discussed, most speakers favoured putting the SCS in the Department of Agriculture. Clayton's aspirations were however supported by Vincent and by McKell, who preferred placing the Service under the Department of Mines and Forests because they dealt with the primary resources of the State.[104] At the end, the SCS was placed under the aegis of the Department of Mines and Forests, but in the years to follow, Clayton would have to fight off further attempts to change this status and put the Service under the Department of Agriculture.[105]

The New South Wales Soil Conservation Act went into effect on 28 October, 1938.[106] It created the New South Wales Soil Conservation Service, the first in Australia, and the second in the world, after the United States of America.[107] The rural and city press commended the Act and urged that adequate financing be made available.[108] Under the directorship of Sam Clayton, the Soil Conservation Service began its work, namely to "study the nature and extent of the erosion problem to determine the causes and their effects and to devise and perfect efficient and economical methods for the prevention as well as for correction of the current erosion".[109] One of the initial tasks was to start a state-wide erosion survey, which Clayton considered as prerequisite to any development of an efficient soil

[100] Breckwoldt, The Dirt Doctors, p. 41.
[101] Ibid.
[102] Ibid.
[103] 'Conservation of Soil. View of Experts', *Sydney Morning Herald*, 6 October 1941.
[104] Breckwoldt, The Dirt Doctors, pp. 41, 49.
[105] Bradsen, Soil Conservation Legislation, p. 35; Breckwoldt, The Dirt Doctors, pp. 54, 57-58.
[106] Bradsen, Soil Conservation Legislation, p. 36; Breckwoldt, The Dirt Doctors, p. 50.
[107] Breckwoldt, The Dirt Doctors, p. 54.
[108] Breckwoldt, The Dirt Doctors, pp. 54-55; 'Big erosion drive awaits finance', *The Land*, 12 May 1939.
[109] Eric E. S. Clayton (1945): The Soil Conservation Service. In: *Journal of Soil Conservation NSW* 1 (1), pp. 8-9, here p. 8.

conservation plan.[110] In June 1941, a survey of the amount of erosion in the eastern and central divisions of New South Wales was commenced by the SCS under the direction of Gordon Kaleski.[111] These parts of the state were the most important from an economic point of view, as they hosted practically all of the state's agricultural production as well as 90 per cent of its livestock.[112] The field work was carried out from 1941 to 1943 and initial results could be presented in early 1944.[113] The survey showed that nearly half of the Eastern and Central Divisions (namely 48.3 per cent) suffered to some degree from accelerated soil erosion.[114] In regard to wind erosion, 0.5 per cent, or 252,265 hectares (974 square miles), were affected with severe erosion and 10.3 per cent, or 4,830,328 hectares (18,650 square miles), with moderate erosion.[115] In addition to the important task of surveying the current state of erosion, the SCS was also responsible for the bulk of erosion research in the state.[116] In order to carry out practical experiments, to train staff, and to hold field days where farmers could learn about soil conservation methods, Clayton sought to establish a soil conservation research station.[117] He immediately thought about the Cowra Experiment Farm of the Department of Agriculture, where he had already conducted Australia's first soil conservation field days in 1930, and where badly eroded tracts of land were still awaiting reclamation.[118] Clayton succeeded with his plan, and the first soil conservation research station was established at Cowra in 1940.[119] The station, established on about 100 hectares (250 acres) of land, was set up to generate both scientific and practical information in soil conservation, but had also an educative component, as it was open for the public at all times for inspection, and special field days were organised to inform interested landholders.[120]

As a matter of fact, the education of the rural population was among the service's foremost tasks, taking the form of practical farm demonstrations, the organization of field days, and the publishing of a large amount of educative material, such as journal articles or

[110] Ibid.
[111] Breckwoldt, The Dirt Doctors, p. 62; 'How N.S.W. will attack soil erosion problem', *The Land*, 7 January 1944.
[112] L. G. Kaleski (1945): The Erosion Survey of NSW (Eastern and Central Division). In: *Journal of Soil Conservation NSW* 1, pp. 12-20.
[113] Ibid.; 'How N.S.W. will attack soil erosion problem' *The Land*, 7 January 1944; 'How N.S.W. will tackle soil erosion', *The Land*, 4 February 1944.
[114] Kaleski, The Erosion Survey of N.S.W., p. 14.
[115] Ibid.
[116] Clayton, The Soil Conservation Service, p. 8.
[117] Breckwoldt, The Dirt Doctors, pp. 58-60.
[118] Clayton, The Control of Soil Erosion on Wheat Lands; see also: Breckwoldt, The Dirt Doctors, pp. 24, 58-60.
[119] 'State-wide attack on erosion; new research station at Cowra', *The Land*, 26 April 1940.
[120] Soil Conservation Service NSW (1941): Instructional Field Day at Soil Conservation Research Station Cowra, 10th October 1941 [Pamphlet].

pamphlets.[121] As Breckwoldt pointed out, Clayton was well aware that he needed the cooperation of the farming community to achieve soil conservation, and consequently favoured the educative approach rather than any compulsion by law.[122] The SCS even co-produced educational movies on the erosion topic, for example *Enemy Within* (1942) and *Man against Erosion*.[123] One particular form of education was the soil conservation competition established in September 1939 out of a cooperation of the SCS with the Narraburra Shire Council at Temora.[124] On the winning properties, field days were held, thus enhancing the effects of soil conservation knowledge diffusion.[125]

In 1941, Labor came back to the government benches, now under the leadership of Premier William McKell.[126] In his election campaign, McKell had specifically canvassed the rural voters, presenting his agenda in a famous *Rural Policy Speech* that he delivered in West Wyalong in April 1941.[127] In McKell's election program, rural housing, extension of electricity, debt relief for farmers, and systematic marketing of primary produce were prominent features, as was the topic of water and soil conservation.[128] In his *Rural Policy Speech*, McKell claimed that despite the fact that Australians "fundamental asset – the land – [was] being threatened" practically nothing had been done in matters of soil conservation.[129] McKell announced that under his government, additional research stations would be established throughout rural New South Wales in which "control measures to suit the soil, climate, type of farming and general economic position of each particular district" would be evolved and applied. Labor also promised to care for the supply with the necessary big machinery for soil conservation measures.[130]

In view of that, soil conservation in New South Wales received a strong stimulus. When McKell presented his soil conservation plans at a field day at the research station at Cowra in 1941, he warned that negligence of soil erosion was in reality an act of sabotage "as

[121] Breckwoldt, The Dirt Doctors, p. 60.
[122] Ibid.
[123] Ibid., p. 140. In 1950, the SCS NSW explicitly started a special scheme to use visual education methods, showing Australian as well as US-American films, cf.: Eric E. S. Clayton (1950): Foreword. In: *Journal of Soil Conservation NSW* 6 (2), p. 61.
[124] 'High Value of Contests. Soil Erosion Education', *The Farmer and Settler*, 20 June 1940; see also: Breckwoldt, The Dirt Doctors, p. 60.
[125] Breckwoldt, The Dirt Doctors, p. 61.
[126] Kingston, A History of New South Wales, p. 161. McKell's endeavours in resource conservation have been described most recently by Cameron Muir, The Broken Promise, pp. 139-163.
[127] Kingston, A History of New South Wales, pp. 161-162; Breckwoldt, The Dirt Doctors, p. 63.
[128] Ibid.
[129] William McKell (1941): Rural Policy Speech. Delivered in West Wyalong on 23 April 1941, Sydney, Consolidated Press Ltd, pp. 11-12.
[130] Ibid.

deadly as any pro-Nazi fifth columnist sabotage could be".[131] He stated that he had doubled the annual allocation for soil conservation from £17,000 to £40,000 and announced his plan to establish three additional research stations next to the already existing one at Cowra.[132] In the following years, the annual expenditure for soil conservation would, however, stay below that sum, reaching for example £32,780 in 1945.[133] The war restrictions on funds and personnel also meant that the plans to open additional research stations was delayed, so that the second station after Cowra was only opened in 1944 at Wellington.[134] As part of his political strategy, McKell created in 1944 a new Department of Conservation that sheltered the Soil Conservation Service (which was taken out of the Department of Mines), the Forestry Commission, and the Water Conservation and Irrigation Commission, thus forming what has been dubbed as McKell's trinity of water, soil and forests.[135]

The drought of 1944 and 1945 brought a series of dust storms over the state, and not only over the countryside, but also over Sydney.[136] As a result, wind erosion reached the top of the political agenda, and the questions of overgrazing and overstocking in the Western Division were especially vividly discussed.[137] Experts, among them Professor James Macdonald Holmes, Professor for Geography at the University of Sydney, urged the government to give the Soil Conservation Service greater powers to prevent overstocking.[138] The McKell government consequently decided to limit stocking on Crown Land and planned to amend legislation the following year in order to prevent overstocking on private lands.[139] It would, however, only be in 1952 that such an amendment was passed, providing for the possibility of stipulating specific ways of land utilization and land management, specifically in regard to the number of livestock to be carried.[140] In order to evaluate the carrying capacity of the respective areas, a special assessment board was then established.[141]

A further amendment was passed in 1947 in reaction to the lack of heavy equipment and low financial resources of the farmers, which were considered serious hindrances for

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[131] 'Heritage of the Soil', *Sydney Morning Herald*, 11 October 1941.
[132] 'State Government's Soil Conservation Research Plans", *The Independent*, 23 October 1941.
[133] 'Soil Conservation Campaign', *Sydney Morning Herald*, 23 October 1948.
[134] 'Wellington soil research station', *The Land*, 21 April 1944.
[135] Breckwoldt, The Dirt Doctors, p. 74.
[136] 'Dust Blacks-Out City in Sudden Storm', *Sydney Morning Herald*, 17 October 1944; 'Cool Change brings Relief', *Sydney Morning Herald*, 21 November 1944.
[137] 'Why and Wherefore of Overstocking', *The Land*, 24 November 1944; 'Soil Erosion in Southern New South Wales', *The (Adelaide) Advertiser*, 21 November 1944.
[138] 'Wider Powers Urged to Check Erosion', *The Sun*, 23 November 1944.
[139] 'Govt. Move to Stop Soil Erosion', *Barrier Miner*, 22 November 1944; 'Powers to Check Erosion', *The Sun*, 30 November 1944.
[140] Bradsen, Soil Conservation Legislation, p. 37.
[141] Ibid.

progress in soil conservation.[142] The 1947 amendment, therefore, provided for the Minister of Conservation to grant financial advances to the farmers for soil conservation works, especially for hiring necessary machines.[143] After the end of the war, the Soil Conservation Service expanded considerably, becoming by far the largest soil conservation body in Australia, reaching a total of £287,440 in expenditures and a total staff of 212 persons in 1948.[144]

Emphasising the need for education, the New South Wales Department of Education introduced the subject of soil conservation into the school curriculum in 1948; the teachers were instructed in soil conservation principles by the SCS.[145] The original Soil Conservation Act 1938 Act underwent further amendments in the decades to come, the most extensive being in 1978 and 1985.[146] The Soil Conservation Service of New South Wales existed until 1991, when it was abolished and its functions incorporated into the Department of Conservation and Land Management.[147]

9.2 The Community Approach: South Australia

South Australia was, after New South Wales, the second state to establish more comprehensive soil conservation legislation during the 1930s, having already passed some superficial legislation in the early 1920s. Although it was the largest of the three south-eastern states in terms of surface area, its population was the lowest. The 1933 census shows that the population of the state was 580, 949 people, and that more than half of them, namely 312, 619, lived in the Adelaide area.[148] In addition to ever increasing urbanization, South Australia faced the lowest birthrate of all Australian states.[149] Moreover, the state's economy relied even more heavily on the primary sector than in Victoria or New South Wales: Unlike its sister states, South Australia did not possess the raw materials necessary for industrial production (most importantly coal), and consequently lagged behind the other states, which developed more rapidly in this matter after the First World War and became important rivals.[150]

In South Australia, the political scene during most of the 1930s and the 1940s was dominated by the government of the Liberal and Country League (LCL). The LCL had been

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[142] Ibid.
[143] Ibid.
[144] 'Soil Conservation Campaign', *Sydney Morning Herald*, 23 October 1948.
[145] Eric E. S. Clayton (1948): Foreword. In: *Journal of Soil Conservation NSW* 4 (2), p. 53.
[146] Bradsen, Soil Conservation Legislation, p. 40.
[147] For further developments see: Government of New South Wales, Department of Primary Industries, Soil Conservation Service: Our History. Online: http://www.scs.nsw.gov.au/about-scs/our-history. [Accessed 30 March, 2016].
[148] Gibbs, A History of South Australia, p. 208.
[149] Ibid.
[150] Ibid., p. 199.

established in February 1932 when the representatives of the Liberal and Country Party agreed to form a new joint party on the state level.[151] In the 1933 state elections, the LCL was able to banish the Labor Party, in office since 1930, to the opposition benches.[152] The LCL would remain in power for 32 years, supported by an electoral system that disproportionally favoured the rural areas to the detriment of Labor, which was stronger in urban areas.[153]

Initial legislation against soil erosion in South Australia dates from the year 1923, when the state introduced a Sand Drift Act in order to reduce the problems caused by sand drift in some badly affected areas in the Murray Mallee, Eyre Peninsula and Upper York Peninsula.[154] The Act empowered private landholders or public authorities to oblige landholders to take prescribed action to prevent sand drift if sand emanating from their land damaged public roads, public works or the land of their neighbors.[155] Even if the Act had a narrow approach to the problem of soil erosion, it was an important first step of political action.[156] More comprehensive soil conservation legislation followed in the context of the erosion crisis of the 1930s: In April 1937, South Australia established a Soil Conservation Committee composed of a range of experts: Walter Spafford, Director of Agriculture (chairman); Professor Richardson, Director of the Waite Agricultural Research Institute; Mr Rogers, Conservator of Forests and Mr McGilp, a member of the Pastoral Board; and Mr Johnson, Engineer for Water Supply.[157] The establishment of the committee was the result of a special meeting in Adelaide the previous year where the agricultural ministers of the states and the Commonwealth had agreed that each state should form a committee to investigate the problem of soil erosion.[158] The members of the committee had extensive experience and interest in soil erosion: Spafford had since the 1920s investigated the causes and remedies of wind erosion at the Department of Agriculture, and Richardson was an expert in wind erosion and plant ecology in the state's pastoral areas. During 1937 and early 1938, the erosion committee, also called 'Spafford Committee', made a range of field investigations in pastoral areas of the north-east and upper-north of the state and in the farming districts of the Murray

[151] Ulrich Ellis (1963): A History of the Australian Country Party. Melbourne, Melbourne University Press, p. 191.
[152] Gibbs, A History of South Australia, p. 206.
[153] Ibid.; Dean Jaensch (1977): The Government of South Australia, St. Lucia, University of Queensland Press, pp. 46-50. This particular characteristic of the electoral system of that period has been dubbed 'Playmander'; the most recent article is by Jenny T. Stock, who comes to the conclusion that the 'Playmander' was decisive in at last some of the South Australian elections, see: Jenny T. Stock (1991): The 'Playmander' revisited: the Significance of Cross-voting in Estimating the Two-party Vote in South Australia, 1943-1953. In: *Australian Journal of Political Science* 26 (2), pp. 331-341.
[154] Tideman, The Struggle for Landcare, p. 5; Bradsen, Soil Conservation Legislation, pp. 42-43.
[155] Ibid.
[156] Ibid.
[157] Ibid.
[158] Ibid.

Mallee.[159] In its report, published in 1938, the Committee came to the conclusion that the increasing erosion and soil drift had in recent years significantly reduced "the carrying capacity of considerable areas in the semi-arid portions of Australia".[160] The Committee also found that soil erosion and drift had taken place "on a considerable scale" in the state's Mallee wheat areas.[161] In both cases, the main factor contributing to wind erosion was found to be "the destruction of the natural vegetative cover and the consequent exposure of the bare soil to the erosive action of the wind". According to the report, this was caused in the pastoral areas mainly through overstocking of grazing animals and in the wheat areas by the indiscriminate clearing of vegetative cover and the cultivation of light sandy areas in the wake of the settlement process.[162] The report was accompanied by three maps that illustrated the extent of soil erosion in the state, as well as a series of photographs taken during the field investigations of the Committee. In its recommendations, the Committee favoured the establishment of a soil conservation service in the long run.[163] As a first step, however, it thought the establishment of a group of advisers within the Department of Agriculture would be adequate to deal with the problem, and accordingly suggested that three advisers be appointed, one in charge of wind erosion on agricultural lands, one for wind erosion on pastoral lands and one for water erosion on agricultural lands.[164] The Committee also made a series of recommendations concerning the insertion of clauses on grazing licenses that would limit the number of stock and thus prevent overstocking, considered as main cause of wind erosion in the pastoral areas.[165] Furthermore, it proposed assigning badly affected land as Crown land, which should then be put under reserve.[166] The recommendations of the Spafford Committee were largely the basis for the subsequent soil conservation bill.[167]

It was the 10 August, 1939 when Reginald J. Rudall, Commissioner of Crown Lands, introduced the Soil Conservation bill into the House of Assembly.[168] When Rudall introduced the second reading of the bill, he referred extensively to the research of Ratcliffe and to the recently published report of the South Australian Soil Conservation Committee.[169] Throughout the debates in the next months, extensive references were also made to the book

[159] Tideman, The Struggle for Landcare, p. 5.
[160] South Australia (1938): Report of the Soil Conservation Committee, p. 4.
[161] Ibid.
[162] Ibid.
[163] Ibid., p. 57.
[164] Ibid.
[165] Ibid.
[166] Ibid., p. 58.
[167] Tideman, The Struggle for Landcare, p. 6; Bradsen, Soil Conservation Legislation, p. 43.
[168] PD, Legislative Assembly South Australia, 10 August 1939, p. 457; see also: Tideman, The Struggle for Landcare, p. 7.
[169] PD, Legislative Assembly South Australia, 16 August 1939, p. 561.

Australia's Dying Heart by pastoralist Jock Pick.[170] International examples of soil erosion past and present also surfaced in the debates, especially the example of the US, which once more illustrates the international ring of the debate in Australia.[171]

There was a large consensus about the need for the bill in both houses and throughout the party benches. The Leader of the Labor Opposition, Robert S. Richards, declared his support of the bill and emphasised that one could not "offer any opposition to a measure which proposes to remedy an evil of which everyone is aware. In these matters one must be guided by the opinion of the experts, and the initial steps to be taken should be taken by those experts".[172] There is no doubt that the large majority of parliamentarians considered soil erosion as a serious menace that urgently had to be combated. They had also mainly adopted an ecological vision on erosion that implied that human land use was chiefly responsible for its occurrence. Parliamentarian Alexander Melrose (LCL), for example, spoke of erosion as "a cancer that is eating into our national stability"[173] and also explicitly referred to ecology as the guiding discipline in this matter:

> In order to get a proper grasp of this situation one should realize the bearing upon it of a knowledge of ecology. It is difficult to find a definition of that word, but I understand it to mean a consideration of all the facts surrounding any living organism, and not only the organism itself, but its complete environment, both as regards air and soil. [...] When the white man, so far as Australia is concerned, imposed his ideas of agriculture on the soil he so disturbed the state of equilibrium existing between the vegetative covering, human population and other animal population that ruin almost preceded him.[174]

The bill proposed the establishment of a part-time advisory committee on soil conservation which would have the role of advising the Minister.[175] The fact that much erosion occurred on pastoral lands, traditionally administered by the Department of Land, led to a broad discussion about the adequate administrative frame of the newly created Committee.[176] Arguing that erosion affected mainly pastoral areas, the House of Assembly did not accept the initial proposition by Rudall to put the soil conservation legislation under the administration of the

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[170] Clement Smith, in: PD, Legislative Assembly South Australia, 22 August 1939, p. 615; Walter Duncan, in: PD, Legislative Council South Australia, 19 September 1939, p. 856; Ernest Castine, in: PD, Legislative Council South Australia, 26 September 1939, pp. 943-944; James Beerworth, in: PD, Legislative Council South Australia, 3 October 1939, pp. 1034, 1037; Id., in: PD, Legislative Council South Australia, 5 October 1939, p. 1181.
[171] Herbert Michael, in: PD, Legislative Assembly South Australia, 22 August 1939, pp. 626-627; Clement Smith, in: PD, Legislative Assembly South Australia, 22 August 1939, p. 631; Jenkins, in: PD, Legislative Assembly South Australia, 22 August 1939, p. 622; Ernest Castine, in: PD, Legislative Council South Australia, 26 September 1939, p. 944.
[172] PD, Legislative Assembly South Australia, 22 August 1939, p. 613.
[173] Alexander J. Melrose, in: PD, Legislative Assembly South Australia, 22 August 1939, p. 615.
[174] Ibid., p. 616.
[175] Tideman, The Struggle for Landcare, p. 7; Bradsen, Soil Conservation Legislation, p. 43.
[176] PD, Legislative Assembly South Australia, 29 August 1939, pp. 723-725; PD, Legislative Council South Australia, 3 October 1939, pp. 1038-1039.

Department of Agriculture, favouring instead the Department of Lands.[177] They were contradicted by Rudall, who argued that the most valuable lands of the state were not the pastoral areas but the agricultural areas, and that these were affected by different kinds of erosion that required a large amount of agricultural expertise.[178] In the end, the Council disagreed with the Assembly and preferred the Department of Agriculture. The final decision on the matter was then left to the Cabinet, which chose the Department of Agriculture.[179] While opposition to the principles of the bill was scarce, some members thought that the provisions did not go far enough. In the House of Assembly, Albert Thompson criticised the bill by saying it was not sufficiently taking account of the wind erosion problem in the Murray Mallee. Thompson argued that in these wheatgrowing areas, the government, if it wanted to fulfill the purpose of the Act, would have to put the entire region under a vegetation reserve.[180]

The Soil Conservation Act passed the Parliament on 30 November, 1939.[181] It provided for the establishment of a permanent South Australian Advisory Committee on Soil Conservation that should be composed of a maximum of seven members, two of them with practical experience in the pastoral industry.[182] The Committee had no executive functions, as its role was purely advisory, namely to advise the Minister on such matters relating to soil erosion and soil conservation.[183] The Act stipulated the power for the Minister to whom the administration of the Act was committed (this would finally be the Minister for Agriculture) to issue orders to enter land for inspection, to resume or acquire land by purchase or compulsory process for the purpose of the creation of soil conservation reserves or other soil conservation measures.[184] The Minister could also prohibit the driving of stock on roads or stock routes in order to prevent erosion of soil if alternative routes were available, or prohibit the cutting of certain trees and pieces of shrubs on lands liable to erosion.[185] Furthermore, the Minister could grant financial assistance to landholders or bodies who wished to undertake soil conservation works.[186] One important recommendation of the Soil Conservation Committee had been to insert clauses in regard to grazing licenses that would allow the prevention of overstocking. Traditionally, the administration of grazing licenses was handled

[177] Tideman, The Struggle for Landcare, p. 7.
[178] Ibid., p. 8.
[179] Tideman, The Struggle for Landcare, p. 8; Bradsen, Soil Conservation Legislation, p. 43.
[180] Tideman, The Struggle for Landcare, p. 7.
[181] Ibid., p. 8.
[182] Soil Conservation Act 1939 (SA), s 4.
[183] Ibid., s 6.
[184] Ibid., s 7, 8, 9; cf. also: Tideman, The Struggle for Landcare, p. 7.
[185] Soil Conservation Act 1939 (SA), s 12, 13; cf. also: Tideman, The Struggle for Landcare, p. 7.
[186] Soil Conservation Act 1939 (SA), s 11.

by the Pastoral Board and the Commissioner of Crown Lands. To address this, the final act contained an amendment of the Pastoral Act of 1936.[187] The amendment gave the Minister of Lands the right to prescribe a limitation or reduction of the stock number on the land if it considered that the land was "likely to be injured permanently".[188] New leases that were granted after the passing of the act were to contain terms prescribing the maximum number of stock that could be grazed.[189]

The Advisory Committee on Soil Conservation held its first meeting on 15 March 1940 under the chairmanship of Spafford; the members appointed were by and large those of the former Soil Conservation Committee complemented by two landowners with pastoral experience.[190] Only Richardson was replaced by Trumble who was the head of the Agronomy Department at the Waite Agricultural Research Institute.[191] As guiding principle for its future work, the Advisory Committee decided to "work on the lines of the education of landholders, rather than on compulsory prevention".[192] Among its first actions, the Committee recommended the nomination of three advisers which would be attached to the Department of Agriculture and assist landowners in soil conservation measures.[193] These appointments were delayed at first because the Premier of South Australia, Sir Thomas Playford (Premier of SA from 1938-1965), thought that in the face of the wartime-induced shortage of staff, the task could be accomplished by the already existing personnel in the Agriculture and Lands Departments.[194] The Advisory Committee insisted, and in March 1941, Robert (Bob) Herriot was appointed as the first South Australian Soil Conservator.[195] Among the early steps taken by the Advisory Committee was a series of inspections in the badly sand drift affected areas of the northern towns of Farina, Parachilna, and Port Augusta as well as in the Murray Mallee region around Loxton. Recommendations were made in regard to soil conservation measures to adopt or lands to be resumed under the Soil Conservation Act.[196] The Committee also initiated an aerial survey of County Victoria in cooperation with the CSIR and established the soil erosion research facilities at Yudnappina.[197] In the season 1943/1944, it set in motion a

[187] Ibid., s 14.
[188] Ibid.
[189] Ibid.
[190] Tideman, The Struggle for Landcare, pp. 5, 9.
[191] Ibid., p. 5.
[192] Quoted by Tideman, The Struggle for Landcare, p. 9.
[193] Ibid., pp. 9-10.
[194] Ibid.
[195] Ibid.
[196] PD, Legislative Assembly South Australia, 10 November 1942, pp. 1205-1207.
[197] Ibid., p. 1206.

scheme to mitigate the clogging of the railway lines through sand drift by distributing rye seed to farmers.[198]

Despite these achievements, the first years of the Advisory Committee were not very effective as the war situation brought about significant restrictions on travelling and funding.[199] For the financial year 1943-44, the total expenditure was, for example, only £790.[200] Several calls to enlarge the funding for soil conservation by parliamentarians such as Christian or by the state Labor Party conference in 1943 remained unheeded.[201] Also, there was a considerable shortfall of qualified staff, so for the first years, Herriot was the only full time soil conservator at the Department of Agriculture, having no assistance except for occasional part-time help from a surveyor of the Lands Department.[202] In 1944, three additional assistant Soil Conservators were appointed, but in early 1945, only one of the three assistants had started to work.[203] Consequently, the nucleus of a Soil Conservation Division within the Department of Agriculture under the leadership of Herriot emerged only gradually and expanded slowly, even after the end of the war: In 1949, the division's staff amounted to a total of ten technical officers with additional vacancies for four officers.[204] As there were problems finding satisfactory applicants to fill the positions, a cadet's scheme was established in 1949 with the aim to reach a staff number of about 25 to 30 officers in 1960.[205] The limited staff and funding of the South Australian Soil Conservation Division, as compared with those, for example, of the New South Wales Soil Conservation Service, corresponds to its limited functions: The Advisory Committee on Soil Conservation formulated the general guidelines of soil conservation policies, while the emerging Soil Conservation Division was responsible for the practical work and the central task "to get the people 'erosion conscious'".[206] Ecological research into soil erosion was in large parts ceded to the Waite Institute in Adelaide.[207]

In 1943, the original Act was amended on the instigation of the Advisory Committee in order to give the Committee and the Minister more powers and to enable them to

[198] South Australia, Report of Advisory Committee on Soil Conservation 1949, p. 3; Tideman, The Struggle for Landcare, p. 11.
[199] Tideman, The Struggle for Landcare, p. 10.
[200] South Australia, Report of Advisory Committee on Soil Conservation 1944, p. 3.
[201] Tideman, The Struggle for Landcare, p. 10.
[202] 'State's Work in Conservation', *(Adelaide) Chronicle*, 7 December 1944; South Australia, Report of Advisory Committee on Soil Conservation 1944, p. 1.
[203] South Australia, Report of Advisory Committee on Soil Conservation 1944, p. 1; Spafford, Controlling Soil Erosion, p. 328.
[204] South Australia, Report of Advisory Committee on Soil Conservation 1949, p. 1.
[205] Ibid.
[206] Robert I. Herriot (1944/45): The Soil Conservation Act and What it Means. In: *Journal of Agriculture of South Australia* 48, pp. 371-373, here p. 372.
[207] Ibid.; Tideman, The Struggle for Landcare, p. 14.

implement further protection of reserves by limiting the stock traveling on them.[208] After the end of the Second World War, strains on finances and personnel lightened and brought about a series of new possibilities.[209] In 1945, a further Amendment of the Soil Conservation Act sought to improve soil conservation in the state by increasing the participation of the local community.[210] The draft for the amendment had substantially been inspired by the US, where a Soil Conservation Service standard law of 1936 provided for the establishment of soil conservation districts.[211] The idea was that through petition and referendum, the local community formed a soil conservation district, whose regulations where then binding for the whole of the district.[212] Herriot was convinced that "this Soil Conservation District idea [was] the main driving force behind the Soil Conservation plan" of the United States of America and advocated for an adoption of the district idea along similar lines.[213] Herriot, supported by Mr Kelly and Dr Trumble, convinced the Advisory Committee of this plan and on 15 November 1945 a bill to amend the existing Act was introduced into the House of Assembly by George F. Jenkins, Minister of Agriculture.[214] In his opening speech, the minister stated:

> The difficulties in the United States ha[d] been overcome by the creation of a soil consciousness in the minds of the people generally. This was brought about largely as the result of setting up local committees to educate farmers and to deal with the problem locally as far as possible.[215]

As the main object of the bill, Jenkins named the decentralization of the administration in order to deal with the erosion problem, "not only to relieve the pressure of work in Adelaide, but also to stimulate and increase local interest in soil conservation and make it possible to conduct widespread educational campaign on this subject".[216]

The bill provided for the establishment of 'Soil Conservation Districts' that would be administered by Soil Conservation Boards.[217] A soil conservation district would be formed if 60 per cent of the landowners living in the area petitioned in favour of its formation. The administration of those districts would be transferred to a Soil Conservation Board, which in turn was composed of between three and seven landowners of the concerned district who

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[208] Bradsen, Soil Conservation Legislation, p. 44.
[209] Tideman, The Struggle for Landcare, p. 10.
[210] Ibid., p. 13.
[211] Worster, Dust Bowl, p. 219.
[212] Ibid.
[213] Quote from: Robert Herriot, '"Soil Conservation Districts." A Wireless Talk in Country Hour Session 5AN, June 10th', in: [SRSA: GRS 1818/1 unit 1, Texts of public addresses and radio broadcasts, R.I. Herriot, Soil Conservator, Department of Agriculture]. See also: Herriot, Soil Conservation - A Community Problem, pp. 376-379.
[214] George F. Jenkins, in: PD, Legislative Assembly South Australia, 15 November 1945, p. 973; cf. also: Tideman, The Struggle for Landcare, pp. 13-15.
[215] PD, Legislative Assembly South Australia, 15 November 1945, p. 969.
[216] Ibid., p. 970.
[217] Tideman, The Struggle for Landcare, p. 13.

would be nominated by the Advisory Committee.[218] In local government areas, the bill also provided for at least one representative of the local government to be a member of the board.[219] The board was charged with the task of promoting local interest in soil conservation by means of organising lectures, demonstrations, conferences, or discussions.[220] It would be responsible for assembling information on soil erosion and conservation within its district and for compiling reports as well as furnishing recommendations in these matters.[221] The Board would have the duty to undertake any investigations requested by the Minister or Committee.[222] The power to issue a soil conservation order for the protection of land that had been held under the original Act by the Minister should pass over to the Soil Conservation Boards in those cases where a Soil Conservation District would have been formed, or, where no such district would be established, to the Soil Conservator.[223] The Minister as well as land-holders affected or local committees would also be able to apply for soil conservation orders to the Advisory Committee.[224] Despite such wide ranging powers to issue orders, first held by the Minister and then by the Soil Conservation Boards and the Soil Conservator, these legal means of compulsion would only rarely be taken over the years.[225]

The amendment was largely supported by the members of parliament, who in a very large majority followed the argument that South Australia would profit from adopting the successful model of the US.[226] There were only minor reservations by some members of the Parliament towards the fact that the board members would originate from their own district, as they feared this might prevent them taking action against their neighbours.[227] The only more explicit opposition came from MP Albert Blesing, former Minister of Agriculture 1933 to 1944), who argued that much erosion was mainly determined by climatic factors, and therefore beyond the control of the farmers, and that the amendment would probably create further unnecessary administration.[228]

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[218] Ibid.
[219] Ibid.
[220] Ibid.
[221] Ibid.
[222] Ibid., pp. 13-14.
[223] Bradsen, Soil Conservation Legislation, p. 44.
[224] Tideman, The Struggle for Landcare, p. 14.
[225] Ibid., pp. 9, 27-29.
[226] For example: Michael, in: PD, Legislative Assembly South Australia, 28 November 1945 , p. 1143; Castine, in: PD, Legislative Council South Australia, 20 December 1945, p. 1441; cf. also: Tideman, The Struggle for Landcare, p. 14; Bradsen, Soil Conservation Legislation, p. 44.
[227] For example: Macgillivray, in: PD, Legislative Assembly South Australia, 28 November 1945, p. 1136; Christian (Eyre), in: PD, Legislative Assembly South Australia, 28 November 1945, pp. 1139-1140; cf. also: Tideman, The Struggle for Landcare, p. 14.
[228] PD, Legislative Council South Australia, 20 December 1945, pp. 1436-1437.

The Soil Conservation Act Amendment Act 1945 was passed in late 1945 and assented to on 24 January 1946. At the beginning, there was a large interest in the principle of the soil conservation districts, but the mark of 60 per cent of landholders required to petition for the formation of a district turned out to be too high and progress was painfully slow: Up to 1951, only three districts were established, namely the one of Upper Eyre peninsula (1947), the Murray Mallee (1948) and the Murray Plains (1949).[229] Another two districts were established by 1954, followed by stagnation for nearly three decades.[230] Despite these meager results, several studies indicate that the basic idea behind the soil conservation districts, i.e. to engage the farming community in soil conservation, was successful in the cases where such districts had been established.[231]

The original Soil Conservation Act 1939 was amended again several times in the following decades, with significant amendments occurring in 1960, 1978, and 1984.[232] It was finally replaced in 1989 with the Soil Conservation and Land Care Act 1989, which also abolished the Advisory Committee on Soil Conservation and instead created a Soil Conservation Council.[233] The new Act aimed at addressing broader issues concerning land management and natural resources and followed the principle to use land according to its capacity.[234] Following the path taken in the 1930s, the Act continued to focus on education and promoting involvement of local landholders in soil conservation.[235] It required the Soil Conservation Boards to prepare a District Plan within a five year period, conceived as a detailed set of guidelines for appropriate land management in the district.[236] Under this legislation, the number of Soil Conservation Boards in operation increased to 27, resulting in a network that covered all of the agricultural and pastoral areas of the state.[237] The Soil Conservation Council, in turn, worked for 15 years, before it was replaced in 2004 by the Natural Resources Management Council, created through the Natural Resources Management Act, 2004.[238]

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[229] Ibid.
[230] Ibid., p. 16.
[231] William E. Matheson (1998): Winds of Change. A History of the Murray Mallee Soil Conservation Board, Murray Mallee District Soil Conservation Board, pp. 13-14. Online: http://www.pir.sa.gov.au/__data/assets/file/0019/151084/NRMHist_WindsofChange.pdf. [Accessed 30 March, 2016]; John Berger et al. (1995): Soil Boards as a Vehicle for Landcare. In: *Australian Journal of Soil and Water Conservation* 8 (3), pp. 8-12
[232] Bradsen, Soil Conservation Legislation, pp. 44-45.
[233] Tideman, The Struggle for Landcare, pp. 36-37.
[234] Ibid., p. 41.
[235] Ibid., pp. 41-43.
[236] Soil Conservation and Land Care Act 1989 (SA), s 36.
[237] Tideman, The Struggle for Landcare, pp. 43, 67.
[238] Ibid., p. 56.

9.3 The Reluctant State: Victoria

Victoria is possibly the most interesting case of the states under consideration here, as it shows how soil conservation legislation was established largely against the resistance of the state's Premier. While being the smallest of the three south-eastern states, it was the most densely populated. The census of 1933 counted 1.8 million people living in Victoria.[239] Just as in the other states, urbanization was high, and the development of the manufacturing sector in the early decades of the 20th century had increased Melbourne's population by the 1920s to about 55 per cent of the total population.[240]

The political situation in Victoria showed some curiosities. In the period under consideration, there was a three-party system, with the ALP, the UAP, and the Country Party.[241] The Country Party had a strong standing in Victoria because of the large numbers of small-scale farmers and their economic dependence on the world markets, which favoured the fact that they organised themselves politically early on.[242] In the three party system, it was difficult for any party to reach the necessary majority to form a government, so the Country Party often took the decisive role in making the government.

Labor, at power from 1929 onwards, was defeated in the 1932 state elections. From 1932 to 1935, Victoria was governed by a Country Party/ UAP coalition with UAP leader Argyle as Prime Minister.[243] After a vote of non-confidence in 1935 initiated by the leader of the Country Party, Albert Dunstan, the Country Party formed a minority government and, with the support of Labor, held power until 1943.[244] Consequently, despite the high urbanization of the state, the population of Melbourne and suburbs was not even represented in the cabinet.[245] The alliance between the Country Party and the ALP in Victoria was an oddity that stood in sharp contrast to the position on the federal levels, where the relations between the two parties were hostile.[246] In 1943, when the Country Party lost support of Labor, Dunstan was able to continue his minority government until 1945 with the support of the UAP.[247] This was followed by a decade of often changing, unstable minority governments until 1955, when Henry Bolte (Liberal Party) came to power.[248] The great success of the Country Party throughout the 1930s and first half of the 1940s was supported by the specific

[239] Yearbook Australia 1933, p. 754.
[240] Blainey, History of Victoria, p. 175.
[241] Ibid., p. 197.
[242] Ibid., pp. 191-194.
[243] Ibid., p. 198.
[244] Ibid., pp. 198-200.
[245] Ibid., p. 191.
[246] Ibid., p. 199.
[247] Ibid., p. 200.
[248] Ibid., pp. 200-201.

electoral system in the state, more precisely the divisions of the electorates: The electoral boundaries were altered infrequently, so with rapid urbanization, the value of the rural votes had become disproportional high.[249] The last adaptation of the boundaries to the population distribution had occurred in 1926, and the ongoing drift to the cities had further increased already existing inequities.[250] In 1944, the boundaries were redistributed, and six seats were transferred from the countryside to the city, ending the long dominant influence of rural voters on the state's governments.[251]

9.3.1 The Slow Path Towards Legislation

Victoria was the slowest of the south-eastern states to pass soil conservation legislation, which is surprising if one considers that the first attempts at control date from the early 1930s. In 1931, the sand drift problem in the Mallee was so serious that a conference was held with members of various government departments and interested representatives from concerned municipalities.[252] The conference's participants made the recommendation to appoint a committee of landowners and departmental officers to investigate the problem of sand drift and report on it, with a view to frame legislation.[253] This was put into practice when a committee was appointed in June 1932 to investigate the wind erosion incidence in the Mallee.[254] The committee published its findings as a short *Report on Sand drift problems in Mallee Areas*.[255] It had found serious incidence of sand drift in the Mallee, affecting the infrastructure – the railways, roads and water channels – and the productivity of the land.[256] The committee was convinced that sand drift was due, in a great measure, to indiscriminate clearing of the natural growth and to the thoughtless cultivation of sandy soils in the Newer Mallee which were likely to drift once their plant cover was removed.[257] It also thought that suitable land use methods could prevent much of the sand drift and consequently recommended introducing legislation for the Mallee region that would provide for restrictions of clearing, stubble burning and fallowing in certain areas, chiefly in proximity of channels or other infrastructural works.[258] A board of three members should be appointed that would supervise the operation of the act and carry out experimental work in the prevention of sand

[249] Ibid., p. 194.
[250] Ibid., p. 195.
[251] Ibid., p. 200.
[252] Sims/Webb, Mallee Sand to Gold, p. 13.
[253] Ibid.
[254] Ibid.
[255] Victoria, Sand Drift Committee (1933): Report on Sand Drift Problems in Mallee Areas.
[256] Ibid., pp. 1-3; cf. chapter 2 and 3 of the thesis.
[257] Ibid., p. 1.
[258] Ibid., pp. 1, 3-4.

drift.[259] For the time being, however, the Dunstan government did not respond to these recommendations and no legislation was passed.[260]

A new impetus for soil conservation legislation came in reaction to the Conference of Commonwealth and state ministers in Adelaide in August 1936, where the state governments were asked to form Soil Erosion Committees in cooperation with the CSIR.[261] As a result, in 1937, the Victorian government appointed the Victorian Soil Erosion Committee, with W. McIllroy of the Lands Department as chairman and further members from the Department of Agriculture, the SRWSC and the Forest Commission.[262] After inquiring among several departments and conducting investigations throughout the state, the Committee submitted its report to the government in February 1938.[263] It had found "abundant evidence of damage due to soil erosion" in Victoria and judged that "whilst the position does not appear to be as yet quite so desperate as some published statements might lead us to believe, it is, nevertheless, a serious one requiring immediate attention".[264] The more than 30-pages long appendix of the report, which showed photographs of different forms of soil erosion throughout the state, gave graphic evidence to these findings.

The Committee highlighted the economic costs of soil erosion: not only the immediate decline in the land's productivity caused by the loss of soil, but also, and often more importantly, the financial expenses caused when soil particles covered properties, infrastructural buildings, or when they impeded water supply provisions.[265] The Committee left no doubt about the responsibility: "In the final analysis the real cause of most erosion can be attributed to the mistreatment by man of the soil and other natural resources in his endeavour to collect from them the greatest return in the shortest time".[266] If a large part of erosion was caused by humans, the report argued, erosion could be prevented or controlled through changes in land management methods.[267] In order to induce such changes in land use, the Committee recommended the enactment of legislation that would create a Soil Conservation Committee.[268] On state-owned land, the Committee would directly control land use; on alienated land, the only way to bring about a change was through the active co-operation of the land proprietors, which had to be obtained either voluntarily or by

[259] Ibid., pp. 3-4.
[260] Bradsen, Soil Conservation Legislation, p. 46.
[261] Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 7.
[262] Thompson, A Brief History of Soil Conservation, pp. 11-12; Bradsen, Soil Conservation Legislation, p. 46.
[263] Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 7.
[264] Victoria (1938): Report of Committee Appointed to Investigate Erosion, p. 2.
[265] Ibid.
[266] Ibid.
[267] Ibid.
[268] Ibid., p. 8.

compulsion.[269] The Committee remarked that attempts to establish compulsory soil conservation legislation might fail "unless the need and purpose of such legislation were clearly understood by landholders" and therefore recommended that the first step should be a public campaign of education that would alert the farming community about the menace of erosion.[270] Among the main functions of the Soil Conservation Committee would, therefore, be the systematic recording of information, the development and application of educative measures for soil conservation, advising landholders and assisting in research.[271]

The Dunstan government once more reacted with a surprising lethargy to the suggestions.[272] The only tangible effect was the appointment of an additional officer at the Mallee Research Station in January 1939, as recommended in the report.[273] The government's inaction was considered with misgivings among large numbers of experts and politicians from all parties.[274] In the course of 1938, several parliamentarians in both Houses urged the government to follow the recommendations of the report and to pass soil conservation legislation. Among them were members from Dunstan's own Country Party, for example the Hon. Leonard Roya Rodda (Country Party), who considered that compulsion might be necessary for some farmers and urged the government "to tackle this very important question in the immediate future".[275] A similar position was taken by Francis Edward Old, Minister for Water Supply, who thought it necessary to "create a proper soil erosion control authority with legislative powers" in order to deal with "this grave menace to our very civilization".[276]

Of the Opposition (1940), Nationalist-UAP leader Sir Stanley Argyle[277] and William H. Everard of (Evelyn) campaigned for legislation.[278] For Everard, the example of the Mallee, where wind erosion delayed trains and where "great losses [were] being suffered" clearly demonstrated the urgent need for action.[279] He protested "because the Government is not doing its duty in trying to solve the erosion problem".[280] Everard quoted Clayton's expertise

[269] Ibid.
[270] Ibid., pp. 8-9.
[271] Ibid., pp. 9-10.
[272] Bradsen, Soil Conservation Legislation, p. 47.
[273] Victoria (1938): Report of Committee Appointed to Investigate Erosion, p. 10; Sims/Webb, Mallee Sand to Gold, p. 55.
[274] From the Labor Party, John J. Holland urged for a quick legislative solution, see: PD, Legislative Assembly Victoria, 6 July 1938, pp. 99-100; independent member James Weir McLachlan, whose electorate of Gippsland North was particularly affected by water erosion, was also urging the Government to take action, see: PD, Legislative Assembly Victoria, 5 July 1938, pp. 72-74.
[275] PD, Legislative Council Victoria, 28 June 1938, p. 14.
[276] PD, Legislative Assembly Victoria, 19 October 1938, pp. 2211-2212.
[277] PD, Legislative Assembly Victoria, 5 July 1938, pp. 58-59.
[278] PD, Legislative Assembly Victoria, 19 October 1938, pp. 2203-2205.
[279] PD, Legislative Assembly Victoria, 15 December 1938, p. 3943.
[280] Ibid., p. 3944.

as proof for the seriousness of the problem and recommended following the example of government action in the United States.[281]

In 1939, pressure on the Country Party government to move in regard to soil conservation legislation increased. New South Wales had already enacted soil conservation legislation in 1938, and in South Australia legislation was likewise under way.[282] Another contributing factor was the occurrence of a devastating bushfire on Friday, 13 January, and the subsequent report by the Royal Commission convened to investigate it.[283] Drought conditions, hot winds and human negligence in the handling of fire had created one of Australia's most massive bushfires, immortalised under the name of 'Black Friday'.[284] The fire swept over an area of 1.4 million hectares of Victoria, burned many sawmills, thousands of sheep, cattle, and horses and even entire townships, killing 71 people.[285] Tom Griffiths, whose marvelous *Forests of Ash* sets the Black Friday Bushfire in the context of the ancient history of the ash forests on the Australian continent, points to the fact that while fires are endemic to the ash forests, Black Friday was "a cultural creation, a culmination of a century of white settlement and environmental practice".[286] Two weeks after the bushfire, a Royal Commission led by judge Leonard Stretton was convened to investigate the causes of the bushfire and means to prevent further ones.[287] Stretton pointed not only to the human responsibility for the origin of the bushfire;[288] he also linked the bushfire to soil erosion. Stretton explained that bushfires caused erosion, mainly by destroying forests and vegetative cover, and that in areas where the bushfire had mainly ravaged, the Royal Commission had observed water erosion and the siltation of rivers and dams.[289] In a digression he described soil erosion "as a devastating agent more capable of causing lasting damage than any army invading the land with gas and artillery".[290] Stretton extensively quoted the US case and pointed to the serious occurrence of wind erosion in some parts of the Mallee. He warned that

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[281] Ibid.
[282] Bradsen, Soil Conservation Legislation, p. 47.
[283] Tom Griffiths (2001): Forests of Ash. An Environmental History, Cambridge [et al.], Cambridge University Press, pp. vii, 129, 134.
[284] Ibid. For a short and general outline of the history of fire in Australian environmental history, see: Garden, Australia, New Zealand, and the Pacific, pp. 119-121. The classic book on fire regimes in Australia is the one of American historian Stephen J. Pyne: Id. (1991): Burning Bush: A Fire History of Australia, Sydney, Allen&Unwin. Pyne speaks of the Black Friday Bushfire as 'Australian holocaust', see pp. 309-317; for a discussion in the context of recent Australian bushfires, see: Tom Griffiths (2009): 'An unnatural disaster'? Remembering and Forgetting Bushfire, *History Australia* 6 (2), pp. 35.1 to 35.7.
[285] Griffiths, Forests of Ash, pp. vii, 129, 134.
[286] Ibid., p. 135.
[287] Ibid., p. 141.
[288] "[...] these fires were lit by the hand of man", in: Victoria/Stretton, Leonard E. (1939): Report of the Royal Commission to inquire into the Causes of and Measures Taken to Prevent the Bush Fires of January, 1939, p. 5.
[289] Ibid., p. 28.
[290] Ibid., p. 29.

"soon the menace will be seen just as seriously at work in other places whose names have stood for richness of the soil and the wealth it holds for men".[291] Pointing to the work of the Victorian Erosion Committee and its report, he pushed for political action, proposing the establishment of an interdepartmental land utilization body.[292]

> It is essential that it [the Committee] or some similar body should devote itself to the problem. It is for such matters as the consideration of causes, and methods of prevention, of destruction of the soil and its products by (inter alia) bush fires, that it has been recommended that a land utilization body be instituted.[293]

The report certainly helped to focus public attention on the problem of soil erosion in the state and to put pressure on the government.[294]

Nevertheless, at midyear there was still no sight of any action by the government. Again, members of parliament from all parties urged action.[295] Most prominent were again the members of the UAP, namely Everard, who quoted the figures of the US as example of what would undoubtedly "occur here unless steps are taken at once to grapple effectively with the problem", and Sir Stanley Argyle, who demanded that the cabinet "deal with the question without further delay".[296] Dunstan's apathy also provoked criticism among his own party members, namely Mr. Allnut, who asked Dunstan in the parliament to report on the progress on soil conservation.[297] Dunstan replied that a Cabinet sub-committee, comprising Francis Edward Old, E. J. Mackrell, and N. A. Martin, had been established and that the government would wait for the report of that body before deciding on action.[298] Dunstan's attitude during the Parliamentarian debates shows, however, his reluctance to take any political action, as he repeated in different contexts that while sand drift was a problem, he considered that it was "almost impossible to cope with" it.[299]

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[291] Ibid.
[292] Ibid., p. 20.
[293] Ibid., p. 29.
[294] See for example: PD, Legislative Assembly Victoria, 5 July 1939, p. 107; cf. also: Powell, Watering the Garden State, p. 214.
[295] For example: Hon. J. M. Balfour (Country Party) thought it "a good thing if the recommendation for the appointment of a soil conservation committee were adopted and an immediate start made on this very important programme", in: PD, Legislative Council Victoria, 28 June 1939, p. 12; Labor party member Mr. Holland (Flemington) also urged repeatedly for action to be taken, and quoted from several works, among them 'The Rape of the Earth' by G. V. Jacks and R. O. Whyte, in: PD, Legislative Assembly Victoria, Grievances, 13 July 1939, pp. 290-291; PD, Legislative Assembly Victoria, Grievances, 3 August 1939, pp. 650-654.
[296] PD, Legislative Assembly Victoria, Grievances, 13 July 1939, pp. 267-268; PD, Legislative Assembly Victoria, Lieutenant-Governor's Speech-Address-in-Reply, 5 July 1939, p. 107.
[297] PD, Legislative Assembly Victoria, 1 August 1939, p. 575; 'Mr. Dunstan's Government Criticised', *Shepparton Advertiser*, 28 July 1939.
[298] PD, Legislative Assembly Victoria, 1 August 1939, p. 575.
[299] For example when it came to debate the increased budget of the SRWSC due to higher costs for clearing the water channels from sand drift: PD, Legislative Assembly Victoria, Supplementary Estimates for 1938-39, 23 August 1939, p. 988; another example: PD, Legislative Assembly Victoria, Water Supply Loans Application Bill, 7 September 1939, p. 1358.

A second event that would contribute to putting pressure on the government was a four-week symposium on soil erosion arranged by the Victorian Institute of Surveyors and held in Melbourne in November 1939. Around 25 experts, mainly from various governmental departments interested in or affected by soil erosion presented papers that were published the following year as the volume *Soil Erosion in Victoria*.[300] In early 1940, as a direct reaction to the symposium, several representatives from the departments concerned formed a joint committee and made a submission to the government, calling for political action and recommending the creation of an Advisory Authority on Soil Erosion with detailed suggestions as to its constitution, organization, and functions.[301] It seems, however, that the Dunstan government still remained lethargic.[302] It needed the strong-willed attempt of Harold Hanslow, Commissioner at the SRWSC and loyal member of the Country Party, to finally force the government into action.[303] Hanslow had been appointed to the SRWSC in March 1938 to represent the views of the irrigators.[304] As Commissioner of the SRWSC he took particular interest in soil erosion, especially wind erosion in the Mallee, and started an educational and public campaign for soil conservation, which included the initiation of a soil conservation competition.[305] In 1940, furious about the government's ongoing apathy, Hanslow wrote a letter to the *Countryman*, the Country Party's official paper, in which he sharply denounced Dunstan's passivity in introducing soil conservation legislation.[306] Hanslow told the newspaper to wait for publication until Dunstan had a chance to comment. Dunstan's reaction was to threaten Hanslow that he would fire him if he did not withdraw the letter. Hanslow, however, was unyielding and warned that the letter would be published unless the government were to finally introduce soil conservation legislation.

Finally, the Premier backed down.[307] The Soil Conservation bill was introduced in parliament by Francis Edward Old, Minister of Water Supply, on the 12th November, 1940.[308] In introducing the bill, Old spoke of "a national tragedy" that was caused by "the insidious effects of soil erosion".[309] Old referred to erosion as a world-wide problem, and especially quoted the US Dust Bowl as an example for the menace of erosion as well as a model for

[300] Clark, Soil Erosion in Victoria; see also: Thompson, A Brief History of Soil Conservation, p. 16; Powell, Watering the Garden State, p. 214.
[301] Thompson, A Brief History of Soil Conservation, pp. 19-20.
[302] Ibid.
[303] Jan McDonald (1996): Hanslow, Harold (1882–1958). ADB Online: http://adb.anu.edu.au/biography/hanslow-harold-10418/text18465. [Accessed 30 March, 2016].
[304] Ibid.; Powell, Watering the Garden State, pp. 215-218.
[305] Ibid.
[306] Thompson, A Brief History of Soil Conservation, p. 22; Powell, Watering the Garden State, p. 215.
[307] Ibid.
[308] PD, Legislative Assembly Victoria, Soil Conservation Bill, 12 November 1940, p. 1478.
[309] Ibid.

successful ways to solve the problem.[310] He also highlighted that the positive results of soil conservation in New South Wales, where legislation had already been passed, had been one important factor for the Cabinet's decision to bring in legislation.[311]

For Victoria, Old quoted estimates that suggested

> [...] that between one-third and one-half of the area of Victoria [were] affected more or less severely by erosion, and it has been conservatively estimated that the actual loss of agricultural and pastoral productivity in Victoria, because of erosion, is something like £3,000,000 a year out of the total income of £50,000,000. This represents a substantial reduction in the income to the Treasury through taxation and other sources, to which must be added the direct cost to the State of the removal of drift sand from public utilities and the cost of remedial works made necessary to public structures, because of erosion. I believe I would not be far wrong in saying that the public revenue is affected to the extent of £1,000,000 a year because of soil erosion, a great deal of which could be obviated by efficient methods of soil conservation and erosion control.[312]

Old argued that it was therefore well worth it to establish a Soil Conservation Board with estimated annual expenditure of only £5,000.[313]

There was a large consensus about the bill in general, and it was consequently adopted by both houses without any substantial amendments. The few elements that were disputed were the amount of money – regarded as being too low by some members[314] – and the question of compulsion. The bill did not provide for any compulsion, because, as Old explained, it was "the Government's intention that an educational campaign should be conducted among farmers and others interested in this matter".[315] However, it was envisioned in the bill that the new Soil Conservation Board would deliver a special report to the government in two years from its establishment, in which precise recommendations should be made with regard to further legislation, especially in regard to additional powers deemed as necessary to make its work really efficiently.[316]

The Soil Conservation Act was officially passed on 9 December, 1940.[317] It provided for the establishment of a Soil Conservation Board that was established on the 24th of the same month.[318] The Board was composed of six members: The chairman, H.G. Strom from the SRWSC was the only full time member, while the other five members of different departments and one representative of the pastoral industry were only working part time for

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[310] PD, Legislative Assembly Victoria, Soil Conservation Bill, 13 November 1940, pp. 1547-1548.
[311] Ibid., p. 1549.
[312] Ibid., p. 1551.
[313] Ibid.
[314] For example by Everard, in: PD, Legislative Assembly Victoria, 19 November 1940, p. 1645.
[315] PD, Legislative Assembly Victoria, 13 November 1940, p. 1549.
[316] Ibid.; see also: Soil Conservation Act, 1940 (Vic), s 10. 2.
[317] Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 8.
[318] Ibid.

the Board.[319] The Board was placed under the Premier instead of a Department concerned with land-use.[320] As specified in the Act, its main function was to carry out a survey on soil erosion in Victoria in order to submit a report containing suggestions for further legislation.[321] Accordingly, in 1941, the Board began with arrangement for the first scientific state-wide survey on soil erosion, which was then, however, suspended.[322] Notwithstanding the suspension, the Board sent out questionnaires to the municipal councils and to various Graziers' and Farmers' Associations throughout the state in order to gain an initial overview.[323] The evaluation of these questionnaires was alarming: Of 138 Shire Councils, 136 had answered, and only seven of them reported to be entirely free from erosion, while 45 reported serious erosion on their territory summing up to over half the total area of the state.[324] The Soil Conservation Act also made provision for the appointment of Regional Advisory Committees, conceived as a link between the Board and the rural population.[325] The first eight of such Committees were established in 1941, among those one for the Mallee, but most of them were ephemeral.[326] The Act also provided for the Board to inform and educate the landholders about ways to protect their soils and gave it the right to undertake practical work of soil conservation measures with the consent of the respective landowners.[327] For the time being, the Board had to use the already established research stations for crop and livestock of the Department of Agriculture at Walpeup, Rutherglen and Weerribee.[328] Even if the Act also made provisions for soil erosion experiments, restrictions on staff made it largely impossible for the Board to undertake original research.[329] By request of the Board, two additional positions were created at the Department of Agriculture for officers to advise landholders on erosion control measures and to undertake research into pasture improvement, but no appointments were made.[330]

In the first years of its existence, information and education would therefore become the major plank of the Board's activity, using the already existing infrastructure of the

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[319] Victoria, Soil Conservation Board, First Annual Report 1940-1941, p. 4; cf. also: Thompson, A Brief History of Soil Conservation, p. 24.
[320] Thompson, A Brief History of Soil Conservation, p. 30.
[321] Soil Conservation Act, 1940 (Vic), s 10. 2.
[322] Victoria, Soil Conservation Board, First Annual Report 1940-41, p. 9; cf. also: Thompson, A Brief History of Soil Conservation, pp. 27-28.
[323] Victoria, Soil Conservation Board (n.d.): A Survey of Soil Erosion: Handbook of The Survey of Soil Erosion, Land Use and other factors relevant to Soil Conservation.
[324] Victoria, Soil Conservation Board, First Annual Report 1940-1941, p. 10.
[325] Victoria, Soil Conservation Board, Second Annual Report 1941-1942, p. 6.
[326] Ibid.
[327] Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 8.
[328] Wadham, The Extension of Agricultural Knowledge, pp. 232-233.
[329] Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 8.
[330] Thompson, A Brief History of Soil Conservation, pp. 24-25.

Department of Agriculture's extension service.[331] Educative efforts in soil conservation of wind eroded soils originated especially at the Mallee Research Station at Walpeup. For example, in 1935, when the so-called 'Better Farming Train', which had toured the state from 1924 to 1935,[332] was on its last tour, agricultural experts issued the latest news from the Walpeup research station, counseling against the burning of stubble as one way to prevent sand drift.[333] The news from the Mallee Research Station was also regularly issued to a number of rural newspapers starting in the mid-1930s, and its officers were involved in organising field days in order to reach the farming community.[334] The staff of the Walpeup research station was also involved in more inventive forms of extension: In the 1940s, it conducted a series of district excursions which resulted in the Walpeup School winning first prize in Victoria for a project on soil conservation.[335] Additionally, the Mallee Research station was engaged in the organisation of a soil conservation competition, established during the 1940s in cooperation with the Soil Conservation Board.[336] The initiative stemmed from a private person, Harold Hanslow, who, as we have seen, was a major force in the establishment of legislation in the state.[337] Hanslow was convinced that the great majority of farmers did not degrade the soil on purpose, and that education was therefore essential: "The man on the land is not always to blame, for though there are some who deliberately mine the land, in many cases it is done in ignorance, and in others economic circumstances force the countryman to mine his fertility".[338] Inspired by a visit to New South Wales where he witnessed the good results of a soil conservation competition at the Narraburra Shire, Hanslow decided to establish a similar competition in the Victorian Mallee.[339] As he could not at first receive financial support from the local trade and business community, he decided to dip into his own pockets and donated a silver cup, estimated at £50 for the winner of the competition.[340] The first competition was held in 1940-41, with H. L. Hore, Chief Agronomist of Department of

[331] Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 8.
[332] Dingle, Settling, p. 196; Wadham, The Extension of Agricultural Knowledge, p. 325; Kelly, Millewa District Schools, p. 9.
[333] 'Better farming train', *Sunraysia Daily*, 1 April 1935; 'Better farming train', *Sunraysia Daily*, 29 March 1935; 'Interest at Ouyen. Menace of Drifting sand', *The (Melbourne) Argus*, 30 March 1935; Kelly, Millewa District Schools, p. 10; Sims/Webb, Mallee Sand to Gold, p. 115.
[334] For example: 'Mallee Research Station Notes', *Swan Hill Guardian*, 27 February 1945; 'Mallee Research Station Notes', *Kerang New Times*, 27 February 1945; 'Mallee Research Station Notes', *Ouyen North West Express*, 10 January 1945; cf. also: Sims/Webb, Mallee Sand to Gold, pp. 112-115.
[335] Sims/Webb, Mallee Sand to Gold, p. 116.
[336] N.N. (1940): Soil Drift Control. In: *Journal of Agriculture of Victoria* 38, p. 460; Thompson, A Brief History of Soil Conservation, p. 70.
[337] N.N. (1940): Soil Drift Control, p. 460; Thompson, A Brief History of Soil Conservation, p. 21.
[338] Hanslow, Soil Erosion as it Affects the Farmer, p. 42.
[339] Thompson, A Brief History of Soil Conservation, p. 21.
[340] Ibid.; 'Soil Drift Control Competition', *The Countryman*, 9 August 1940.

Agriculture and former director of the Walpeup research station, as judge.[341] It was launched with a lot of publicity by the rural press as well as a sort of promotion tour, during which the cup was exhibited in several rural centres.[342] In order to further enhance the attractiveness of the competition, the prize money was augmented in the following year and supplementary prizes for Shire Districts were established, now with increasing financial support from banks and businesses associated with farm products or from the Shire Councils.[343] In the following years, the soil conservation competitions were further expanded with the support of the Soil Conservation Board and the later Soil Conservation Authority.[344] In 1945, a second competition was held for the Goulburn Catchment, in 1947 for the Upper Murray (Hume) catchment, and in 1950 a fourth competition for the Pyrenees.[345] The winning soil conservation methods were diffused into the rural community by the means of field days which were held each year on the winning properties and by presentation of the winners in the *Journal of the Department of Agriculture* and in the rural press.[346]

The Soil Conservation Board suffered further limitations with the entry of Japan into the Second World War in December 1941. In March 1942, "faced with the extreme difficulty of carrying on effectively under prevailing conditions, and feeling that it could not justify the diversion or retention of manpower to the detriment of the war effort" the Board asked for permission to suspend its active operations .[347] The request was complied with, and the Board was suspended from March 1942 onwards.[348] Under the pressure of parliamentarians and public voices who urged that soil conservation not be neglected despite the war, the Board was reinstituted in December 1942, regardless of ongoing difficulties.[349] In December 1943, the Board presented a special report, which contained recommendations regarding further soil conservation legislation.[350] George T. Thompson, at the time Deputy Chairman of the Board,

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[341] Thompson, A Brief History of Soil Conservation, pp. 21-22.
[342] 'Hanslow Cup to be exhibited at Birchip', *Birchip Advertiser*, 27 August 1940; 'Soil Drift Control Competition', *The Countryman*, 9 August 1940; Hore, Soil Drift Control. Results of Competition, pp. 357-365.
[343] Hore, Soil Drift Control. Results of Competition, pp. 357-365; Harold Hanslow (1943): Soil Drift Control. Results of Competition, 1942-43. In: *Journal of Agriculture of Victoria* 41, pp. 385-392; cf. also: Thompson, A Brief History of Soil Conservation, pp. 70-71.
[344] Ibid.
[345] Thompson, A Brief History of Soil Conservation, pp. 30, 38, 71.
[346] Hanslow, Soil Drift Control. Results of Competition, 1942-43, pp. 385-392; Id. (1944): Soil Drift Control. Results of Competition, 1943-44. In: *Journal of Agriculture of Victoria* 42, pp. 442-448; 'Hanslow Cup Competition', *Birchip Advertiser*, 1 July 1941; 'Soil Drift Control. Competition Winners Announced', *Sunraysia Daily*, 22 May 1944. 'Soil drift control in Mallee. Report on competition', *The Countryman*, 3 November 1944; 'This Mallee Farmer Has Prevented Erosion', *The Herald*, 13 January 1945.
[347] Victoria, Soil Conservation Board, Second Annual Report 1941-1942, p. 3.
[348] Ibid.; see also: Thompson, A Brief History of Soil Conservation, p. 28.
[349] Victoria, Soil Conservation Board, Third Annual Report 1942-43, p. 3; Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 9.
[350] Victoria, Soil Conservation Board, Special Report 3rd December 1943.

remembered that "proposals that appeared to cut across the policies then being pursued were not approved by the Board".[351] In the end, the amendments suggested were rather small, as "owing to the abnormal conditions" which had prevailed since its appointments, the Board considered that it had not gained the "experience which should constitute the basis and guiding principle of any well considered recommendations for further legislation covering all phases of soil conservation".[352] But once again, the Dunstan government reacted slowly and appointed another Cabinet sub-committee to deal with the matter.[353]

9.3.2 Outrage about Dunstan

In the summer 1944/45, when a series of record dust storms swept over the state, Prime Minster Dunstan once more and more substantially than before provoked the rage of those who took soil conservation to heart. In December 1944, Strom was suddenly relieved from his position as chairman of the Soil Conservation Board and transferred to the SRWSC.[354] His place was taken in January 1945 by Hogan, the former ALP Prime minister who was now a supporter of the Country party.[355] For many, the appointment of Hogan at a luxury salary of £800 was an insult to the soil conservation cause, as he appeared as a mere stop-gap, having neither serious experience nor interest in the matter.[356] The salary seemed even more overblown, as at the same time, salaries for regular soil conservationists were relatively low.[357]

Around the same time, Dunstan committed another serious faux-pas: In December 1944, he was reported in the (Melbourne) *Herald* to have said that "a scare campaign seemed to be in progress on erosion" and that "exaggerated statements might lead the uninformed to imagine that there was a possibility of the farmlands of Victoria being blown away at any moment" while, according to Dunstan, the origin of most of the dust was Central Australia.[358] This aroused immediate indignation among soil conservation advocates. The *Argus* stated that

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[351] Powell, Watering the Garden State, p. 218; Thompson, A Brief History of Soil Conservation, p. 32.
[352] Victoria, Soil Conservation Board, Special Report, 3rd December 1943, p. 2.
[353] Thompson, A Brief History of Soil Conservation, p. 33.
[354] Ibid., p. 37.
[355] Ibid.
[356] 'Move on Erosion Disappoints. Critics Want Expert as Board Chairman', *The (Melbourne) Herald*, 3 January 1945; 'Saving the Soil at £800 a Year', *The (Melbourne) Herald*, 3 January 1945; 'Problem of Erosion. Criticism of New Appointment', *The (Melbourne) Age*, 4 January 1945; 'Soil Conservation Appointment. Letters to the Editor', *The (Melbourne) Age*, 5 January 1945; 'Mr Hogan's Appointment', *The (Melbourne) Argus*, 6 January 1945.
[357] 'The Value of Soil', *Kerang New Times*, 27 March 1945.
[358] 'Erosion a Scare, says Premier', *The (Melbourne) Herald*, 28 December 1944.

"there was nothing imaginary about the menace of soil erosion in Victoria, in common with other parts of Australia".[359] The newspaper continued to explain

> [...] that Mallee soil is raised and driven by the winds has been known for many years even to city dwellers, who have frequently read of the large annual sums spent by public bodies to keep water channels, roads and railway lines clear for their normal purpose. Perhaps the PREMIER is *not* perturbed by these alarming facts; *but we are*.[360]

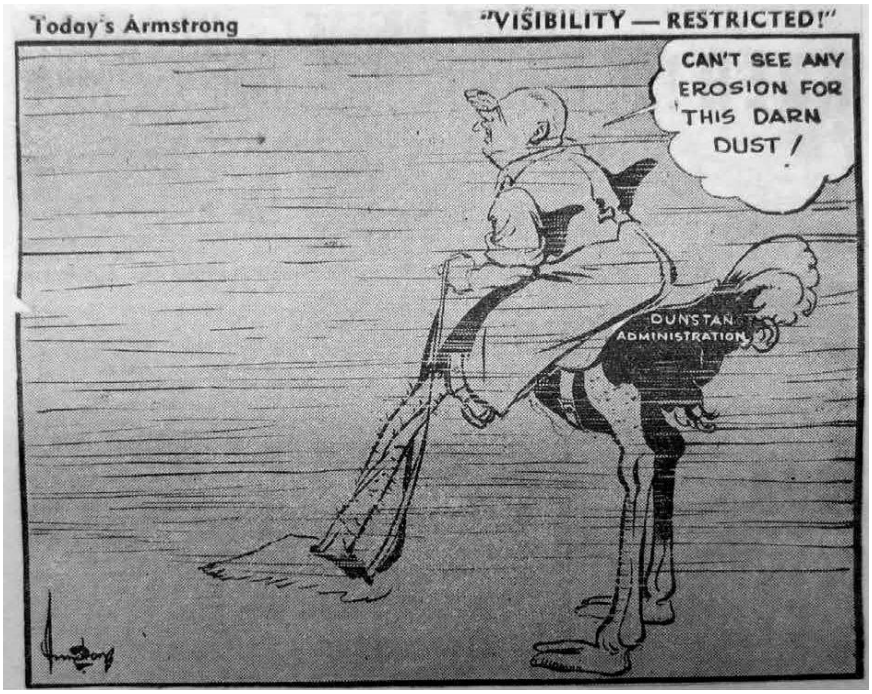
Dunstan replied to the article a day later, stating that while he appreciated the interest being taken in the problem of soil erosion, he "felt many of the statements were greatly exaggerated and might give the impression to people in other states that the farm lands of Victoria were being blown away. Such, however, was not the case".[361] The (Melbourne) *Herald* published a range of expert voices that commented on Dunstan statement. Among them were Samuel Wadham, Professor for Agriculture at Melbourne University, who disagreed with Dunstan and argued that wind erosion was taking serious proportions and that it was generally caused by farming and pastoral methods, and agricultural chemist Geoffrey W. Leeper, also from Melbourne University, who argued that much of the soil in recent dust storms came from the Mallee and not Central Australia.[362] In the same issue, the (Melbourne) *Herald* ran a column entitled 'Mr Dunstan Puts his Head in the Sand'[363] where it criticised Dunstan's passivity and negation and deplored that the Premier's comment would frustrate the cause of soil conservation just at a time when the public conscience had been aroused to realise the menace of erosion.[364] The *Argus* cartoonist Armstrong, probably inspired by the headline of its sister newspaper, took his pen to resurrect 'Albert the Ostrich', a figure he had created in the mid-1930s.[365]

In the chorus of outrage, the voice of the Victorian Communist Party joined in: In January 1945, the Party published a nine-page pamphlet on *Dunstan and Soil Erosion* that sharply criticised Dunstan's lethargy about protecting the soils and called to remove the government in order to take appropriate action to tackle the menace of soil erosion.[366] Interestingly enough, the author of the pamphlet was soil expert Gerard (D.) Blackburn, who had since January 1939 been working as research officer at the state's Department of

[359] 'Erosion is a real menace', *The (Melbourne) Argus*, 29 December 1944.
[360] Ibid.
[361] 'Premier on Soil Erosion. Statements "Greatly Exaggerated"', *The (Melbourne) Age*, 29 December 1944.
[362] 'Soil Erosion Warnings Not "A Scare"', *The (Melbourne) Herald*, 29 December 1944.
[363] 'Mr Dunstan puts his Head in the Sand', *The (Melbourne) Herald*, 29 December 1944.
[364] Ibid.
[365] 'A Decade of Albert Dunstan', *The Australasian*, 20 October 1945, p. 1.
[366] G. Blackburn (1945): Dunstan and Soil Erosion, Melbourne, Australian Communist Party, Victorian State Committee.

Agriculture, namely at the Mallee research station at Walpeup, and in 1945 had most likely already started to work at the CSIRO Division of Soils.[367]

Fig. 21: Outrage about Dunstan: Cartoon by Armstrong (1945).
[*The (Melbourne) Argus,* 10 January 1945].



Instead of softening his tone, however, Dunstan continued in the same way. In March, he went on a tour in the North-west of Victoria to assess the situation for himself. On the 12th of March, while visiting Warracknabeal at the border between the Wimmera and the Mallee, he was reported to have said that

> [...] he had not found things nearly as bad as he had anticipated in the Mallee. He had made an extensive tour of northern centres yesterday and to-day and had been unable to find erosion on anything like the scale pictured. He had always stated there was bound to be some sand drift in drought times, but it was not as bad now as in 1914 or 1902 droughts [sic].[368]

Apparently, Dunstan had also added that "soil drift was not going to be cured my moaners and croakers".[369] At another stop at Horsham he was reported to have said that "the present ill-advised campaign on erosion is more likely to cause a drift of people from the land rather than help prevent sand drift in drought time".[370] After his return to Melbourne, Dunstan reiterated his opinion that the dust stemmed mostly from Central Australia and not from the Mallee or Wimmera and that after his tour through the region and personal contact with the landholders,

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[367] Sims/Webb, Mallee Sand to Gold, pp. 46, 55.
[368] 'Soil Erosion. Premier Minimises Damage', *The (Melbourne) Age*, 13 March 1945.
[369] Ibid.; 'Premier minimises erosion', *The (Melbourne) Argus,* 13 March 1945.
[370] 'Soil erosion exaggerated', *The Weekly Times*, 14 March 1945.

he was "more than ever convinced that there had been considerable exaggeration in many of the statements made on the extent of erosion by wind".[371] He proclaimed to be certain that with good rains, the wheat belt of the state would again produce record yields.[372]

Again, a series of rural and city newspapers vehemently denounced these statements in the following days.[373] In a series of public statements, Dunstan tried to clarify his position, arguing that he had never denied that wind erosion occurred or had detrimental effects, but that its extent had been exaggerated by city newspapers in the past.[374] He argued that exaggerated press articles of the Mallee turning into a Dust Bowl were bad advertising abroad, as it could hinder migration to Australia.[375] Dunstan also argued that during his recent visit many farmers in the drought areas had expressed resentment over exaggerated press statements on wind erosion and had complained that the negative press had done more damage to the region than the erosion itself.[376]

As a matter of fact, a look at the rural press in the summer 1944/45 confirms Dunstan's assertion that a least a substantial part of the population in the rural northern areas of Victoria felt mistreated by the reports in the city press about their region turning into a 'dust bowl'. Some Mallee newspapers, first of all the *Sunraysia Daily*, printed a number of letters from readers that accused the city press of exaggerating the erosion problem in the Mallee. Especially a series of articles written by W.S. Noble for the *Herald* prompted indignation within parts of the Mallee population.[377] In long letters to the editors, the readers vented their anger, accusing the city journalists of using the country and their people as "sport and hunting ground […] in search of something sensational to dish up to city readers"[378] or to pick some extreme cases of erosion, then artificially inflate them to "make a delectable tit-bit for his city readers".[379] One reader complaint that it appeared to him "as if the newspaper's

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[371] 'Premier Says Erosion Exaggerated. Tours North, Fails to find 'Menace'', *The (Melbourne) Herald*, 14 March 1945.
[372] Ibid.
[373] 'Premier Invited to See Erosion', *The (Melbourne) Herald*, 15 March 1945. Only the Country Party's press had Dunstan's back, see: 'Erosion 'Scare' Campaign is detrimental to state', *The Countryman*, 23 March 1945.
[374] Ibid.
[375] 'Mr Dunstan on Harm', *The (Melbourne) Herald*, 15 March 1945; an argument that Dunstan repeated in Parliament, see: PD, Legislative Assembly Victoria, Want of Confidence in Ministers, 29 August 1945, pp. 3802-3810.
[376] 'Mr Dunstan on Harm', *The (Melbourne) Herald*, 15 March 1945; 'Sand Drift Exaggerated by Scare Campaign', *The Countryman*, 16 March 1945; 'Erosion 'Scare' Campaign is detrimental to state', *The Countryman*, 23 March 1945.
[377] W. S. Noble, 'Imagine Mallee Home as matchbox in Tray of Sand', *The (Melbourne) Herald*, 9 February 1945; Id., 'Dust in North Makes Life One Long Trial', *The (Melbourne) Herald*, 10 February 1945. Reactions by the rural press and their readers: 'As Others See Us. Mallee Again hits Headlines', *Ouyen North West Express*, 14 February 1945; 'It is just my opinion. In the Mallee', *Ouyen North West Express* , 21 February 1945.
[378] 'Protest against city press articles', *Sunraysia Daily*, 15 February 1945.
[379] 'Farmers would welcome articles of constructive nature', *Sunraysia Daily*, 15 February 1945.

investigator ha[d] been bitten by the drift bug, and he become 'drift happy'[380] while another spoke of the "'will-o'wisp'" correspondents of the City Press" who, "despite their 'vision of only a few feet' from the windscreens, were able to let their pens flow to imaginary heights, creating a damaging and what I know to be an incorrect impression".[381] It is interesting to note that among the readers that complained about the city press were many women.[382] The following example from Renee Woods is quoted in length as it contains a series of typical arguments:

> It is hard to see the land that has been loved and fought for, blasted to the four winds in tortured, screaming headlines by the Banshees of Ignorance. And harder still to hear city-bred greybeards discourse at great and unlearned length on the 'futility of it all', without once pausing to assimilate just exactly what the 'all' means. Have they in their city-encircled lives ever seen the dawn spill its wealth on the rich red soil of plains and gently swelling hills? Not the jagged-toothed dawn made dull by the vomited filth of a thousand factories and its breath made vile with the odors of a crowded manufacturing area. Only we, the Mallee folk, know the price paid and the dividends received, for a lifetime of work. Always the Mallee has been Victoria's Cinderella province. It has basked in Nature's smiles and endured natures frowns. Have Won before. It is only in recent years that farmers have become 'erosion conscious'. Many a hard fight with the climate and land has been won before. Men who have given the best years of their life to their holdings are not the caliber of which defeatists are made. It takes more than a sensational story written by someone who has only seen the Mallee in the throes of a drought to drive these men from the land. Metropolitan dailies would have an ever-credulous public believe that every dust storm is the death knell of Victoria's wheat lands, irrespective of the origin of the said dust. [...] One drought every now and then does not make for complete disaster. [...] Droughts and floods are an act of God and not man made. In the very near future the Mallee will bloom again and Press articles will bristle anew with superlatives.[383]

Renee Woods's letter as well as the above-quoted examples reflect that the anti-urbanism of the rural population that had been strong at the beginning of the century when it had been fed by the feeling of being patronised by Melbourne was well alive in the mid-1940s.[384] Historian Bruce D. Graham considered that such feelings were linked to the sense of isolation and insecurity that perturbed the pioneering generations at the agricultural frontier.[385] It is therefore not surprising that such feelings broke out again at a time when the 'last pioneering region', as the Mallee was often called, lived through particularly rough, even existence-threatening times.

As Renee Woods' letter reveals, the Mallee settlers were afraid that the 'Dust Bowl' image would prompt the public opinion to discount the region and that consequently, public

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[380] 'City press gives distorted view of drought area', *Sunraysia Daily*, 14 February 1945.
[381] J. F. Johns: 'Melbourne press articles created damaging impression', *Sunraysia Daily*, 28 February 1945.
[382] 'Countrywomen': 'Protest against city press articles', *Sunraysia Daily*, 15 February 1945; 'Mallee really a land of plenty. Wise farmers not troubled by dust and drought', *The Weekly Times*, 15 November 1944.
[383] Ibid.
[384] Dingle, Settling, p. 188. For the social tensions between the city and the countryside, see: Graham, The Formation of the Australian Country Parties, pp. 41-44.
[385] Graham, The Formation of the Australian Country Parties, p. 43.

efforts to sustain the Mallee through the difficult times would be considered as futile. Some other readers wrote more explicitly that they were anxious that the depiction of the Mallee as 'Dust Bowl' in the press might make people, especially investors, lose confidence in the region, deter tourists, and delay relief policies.[386] These concerns were justified: As we have seen in the first part of the thesis, the massive economic and ecological costs that drought and wind erosion put on the region triggered debates about the abandonment of farming in parts of the Mallee. Faced by the growing costs for the cleaning of the water channels, the chairman of the SRWSC, East, had called in December 1944 for the abandonment of parts of the state's north-west.[387] East was clear-cut in his belief that in the Millewa, "Nature herself [did] not provide the essentials for successful settlement".[388] Just as Renee Woods, many Mallee settlers repeated that once the abnormal dry years were passed, the Mallee would "bloom like a garden once again"[389] as the region had enormous "recuperative qualities".[390] They rejected the idea of abandoning the region and reaffirmed their "faith in the Mallee":[391]

> Faith in the Mallee: While there is no denying that the Mallee has been passing through one of the most difficult periods in its history, the representation of that vast portion of Victoria as a 'dust bowl' and a 'no-man's land' with the inference that the Mallee is 'done' has caused a violent reaction throughout the area. Farmers and others in a position to know empathically say this is not so, and strongly re-affirm their faith in the Mallee.[392]

In many such statements, the pioneer myth, combined with elements from the ANZAC legend, is evident, for example when Renee Woods writes that the settlers had won before "many a hard fight with the climate and land" and that the Mallee settlers were "not the caliber of which defeatists are made". We have already seen the importance of the pioneer myth within the Australian society, which was especially strong on newly established farms or on marginal settlements.[393] In the Mallee, the pioneer myth was especially significant for the regional identity, as John A. Senyard's local study of the Walpeup Shire has shown.[394] The settlement of the region after the First World War had been accompanied by public

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[386] 'Melbourne press reports should not go unchallenged', *Sunraysia Daily*, 16 February 1945; 'City press gives distorted view of drought area', *Sunraysia Daily*, 14 February 1945; J. F. Johns: 'Melbourne press articles created damaging impression', *Sunraysia Daily*, 28 February 1945.
[387] 'Would Leave Part of Mallee', *The (Melbourne) Herald*, 12 December 1944.
[388] 'Millewa settlement story of blasted hopes', *Sun News Pictorial*, 16 February 1945.
[389] 'Cr. Nind Objects to Pessimistic Reports. Great faith in the Mallee', *Swan Hill Guardian*, 12 January 1945.
[390] 'City press gives distorted view of drought area', *Sunraysia Daily*, 14 February 1945.
[391] 'Protest against city press articles', *Sunraysia Daily*, 15 February 1945; Steele Blayde: 'Is the Mallee worth Saving?', *Sunraysia Daily*, 25 May 1944; John F. Edey: 'Is the Mallee worth saving?', *Sunraysia Daily*, 12 January 1945; 'Mallee Worth Saving: Minister Sympathetic to R.S.L. Deputation', *Swan Hill Guardian*, 6 March 1945; 'Farmer's Faith in the Mallee', *The Countryman*, 16 March 1945.
[392] 'Faith in the Mallee', *Birchip Advertiser*, 7 December 1944.
[393] Hirst, The Pioneer Legend, p. 332.
[394] Senyard, A Mallee Farming Community in the Depression.

propaganda that consciously used the pioneer myth to idealise the process.[395] In the local rhetoric, those who did not succeed were then considered as being unsuited to the job, as being 'non-triers' who were lacking in the personal stamina of the true pioneer.[396] This was in accordance with the official conservative rhetoric used by politicians.[397] Especially in regions of soldier settlement like the Mallee, pioneer myth and ANZAC legend merged: In 1916, Sir Lyuph Stanley, Governor of Victoria spoke for example of "the great hearts of the men who pioneered the Mallee" as "those who refuse to admit defeat, just as did those great hearts which carried the slopes of Gallipoli".[398] Perseverance was elevated to a primordial virtue of the Mallee settler so that leaving the region would have been considered as a cowardly retreat. The conviction that droughts were an exception rather than the norm made the option of retreat even more inconceivable. The fact that during the 1930s, women were increasingly incorporated into the pioneer myth, probably explains why so many women took to their pen to defend their region.[399] The ecological vision of the Mallee Dust Bowl challenged the pioneer myth and directly accused the farmers for much of the wind erosion crisis. Consequently, those who had identified strongly with the pioneer ideal felt attacked and unfairly blamed. Some of the Mallee settlers who felt accused tried to defend themselves, as one settler who stated: "If we did not destroy all the scrub we were called slackers".[400] The Mallee settlers felt especially stigmatised by the suggestion that the dust storms originated in their regions:[401]

> A contradiction to the stigma continually placed upon the Mallee by the city press, particularly in regard to the palls of dust which at times invades the city of Melbourne, has been issued by Mr. W. R. Jewell, agricultural research chemist. After analyzing two samples of dust, Mr. Jewell stated that probably the dust came from much farther afield than the Mallee. Said Mr. Jewell "the dust is of higher fertility than the Mallee dust". With a strong north wind blowing it is common knowledge that much of the dust credited to the Mallee comes from many centres further east than the much slandered Malle by the city press.[402]

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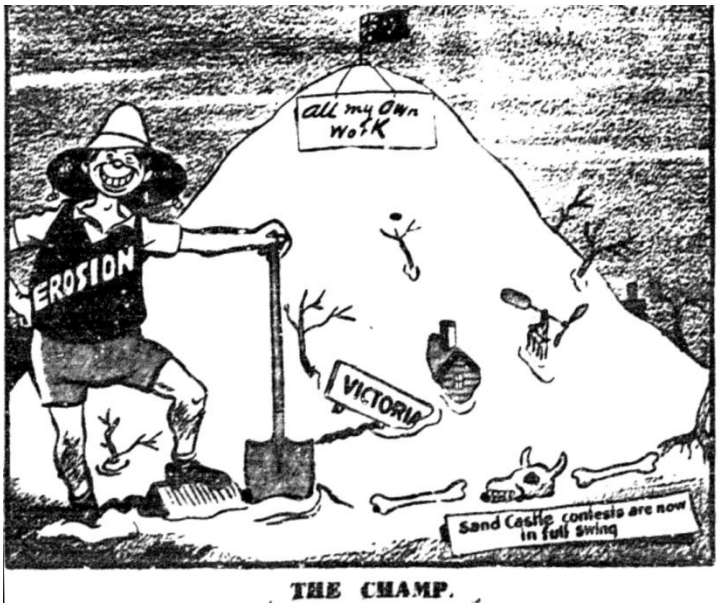
[395] Ibid., p. 69.
[396] Ibid., pp. 81-82.
[397] Lake, The Limits of Hope, p. 203.
[398] *Ouyen Mail*, 22 March 1916.
[399] Susan Sheridan (1995): Along the Faultlines: Sex, Race and Nation in Australian Women's Writing, 1880s–1930s, St. Leonards, N.S.W, Allen&Unwin, p. 157; Curthoys, Mythologies, p. 20.
[400] 'A menace to be attacked', *Sunraysia Daily*, 13 November 1944.
[401] The origin of the dust from the Mallee was also refuted in Parliament by Mr. Dodgshun of the Mallee electorate Ouyen, in: PD, Legislative Assembly Victoria, Budget Debate, 4 October 1944, pp. 1281-1287:
Mr. McKenzie: "The denudation I saw there was the outcome of indiscriminate cutting, burning, and rolling of Mallee scrub. The removal of that natural cover resulted in the soil from these farms landing in Melbourne, Wonthaggi, and Hobart from the air! […] Red mud that has damaged motor cars in Melbourne in recent years is really Mallee farms in full flight!
Mr. Dodgshun: "That is, a lot of 'hooey'. I have told honorable members over and over again where that dust comes from."
Mr. McKenzie: "It is not 'hooey'. I know that it comes from the area I have mentioned. After the first or second fallowing the top soil blows away."
[402] 'That Mallee Dust!', *Swan Hill Guardian*, 29 March 1945.

The question of the origin of the dust was of course especially charged, as it referred to the question of human responsibility. If the dust came from the newly settled areas like the Mallee, then the settlers were to blame. If they originated, however, from the deserts of Central Australia, then they were primarily a natural phenomenon of Australia's climate and would disappear with the drought. In their defense of the Mallee, the settlers pointed to the fact that their dust was "yellowish-grey" and not red, which proved that the mainly red dust storms did not originate in the Mallee, claiming that "henceforth and forever hereafter, let it be known to city scribers that it's NOT our dust!"[403]

Fig. 22: Blaming the Farmer?
[*The (Melbourne) Herald*, 29 December 1944].



It seems, therefore, that Dunstan's downplaying of the erosion in the Mallee and Wimmera and his insistence that the dust originated in the centre of Australia was not so much a whim of an ignorant politician who blinked at an obvious fact as is intimated in most historical accounts, as rather an attempt, perhaps even a deliberate political (mis)calculation, to meet the concern of at least a part of the rural population in the marginal areas.[404] If it was his intention to gain the support of rural Victoria, Dunstan was, however, mistaken. None of the country newspapers took openly Dunstan's defence; on the contrary, the local Mallee newspaper

[403] 'It's not our dust!', *Ouyen North West Express*, 29 January 1944; see also: Renee Woods: "Metropolitan dailies would have an ever-credulous public believe that every dust storm is the death knell of Victorias's wheat lands, irrespective of the origin of the said dust.", in: 'Mallee is no graveyard of blasted hopes and dreams', *Sunraysia Daily*, 24 March 1945.
[404] This aspect has been ignored so far, see: Bolton, Spoils and Spoilers, p. 140; Powell, Watering the Garden State, p. 214.

Swann Hill Guardian even called Dunstan's statement "ridiculous and stupid".[405] Also, the representatives of the landholders publicly disavowed Dunstan's statement: On Wednesday 14 March, at the annual conference of the Victorian Wheat and Wool Growers Association, its president, Sir Louis Bussau, contradicted Dunstan, saying that erosion was worse than in previous droughts and that it was a serious menace that if not stopped, would drive more and more people from the land.[406] Other delegates at the conference invited Dunstan to visit the wind eroded parts of the Mallee and Wimmera.[407]

In August 1945, Cain from Labor (who had supported Dunstan until 1943) moved a non-confidence motion in the Victorian Parliament.[408] Dunstan's statement to have seen no erosion was among the central arguments for Cain that the government was not capable of dealing with the most important matters of the state.[409] During the following debate several members of the Assembly uttered frustration with the slow progress of soil conservation.[410] When it came down to the vote, Country party members Allnutt and Dodgshun, who had in the last years become increasingly critical towards Dunstan voted with Labor. The motion did not pass, however, as there was a majority of 4 against it.[411] Still, there is no doubt that Dunstan's comment on the non-existence of soil erosion damaged his reputation among the opposition as well as among his own party members and indirectly contributed to his fall in November 1945.

9.3.3 The Soil Conservation and Land Utilization Act 1947/ 1949

In the years after the Second World War, soil conservation became more important in Victoria. Expenditures of the Soil Conservation Board more than doubled between the financial years 1944/45 and 1945/46, and new legislation created a new soil conservation body with stronger powers. With Labor's rise to power in November 1945, soil conservation became a prominent topic on Prime minister Cain's political agenda. After participating in the Commonwealth Premiers conference in Canberra, Cain convened a special conference on soil erosion in Melbourne in early February 1946.[412]

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[405] 'Mr. Dunstan. The Premier. Everyone out of step except Mr Dunstan', *Swan Hill Guardian*, 20 March 1945.
[406] 'Premier found little evidence of erosion', *Sunraysia Daily*, 15 March 1945; 'Premier and Sir L. Bussau clash on erosion', *Sun News Pictorial*, 15 March 1945.
[407] 'Premier Invited to See Erosion', *The (Melbourne) Herald*, 15 March 1945.
[408] PD, Legislative Assembly Victoria, Want of Confidence in Ministers, 29 August 1945, pp. 3795-3796.
[409] Ibid.
[410] Ibid., pp. 3795-3900.
[411] Ibid., p. 3906.
[412] 'Soil Erosion problem. State Committee Meets', *The (Melbourne) Age*, 6 February 1946; 'Soil Erosion Problems Under Discussion', *The (Melbourne) Argus*, 6 February 1946.

Fig. 23: Annual expenditure of Soil Conservation Board Victoria 1942 to 1950.
[Compiled from various annual reports].

1942-43	£1,012
1943-44	£2,800
1944-45	£3,780
1945-46	£10,122
1946-47	£11,468
1947-48	£14,349
1948-49	£14,710
1949-50	£23,966

At the Conference, Robert Herriot from the South Australian Advisory Committee on Soil Conservation was invited as guest speaker, as was T.P. Taylor of the Soil Conservation Service of New South Wales. Apparently, the recent change in South Australian legislation, which had introduced soil conservation districts, was widely discussed at the conference.[413] Following the conference, the Victorian Soil Conservation Board submitted amendments to the existing Soil Conservation Act and the introduction of new legislation was planned for the second half of the year.[414]

Before this happened, however, in June 1946 the Cain government appointed a Royal Commission under Judge Stretton to enquire into the grazing of forest lands in Victoria, particularly in relation to water catchments in mountainous regions.[415] This was probably a reaction to the ecological work undertaken by Maisie Fawcett on the High Plains around Omeo and the report of a sub-committee that warned of the deterioration of grazing values in the High Plains.[416] The report of the Royal Commission is an impressive document for the spread of ecological consciousness and the acknowledgement of the need for soil conservation at the end of the period under consideration here. Stretton did once more reach beyond the designated scope of the inquiry and broadened his examination, as he explained:

> Among the many subjects which fill the field of this inquiry, three stand, pre-eminent, in an inseparable trinity - Forest, Soil, and Water. [....] Destroy any of them and [...] you destroy the well-being of your people. You may even destroy the people themselves. This is no mere pattern of fantasy built into an edifice of words. Civilizations have perished, leaving only the monuments of man's pretentiousness to mock their memory, because in ignorance or wantonness man's impious hand has disturbed the delicate balance which nature would maintain

[413] Ibid.
[414] 'New Legislation Soon for Soil Conservation', *The (Melbourne) Argus*, 30 May 1946.
[415] Thompson, A Brief History of Soil Conservation, p. 42; Powell, Watering the Garden State, p. 220.
[416] Thompson, A Brief History of Soil Conservation, p. 39.

> between forest, soil, and water. The active destructive agent in the cycle is man-made erosion, which is his great enemy.[417]

Accordingly, the first chapter of the Royal Commission's report covered the question of 'Man's Destruction of the Soil'. The chapter gave an overview of soil erosion in different times and countries, then lingered relatively long on the US example before quoting some specific Victorian problems.[418] Stretton deplored the lack of authority and effectiveness of the present Soil Conservation Board, which he attributed to its statutory framework.[419] In order to effectively protect the resources of water, forest, and soil, the report recommended creating a land utilization authority that would be "the supreme authority over land use and usage in the State".[420] This reflected a recent proposal by the Commonwealth Rural Reconstruction Commission that the states might create a land utilization body that would control the use and distribution of all public lands.

As a consequence of the report, the government appointed a committee of members of the Forest Commission, Lands Department and the SRWSC to make more precise suggestions about how such an authority should be shaped.[421] The recommendations of the committee were incorporated in the Soil Conservation and Land Utilisation bill that was introduced in April 1947 in the Victorian parliament.[422] The bill passed without difficulty, but the Labor government fell in November 1947 before the necessary steps to establish the new Authority had been made.[423] The bill was then re-introduced with some amendments in 1949 under the Liberal-Country Party Coalition. Despite some reluctance of the Country Party towards some of compulsory clauses,[424] the bill was passed and became the Soil Conservation Board and Land Utilization Act of 1949.[425]

The Act provided for the formation of a Soil Conservation Authority consisting of three full-time members that replaced the former Soil Conservation Board.[426] In tandem, a Land Utilization Advisory Council with four members drawn from Agriculture, Forests, Lands, and the SRWSC was established to deal with land use in the main catchment areas.[427]

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[417] Victoria/Stretton, Leonard E. (eds.) (1946): Report of the Royal Commission to Inquire into Forest Grazing, p. 6.
[418] Ibid., p. 12.
[419] Ibid., p. 25.
[420] Ibid., pp. 25-27.
[421] Thompson, A Brief History of Soil Conservation, p. 42; Powell, Watering the Garden State, p. 220.
[422] Ibid.
[423] Powell, Watering the Garden State, p. 220.
[424] Ibid., p. 221.
[425] Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 9.
[426] Ibid., p. 10.
[427] Ibid., pp. 16-17.

The chairman of the Soil Conservation Authority was at the same time the chair of the Council.[428]

The main function of the Soil Conservation Authority was to carry out surveys, evolve preventive and remedial measures, educate, and inform the landholders and coordinate the policies and activities of all departments dealing in some way with Crown lands.[429] The Soil Conservation Authority received more extensive power than its precursor, especially when it came to enforcing soil conservation measures.[430] In cases where soil erosion on a certain area adversely affected the holdings or works of a private landholder or public body, the Authority could order the owner or occupier of those lands to implement soil conservation measures.[431] The Authority could assess the proportions of the cost of any corrective or protective measures to be paid, but, in order to protect the landholders, the costs could not surpass ten pounds per year or more than one per cent of the unimproved value of his land, whichever was the greater.[432] Also, the landholder had the right to appeal to a County Court whose decision was final.[433] For non-compliance with the decision of the Court, a penalty of up to £50 could be imposed, but this was considered "an extreme resort only" as the Authority counted on the cooperation of the farming community.[434] To carry out the various duties of the Authority to the best advantage, the staff was divided into five units dealing with Administration, Field Operations, Research, Engineering, and Publications and Information.[435] The main unit was the field division as it had the task of advising and assisting the landholders regarding soil conservation measures and of carrying out practical projects and demonstration work.[436] But more emphasis was also given to research, with particular regard to conservation ecology, conservation economics and soil physics.[437] On the grounds that "soil conservation depend[ed] to a large extent on the goodwill and co-operation of the whole community", the Soil Conservation Authority also further emphasised the publication and information section, special demonstration plots and undertook the preparation and diffusion of informative material among landholders and the general public.[438]

[428] Ibid.
[429] Ibid., p. 11.
[430] Ibid., p. 10.
[431] Ibid., p. 12.
[432] Ibid.
[433] Ibid., p. 14.
[434] Ibid.
[435] Ibid., p. 19.
[436] Ibid.
[437] Ibid., pp. 21-22.
[438] Ibid., p. 22; Wadham, The Extension of Agricultural Knowledge, pp. 232-234.

Fig. 24: Educating: A School Class During a Soil Conservation Exhibition.
[PROV: VPRS 14740/P0001/6: Photographs - Soil Conservation Board].

A new tool was the provision for the establishment of Soil Conservation Districts that replaced the original Regional Advisory Committees. Contrary to the system adopted in South Australia, the Victorian Soil Conservation Districts were constituted by the Governor in Council on recommendation of the Authority. For each district, an advisory committee was appointed by the Governor in Council, composed of representatives of the Authority, government departments or public authorities and from farming representatives (who had to be in the majority).[439] Their power was limited compared to the South Australian districts: They had the right to make recommendations to the Authority regarding changes in land use to be adopted on any lands in their area (including Crown Lands) for the purpose of preventing soil erosion,[440] but their main function was mainly to serve as a link between the local level and the Authority by reporting on soil conservation matters in their district.[441] By 1953, thirteen Soil Conservation Districts had been constituted.[442]

[439] Soil Conservation Authority, Victoria, A Brief History of Victorian Erosion Control, p. 14.
[440] Ibid., p. 15.
[441] Ibid., p. 14.
[442] Ibid., pp. 15-16.

The Soil Conservation and Land Utilization Act 1947/49 was amended a number of times, most substantially in 1957, 1981, 1983, and 1985.[443] From 1984 onwards, the policy, planning, and operational responsibilities of the Soil Conservation Authority were carried out by the Department of Conservation, Forests, and Lands, and in 1987, the Authority was abolished.[444] Since then, its functions have been carried out over the years by a variety of changing departments, at the moment the Department of Environment and Primary Industries.[445]

The ninth chapter has shown that the perception of soil erosion as a multi-level threat to Australians led to the establishment of soil conservation legislation in the three south-eastern states. Along with the way Australians experienced wind erosion and international influences, primarily from the US, cultural concepts on wind erosion played an important role in initiating the process of legislation. The concept of wind erosion as a serious menace and the ecological vision of the erosion phenomenon were important prerequisites for the adoption of such legislation, as they called for action and implied a human responsibility. All of the states focused on the voluntary cooperation of the landholders, rather than on compulsion. This was certainly linked to the fact that in all of the south-eastern states, rural interests, who were in the majority opposed to strict compulsion, were largely represented in the governments. But it was also due to the widespread belief that spread of knowledge and education were privileged ways to change human behavior. The emphasis on voluntary cooperation has engendered criticism, namely from John Bradsen, expert on Australian soil conservation law.[446] In the 1980s, Bradsen evaluated the progress in soil conservation in Australia and came to the conclusion that the actual results were disappointing.[447] It is true that the actual outcome of the soil conservation policies fell short of the expectations put forth at time of their inception.[448] However, the priority given to education and volunteering most certainly played a central role in the diffusion of an ecological understanding of soil erosion and in the spread of the ecological vision in general, which most likely indirectly contributed

[443] Bradsen, Soil Conservation Legislation, pp. 50-51.
[444] Encyclopedia of Australian Science: Soil Conservation Authority of Victoria (1950-1983). Online: http://www.eoas.info/biogs/A001519b.htm. [Accessed 30 March, 2016].
[445] Government of Victoria, Department of Environment and Primary Industries. Online: http://www.dse.vic.gov.au. [Accessed 30 March, 2016].
[446] According to Bradsen, the fact that much land in Australia is Crown or government land had originally favoured land legislation that prioritised the interest of the general community, see Bradsen, Soil Conservation Legislation, pp. 24, 27; Id. (2000): Soil Conservation: History, Law and Learning. In: Stephen R. Dovers (ed.), Environmental History and Policy. Still Settling Australia, Oxford, Oxford University Press, pp. 273-298, here p. 276.
[447] Ibid.
[448] Woods, Land Degradation in Australia, p. 63; Arthur Conacher/Jeanette Conacher (1995): Rural Land Degradation in Australia, Melbourne, Oxford University Press, pp. 12-18.

to the emergence of a new environmental ethic in Australia.[449] The states – as the main politico-administrative level for soil matters – played the major role in this process; however, the Commonwealth also played a certain role in the creation of soil conservation policies, as the following chapter will illustrate.

10 A Weak Position? The Federal Role in Soil Conservation

Even though the Commonwealth played only a subordinate role in offering political responses to the problem of wind erosion, it nonetheless became active on several levels. First of all, in analogy to the states, the Commonwealth became directly involved in soil conservation legislation of those territories under its own jurisdiction, namely the Northern Territories and the Australian Capital Territory. The Commonwealth's engagement in soil conservation with regard to its own territories was relatively slow, if compared to the actions undertaken by the various states: A Commonwealth Soil Conservation Service is mentioned for the first time in 1945, but it does not appear to have been properly constituted at that time.[450] More tangible results can only be seen in 1947 with the Australian Capital Territory (ACT) – an area of about 235,527 hectares (582,000 acres)[451] – when the ACT Conservation of Soil Ordinance provided for the establishment of a Soil Conservation Council.[452] The Council, composed of departmental officers, could proclaim tracts of land as areas of soil erosion hazard, it had the right to investigate matters relating to soil conservation, and it could give advice and assist the landholders in carrying out soil conservation work.[453] In regard to the Northern Territories, comprising the vast area of 135,616,957 hectares (335,116,800 acres), federal initiatives at soil conservation were even more protracted: Despite repeated public demands for soil conservation endeavours during the 1940s, the first actions date in the 1960s.[454] Secondly, it played a role in its function as a federal authority. Thirdly, it was the governmental office responsible for international action, namely for Australia's involvement in soil conservation policies as formulated by the United Nations Organization.

10.1 Establishing a Federal Soil Conservation Policy – Attempts and Failures

In the context of the soil erosion crisis of the 1930s to the mid-1940s, many Australians called for federal involvement in soil conservation to fight off the 'national

[449] See also: Sauter, Australia's Dust Bowl.
[450] Bradsen, Soil Conservation Legislation, p. 60.
[451] Year Book Australia 1944-45, pp. 104-105.
[452] Bradsen, Soil Conservation Legislation, p. 61.
[453] Ibid.
[454] Ibid., pp. 64-65.

menace' of erosion. They usually referred to the US, where the federal government had taken a significant role in soil conservation during the 1930s.[455] This federal involvement had come in the US through passage of the Soil Conservation Act of 1935, which authorised the Secretary of Agriculture to require state legislation of a given standard if the farmers were to be entitled to benefit from federal funds.[456]

In Australia, numerous public voices rose in the mid-1930s to demand a similar strong engagement on the national level: writer William Hatfield and pastoralist Jock Pick were but two of the *public personae* calling for such a federal approach.[457] From within the political scene, several members of the federal parliament pushed for a national approach, prominent among them Senator Gordon Brown (Queensland). In May 1936, during debates of a supply Bill in the Senate, Brown asserted that the problems of soil and forest conservation were "of high national importance".[458] He deplored the apathy of the states in forest protection and claimed that, "like defence, afforestation and soil erosion should be completely under the control of the Commonwealth Government".[459] The following year, Brown pointed to the erosion problem in Australia and compared it to the devastating situation in the United States and South Africa, where erosion had destroyed millions of acres of valuable agricultural land and had forced thousands of farmers off their land.[460] Referring to a series of newspaper articles by Ion Idriess, he came to the conclusion that the situation had become so critical in Australia, "that interested people in all States are looking for some indication of statesmanlike action by the Commonwealth Government to prevent further erosion".[461]

A federal approach to the erosion problem was first seriously discussed at a Conference of Commonwealth and state ministers in August 1936 in Adelaide.[462] The Agricultural Sub-Committee (Development), under the chairmanship of McLachlan, considered the establishment of a national soil erosion bureau.[463] The Conference assigned the authority in the matter to the states and issued the recommendation "that each State establish a Committee to study the problems of soil erosion and conservation, and to suggest means by

[455] Powell, Mothering, Husbandry and the State, p. 17; Bradsen, Soil Conservation Legislation, pp. 23, 108.
[456] Keith O. Campbell (1948): The Development of Soil Conservation Programmes in Australia. In: *Land Economics* 24 (1), pp. 63-78, here p. 77.
[457] Hatfield, Australia Through the Windscreen, p. 294; Pick, Australia's Dying Heart, pp. 65-74.
[458] Gordon Brown (Queensland), in: PD, Federal Hansard, Senate, Supply Bill, 22 May 1936, pp. 2146.
[459] Ibid., p. 2147.
[460] Gordon Brown, in: PD, Federal Hansard, Senate, Governor's-General Speech, 22 June 1937, p. 122; cf. also: Bradsen, Soil Conservation Legislation, p. 108.
[461] Ibid.
[462] Bradsen, Soil Conservation Legislation, p. 109.
[463] Commonwealth of Australia (1936): Conference of Commonwealth and State Ministers held in Adelaide, 26th to 28th August, 1936. Proceedings and Decisions of Conference, Adelaide, Government Printer. In: [NAA: A659, 1945/1/5300, Conference of commonwealth and state ministers, Adleiade- August 1936].

which correctives might be applied; the Council for Scientific and Industrial Research to co-operate with such Committees".[464] As has been illustrated above, the recommendation was the stimulus for the Victorian and South Australian governments to establish soil conservation committees that played an important step in further legislation.

Interestingly enough, the question of the establishment of a National Soil Erosion Bureau had been included on the conference's agenda on the suggestion of the Premier of Victoria, who was, as we have seen, rather reluctant when it came to introducing soil conservation legislation in his own state.[465] The request was probably submitted on instigation of Francis Old, Victoria's Minister of Water Supply and a zealous advocate of soil conservation, who was also intermittently acting premier in 1936-37.[466] Old's initiative to include the question on the conference's agenda was most likely the result of an appeal by a deputation of the Brotherhood of Resonians on 30 July, 1936.[467] The Resonians, who got their name from traveling with the Reso train, run by the Railway Department, had organised themselves with the aim to be of service to Australian residents as well as overseas visitors.[468] In August 1935, the Deputy president of the Resonians,[469] Herbert Horace Olney, who was also a member of the Victorian Parliament from 1931 to 1943,[470] had listened to a lecture on soil erosion in the US by Professor C.A. Brown, Supervisor of Chemical Research of the Bureau of Chemicals and Soils, Washington.[471] Olney had then stirred the Resonians to action: In January 1936, the Resonians discussed soil erosion at a meeting and decided to start a public campaign for soil conservation.[472]

Next to the Resonians, another, more important community group fought for a national approach in soil conservation, namely the Australian Natives Association (ANA). Founded in Melbourne in 1871 as a friendly society, the ANA was a fervent promoter for Federation in its early days, and a steady and enthusiastic advocate of 'White Australia'.[473] Membership was

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[464] Ibid.
[465] Letter from Prime Minister of Victoria, 13 August 1936; Report from G. Whiteford, Prime Minister's Department, 17 August 1936. In: [NAA: A461, AO326/1/3 PART 1, Conference - Commonwealth & State Minsietrs. Adelaide August 1936. Agenda Part 1]. See also: 'Soil Erosion. A National Problem', *Shepparton Advertiser*, 30 July 1936.
[466] B. J. Costar (1988): Old, Francis Edward (1875–1950)'. ADB Online: http://adb.anu.edu.au/biography/old-francis-edward-7898/text13733 [Accessed 14 January, 2016].
[467] 'Land Menaced by Erosion', in: *The (Melbourne) Argus*, 30 July 1936; 'To Save the Soil', *The (Melbourne) Argus*, 30 July 1936.
[468] PD, Legislative Council Victoria, Consolidated Revenue Bill, 4 November 1936, pp. 2578-2583.
[469] 'Soil Erosion. Resonians Concerned', *The (Melbourne) Age*, 10 January 1936.
[470] Geoff Browne (1988): Olney, Sir Herbert Horace (Bert) (1875–1957) ADB Online: http://adb.anu.edu.au/biography/olney-sir-herbert-horace-bert-7904. [Accessed 30 March, 2016].
[471] PD, Legislative Council Victoria, Consolidated Revenue Bill, 4 November 1936, pp. 2578-2583.
[472] 'Soil Erosion. Resonians Concerned', *The (Melbourne) Age*, 10 January 1936; 'Preventing Soil Erosion', *The (Melbourne) Argus*, 10 January 1936.
[473] Kelleher, Australian Natives' Association, p. 2; Robin, How a Continent Created a Nation, p. 13.

restricted to males that were born in Australia, New Zealand, Fiji or New Guinea or on the voyage to those countries.[474] The relative influence of the ANA within the Australian society declined in the early decades of the 20th century, but its membership and resources rose. In Victoria, the Association's main sphere of influence, membership climbed to a total of 45,872 in 1941 and funds reached the sum of £1,393,627.[475] The ANA had first gotten involved in forest conservation in Victoria in the 1880s and continued to lobby for it in the following decades through, for example, promoting Arbor Day.[476] In 1937, the ANA started a large-scale campaign for a national soil conservation policy.[477] On 29 July 1937, the association organised, in collaboration with the Australian Forest League and the League of Youth,[478] a meeting at Melbourne Town Hall to discuss the menace of soil erosion and the development of an educational campaign on soil conservation.[479] A large range of people were invited to the symposium, among them representatives of the various Victorian State Departments, interested persons of State Departments in other States, and the CSIR together with representatives of scientific, public, and educational organisations in Victoria.[480]

Probably on the instigation of Ambrose Pratt, the founder of the League of Youth, CSIR erosion expert Francis Ratcliffe was asked if he was willing to contribute a paper to the conference. The request was carefully pondered at the CSIR, which was apparently concerned with remaining uninvolved in the politics of the day. Ratcliffe was anxious that "it would be somewhat impolitic for a junior officer of the CSIR to appear on the propagandist platform at a public meeting expressly designed to stir the Government into action".[481] Finally, the executive committee of the CSIR decided that Ratcliffe should act as he saw fit, but in case that he decided to deliver a speech, he should make plain that he spoke "only as a perfectly

[474] Ibid.
[475] John E. Menadue (1971): A Centenary History of the Australian Natives' Association: 1871-1971, Melbourne, Horticultural Press, p. 26.
[476] Ibid., pp. 282-283.
[477] Ibid.
[478] The 'League of Youth' had been founded in 1933 by Ambrose Pratt and was committed to the "protection and preservation of the flora and fauna of Australia" and "the development of ideals of citizenship in the minds of young Australians", see: Diane Langmore (1988): Pratt, Ambrose Goddard Hesketh (1874–1944). ADB Online: http://adb.anu.edu.au/biography/pratt-ambrose-goddard-hesketh-8096/text14131. [Accessed 22 March, 2016].
[479] 'Australia-wide attack on menace of soil erosion', *The Land*, 9 July 1937.
[480] Circular by J. W. Marrows and J. Parker, 29th June 1937, in: [NAA: A9778, C30/5/116, Soil erosion, representatives by ANA [Australian Natives' Association]]. Cf. also: 'Soil Erosion. Survey Wanted', *The (Melbourne) Argus*, 17 July 1937; 'Australia-wide attack on menace of soil erosion', *The Land*, 9 July 1937; 'Menace of Soil Erosion: A.N.A. Convenes Conference', *The Countryman*, 2 July 1937.
[481] Letter from Francis Ratcliffe to David Rivett, 17 June 1937, in: [NAA: A9778, C30/5/116, Soil erosion, representatives by ANA [Australian Natives' Association]].

impartial observer" and that he had "no part nor lot in any political aspects of the matter".[482] Especially the question of a national soil conservation policy was considered as thorny within the ranks of the CSIR. As stated in the second part of the thesis, the formation of the CSIR had been on delicate terrain, as it had met the opposition of a range of state ministers and officers that eyeballed the formation of a federal research institute with mistrust and jealousy.[483] Apparently, the CSIR leaders wanted to avoid giving the impression that they were trying to gather even further power on the federal level. Before the conference, Ratcliffe warned Pratt not to draw parallels between the US Soil conservation service and Australia too closely, as this might be perceived as the "usurpation of a Commonwealth body of cherished State rights".[484] Ratcliffe attested to Pratt that when it came to its official position, the CSIR would not favour a large role of the Commonwealth in soil conservation.[485] Unofficially, the position of the CSIR was more inclined towards federal involvement: In a letter to J. Parker, the General Secretary of the ANA, Rivett of the CSIR admitted that there were actually good reasons to have a national organisation on similar lines as the USA.[486]

Around 200 people attended the conference,[487] among them renowned Victorian experts such as Samuel Wadham, Professor for Agriculture at Melbourne University; Sir James Barrett, Chancellor of the University of Melbourne; Gray, of the Commonwealth Forestry Bureau; East, the chairman of the Victorian SRWSC; Mullett the Director of Agriculture; and John Arnold Seitz, Director for Education and Sir Herbert Gepp.[488] In his conference speech, Ratcliffe refrained from speaking on the topic of a national soil conservation policy and contented himself with describing the causes of erosion, with special reference to the inland pastoral countries.[489]

Behind the scenes, however, Ratcliffe played an important part, largely against his will: In the run-up to the conference, he furnished information on soil conservation that were then printed and circulated during the meeting, and he also provided recommendations that

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[482] Letter from David Rivett to Francis Ratcliffe, 21 June 1937, in: [NAA: A9778, C30/5/116, Soil erosion, representatives by ANA [Australian Natives' Association]].
[483] Currie/Graham, The Origins of CSIRO, pp. 81-83.
[484] Letter from Francis Ratcliffe to Ambrose Pratt, 26 May 1937, in: [NAA: A9778, C30/5/116, Soil erosion, representatives by ANA [Australian Natives' Association]].
[485] Ibid.
[486] Letter from David Rivett to J. Parker, 2 July 1937, in: [NAA: A9778, C30/5/116, Soil erosion, representatives by ANA [Australian Natives' Association]].
[487] The number 200 appears in the *Argus* article: 'Menace of Erosion. Action Urged. Danger seen', *The (Melbourne) Argus*, 30 July 1937;
[488] Ibid.; 'Menace of Soil Erosion. Experts discuss grave problem', *The (Melbourne) Age*, 30 July 1937.
[489] Francis Ratcliffe's script of talk at the Erosion meeting 29/7/1937, in: [NAA: A9778, C30/5/116, Soil erosion, representatives by ANA [Australian Natives' Association]].

became the basis of the draft for a resolution adopted during the meeting.[490] As might be expected, Ratcliffe insisted that the authorship of these texts remained anonymous.[491] The resolution adopted during the conference stated that "in view of the grave and growing menace of soil erosion in Australia, which threatens to rob great areas of their productivity, to lower our standard of living and to undermine our national prosperity", the state governments and experts should undertake surveys and publish reports in six months. The resolution also called for the establishment of a national committee to correlate the reports and programmes and stipulated for the Commonwealth government to co-ordinate the individual efforts of the state governments and to cooperate in a national campaign of soil conservation.[492]

The resolution was send to the Prime ministers of the states, as well as to Australian Prime Minister Joseph Lyons.[493] Parker also asked Lyons to receive a delegation next time he came to Melbourne which would have the purpose of submitting a request that a Commonwealth conference be organised.[494] As Lyons did not follow the request, the ANA wrote again, urging Lyons to receive a delegation and stating that the association was convinced about "the urgent need for a national policy" as in its opinion, "little, if anything [could] be achieved by leaving the problem in the hand of the States".[495] A copy of the letter was sent to the CSIR, which reiterated its concern and asserted that the ANA was "treading on rather delicate ground, for, after all, the control of agricultural and other lands in Australia is vested in the various states and not in the Commonwealth".[496] The CSIR thought it "particularly important that nothing should be done that is at all likely to jeopardise the winning of the cooperation of the various States in the admittedly desirable national attack of the problem" and therefore recommended to delaying political action for the time being.[497]

While this cautious handling indicates the obstacles that were in the way of a national soil conservation approach, the lobbying of the Resonians and the ANA were no doubt successful in putting the question of a national soil conservation policy on the political agenda. During the campaign of the federal election of October 1937, Labor Party leader and

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[490] Letter from Francis Ratcliffe to David Rivett, 17 June 1937, in: [NAA: A9778, C30/5/116, Soil erosion, representatives by ANA [Australian Natives' Association]].
[491] Ibid.
[492] 'Menace of Soil Erosion. Experts discuss grave problem', *The (Melbourne) Age*, 30 July 1937.
[493] Letter from J. Parker to Prime Minister Lyons, 4 August 1937, in: [NAA: A 461, B302/1/6 Part 1, Soil drift and soil erosion].
[494] Ibid.
[495] Letter from J. Parker to Prime minister Lyons, 6 September 1937, in: [NAA: A 461, B302/1/6 Part 1, Soil drift and soil erosion].
[496] Memorandum from Cook to the Secretary of the Prime Minister Department, 18 September 1937, in: [NAA: A9778, C30/5/116, Soil erosion, representatives by ANA [Australian Natives' Association]].
[497] Ibid.

contender John Curtin took up the topic.[498] This political bent was congruent with the political tradition of the Australian Labor Party, which was generally more inclined to invest the federal level with powers than were the other parties.[499] In September, Curtin issued a policy statement wherein he asserted the national necessity of reafforestation in order to prevent soil erosion and promised that "a labor government [would] put national forestry in the vanguard of planned national projects".[500] Furthermore, it would "initiate and sustain the counter attack against soil erosion by enlisting agricultural scientists to save large areas of the continent".[501] Prime Minister Lyons of the UAP hastened to issue a press statement that enumerated the soil conservation efforts undertaken under his premiership, namely the involvement of the CSIR and the following investigation of Ratcliffe, as well as a national reafforestation scheme.[502]

In point of fact, the Commonwealth had inaugurated a reafforestation and unemployment scheme in the mid-1930s, which also indirectly targeted soil conservation. In January 1935, the Australian federal government had decided on a three-year afforestation plan, whose financial contributions were split between the Commonwealth and the states, largely on a pound-for-pound basis.[503] All in all, the grants to the states for the purpose of forestry amounted to a total of £322,000.[504] The scheme was conceived as an unemployment relief measure, especially for young men.[505] It was largely inspired by the afforestation scheme of the U.S Forestry Service that had been established in close conjunction with the US Civilian Conservation Corps (CCC), inaugurated in 1933 and likewise targeting in particular unemployed young men.[506] The CCC was largely involved in soil conservation projects, for example the US Shelterbelt tree-planting programme of the U.S Forestry Service, which

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[498] Geoffrey Bolton (1996): The Oxford History of Australia. Volume 5, 1942–1995: The Middle Way, Melbourne, Oxford University Press, pp. 27-28.
[499] Ibid. The fact that the Australian Labor Party is traditionally more inclined to invest the federal level with powers is also linked to their greater support of environmental policies during the 1980s, see: Franz Oswald (1991): Auf dem Prokrustesbett des Föderalismus. In: Gerhard Stilz (ed.), Mensch und Natur in Australien, Vol. 4, Bern [et al.], Peter Lang, pp. 7-22, here p.13; Elim Papadakis (1993): Politics and the Environment: The Australian Experience, St. Leonard, NSW, Allen&Unwin, pp. 113-116.
[500] 'Confidence in Mr. Curtin', *The (Adelaide) Advertiser*, 11 September 1937.
[501] Ibid.
[502] Press statement by Prime Minister Lyons, 13 September 1937, in: [NAA: A 461, B302/1/6 Part 1, Soil drift and soil erosion]. Cf. also: 'Dealing with Erosion', *The (Melbourne) Argus*, 14 September 1937.
[503] See archival file: [NAA: CP103/11, 750, Reafforestation (General) Correspondence reports and newspaper cuttings]. In December 1934, a national afforestation plan had beforehand been discussed at a conference of State and Commonwealth forestry officials held in Melbourne, see, for example the note of Charles E. Lane Poole, Inspector-General of Forests from 30 Jul. 1934 about the planned 'Forestry Employment Schemes for youth', who draws on the C.C.C. example; the archival file also contains an extract from American Forests dated July 1934 entitled 'C.C.C. Work Accomplishments for the First Year'.
[504] NSW: £50,000, VIC: £100,000, QLD: £30,000, SA: £17,000, WA: £100,000, TAS: £25,000; see: Loan Appropriation (Unemployment Relief) Act 1935 (Commonwealth), s 9.
[505] 'Afforestation Grant', *Sydney Morning Herald*, 1 February 1935.
[506] Sears, Grassroots Democracy, pp. 10-11; Maher, Nature's New Deal, p. 164; Wellock, Preserving the Nation, pp. 100-101; Worster, Dust Bowl, pp. 220-224.

planted nearly 220 million trees as a windbreak of about 160 km wide and 1,600 km in length between Texas and the Canadian border.[507] Though reforestation was not explicitly directed against wind erosion or dust storms, prevention of erosion on the watershed of the River Murray was an essential part of it.[508] The debates in the federal parliament on the bills that authorised the issue and application of the money for the financial assistance to the states clearly show that the scheme was closely embedded in concerns for the conservation of the nation's natural resources.[509] In the second reading of the Loan Appropriation (Unemployment Relief) Bill, James Henry Scullin (Yarra) (Labor) made an urgent appeal for a greater effort for forest conservation in Australia,[510] which was welcomed by all of the political parties:

> Those of us who have lived near or travelled through forest areas, cannot fail to be impressed by the enormous destruction and, I would say, wanton waste, of this valuable asset. I speak not alone of the valuable timber as such, but of the effect of timber destruction upon our water supply and fertile soils, which is even more serious.[511]

In his argument, Scullin referred to the 1932 report of B.U. Byles, from the Commonwealth Bureau of Forestry, which had pointed to the problems of deforestation and soil erosion, namely the siltation of water catchments.[512] Scullin urged that the Commonwealth and state governments should "co-operate in the carrying out of a comprehensive plan for the protection and development of our natural resources".[513] Archibald C.W. Fisken, (UAP) (Ballaarat) who congratulated Scullin on his speech, warned that if Australia continued as it had in the past century, large areas would turn into unproductive deserts like had already happened in the past in Africa, Arabia, and Palestine.[514] In the same context, Senator Gordon Brown (Labor) plead for an energetic afforestation policy as the greed of certain persons had caused the denudation of many forests,

> [...] thus bringing about erosion which has cost the country millions of pounds. I read only the other day that as a result of huge duststorms in the United States of America, caused largely by

[507] Worster, Dust Bowl, pp. 220-224.
[508] 'Afforestation Grant', *Sydney Morning Herald*, 1 February 1935.
[509] These were the Appropriation (Unemployment Relief) Act 1935 assented the 4th April 1935 and the Appropriation (Unemployment Relief) Act 1936, assented the 27th May 1936; for example Harrison, in: PD, Federal Hansard, House of Representatives, Loan Appropriation (Unemployment Relief) Bill, 21 March 1935, p. 253.
[510] 'Australia's Forests. Protection and Development', *The (Melbourne) Age*, 21 March 1935.
[511] Scullin, in: PD, Federal Hansard, House of Representatives, Loan Appropriation (Unemployment Relief) Bill, 20 March 1935, p. 172.
[512] Ibid.; pp. 172-173; Baldur U. Byles (1932): Report on a Reconnaissance of the Mountainous Part of the River Murray Catchment in New South Wales, Bulletin of the Commonwealth Forestry Bureau, No. 13.
[513] Scullin, PD, Federal Hansard, House of Representatives, Loan Appropriation (Unemployment Relief) Bill, 20 March 1935, p. 174.
[514] Fisken, in: PD, Federal Hansard, House of Representatives, 21 March 1935, p. 245.

> the destruction of timber, many farms had been wiped out. According to one authority, the land will not be productive for possibly a hundred years.[515]

Eric Harrison (UAP) also spoke of the need to learn from other countries, particularly the US, where due to deforestation, erosion had occurred and topsoil had been lost, so that it had been necessary to transfer about 86,000 farmers into other areas in order to allow them to continue profitable farming operations.[516]

Even if the Lyons government had therefore not been completely idle in matters of soil conservation, Curtin elevated a national soil conservation approach to a campaign issue: In his electoral speech on 20 September 1937 at Freemantle, Curtin took up the topic of reafforestation as means of soil conservation, stating that soil should be regarded as the "nation's main asset" and soil protection as important as "national defence itself".[517] Up to now, Australian forests had been destroyed by fire and axe with tragic effects on the soils:

> In all the States of the Commonwealth are to be found sad areas of dead trees ringbarked for no other purpose than to secure grass for a few sheep. In many instances the surface ground has been so torn by erosion as to become useless even for sheep. These are facts of major importance, and the Labor Government will put national forestry in the vanguard of its planned national projects. It will ensure and sustain the counter attack against soil erosion, and in collaboration with the States – within whose functions forestry, tree planting, and soil preservation mainly lie – will urge immediate and constructive action in order to ensure a united national drive for forestry recovery and afforestation in order to combat the ravages by loss of soil arising either from wind or water.[518]

Curtin's attempts at reassembling the Australian people behind him came, however, to naught, and Lyons remained in office for the time being. Only in 1941, when Curtin won the following elections, did conditions seem to be more favourable for stronger federal involvement in soil conservation. Actually, the Commonwealth government introduced a bill into Parliament in October 1942 to increase the federal government's institutional powers in time of war that also specifically included soil conservation.[519] In August 1944, Curtin passed a referendum in order to retain some powers at the Commonwealth level for a limited time

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[515] PD, Federal Hansard, Senate, 28 March 1935, p. 409.
[516] Harrison, in: PD, Federal Hansard, House of Representatives, 14 May 1936, p. 1757. The idea to establish a afforestation scheme that would provide for employment of the youth as well as help to prevent soil erosion was likewise present in the state parliaments, for example in Victoria, see: McLachlan, PD, Legislative Assembly Victoria, Unemployment Relief Loan and Application Bill, 17 September 1935, pp. 2777-2779.
[517] Museum of Australian Democracy at Old Parliament House: Election Speech of John Curtin, 1937. Online: http://electionspeeches.moadoph.gov.au/speeches/1937-john-curtin [Accessed 30 March, 2016].
[518] Ibid.
[519] Bolton, The Middle Way, pp. 28-29; Campbell, The Development of Soil Conservation Programmes, pp. 72-73.

after war.[520] Again, soil erosion control was indirectly included in the list of powers to be passed on to the federal government, but the referendum was rejected.[521]

In the dust storm and drought years of 1944-1945, the pressure for a stronger involvement of the Commonwealth in soil conservation further increased: Political voices on the state as well as federal level called for a Commonwealth approach to the erosion problem grew in number. Among the federal parliamentarians, it was especially Albert E. Smith, member of Wakefield (South Australia), who fervently lobbied for a national approach to soil conservation.[522] In November 1944, Smith even presented a draft bill that provided for the setting up of a Federal soil and water conservation service.[523] Furthermore, Smith made representations to Mr. Scully, the Minister for Commerce and Agriculture, regarding the problem of soil erosion.[524] In many speeches and questions, he stressed that the time had "arrived for this matter to be dealt with on a national basis, because if this menace is to be tackled with the prospect of success, it must be tackled by the Commonwealth in co-operation with the states".[525] For Smith, the US was the blueprint for his plans of a federal approach to the erosion menace:

> Australia should have learned a lesson from the United States of America, but it has not. Vast areas of fertile land in the United States of America became a desert in a comparatively few years. The loss and misery caused were enormous, and much of the harm was undone only because planning, as well as restorative and preventive measures, were effectively undertaken on a national scale. Australia, as the recent drought made only too clear, cannot afford anything less than a national attack on the problem of soil erosion, in which the whole of the people of the Commonwealth should co-operate.[526]

The first months of 1945 saw a number of Federal Parliamentarians urging the Commonwealth to take stronger responsibility in soil and water conservation.[527] In the House of Representatives Nelson Lemmon (Forrest) argued, for example, that considering the national menace of soil erosion, an authority should be set up under CSIR to collate the research of the various states. He also asked a Commonwealth Commission to be established

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[520] Ibid.
[521] Ibid.
[522] Bradsen, Soil Conservation Legislation, p. 111.
[523] 'Plan to Check Soil Erosion. Bill Prepared by S.A. member', *The (Adelaide) Advertiser*, 21 November 1944; 'Soil Erosion. Private Member's Plan', *(Adelaide) Chronicle*, 23 November 1944: A. E. Smith, Draft of a proposed Bill for the Establishment of a Federal Soil and Water Conservation Service, December 1944, in: [NAA, A9778, C30/5/42, Soil erosion, Federal Soil and Water Conservation Service, prop legis'n [proposed legislation]]; see also: Bradsen, Soil Conservation Legislation, p. 111.
[524] Smith, in: PD, Federal Hansard, House of Representatives, Questions, 1 March 1945, p. 227; cf. also: Bradsen, Soil Conservation Legislation, p. 111.
[525] Smith, in: PD, Federal Hansard, House of Representatives, 4 May 1945, p. 1421 and ibid., 21 March 1946, p. 497.
[526] Smith, in: PD, Federal Hansard, House of Representatives, Budget 1945-46, 18 September 1945, p. 5513.
[527] Bradsen, Soil Conservation Legislation, p. 111.

under the Department of Post-war Reconstruction to tackle soil erosion on a national basis.[528] William J. F. Riordan (Kennedy) supported Lemmon's proposal and expressed his hope that "the National Parliament should deal with the problems of drought and soil erosion in a national way".[529]

Urging appeals were not restricted to the political staff of the Commonwealth: In South Australia, member of Parliament J.M. Beerworth (Northern) moved for a motion in November 1944, "for the purpose of discussing a matter of urgency, namely, the desirability of immediate co-operation between the Commonwealth and the States in the formation of a national policy to deal with the ever-increasing problem of soil erosion".[530] He though that "next to the prosecution of the war there [was] nothing of greater importance to the people of Australia than this problem of soil erosion".[531] One fervent advocate for a federal approach to soil conservation came from New South Wales, namely from William McKell, ALP Prime Minister of the state 1941 to 1946. McKell's belief that soil conservation was a national task dates back at latest to 1938.[532] At the Premiers' conferences in 1944 and 1945, McKell pressed for a national approach in soil conservation and even presented the Commonwealth Minister for External Affairs with a copy of the US Soil Conservation Act.[533] He intensified his public campaign for a programme along the lines of the US Soil Conservation Service in 1945, after returning from a study tour in the US and other countries.[534]

In March 1945, in response to the mounting political pressure, William Scully announced that he had called a meeting of the Agricultural Council to discuss the matter.[535] At the meeting, the Council made plain once more that the main responsibility in soil conservation rested with the states.[536] It further resolved that the Commonwealth should have a role in co-ordination and cooperation, as well as in assisting the states by providing trained

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[528] PD, Federal Hansard, House of Representatives, 14 March 1945, p. 582; see also Bradsen, Soil Conservation Legislation in Australia, p. 111.
[529] Ibid.; another example for the demand of a national approach: Johnson, in: PD, Federal Hansard, House of Representatives, 8 March 1945, p. 484.
[530] Beerworth, in: PD, Legislative Council South Australia, 22 November 1944, p. 1078.
[531] Ibid.
[532] Bradsen, Soil Conservation Legislation, p. 110.
[533] Powell, The Empire Meets the New Deal, p. 350; Breckwoldt, The Dirt Doctors, p. 80.
[534] See archival file: [SRNSW: NRS 1703, Conservation Authority of NSW; Correspondence files, 1945–1974. [10/3408]]; see also: William McKell (1945): Report on Soil Conservation in the United States of America, Sydney, Government printer; 'Soil Conservation. McKell Outlines Plans. New Deal needed on Land', *Daily Mirror*, 14 November 1945; 'US Experience Will help Erosion Control', in *The Sun*, 14 November 1945; 'U.S. Fight against Soil Erosion has Lesson for NSW', *Sydney Morning Herald*, 23 October 1945; Breckwoldt, The Dirt Doctors, pp. 47, 80; Jack R. Hallam (1983): The Untold Story: Labor in Rural N.S.W., Sydney, Allen&Unwin, pp. 39-40, 60.
[535] William Scully, in: PD, Federal Hansard, House of Representatives, 1 March 1945, p. 227.
[536] Chifley, in: PD, Federal Hansard, House of Representatives, 27 &28 September 1945, p. 6108.

personnel and special research.[537] In order to fulfill this function, the Council suggested that the Commonwealth should establish a Standing Committee on Soil Conservation.[538] These recommendations were included on the agenda of the Conference of Commonwealth and state ministers in September 1945, but they seem to have been rather sluggishly debated by the members and were not endorsed.[539] In order to progress with the matter, the Premier Department wrote to the states in December, asking them if they would accept the suggestions of the Agricultural Council.[540] The states of New South Wales, South Australia, and Western Australia fully agreed,[541] but Queensland stated that it did not feel that there was a need for anything but the most general form of co-ordination, and Victoria requested another discussion of the matter at the next Premiers' Conference.[542]

Consequently, the matter was again discussed at the following Premiers' Conference on 24 January 1946 with more tangible results:[543] Following the recommendations of the Agricultural Council, the Conference resolved that in order to deal with the questions of soil conservation "strong and well-staffed bodies of State officers should handle the general work within State Boundaries".[544] The role of the Commonwealth was confined to assisting the states in coordinating their work, assisting in the training of personnel and in carrying out special research projects.[545] In order to coordinate the activities of the states, a Standing Committee on Soil Conservation was established.[546] The Standing Committee comprised nine members, one representative for every state and one for the Commonwealth Territories, as well as the Director General of Agriculture and Prescott, the Chief of the CSIR Division of Soils.[547] The members for the states were usually the heads of the state's soil conservation authorities; the first Standing Committee had, for example, Clayton as representative for New South Wales, Hogan for Victoria, and Herriot for South Australia.[548] The Standing Committee

[537] Mr Smith, in: PD, Federal Hansard, House of Representatives, 1 March 1945, p. 227.
[538] Ibid.
[539] PD, Federal Hansard, House of Representatives, 19 September 1945, pp. 5575-5576.
[540] Chifley, in: PD, Federal Hansard, House of Representatives, 27 &28 September 1945, pp. 6107-6108.
[541] Letter of Premier of Victoria to Prime Minister of the Commonwealth, 20 December 1945, in: [NAA: A461, B302/1/6 PART 3, Soil erosion Part 3].
[542] Letter from Premier of Queensland to Prime Minister of the Commonwealth, re: Soil Erosion and Conservation, 5 December 1945, in: [NAA: A461, B302/1/6 PART3, Soil erosion Part 3].
[543] 'Conservation of Soil. Premiers' Decisions', *Sydney Morning Herald*, 25 January 1946; cf. also: Bradsen, Soil Conservation Legislation, p. 112.
[544] Letter of Prime Minister of Commonwealth to State Premiers, re: Soil Conservation, 5 February 1946, in: [NAA: A461, B302/1/6 PART 3, Soil erosion Part 3].
[545] Bradsen, Soil Conservation Legislation, p. 112.
[546] Ibid.
[547] Circular of Prime Minister of Commonwealth to State Premiers, 28 May 1946, in: [NAA: A461, B302/1/6 PART 3, Soil erosion Part 3].
[548] Ibid.

on Soil Conservation continued to meet at least once a year from the time of its inception owing to McKell's insistence at the 1946 Premiers' Conference.[549]

The question of financial assistance by the Commonwealth remained unclear, and no funding was granted at first.[550] Then, for the fiscal year ending June, 1946, the Commonwealth introduced tax deductibility for measures taken to deal with soil erosion, but this did not include the erection of fences or the control of salinity problems.[551] The Standing Committee, was, of course, but a small comfort for those who had advocated for a federal soil conservation policy, and pressure for a more direct involvement continued throughout the second half of the 1940s.[552] As Bradsen noted, "by 1950, national significance of the degradation problem was thoroughly established".[553] In the following years and decades, however, concern for a soil conservation strategy faded away, as Bradsen noticed in surprise.[554] The reasons this happened are unclear; probably a combination of factors played a role: the change of government, the improved pastures and climate, or the fact that the topic was just losing its newsworthiness.[555] It was only in the 1970s, that the Commonwealth again became more strongly interested in soil conservation, a result of several initiatives of the Standing Committee on Soil Conservation.[556] The Collaborative Study Report No 1, *A Basis for Soil Conservation Policy in Australia*, published in 1979, found that just over half of Australia's agricultural land was degraded.[557] Despite some initiatives for a national soil conservation strategy resulting from the report, the attempts then petered out.[558] Efforts for a national approach were reactivated in 1983 when a National Soil Conservation Program was established, supported by the publicity for soil conservation brought about by the drought and dust storms of that year.[559] Even though, as we have seen, attempts at a direct federal involvement in soil conservation policies largely failed in the period under consideration, the Commonwealth nevertheless indirectly influenced the soil conservation agenda of the day, namely through issuing guidelines for post-war planning of the rural sector.

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[549] Breckwoldt, The Dirt Doctors, p. 168.
[550] Bradsen, Soil Conservation Legislation, p. 112.
[551] Ibid.
[552] Ibid., pp. 112-113. For example: Smith, in: PD, Federal Hansard, House of Representatives, 21 March 1946, pp. 496-498.
[553] Bradsen, Soil Conservation Legislation, p. 114.
[554] Ibid.
[555] Ibid.
[556] Ibid., pp. 115-117.
[557] Ibid.; Commonwealth of Australia, EHCD, A Basis for Soil Conservation Policy, p. 8.
[558] Bradsen, Soil Conservation Legislation, pp. 119-120.
[559] Bradsen, Soil Conservation Legislation p. 121; 'Call for five-year national scheme to save soil', *The Canberra Times*, 15 February 1983, p. 8.

10.2 Federal Influences on Post-war Planning of the Rural Sector

The drought and wind erosion in Australia were but two elements in a range of structural problems of the rural sector during the 1930s and first half of the 1940s that called for reform. The Second World War had brought a series of additional troubles for agricultural producers, such as the loss of markets, the shortage of materials and labour, and the accelerated exodus from the land.[560] Additionally, the question of post war soldier settlement became acute, and it was high time to come up with a plan if the faults of settlement policy after the last war were to be avoided.[561] Faced with the desolate situation of the rural sector and political pressure for soldier settlement, the Commonwealth decided in May 1942 to take action and to plan for Australia's post-war rural reconstruction.[562] Consequently, in 1943 the Curtin government established the Rural Reconstruction Commission (RRC) as one of three investigatory commissions attached to the newly created Ministry of Post-War Reconstruction (the other two being the Housing and Secondary Industry Commissions).[563] The commission would report on "the reorganisation and rehabilitation of the Australian rural economy during the post-war period".[564] Past experiences with soil erosion and the scientific knowledge and the broader ecological concepts developed in the wake of the erosion crisis all had impacts on the RRC's planning for the future of Australia's primary sector.

The Minister of Post War Reconstruction, Ben Chifley, was anxious that the character of the commission should be independent and have a "broad national outlook, capable of sifting and weighing evidence and conflicting views".[565] He therefore took care that the Commission's members were not representatives of any political pressure groups.[566] Four commissioners were accordingly appointed, namely F.J.S. Wise, the Western Australian Minister for Lands and wartime controller of Food; J. F. Murphy, Secretary of the Commonwealth Department of Commerce and Agriculture; economist C.R. Lambert, bank officer at the Rural Bank and chairman of the NSW Reconstruction Board from 1939 onwards; finally, and most influential, Samuel Wadham, Professor for Agriculture at

[560] Sydney J. Butlin/Carl B. Schedvin (1977): War Economy 1942-1945, Canberra, Australian War Memorial, p. 733; A. W. Martin/Janet Penny (1983): The Rural Reconstruction Commission, 1943-47. In: *Australian Journal of Politics & History* 29 (2), pp. 218-236, here p. 222.
[561] Butlin/Schedvin, War Economy, p. 733; Martin/Penny, The Rural Reconstruction Commission, pp. 218, 222.
[562] Ibid.; see also: Stuart Macintyre (2015): Australia's Boldest Experiment: War and Reconstruction in the 1940s, Sydney, NewSouth Publishing, pp. 168-175.
[563] Martin/Penny, The Rural Reconstruction Commission, p. 218.
[564] Ibid.
[565] Quoted in: Troy Whitford/Don Boadle (2008): Australia's Rural Reconstruction Commission, 1943-46: A Reassessment. In: *Australian Journal of Politics and History* 54 (4), pp. 525-545, here p. 523.
[566] Martin/Penny, The Rural Reconstruction Commission, pp. 222-223.

Melbourne University.[567] In order to furnish recommendations in regard to the reconstruction of the primary sector, the commissioners conducted a wide range of investigations in the style of a Royal Commission. For more than a year, they gathered information throughout the states, heard evidence from over 800 witnesses, primarily from federal and state government departments, businesses companies, etc.[568] Their survey of rural Australia, unprecedented in its scope, was published in ten reports between 1943 and 1946.[569] Nine of the ten reports were written by Wadham and Lambert, who had also been responsible for the greatest part of the field investigations.[570]

The actual influence of these reports on policy making has been judged as comparatively small by most historians in the past, if measured against the number of actual recommendations that were implemented.[571] This was largely due to the fact that the Commission, as a federal body, reported on issues that basically concerned land use and land settlement, and was therefore in the jurisdiction of the states.[572] Some historians have argued that the reports gave rather general outlooks and did not furnish enough detailed proposals on how to frame the federal-states relationship.[573] Another contributing factor was the fact that most reports were only finished relatively late, in 1947.[574] For the Agricultural Council, which was the qualified body to take action in most aspects, this was in many instances too late to take the recommendations into consideration; also, at that moment, the Commonwealth had passed to other matters of interest and therefore omitted urging for the recommendations' implementation.[575]

However, a recent reassessment of the RRC, drawing attention to the process rather than the outcome, has highlighted that the inquiry process itself played an important role in finding a sort of political consensus among an especially large variety of interests and authorities in rural matters.[576] A number of historians have also emphasised that the reports contained a bundle of ideas about the future of Australia's rural industry that, even though they were not immediately put into government policies, were important pools of information

[567] Butlin/Schedvin, War Economy, p. 733; Martin/Penny, The Rural Reconstruction Commission, p. 222.
[568] Commonwealth of Australia, RRC (1944): A General Rural Survey: The Commission's First Report, pp. 3-4; see also: Butlin/Schedvin, War Economy, p. 734; Martin/Penny, The Rural Reconstruction Commission, pp. 218, 225. Among them f. ex. Dewar Goode, Evidence for Rural Reconstruction Commission 1943, in: [SLV: GOOD 00639, 20, Dewar Wilson Goode Collection, Ms 13586], cf. chapter 7.
[569] Martin/Penny, The Rural Reconstruction Commission, p. 218.
[570] Whitford/Boadle, Australia's Rural Reconstruction Commission, p. 531.
[571] Martin/Penny, The Rural Reconstruction Commission, p. 219, 233; Butlin/Schedvin, War Economy, p. 734.
[572] Ibid.
[573] Ibid.
[574] Ibid.
[575] Butlin/Schedvin, War Economy, pp. 740-741; Martin/Penny, The Rural Reconstruction Commission, pp. 219, 228.
[576] Whitford/Boadle, Australia's Rural Reconstruction Commission, pp. 534-535, 544.

and contained general principles that most likely did indirectly influence ways of thinking.[577] The tenor of the reports suggests that the RRC saw itself largely in this latter role, as a provider of general information and sound principles for future rural policy: This is reflected in the "strong moralistic tone" of many passages of the reports.[578] It also appears in the statement of Samuel Wadham, who asserted that the Commission would have served its purpose if people read its reports and consequently adopted a reasonable view on the resource land.[579] The strong educative character of the RRC's report was linked to the generally high esteem of expert knowledge of the period and reveals attempts at economic and social engineering:[580] The expertise not only in matters of science, technology, and economics, but also sociology, was thought to produce rational principles whose application would produce societal well-being.[581] On a number of occasions, the RRC insisted on the need for public education and the necessity to resist public opinion and pressure.[582]

The ten reports of the RRC cover a large range of topics, from the general survey of the first report to more specific questions such as finances and credits, farming efficiency, irrigation and water conservation, questions of land tenure, commerce, and rural amenities. Many of them refer to Australians experiences with wind erosion that impacted on future land use and land settlement planning. This is exemplified in the RRC's first report *A General Rural Survey*, which was mainly written by Wadham.[583] As the title indicates, it was a broad survey which created the framework for the subsequent reports and anticipated many of their conclusions. It emphasised the value of agriculture to the Australian economy, and stressed the necessity to shape agricultural production according to the environmental and climatic conditions of the continent.[584] The significance of the erosion experiences is, for example, apparent in the first objective for future policies as stated by the report:

> Different individuals approach the study of a rural economy from different points of view. To some the only motive will be the prospect of profit to themselves irrespective of the wastage of national assets; and to them the moral obligations in relation to land which are accepted by the average citizen in a civilized state make no appeal. It may be necessary in the future to devise and exercise stronger public control against such actions than has been customary in the past. There can be no improvement in land utilization without effective statutory powers to restrain

[577] Ibid.; Martin/Penny, The Rural Reconstruction Commission, p. 219.
[578] Martin/Penny, The Rural Reconstruction Commission, pp. 230-231.
[579] Whitford/Boadle, Australia's Rural Reconstruction Commission, p. 534.
[580] MacIntyre, A Concise History, pp. 187-188.
[581] Martin/Penny, The Rural Reconstruction Commission, pp. 221, 229-231.
[582] Commonwealth of Australia, RRC (1944): Settlement and Employment of Returned Men on the Land: The Commission's Second Report, p. 13 (par. 159).
[583] Leonard R. Humphreys (2000): Wadham. Scientist for Land and People, Carlton, Vic., Melbourne University Press, p. 102.
[584] Ibid.

> the individual who is not prepared to co-operate in a general scheme designed to prevent or stop erosion and wastage of soil fertility.[585]

The change of the population paradigm as analyzed in the second part of the thesis appears clearly in the RRC's reports: The prime objective for rural reconstruction was neither increased rural population nor even expanded production, but an efficient and sound land use that included soil conservation.[586]

10.2.1 Soldier Settlement after the Second World War

One reason for the setting up of the RRC had been increasing public pressure for solider settlement schemes. The failure of the settlement schemes after the First World War, which had cost the Crown £45 million up to 1943, was on everybody's mind, and it seemed a fundamental necessity to plan the next scheme in a better way in order to prevent a similar disaster.[587] Accordingly, Chiefley pressured for an early report on soldier settlement, even if the Commission was still mainly occupied with gathering information throughout the states.[588] Following this behest, the RRC presented its second report, *Settlement and Employment of Returned Men on the Land,* largely written by Lambert and Wadham, in January 1944.[589] This second report was the only report of the RRC that had a large and direct political impact, as it provided the basis for Australia's post-war soldier settlement policy.[590]

As so often throughout the reports, the Commission affirmed its rational approach, underlining its endeavour to have apprehended the subject from "a realistic point of view, free from sentiment and wishful thinking".[591] The report comprised recommendations for a soldier settlement scheme that were based, firstly, on the assessment of the future requirements for farm produce and labour in the post war period, secondly, on an estimate of the potential candidates and, thirdly, on the past experience of soldier settlement.[592] In regard to the future demand for farm produce and labour, the RRC expected a short term increase based on a rise of demand in the immediate after war period due to food shortage, and, more importantly, an increase of demand over the long term as a result of international trade and growth of

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[585] RRC (1944): A General Rural Survey: The Commission's First Report, p. 6 (par. 13).
[586] Humphreys, Wadham, p. 137.
[587] RRC (1944): Settlement and Employment of Returned Men on the Land: The Commission's Second Report, p. 6 (par. 138).
[588] Martin/Penny, The Rural Reconstruction Commission, p. 225.
[589] Ibid.
[590] Butlin/Schedvin, War Economy, p. 734.
[591] RRC (1944): Settlement and Employment of Returned Men on the Land: The Commission's Second Report, p. 46.
[592] Ibid.

Australian population.[593] As far as the potential settlers falling under the scheme, the RRC forwarded an estimate of up to 50,000 settlers, but thought it likely that the number would be smaller.[594]

The failures of the post First World War soldier settlement scheme were exhaustively analyzed and were the basis for future recommendations. As reasons for the past failures, the report named the omission to assess the suitability of the applicants, as well as the lack of adequate and competent technical guidance and supervision of settlers once set upon the land.[595] Other factors were the inflated land and commodity prices after the war which resulted in over-capitalization, the inadequate farm size, and the unsuitability of many areas of land for the purpose for which they were used.[596] The RRC concluded its survey of First World War settlement policy with the warning that "in 1944 the stage [was] set for a repetition of the post-war settlement disasters of the previous period, and such repetition will recur unless adequate precautions are taken and, above all, unless returned men and the public understand the real nature of the problem".[597] It was therefore necessary that the governments resist any public pressure for establishing settlements where expert knowledge advised not to do so.[598]

Consequently, the basic message was that the main criterion for the number of settlers that were to be put on the land should not be the number of applicants, but the availability of suitable land. The RRC pointed explicitly to the fact that in those cases where Crown lands had been subdivided for soldier settlement, these had often been marginal lands or densely forested lands particularly difficult to manage.[599] In regard to the marginal wheat lands, their settlement had been "the fruits of an over-optimism" and caused by "a failure to understand the true significance of climatic data and the effects which a decrease in both the amount and reliability of rainfall have on production costs".[600] The general lack of knowledge of the correct method of how to treat the various soil types in order to ensure reasonable productivity was named as a contributory factor for the failure of the settlement schemes.[601] The RRC concluded from these experiences that "any future scheme for developing Crown lands for

[593] Ibid., p. 9 (par. 149).
[594] Ibid., pp. 46-47.
[595] Ibid., pp. 3-16.
[596] Ibid.
[597] Ibid., p. 8 (par. 147).
[598] Humphreys, Wadham, p. 115.
[599] RRC (1944): Settlement and Employment of Returned Men on the Land: The Commission's Second Report, p. 7 (par. 140).
[600] Ibid.
[601] Ibid.

farming settlement should be located in the better rainfall coastal areas of equable climate".[602] The RRC's second report enumerated the general principles which should be used to guide land settlement, namely the use of the land according to the requirements of a sustainable market, the provision of sufficient farm size and the selection of the land in such a way as to offer social amenities and allow for a social life.[603] Also, it specifically set out that

> The design of farms should have regard to soils, topography and general physical characteristics, and areas should be determined accordingly. In certain critical industries, such as those in irrigated areas, a detailed soil survey should be made before the scheme of layout is determined. Where large areas of land are to be subdivided or land is to be devoted to new uses, it should be pre-requisite that at least a large-scale soil survey is obtained.[604]

The report outlined a detailed plan for a Commonwealth-states collaborative soldier settlement scheme that provided for the Commonwealth to shoulder the bulk of finances, while the states would select the land and settlers and provide for most of the administration.[605] With its recommendation of a close cooperation between the states and the Commonwealth, the Commission went against a proposal of the returned soldiers leagues, who had suggested that the Commonwealth would completely take over the financing and control of future soldier settlement.[606] The RRC stressed the need for a close examination of the qualifications of the applicants, the provision of finance and special concessions required for settler success, and the acquisition and preparation of land and housing as well as the training of applicants.[607] This training had to cover, among others, a course on the subject of soils and soil management with special reference to erosion control, maintenance of fertility and the functions of implements.[608] In a series of 'Post-war discussion notes' published by the Ministry of Post-War Reconstruction and the Australian Army Education Service, the principles of post-war farming were diffused, and the reading material referred to the importance of soil conservation.[609] Some of the pamphlets were even entirely dedicated to the problem of soil erosion.[610]

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[602] Ibid., p. 8 (par. 145).
[603] Ibid., p. 31 (par. 202).
[604] Ibid.
[605] Ibid., pp. 22-24 (par. 181-192).
[606] Ibid., p. 22 (par. 181-182).
[607] Ibid., pp. 26-41.
[608] Ibid., p. 28 (par. 196).
[609] Commonwealth of Australia, Ministry of Post-War Reconstruction (ed.) (n.d.): Discussion Bulletin 'Rural future ' (reprint of Australian Army Education Service Current Affairs Bulletin), Post War Discussion Notes 'The Land', Melbourne.
[610] Clark, Soil Erosion in Australia; Commonwealth of Australia, Ministry of Post-War Reconstruction (ed.) (n.d.), Discussion Bulletin 'Soil Erosion' (reprint of Australian Army Education Service Current Affairs Bulletin).

Political action soon followed the publication of the report. At Premiers' conferences in August and October 1944, a co-operative scheme of soldier settlement was discussed following the suggestions of the RRC and was accepted, with some modifications in regards to land tenure.[611] The negotiations between the Commonwealth and the states were finalised in August 1945 and took shape under the War Services Land Settlement Agreement 1945.[612] Altogether, just over 12,000 veterans were settled on the land under the scheme, a far smaller number than the 50,000 estimated.[613] The obligation for soil surveys before settlement was largely implemented by the states in cooperation with the CSIR(O) Division of Soils, which led to a large increase in staff of the latter, as described earlier in the thesis.[614] The CSIR(O) was mostly engaged in a soil survey of larger tracts of virgin land, especially in South Australia, Western Australia, and Tasmania.[615] In South Australia, soldier settlement focused on lands with reliable rainfall, namely the upper and lower South East and Kangaroo Island, as well as on some irrigation areas along the Murray River, the largest of them at Loxton.[616] Here again, extensive soil surveys preceded settlement.[617] In Queensland, New South Wales, and Victoria, the Departments of Lands and Agriculture, sometimes in consultation with CSIR(O) Division of Soils, undertook soil surveys in order to assess the suitability of the lands for the specific farming purpose, focusing on irrigation areas.[618] In Victoria, large soldier settlement schemes were developed thanks to irrigation at Maffra, Numurkah and Robinvale, where almost 1,000 new farms were established.[619] Compared to the First World War schemes, the post-war schemes of the Second World War were relatively successful and showed a relatively low failure rate over the first fifteen years.[620] The great strength of the scheme was, as economic historians Butlin and Schedvin suggest, the careful and cautious planning that resulted from the "mood of pessimism which guided its preparation".[621] Just as the failure after the First World War had led to a widespread pessimism, the short term

[611] Butlin/Schedvin, War Economy, pp. 735-736; Martin/Penny, The Rural Reconstruction Commission, p. 226; Humphreys, Wadham, pp. 116-117.
[612] Butlin/Schedvin, War Economy, p. 738; Waterhouse, The Vision Splendid, p. 208.
[613] Waterhouse, The Vision Splendid, pp. 208-209.
[614] Humphreys, Wadham, p. 117; Stephens, Soil Survey, p. 11.
[615] Stephens, Soil Survey, p. 11.
[616] Williams, The Making of the South Australian Landscape, pp. 266-267; Stephens, Soil Survey, pp. 11-12. For the histories of South Australian soldier settlement schemes, see: Jean Nunn (1981): Soldier Settlers: War Service Land Settlement Kangaroo Island, Hawthorndene, S. Aust., Investigator Press; Brian O'Connor/Pam O'Connor (1991): In Two Fields. Soldier Settlement in the South East of South Australia, Millicent, Millicent Print; Karen George (1999): A Place of their own: The Men and Women of War Service Land Settlement at Loxton after the Second World War, Kent Town, S. Aust., Wakefield Press.
[617] Williams, The Making of the South Australian Landscape, pp. 266-267.
[618] Stephens, Soil Survey, p. 11.
[619] Powell, Watering the Garden State, p. 225.
[620] Waterhouse, The Vision Splendid, pp. 208-209.
[621] Butlin/Schedvin, War Economy, p. 738.

success of the new scheme created a fresh optimism for the possibilities of large settlement schemes and the potentials of Australia's land resources that guided new settlement policies in the 1950s and 1960s.[622] By the early 1960s, in most of the states, about 10 per cent of the soldiers had failed; with only 4 per cent, Victoria was the most successful state, and Tasmania, with 28 per cent, the least successful.[623] In the longer run, however, the soldier settlement schemes would reveal that they had substantial weak points, too and that they required substantial Commonwealth and state expenses.[624]

10.2.2 The "Exploded Theory of Vast Potentialities"

As we have seen in the RRC's first and second reports, the past experience with soil erosion greatly affected the formulating of future land policies. The principles of future land policy were analyzed more extensively in the RRC's third report *Land Utilization and Farm Settlement,* which addressed in-depth the problem of soil erosion.[625] The RRC's reports show the clear influence of its principal author, Samuel Wadham.[626] Since the mid-1930s, probably influenced by Griffith Taylor, Wadham had advocated a reassessment of the land resource.[627] In a paper of 1937, Wadham had castigated the "exploded theory of vast potentialities". Pointing to the importance of environmental factors in limiting the expansion of rural settlement, Wadham had concluded that expectations of huge population and unlimited resources were unrealistic.[628] Wadham stressed that efficient agriculture depended on a favourable rainfall and evaporation ratio and that the "climatic controls" were of an "immense significance in the utilization of the land of the continent on which we live".[629] Wadham had expressed his hoped that the "days [were] gone in which it was necessary to listen to outbursts of oratory on the illimitable potentialities and unbounded resources of Australia".[630] In the same article, the Professor also warned that in areas with unfavourable climatic conditions, vegetation was readily exploited and destroyed, causing soil erosion.[631] He therefore predicted that the capacity of the arid zone of supporting primary production would most likely

[622] Powell, Patrimony of the People, pp. 21-22.
[623] Stephen Garton (1996): The Cost of War. Australians Return. Oxford [et al.], Oxford University Press, pp. 139-140.
[624] Waterhouse, The Vision Splendid, pp. 208-209; Garton, The Cost of War, p. 139.
[625] And its content diffused in the press, see f. ex.: 'The Menace of Lost Soil', *The (Melbourne) Age*, 22 November 1944.
[626] Macintyre, Australia's Boldest Experiment, p. 171.
[627] Humphreys, Wadham, p. 127.
[628] Samuel M. Wadham (1937): Australia's Absorptive Capacity: The Primary Industries. In: Walter G. Duncan/Claud V. Janes (eds.), The Future of Immigration into Australia and New Zealand, Sydney, Angus&Robertson, pp. 137-166, here p. 137.
[629] Ibid., p. 138.
[630] Ibid., p. 137.
[631] Ibid., p. 139.

decrease in the future.[632] He called for a scientific study of the Australian soils and for better cooperation between the state departments of Lands, Agriculture, and Forests which he blamed for having wrong-headed land policies in some areas.[633] In order to protect the soils and render agriculture more efficient, Wadham favoured passing legislation that prohibited unwise land use:

> In the United States of America the erosion menace has brought about a further restriction in the rights of land-owners to use land unwisely, and I believe that we shall certainly have to take similar steps in parts of Australia in the near future. The difference between misusing land and causing it irreparable damage, and using land ineffectively and thereby failing to develop the country as it should be developed, is to some minds not a very great one.[634]

The first edition of the classic volume *Land Utilization in Australia* that Wadham co-authored with his colleague Gordon L. Wood, came to a similar assessment. The authors considered the possibility of extending the present pastoral areas as slight, as they considered that the pastoral industry had already expanded too far into the dry interior in many cases, resulting in over-grazing, a reduction of the carrying-capacity, and soil erosion.[635]

Already familiar with the problems that soil erosion presented for the primary sector in the second half of the 1930s,[636] Wadham's investigational tour throughout rural Australia as commissioner of the RRC further increased his awareness of the problem.[637] His own travel experience, during which the effects of erosion had leapt out at him, prompted him to issue a public warning in the *Sydney Morning Herald* about the "Grim Menace of Dust and Erosion".[638] Therein he admitted that before his tour, he had been "skeptical about this erosion business" but that had had to change his opinion as in "many districts erosion forced itself under notice" and that he had observed that the "speed of the plague was increasing".[639] As a consequence, Wadham became an active public voice that warned about the problem, as he did in December 1944, for example, when he participated in a nation-wide radio broadcast on *Erosion: The Menace to Australia's Soil* of the Australian Broadcast Commission, where he presented his expert opinion on the erosion problem, together with Gordon Wood and Harold Hanslow.[640]

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[632] Ibid., p. 140.
[633] Ibid., p. 158.
[634] Ibid., p. 160.
[635] Wadham/Wood (1939), Land Utilization in Australia, p. 109.
[636] See also: Samuel Wadham: 'Science and Agriculture. Widespread Problem of Soil Erosion', in: *The (Melbourne) Argus*, 10 February 1938.
[637] Martin/Penny, The Rural Reconstruction Commission, p. 225.
[638] Samuel Wadham: 'Grim menace of Dust and Erosion', in: *Sydney Morning Herald*, 5 December 1944.
[639] Ibid.
[640] Australian Broadcasting Commission (1944): Erosion. The Menace to Australia's Soil. With contributions of S. M. Wadham/G. L. Wood/H. Hanslow. The Nation's Forum of the Air 1(10), Sydney, Booth&Son.

The RRC's third report mirrors many of Wadham's convictions: The report named a basic triad of prerequisites for the successful development of the rural sector: future land utilization should be economically efficient with low costs of production, it should allow for a reasonable standard of life for the farming population and it should not permanently degrade the soil.[641] In a nutshell, it described the challenge of future land policy:

> The task of land settlement for agriculture is an extremely complex one involving a careful weighing of all the physical, economic, financial, social and political factors which influence the success or otherwise of settlement. In can only be accomplished by men fully conversant with all these complex problems and their implications. The real problem of land settlement is how to arrange the occupation of land so as to make the most profitable use of them economically and socially without prejudicing the interest of future populations.[642]

In order to make future land utilization a success, the various types of farming should be located in areas where climate and soils were suitable for producing the commodities concerned, an adequate system of land tenure and farm finance should be established, and the rural community should be provided with adequate rural amenities and education.[643] The report pointed to the past settlement experience, where maladjustments had occurred which had led to "human distress, loss of capital and wastage in natural land resources".[644] As examples of such maladjustments, the report pointed to the settlement of marginal wheat areas and the uneconomic small farm units in all of the states.[645] Just as in the second report, the Commission emphasised that it was vital to align future settlement policies with the economic and environmental facts, instead of wishful thinking. It strongly attacked those who clung to the idea of 'Australia Unlimited' and tagged them as "would-be patriots whose chief characteristic is a blind faith in unlimited potentialities".[646] The Commission expressed its hope that "over-optimistic forces which led to the mistakes of the past [were] spent" but, anticipated that they were most likely "merely dormant".[647]

As the environmental factors were considered as main determinants for the planning of future agricultural settlement, it is not surprising that about half of the report was dedicated to an extensive discussion of the climatic and soil factors determining the land use. This comprised an extensive summary on the problems of soil fertility and of soil erosion in all of the Australian states, accompanied by up-to-date maps of the distribution of soil erosion. In regard to soil erosion, the Commission asserted that it had been prudent not to simply follow

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[641] RRC (1944): Land Utilization and Farm Settlement: The Commission's Third report, p. 6 (par. 259).
[642] Ibid., p. 8 (par. 271)
[643] Ibid., p. 6 (par. 259).
[644] Ibid., p. 8 (par. 271).
[645] Ibid.
[646] Ibid., p. 11 (par. 281).
[647] Ibid.

public opinion on the matter, as it considered that such public moods were not always objective.[648] Instead, it had attempted to approach the problem with a "completely open mind" and had followed its own observations rather than merely the evidence presented to it.[649] Still, it had come to the

> conclusion that the magnitude of the problem is considerable, that the official statements are not exaggerated and that the people of Australia as a whole do not realize
> (a) the extent to which soil erosion is a very real menace to the future of large sections of their country;
> (b) that if a national calamity is to be averted, drastic action is necessary within the next decade; and
> (c) that, failing better methods of land utilization, the menace will spread to even wider areas than are at present affected.[650]

The moral character of the report appears especially in its general statement on the erosion problem, where it followed the ecological vision largely promoted during the soil erosion crisis:

> The Commission takes the view that the nation cannot permit any individual or generation of individuals to use any land in such a way as to damage it irreparably. We believe that the holding of land is, in a sense, a trust for posterity and that individual or cooperation, no matter what their title of ownership may be, should be permitted either willfully or through ignorance to use land in such a way as to render it liable to erosion.[651]

The Commission called for an educative campaign on the need for soil conservation; it also pilloried inter-departmental frictions within the states, and called for better cooperation between the different departments concerned with land use in order to efficiently act against the erosion problem.[652] The report did not touch the question of a national soil conservation policy, and merely pointed to the need for state-Commonwealth cooperation, in matters of a national soil survey.[653]

The Commission's apprehension that the development advocates were "merely dormant" and would wake up soon enough proved to be well-founded.[654] The voices of caution and restrain in land settlement faded away in the years of post-war 'boomerism': The apparently successful soldier settlement schemes and good economic prospects for primary production, namely a secure market for primary products in Britain, a growing export market in Asia, and an increase of home demand due to large immigration schemes after the war, led

[648] Ibid., pp. 45-46 (par. 349).
[649] Ibid.
[650] Ibid.
[651] Ibid., p. 58 (par. 360).
[652] Ibid., pp. 58-60 (par. 364).
[653] Ibid., p. 64 (par. 376).
[654] Ibid., p. 11 (par. 281).

to a new sense of optimism in rural development and closer settlement.[655] This was supported by a series of relatively humid years. With the help of science, new plants and grains were introduced and old problems of noxious plants were solved.[656] With the development and successful application of myxomatosis by the CSIRO in 1950, the problems of rabbits seemed to be solved once and for all.[657]

Irrigation was the new magic word that would transform the reluctant continent into a source of wealth, best exemplified with the Snowy Mountain Scheme.[658] As has been discussed, the faith in irrigation was in large parts a direct result of the wind erosion experience, and large irrigation schemes extended into the semi-arid belts.[659] In Victoria, the total area under irrigation increased from 269,000 hectares in 1945 to 426,000 hectares in 1959-60, an increase of 58 per cent.[660] Under Menzies' long liberal reign (1949-1966) extensive land settlement schemes were initiated in each of the states that increased the pressure on Australia's natural soil and forest resources.[661] In some cases, the Menzies administration supported the development schemes, for example in Queensland, where it assisted the state government in developing the Brigalow country in Central Queensland.[662] Initiated in 1962, the Brigalow scheme opened 4.5 million hectares of virgin brigalow scrub for closer settlement, with broad-acre grazing and cultivation.[663] A similar big scheme was carried out in Western Australia: Starting in the early 1950s, the development of the Esperance was driven forth, and in the following 20 years, the area developed for farming and pastoral use increased more than twenty-fold.[664] Between 1950 and 1990, the area opened was more than 1 million hectares.[665] The development craze also targeted some unused land tracts in Victoria, where plans to push the wheat belt in the hitherto unused areas of the Little Desert were made in the late 1960s.[666] Here, however, the fever of land development was for the first time stopped by a popular environmental movement, as Libby Robin has shown.[667]

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[655] Barr/Cary, Greening a Brown Land, p. 223.
[656] Waterhouse, The Vision Splendid, p. 211.
[657] Ibid.; Barr/Cary, Greening a Brown Land, p. 38.
[658] Barr/Cary, Greening a Brown Land, p. 223.
[659] Powell, Patrimony of the People, p. 22.
[660] Powell, Watering the Garden State, p. 225.
[661] Powell, Patrimony of the People, pp. 21-22.
[662] Ibid.
[663] Ibid.
[664] Powell, Patrimony of the People, p. 22; Timothy D. Overheu et al. (1993): Esperance Land Resource Survey, South Perth, W.A., Dept. of Agriculture, Table 1. 'Agricultural statistics for the Esperance Shire', p. 9.
[665] Ibid.
[666] Ibid.
[667] Robin, Defending the Little Desert.

10.2.3 The Controversy about Small-Scale Farming

With its plain dismissal of ideas about huge potentialities, the RRC's report took a clear position in a controversial public debate about the viability of small-scale farming and closer settlement during the last years of the war and in its immediate after-war period.[668] The main actors in the public arena were Wadham and his opponent, Bartholomew A. Santamaria, the secretary of the National Catholic Rural Movement (NCRM).[669] The NCRM was the largest religious agrarian body in Australian history and, as such, influential in society.[670] Interestingly, the experience of wind erosion and drought was a main aspect in the arguments of both Wadham and Santamaria, but it led to conclusions about future land policies that were diametrically opposed to each other.[671]

As son to immigrant Italian parents who had settled in Melbourne, Santamaria became interested in the concept of 'Catholic Action', as primarily promoted by the Popes Pius XI (1922-1939) and Pius XII (1939-1958), namely the idea to strengthen the Church by giving the laity a greater participation in the functioning of the Church.[672] When the Australian National Secretariat of Catholic Action (ANSCA) was established in November 1937, Santamaria became assistant to the director.[673] The ANSCA ventured to establish a network of specialised movements, the first on a national level would be the NCRM, founded in 1939 with Santamaria as its secretary.[674] Santamaria described the specific Australian background of the formation of the NCRM in *The Fight for the Land: A Program and objectives of the National Catholic Rural Movement* (1942):

> The crisis which cradled the NCRM is part of the great and fundamental crisis in the relation of the Catholic to the modern world, but it has features of its own of a surpassing seriousness which rendered the foundation of the Rural Movement a matter of urgent national and religious importance.[675]

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[668] Humphreys, Wadham, p. 121.
[669] Davison, Country Life, pp. 01.7-01.8; Humphreys, Wadham, pp. 123-124; Macintyre, Australia's Boldest Experiment, pp. 171-172.
[670] Richard Doig (2000): A 'New Deal' for Australia. The National Catholic Rural Movement and American Agrarianism, 1931-49. In: *Rural Society* 10 (2), pp. 139-152, here p. 139.
[671] Santamaria is best known for his advocacy of the agrarian myth and of small scale farming during and after the Second World War, as well as for his fervent anti-communism and the role he played in the split of the Australian Labor Party in 1956, cf.: Gerard Henderson (1983): Mr Santamaria and the Bishops, Sydney, Hale and Iremonger, p. 26; Davison, Country Life, pp. 01.7-01.8. His interest in soil erosion, which was closely linked with his concepts of rural life have so far been unnoticed.
[672] David Carmant (2001): Santamaria. In: Graeme Davison et al. (eds.), Oxford Companion to Australian History, p. 575; Henderson, Mr Santamaria and the Bishops, p. 9.
[673] Henderson, Mr Santamaria and the Bishops, pp. 19-21.
[674] Henderson, Mr Santamaria and the Bishops, p. 22; Patrick Morgan (ed.) (2008): B.A. Santamaria. Running the Show. Selected Documents: 1939-1996. Carlton, Vic., The Miegunyah Press, pp. 52-53.
[675] Bartholomew A. Santamaria (1942): The Fight for the Land: The Program and Objectives of the National Catholic Rural Movement, Melbourne, N.C.R.M., p. 1.

The NRCM was the movement par excellence when it came to defending the 'agrarian myth': According to Santamaria, the main purpose of the NCRM was to stop the depopulation of the countryside, a task of national importance: "The land comes first. Without the extension of rural settlement we cannot hope to establish that reservoir of population which is Australia's first national need".[676] The matter was also of utmost religious importance as depopulation threatened the parochial life as the basis of the Church.[677] The NCRM made fast progress: By 1941 it assembled over fifty groups, mainly in the farming regions of southern New South Wales and Victoria, and published its official organ, the monthly newspaper *Rural Life* with a circulation of 4,000 copies.[678]

Santamaria was among those conservatives that were concerned about the effects of soil erosion on traditional Australian values allegedly kept up by the rural population. The introduction of his book *The Earth our Mother* clearly reflects the context of the erosion crisis for Santamaria's ideas:

> This book was completed as the first of the disastrous dust storms which swept Melbourne and Sydney at the end of 1944 deposited on urban roof tops their indisputable evidence of the impending ruin of Australia's good earth. The dust storms are unpleasant. God grant that they may be providential. For if they drive into the hearts and minds of those who rule Australia the conviction that what happens to the nation's agriculture is of the first importance, even the families of the Mallee and of the Far West will not have suffered in vain.[679]

In the logic of the NCRM, soil erosion posed a major threat to rural life: *The Fight for the Land*, taking the term "land" in its broad meaning as rural area as well as in its narrow meaning as soil, dedicated its first eight pages to the topic of soil erosion and linked it with the main policies of the NCRM. Santamaria's main objective was to show that a faulty land system was at the origin of soil erosion.[680]

As Richard Doig has shown, the ideology of the NCRM owed much of its ideas to American agrarian thinkers, and especially to the writings of Luigi Ligutti, a rural priest who in 1934 was appointed the director of rural life in Des Moines, Iowa and elected to the executive committee of the American National Catholic Rural Life Conference.[681] Ligutti was

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[676] Bartholomew A. Santamaria (1945): The Earth Our Mother: A Study of the Future of Australian Agriculture, Melbourne, Araluen Publishing Co., pp. 7, 28.
[677] Santamaria, The Fight for the Land, p. 2.
[678] Henderson, Mr Santamaria and the Bishops , p. 22; Doig, A 'New Deal' for Australia, p. 139.
[679] Santamaria, The Earth our Mother, p. 7.
[680] It is also interesting to note that the NCRM cooperated with the newly established soil conservation body of South Australia: On the 13th June 1945 the NCRM sponsored a lecture given by Robert I. Herriot, South Australia's first soil conservator, who spoke about the moral aspects of soil conservation, reminding his audience that there was "a bounden duty on farmers to conserve their God given heritage which must not be robbed in one or two generations for maximum profit", *Rural Life*, July 1945.
[681] Doig, A 'New Deal' for Australia, pp. 142-146; Henderson, Mr Santamaria and the Bishops, pp. 57-58; Edward S. Shapiro (1979): Catholic Agrarian Thought and the New Deal. In: *The Catholic Historical Review* 65

startled by the land degradation in America, especially the erosion of its soils. He expressed his discontent in 1940 in *Rural roads to security* where he ascribed the cause of soil erosion to commercial agriculture that went hand in hand with the exploitation of the soil:[682] "Industrialization on the land will reduce a nation of free citizens to slaves, bring death to living things, bareness to its soils, and the final reduction of its rich acres to deserts, gullies, rocks and dust bowls".[683] In Australia, the NRCM took the same line, as Rev. J. Cleary pointedly summarised in a sermon preached at the third national convention of the NCRM:

> All had to be sacrificed to the specialized crop which could be most readily converted into cash and transported overseas: Blight, disease, floods, soil erosion were often the penalty of years of recklessness. While districts, like the Victorian Mallee, became little better than the American Dust Bowl.[684]

Part of this development had been, according to the NCRM's doctrine, endemic to the nation's history, as Australia's primary sector had from the very beginning focused on export.[685] But it had then been further encouraged by the state governments and their liberal supporters.[686] The cash crop farming had induced the exploitation of the soil through overcropping and overgrazing and caused the removal of trees and native vegetation.[687] This process had been fostered through the establishment of large holdings that had supplanted small family farms, which in turn had accelerated erosion.[688]

According to the beliefs of the NCRM, the rural family was the institutional incarnation of the Catholic faith and its special relation to the land: For the Catholic, the land was "one of the great factors in man's existence, a factor with a life of its own through the life of the innumerable organisms of which it is composed. It is a thing to be cherished, a thing to be preserved, a thing to be endowed, a thing to be husbanded".[689] On a family farm, according to such an underlying idea, the independent farmer would live directly from the crops and consequently care for the land, while the profit-orientated large scale farmer would exploit the soil.[690] Commercial farming on large holdings was also held accountable for the large

(4), pp. 583-599, here pp. 584-593; David S. Bovée, (2010): The Church and the Land. The National Catholic Rural Life Conference and American Society, 1923 - 2007. Washington, D.C., Catholic University of America Press, pp. 121-123, 138-139.

[682] Luigi G. Ligutti/John C. Rawe (1940): Rural Roads to Security: America's Third Struggle for Freedom, Milwaukee, The Bruce Publishing Company, pp. 214-217.

[683] Ibid., pp. 103-104.

[684] J. Cleary (n.d.): The Spirit of the Land. (Sermon Preached at the Third National Convention of the NCRM), Carnegie (Melbourne), Renown Press. The convention took place on an annual basis, so the date is probably in 1941 or 1942.

[685] Santamaria, The Fight for the Land, p. 1.

[686] Ibid., p. 3.

[687] Ibid., pp. 4-5; Santamaria, The Earth our Mother, p. 54.

[688] Ibid.

[689] Santamaria, The Fight for the Land, p. 5.

[690] Ibid., pp. 2-3.

indebtedness of the farmers, who then, in a desperate attempt to pay back the interests, would be driven to "practices of soil exploitation and bad husbandry".[691] By this means, commercial farming, indebtedness of the farmer, and the break-up of the family were all interlinked with the problem of soil erosion. These interrelations were in Santamaria's eyes well illustrated in Steinbeck's novel "Grapes of Wrath". While he condemned the novel as being "disgusting", "obscene", "blasphemous", and "pornographic", it nevertheless held a lesson, a lesson that only a Catholic could fully appreciate:

> It was the moral of the intimate connection between the false ideals of Farming for Money, the destruction of the fertility of the soil in the Dust Bowl, the bankruptcy of families caught in the toils of great companies and high finance, the eventual loss of the farm home and the break up of the tightly knit family unit which held together only as the family held to the farm.[692]

Living on and from the earth was also important for the Catholic faith, as there was "no faith which is stronger than the Faith of the tillers of the soil".[693] The answer to the problem of soil erosion was therefore not purely scientific, but required a change of the economic and social land system.[694] According to Santamaria's logic, only a debt-free, independent, and self-sufficient farmer living from his own work and doing diversified farming would have the moral freedom of the individual person[695] and at the same time "conserve the fertility of the soil and prevent erosion".[696] Soil conservation contributed to the preservation of the rural areas and was in this way an important tool for stabilising Australia's democracy. Subsistence farming was therefore considered the best remedy against the negative powers of the 'mass' that would – as the example of Germany had shown – lead to a totalitarian system. "No society", Santamaria wrote, "which has allowed its agriculture to be destroyed has been able to withstand revolution and, in modern times, totalitarianisms".[697] The fear of the 'mass' was of course widespread among conservatives at the time, and while the specific quotation targets fascism, Santamaria was probably much more concerned about communism.[698]

It seems, however, that Santamaria was well aware of the fact that some parts of Australia, like the Mallee, had just proved dramatically unfitted for small scale farming: In *The Fight for the Land*, Santamaria modified his general assertion and admitted that there were some regions where the climatic conditions made such a farm system impracticable.

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[691] Santamaria, The Earth our Mother, p. 105; Santamaria, The Fight for the Land, p. 3.
[692] Santamaria, The Fight for the Land, p. 5.
[693] Ibid., p. 6.
[694] Santamaria, The Earth our Mother, p. 105.
[695] Santamaria, The Fight for the Land, p. 6.
[696] Santamaria, The Earth our Mother, p. 55.
[697] Santamaria, The Earth our Mother, p. 28; cf. also Fry, Soldier Settlement and the Agrarian Myth, pp. 41-42.
[698] Ibid.; on the concept of 'mass society', see f. ex.: William Kornhauser (1959): The Politics of Mass Society, Glencoe, Ill., The Free Press, pp. 21-38.

While he acknowledged that the rainfall would not be sufficient in the whole of Australia to allow for the kind of diversified farming he had in mind, he ventured that "it may be submitted with conviction that too pessimistic an impression is often conveyed by the prophets of caution in this matter".[699] Those parts with adequate rainfall, especially along the coastal strip of Eastern Australia, "could house millions of people over and above those they already contain".[700] Additionally, further areas could be turned productive through irrigation.[701]

In October 1943, as secretary of the NCRM, Santamaria made a submission to the Rural Reconstruction Commission explaining his concept for a post-war society reconstruction of the rural areas after the principle of subsistence farming.[702] He reiterated the principal ideas of *The Fight for the Land*, namely the central crisis of Australia's rural sector through depopulation and the menace this would bring about. Santamaria also stressed the importance of small-scale farming, based on the principle of the family farm.[703] This however, was vehemently disputed by Samuel Wadham, who was a vehement opponent to the idea of small-scale farming.[704] Not surprisingly, the RRC followed Wadham's convictions in regard to questions of the size and organisation of future land settlement and production. The report stated that the development of farming on a small-scale basis (one-man unit) ignored the requirements of modern, efficient farming, which demanded a certain degree of mechanization and farm size along with additional work force to provide for efficient production and that this was therefore, in most cases, incompatible with the family farm.[705] Additionally, a certain size of farm area was considered necessary to maintain soil fertility and avoid erosion.[706] The RRC conceded that a family farm could run efficiently if it was not conceived as a 'one-man unit farm' but was sufficient in size to warrant its operations on modern lines with a moderate degree of mechanization.[707] The Commission also thought that the concept of a 'home maintenance area' should be upgraded to that of a proper economic unit, defined as an area best suited in the long term to the commodities actually produced, "with due regard to proper farming and soil conservation methods" that would permit the

[699] Santamaria, The Fight for the Land, p. 14.
[700] Ibid.
[701] Ibid.
[702] Humphreys, Wadham, pp. 123-124; Davison, Country Life, pp. 01.7-01.8.
[703] Ibid.
[704] Ibid.
[705] RRC (1944): Land Utilization and Farm Settlement: The Commission's Third report, pp. 106-107 (par. 477).
[706] Ibid., pp. 105-106 (par. 476).
[707] Ibid., p. 108 (par. 480).

most efficient production and provide for an income in accordance with the Australian standard of living.[708]

After the RRC reports were published, Wadham continued his crusade against the idea of small-scale farming and closer settlement, for example in a paper on *Difficulties of Small-Scale Farming in Australia*, where he reaffirmed that closer settlement schemes of the past were based on some exterior social and economic concepts that were unsuited to Australia's specific conditions:

> The inability of the advocates of many of these schemes to take into account of the facts of the Australian environment and the wrongly conceived policies which resulted, lead one to marvel that the damage to the land, its soils, and its vegetation is not much greater than it actually has been.[709]

Thus, small-scale farming, according to him, was "probably the most stupid" of "all the foolish policies of land settlement" advocated, and had contributed to soil erosion and surely was not a solution to the problem.[710]

10.2.4 Land Tenure – A Crucial Question

Another political issue that was vividly debated at the time, especially in the context of the erosion problem, and on which the RRC took a stand, was the question of the adequate system of land tenure.[711] As we have seen in the first part of the thesis, the basic proposition in Australia is that all land of the continent belongs to the Crown. Landholders then acquire land from the Crown in the form of tenure, a process called alienation, for example as freehold (free grants or purchased grants without a time limit) or licensing (leasehold for a certain time limit).[712] The question of the link between tenure and exploitative land use practices that encouraged soil erosion was vividly debated when it came to deciding on the political or social causes lying behind wind erosion, especially on pastoral lands. This, in turn, related directly to the question of who was to blame for the ongoing soil erosion crisis.

Francis Ratcliffe, who had soon felt that the sand drift problem in South Australia's pastoral area was not so much a scientific matter as it was a political one, addressed the question of land tenure in his CSIR report.[713] Ratcliffe referred to the widespread opinion that the lack of security in tenure of pastoral leases would encourage exploitative land use and

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[708] Ibid., p. 110 (par. 486); see also: Humphreys, Wadham, p. 122.
[709] Samuel M. Wadham (1951/1st ed. 1947): Difficulties of Small-Scale Farming in Australia. In: Gordon L. Wood (ed.), Australia. Its Resources and Development. New York, Macmillan, pp. 139-146, here p. 139.
[710] Ibid.
[711] A question that has still been debated in more recent years, see for example: Bradsen/Fowler, Land Degradation, pp. 145-147.
[712] Ibid., pp. 135-136.
[713] Ratcliffe, Soil Drift in the Arid Pastoral Areas.

overstocking.[714] He stated that many lessees would feel that those who were taking care to maintain the land in good condition were penalised, as it was more likely that their leases would be terminated. Also, many lessees would 'flog' the land in the last years before termination of the lease if they knew that they were going to lose it.[715] Security of tenure was, however, not the solution, as Ratcliffe saw the problem not in the rather exceptional gross overstocking, but in the prevalent practice of slight and often unaware overstocking by the average pastoralist.[716] Ratcliffe therefore propagated the idea that the only solution was to insert stocking clauses into the leases.[717] Most likely as a direct reaction to Ratcliffe's report, South Australia introduced a clause in its Pastoral Act 1936, that prohibited the overstocking of the leased land during the last three years of the term.[718] The South Australian Soil Conservation Committee, likewise, referred to the question of a link between the lease system and land degradation. In its 1938 report, it dismissed any blame on government policy, and asserted that overstocking was not acceptable "whatever the explanation and excuse for the practice be".[719] While the report agreed that overstocking clauses should be integrated in leases, it laid the blame on the "wanton carelessness of some pastoralists".[720] In 1939, further provisions to prohibit overstocking of leases were inserted in 1939 into the Crown Lands Act and the Pastoral Act 1936.[721]

The controversy in South Australia continued, and gathered momentum in the first half of the 1940s. Jock Pick's *Australia's Dying Heart*, already analysed in depth in the previous part of the thesis, butted into the debate. Overgrazing, the main cause of soil erosion in the pastoral inlands, was in Pick's eyes the result of unwise policies in land tenure and administration that made immediate reforms in land administration urgent.[722] Pick sharply criticised the main form of land tenure in these areas, the grazing lease for a fixed period, which had no guarantee of renewal. He also propounded the popular argument that the better a lessee cared for his land, the higher was the chance that his lease would not be renewed.[723] The result was that the lessee was pushed to stock his country to the utmost for the limited time he was certain to hold it. Pick therefore favoured private ownership of land, as any improvement of the land would directly benefit the owner and would therefore encourage soil

[714] Ibid., p. 68.
[715] Ibid.
[716] Ibid., p. 69.
[717] Ibid.
[718] Pastoral Act 1936 (SA); cf. also: Bradsen/Fowler, Land Degradation, p. 153.
[719] South Australia (1938): Report of the Soil Conservation Committee, p. 12.
[720] Ibid.
[721] Bradsen/Fowler, Land Degradation, p. 153.
[722] Pick, Australia's Dying Heart, pp. 25, 57.
[723] Ibid., pp. 25-27.

conservation methods.[724] Pick also condemned the tendency to sub-divide large holdings in the inland into small areas, emphasising that "the Inland is no place for the small man".[725]

A similar discussion was stirred in New South Wales by Hugh Stevenson Roberton, a New South Wales farmer, who in 1945 asked the pertinent question about the underlying reasons for exploitative land use in his book *Now Blame the Farmer*.[726] Born in Scotland, Roberton had migrated to New South Wales in 1922 at the age of 22, where he first worked as a share-farmer and later leased 718 acres (290 ha) of Murrulebale land that he then purchased in 1948.[727] Roberton was politically active in the Farmers and Settlers' Association of New South Wales, of which he was president from 1945 to 1949, as well as in the Country Party of New South Wales, where he was a member of the central council from 1938 to 1942.[728] Starting in the early 1930s, he wrote newspaper columns under the pen-name 'Peter Snodgrass' in the rural newspaper *The Land*.[729] In 1939, he used his Snodgrass column to propose permanent stabilisation of wheat prices, the so-called 'Roberton scheme', endorsed with substantial modifications in August 1942 by the Federal Labor cabinet.[730]

In 1945, Roberton took up the pen for a vehement defense of the farmer, who he thought was unfairly blamed for the break-down in land settlement and present land degradation.[731] Roberton left no doubt about the human responsibility for land degradation when he declared that "wind and water erosion, disease, pest and weed infestation are neither unhappy accidents nor the will of Good. They are the ultimate effects of our excesses, the direct results of low fertility and soil sterility, the dual infection that comes from the prostitution of the land" and emphasised that it was "a delusion to blame the climate".[732] But the farmer was not responsible for these human excesses, quite the contrary, he was the "innocent victim of economic circumstances" that had forced him to practices of land exploitation against his better judgment.[733] The fault was with the Crown, which had given "unbridled licence for the rape of the land"[734] through opening up land that had been

[724] Ibid.
[725] Ibid., pp. 43-45.
[726] 'Book Review: Hugh Roberton's Courageous Plan For Improving Life Of People On Land', *The Farmer and Settler*, 19 July 1946; 'Book review "Now Blame the farmer" by Hugh S. Robertson', *Rural Life*, December 1945; Donald Boadle (2012): Roberton, Hugh Stevenson (1900–1987). ADB Online: http://adb.anu.edu.au/biography/roberton-hugh-stevenson-14453/text25543. [Accessed 8 October, 2015].
[727] Ibid.
[728] Ibid.
[729] Ibid.
[730] Ibid.
[731] Roberton, Now Blame the Farmer, p. 49.
[732] Ibid., p. 62.
[733] Ibid., p. 51.
[734] Ibid., p. 45.

overcapitalised and had left the farmer with high debt.[735] Likewise, overstocking was not done on purpose, but because the pastoralists had no other choice.[736] Roberton thought that while freehold might be the best form of tenure in the long run, at the moment it was ill-suited, as it required a high starting capital that put too much pressure on the land and resulted in over-use. Roberton also disapproved of short term leases, as this encouraged disinterest and exploitation.[737] Consequently, he favoured long term leases as the best form of land tenure as it encouraged the farmer to care for the land and at the same time liberated him from high financial pressure.[738]

Within these debates on questions of land tenure and different suggestions as to how to mitigate the problem, the RRC ninth report took a clear position, even though its writing had caused substantial discordance among its members.[739] The report defined that

> [...] the principal objective of agricultural land use shall be attainment of the greatest possible efficiency in agricultural production compatible with the maintenance of independent farm units and with due regard to the preservation of soil fertility and standards of living of the operators and farm workers.[740]

The Commission thought that these principles were best obtained by a freehold system.[741] Also, it acknowledged that social demand would always push in this direction, so the best means was to optimise the already existing system.[742] Soil conservation played an important role in the considerations of the Commission. Similarly to Pick or Roberton, the Commission argued that security of tenure would automatically induce the landowner to maintain his land if he had an equity in it, and therefore would naturally embrace the principle of conserving the land for future generations.[743] On the other hand, a limited tenure would weaken the motive of the landholder to conserve the soil and would therefore be liable "to encourage destructive exploitation".[744] The RRC therefore recommended that lessees be permitted to convert Crown leasehold to private ownership, and that future Crown leasehold be limited to lands required for public purposes.[745] However, just as Ratcliffe before, the RRC considered that security of tenure was not sufficient to guarantee the conservation of the land.[746] Even if security of

[735] Ibid., pp. 51-55.
[736] Ibid., pp. 66-67
[737] Ibid., p. 115.
[738] Ibid., pp. 101-103.
[739] Humphreys, Wadham, pp. 118-119.
[740] RRC (1946): Rural Land Tenure and Valuation: The Commission's Ninth Report, pp. 58-59 (par. 2064).
[741] Martin/Penny, The Rural Reconstruction Commission, p. 231.
[742] Ibid.
[743] RRC (1946): Rural Land Tenure and Valuation: The Commission's Ninth Report, p. 15 (par. 1899).
[744] Ibid.
[745] Ibid, p. 59 (par. 2065).
[746] Ibid., p. 16 (par. 1900).

tenure was provided, "ignorance, greed, and need" were still likely to lead to the neglect of conservation.[747] The first matter, ignorance, could, of course, be best fought with knowledge by means of education.[748] The second matter, need, was caused if the income from the land holding was inadequate, and this mainly resulted from holdings that were too small, from outputs that were too low, from prices and costs that were too high, or from excessive debt commitments. If this was the case, the land holder had a "motive to increase receipts by overloading the land, or to reduce expenses by postponing precautions against deterioration".[749] Holdings that were working efficiently, therefore, also favoured soil conservation. The third matter, greed, should be counteracted by giving the state the power to impose restrictions and control that would ensure the proper use and preservation of the land: in case of neglect, the state would have the authority to exercise the right of resumption.[750] While it is difficult to establish immediate results of the RRC'S recommendation, it might have influenced New South Wales' decision to issue legislation in order to prevent overstocking on leased Crown Land in 1952.[751]

10.3 The Commonwealth in Charge – International Action in Soil Conservation

The Commonwealth had one more important role in regard to soil conservation, namely when it came to international action where the states had no governmental capacity.[752] The international alarm on soil erosion led to the fact that the issue was put on the international political agenda, first by the League of Nations and then by its successor, the United Nations Organization. At the forty-eighth meeting of the League of Nations' Economic Committee in July 1938, the attention of the Committee was drawn to the dangers arising out of deforestation and resulting soil erosion in various parts of the world.[753] The Committee, consequently, indicated to the Assembly the desirability of instituting a study of the question of deforestation, to be carried out in collaboration with the International Institute of Agriculture.[754] This suggestion was adopted by the Assembly, which asked the Economic and Financial Organization "to undertake a study of the causes which have led to the harmful deforestation and soil erosion of certain areas and of the measures which Governments have

[747] Ibid., p. 16 (par. 1901)
[748] Ibid.
[749] Ibid.
[750] Ibid., p. 16 (par. 1902); see also: Humphreys, Wadham, p. 119.
[751] Bradsen, Soil Conservation Legislation, p. 37.
[752] Ibid., p. 111.
[753] League of Nations, Economic Committee (1939): Report to the Council on the Work of its Forty-Ninth Session, Geneva, 3rd April 1939, pp. 1-3, here p. 3.
[754] Ibid.

undertaken to check and counteract these tendencies".[755] The question was again discussed during the committee's subsequent forty-ninth meeting which opened in Geneva on 27 March 1939. Several members of the Committee again drew attention to the great damage caused by soil erosion, whether due to deforestation or other causes. As the International Institute of Agriculture had commenced a comprehensive study on the question of deforestation in a large number of countries in 1931, with its results published in 1938, the Committee thought that any inquiry or study might duplicate already existing work or work under way. It suggested that the question might usefully be taken up again as a part of the work of the European Conference on Rural Life planned for the autumn.[756]

The start of the Second World War fundamentally changed the setting, as food security became a main issue in the war-torn world. Consequently, the question of soil conservation was integrated into a larger international agricultural strategy to secure food for the world's population during World War Two. In February 1943, as part of Roosevelt's principle 'Freedom of Want' as outlined in his 1941 State of the Union address (known as the Four Freedoms speech), a conference of the United Nations was organised at Hot Springs, Virginia, that dealt with food and agriculture.[757] It established the UN Food and Agriculture Organization (FAO).[758] The underlying idea of the FAO's establishment was to secure the world with adequate nutrition, a concern that had gathered momentum among a group of scientists and the League of Nations since the mid-1930s.[759] Among the early advocates of an international approach to care for adequate world nutrition were two Australians, namely Stanely Bruce, former Prime Minister of Australia, and Australian diplomat and economist Frank Lidgett McDougall.[760] At the sixteenth Assembly of the League of Nations in September 1935, they presented a scheme to "marry health and agriculture",[761] that proposed to solve the immediate problems of agricultural crisis, prevent war with Germany, change what people farmed and ate and, in the longer term, restructure the global economy, redistribute wealth, and create a more equitable and healthier society.[762] Cameron Muir has recently highlighted the significant role that McDougall played in alerting Roosevelt to the

[755] Ibid.
[756] Ibid.
[757] Food and Agriculture Organization (FAO) (1948): Soil Conservation: An International Study, Washington, United Nations Organization; Muir, The Broken Promise, pp. 120-121, 126.
[758] Amy L. Staples (2006): The Birth of Development: How the World Bank, Food and Agriculture Organization, and World Health Organization have changed the world, 1945-1965, Kent, Ohio, Kent State University Press, p. 76; Muir, The Broken Promise, p. 121.
[759] Staples, The Birth of Development, p. 72.
[760] Muir, The Broken Promise, pp. 112, 122-125.
[761] Ibid.
[762] Ibid.

topic of nutrition and agriculture and putting the item on his political agenda for the conference.[763]

The problem of soil conservation was closely linked with concerns about food and nutrition, and was likewise discussed at Hot Spring. US soil conservation father Hugh H. Bennett used the platform to highlight the importance of soil conservation for any policy that aimed at securing the world's supply of food.[764] Even if Bennett was concerned that the nutrition agenda and increase of food production somewhat overshadowed the problem of soil erosion,[765] the topic of soil conservation was still integrated as an important element in the FAO's agenda to secure agricultural production and food security.[766] The Conference declared as item XX:

> Soil erosion has in the past destroyed or severely limited the utility of vast areas of land and will, in future, unless checked, constitute the greatest physical danger to the world's food production. Failure to conserve and control water supplies and to use them efficiently has, in many areas, precluded important potential increase in food production. To meet the needs of the growing world population and to ensure high nutritional standards, all land in agricultural use or suitable for being brought into agricultural use should be adequately protected from erosion and from any other serious damage by various measures, including structural work and the insurance of satisfactory agricultural systems and husbandry practices. The conserving of land and water resources should be regarded as an obligation of governments as well as individuals.[767]

It recommended that every nation should invest in soil erosion surveys and research as well as adopt a soil conservation policy.[768] With the United Nations Food and Agriculture Organization Act, assented to on 7th December, 1944, the Australian federal parliament approved the acceptance of the Constitution of the FAO of the UN.[769]

The RRC referred to the Commonwealth's agreement to the principles of the Hot Spring Conference, namely to raise the level of nutrition and the standard of living of its own people, to improve efficiency of agricultural production and distribution, and to cooperate with other nations for the achievement of these ends.[770] In 1948, the FAO published *Soil Conservation – An International Study*, which focused largely on the US and China, while Australia did not appear in the study. In order to remedy this lack, the Australian National FAO Committee decided that an adaptation of the publication would be of interest, a work

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[763] Muir, The Broken Promise, pp. 125-126.
[764] Ibid., p. 128.
[765] Ibid.
[766] FAO, Soil Conservation: An International Study; Commonwealth of Australia, Standing Committee on Soil Conservation (1953): Adaptation for Australian Conditions of 'An International Study on Soil Conservation' published by the FAO of the United Nations, Melbourne, Department of Commerce and Agriculture.
[767] United Nations (1943): Conference on Food and Agriculture: Text of the Final Act . In: *The American Journal of International Law* 37 (4), Supplement: Official Documents, pp. 159-192, here p. 178.
[768] Ibid., pp. 178-179.
[769] United Nations Food and Agriculture Organization Act 1944.
[770] RRC (1944): A General Rural Survey: The Commission's First Report, p. 7 (par. 14, 15), p 34 (par. 72).

undertaken by the Standing Committee on Soil Conservation, under the leadership of Bob Herriot, and published in 1953.[771] The international level would also play a major role in a later move towards a national approach to soil conservation in Australia: The World Conservation Strategy, launched in 1980 by the International Union for Conservation of Nature and Natural resources (IUCN) in collaboration with UNEP, WWF, FAO and UNESCO gave a major impetus for the development of the National Conservation Strategy for Australia, established in 1983.[772]

The tenth chapter of the thesis has shown that the Commonwealth played a certain part in regard to Australian responses to the erosion problem, even though its role was much less important than that of the states. Like the states, the Commonwealth became directly involved in soil conservation legislation in those territories under its own jurisdiction, namely the Northern Territories and the Australian Capital Territory. Moreover, starting in the mid-1930s, many Australians had been calling for a strong federal involvement in soil conservation to fight off the 'national menace' of soil erosion. Even though the numerous attempts came to naught, the Commonwealth influenced the soil conservation agenda of the day in another, more indirect way, namely through issuing guidelines for post-war planning of the rural sector. Effects were most obvious in soldier settlement schemes after the Second World War, but the new understanding of land as a natural resource as issued in the RRCs most likely also influenced future land settlement policies in a more indirect way. The federal level also became active in matters of international action against soil erosion, as projected by the FAO.

The fourth and last section of the thesis has analyzed the political responses of Australians to the soil erosion crisis of the 1930s and first half of the 1940s. At the time of Federation in 1901, the states had retained public authority concerning land, so political action against soil erosion was largely the responsibility of the states. The first part of the section showed that the perception of soil erosion as a multi-level threat to the nation led to the establishment of soil conservation legislation in all of the Australian mainland states. The local experience with wind erosion in the different states was an important factor in the process of legislation, but international influences also played a crucial role in Australians' search for political solutions. As the analysis has revealed, cultural concepts on wind erosion were of critical importance for the development of political action, as the concept of wind

[771] Commonwealth of Australia, Standing Committee on Soil Conservation (1953): Adaptation for Australian Conditions of 'An International Study on Soil Conservation' published by the FAO of the United Nations.
[772] Woods, Land Degradation in Australia, p. 6; Bradsen, Soil Conservation Legislation, pp. 123-127.

erosion as a menace and the ecological vision on the erosion phenomenon implied the need for action and contained a human responsibility which postulated that a modification of human behavior was necessary. In this way, domestic experience, scientific knowledge and cultural concepts were important prerequisites for the adoption of such legislation. The three south-eastern states established soil conservation legislation between 1938 and 1940, a process characterised by a certain unanimity throughout the party benches. All of the states were hampered to a certain degree by the economic difficulties of the 1930s and the restrictions in staff and material brought about by the War situation, but some states, like New South Wales, were significantly more active than others. The actual political action and the consequent shape of the legislation in each of the states differed according to the specific political and economic situation, but also according to the particular domestic experience with soil erosion in conjunction with historically grown land settlement patterns. All of the states emphasised education, although their legislation all contained more or less potent ways of compulsion. It is probable that the emphasis on education played an essential role in the diffusion of an ecological understanding of wind erosion and consequently of an ecological vision in general, and thus indirectly contributed to the emergence of a new environmental ethic. Compared to the states, the Commonwealth played only a minor role in political action against soil erosion, as several attempts to increase the federal power in soil conservation matters failed. By means of the Rural Reconstruction Commission, the Commonwealth formulated general principles on future land settlement and primary production that clearly reflected an ecological vision on soil erosion. It was in this way that the Commonwealth most likely influenced future land policies, the most directly in the case of soldier settlement policies. Finally, the Commonwealth also became active in regard to soil conservation policies formulated on the international level, where the states had no authority, namely in assenting to the constitution of the United Nations FAO.

Conclusion

The heuristic approach of the thesis, namely to start from the contemporary debate on wind erosion as a menace and then to add the analytical perspective of the historian to those of the historical actors has been fruitful. On a continent where bushfires, floods, droughts and other natural disasters are very frequent, a comparatively 'harmless' natural disaster like wind erosion might seem, at the first glance, not worthy of more extensive historical investigations. And yet, as this thesis illustrated, wind erosion in the 1930s and first half of the 1940s was considered by large parts of the Australian society as a serious national menace, one which triggered existential environmental concern. The approach of the CRC 923 Threatened orders, which takes as its starting point the perspective of the historical actors and their public communication about a perceived threat, has been fruitfully applied in this thesis. It has allowed focusing on a moment in Australian history that was perceived by those living through it as a serious environmental crisis, even though it largely sank into oblivion once the crisis was over.

As the first section 'Living' has shown, wind erosion in the 1930s and first half of the 1940s was first of all a physical phenomenon with significant impacts on the regions affected and the people who lived there. Starting from the assumption that white settlers' interference with the natural environment through their pastoral use and land management is at least partially responsible for the erosion crisis as it developed in the first half of the 20th century, the first chapter analyzed the process of pastoral and agricultural settlement beginning with the arrival of the First Fleet, with a special emphasis on the (Victorian) Mallee region. As discussed in this section, soon after the first colonists had arrived, pastoralism spread over the continent, moving more and more towards the drier interior. A steady process in the long run, it was, however, regularly interrupted by periods of droughts and economic depression. Agricultural settlement, likewise, encroached more and more towards the interior, particularly in the second half of the 19th century, which saw an increase in population in Australia and a high social demand for opening up new land for farming. The Victorian Mallee was, because of its dense mallee shrubs, an unattractive country, so it was only in the 1880s and 1890s that a first wave of farmers settled the areas, helped by new techniques like the mallee roller and stump-jump plough. The spread of pastoralism and the clearing of vegetation had important effects on the natural environment, and along with the Federation Drought, dust storms became frequent and sand drift began to pose serious problems. The drought brought a

momentary setback in agricultural and pastoral expansion, but that was only short-lived: The first decade of the 20th century saw a new enthusiasm in closer settlement and a boom of the yeoman ideal. During this period, the mallee areas of Australia's south-east were opened for agricultural settlement, including the Mallee in South-West New South Wales, the South Australian Murray Mallee in South Australia and the Victorian Mallee. In the wake of the First World War and the concomitant revival of the yeoman ideal, the wheat frontier encroached even further into the dry mallee areas as state governments established soldier and civilian closer settlement schemes. The opening up of these regions was paralleled by the use of new agricultural techniques like the long bare fallow, which rendered the soils vulnerable to the forces of the wind. In the 1920s, wind erosion was a problem in the South Australian and NSW pastoral regions, as well as in the south-eastern wheat belt, and the problem gained more and more public attention during the 1930s.

The second chapter examined how the settlers in the wind-eroded Mallee region experienced dust, drought and depression. The chronological approach clearly shows the difficulties that arose from a succession of difficult years caused by the economic depression of the rural sector in the early 1930s and the resulting dump of wheat prices, and the effects of a series of dry years which resulted in particularly low yields. As more and more members of the community needed government support to live through the difficult times, the Mallee region became increasingly associated with human hardship. Wind erosion in form of sand drift and dust storms may not have been the major factor causing the difficulties many settlers lived through, but it was an important additional distress. Just how significant this distress caused by wind erosion could be, was illustrated with the help of a large range of autobiographic sources. The analysis shows that the dust storms and wind erosion severely interrupted everyday life routines of the Mallee settlers and strongly impacted the region's social and economic life. The Mallee settlers suffered from physical discomfort and health issues caused by the dust loaded air, particularly eye irritations and respiratory troubles. While men were particularly affected by the dust while working the land, women suffered from the additional workload cause by the dust, especially the cleaning of the house and repeated washing. Children were more easily scared by the dust storms than adults, and were especially affected by the erosion on their way to school and during farm chores. They were also physically threatened by the dust storms, for example when they got lost during the bigger dust storms. The farm as economic base of the family also suffered from wind erosion, as sand drift threatened to cover farm buildings, fences, and water channels, in addition injuring farm animals. The effects of off-site erosion in the form of sand drifts were also a serious

threat to the normal functioning of the rural community: sand drift clogged basic infrastructure that was crucial for the survival of the region. Roads and railways, which assured the economic and social life of the region, were badly affected, and costs to remove the sand from roads and railways piled up. As most of Victoria's north-west had no natural water supply and no artesian groundwater, the settlement of the region in the early decades of the 20th century had been accompanied by the establishment of a large irrigation system supplying supplied water to an area of around 28,500km^2 with the aid of open channels. The sand drift, which was especially pronounced during periods of droughts, clogged those water channels at times when water was especially scarce, thus threatening the survival of parts of the Mallee. As the costs to remove the sand from the channels dramatically rose and parts of the irrigation system had to be abandoned, concerns emerged about whether wheat growing and closer settlement in the northern Mallee had a future. In this way, the occurrence of wind erosion contributed to the abandonment of parts of the semi-arid regions.

Scenes similar to those in the Victorian Mallee took place in other parts of Australia's south-eastern wheat belt, and more and more settlers left these rural areas. The abandonment of the marginal wheat growing regions is intrinsically inscribed in the failure of soldier and civilian closer settlement schemes in Australia, and this story was taken up in the third chapter of the thesis. In several such regions, the state government recognised that wheat growing there was uneconomic, and the governments introduced schemes to help the settlers to leave their ruined farms. In the face of increasing wind erosion, the recognition of the economic problems of wheat growing was increasingly linked with an acknowledgement of the ecological problems. In Victoria, the first compensations were paid to British migrants that had been settled mostly in the Newer Mallee in the 1920s, followed by a more general scheme of reconstruction of the marginal areas from 1933 to 1937. The series of droughts that began in 1937 increased problems of drought and wind erosion in the semi-arid wheat belt to such an extent that the federal government came to the states help: In 1939, the Commonwealth established a scheme to reconstruct the wheat growing areas of the four main wheat growing states (SA, NSW, VIC and WA), and up to June 1947, it paid 2 million pounds for that purpose. Under the scheme, parts of the population were removed, and the remaining holdings were transformed into grazing areas. In Victoria, the scheme targeted 300 settlers, most of them in the northern Mallee. In South Australia, 600 settlers were involved, and in New South Wales, the scheme even planned the transfer of 1,300 to 1,500 settlers living in the marginal areas. The transfer of wheat growing areas to grazing propositions was not only a result of the economic situation, but was also linked to the recognition that ploughing techniques on the

sandy Mallee soils had increased wind erosion. Thus, the actual experience of wind erosion was an important factor in the emergence of changing attitudes of Australians towards their soil resources and their natural environment in general. This in turn promoted interest in scientific research and public demands for political solutions.

Scientific research developed important concepts which influenced how Australians understood wind erosion, as the second section of the thesis 'Understanding' shows. Research depended on a multitude of factors that were explicated in the fourth chapter of the thesis, namely the local scientific landscape in conjunction with the exchange of knowledge with the international scientific community. In the period under consideration, the scientific landscape in Australia experienced significant changes. The colonial structures continued to be important, above of all the important role of the states in scientific research. Another legacy of Australia's colonial past that continued to be powerful was the alignment of science to the needs of the export industry, namely in the domains of forestry, agriculture and engineering. Science in Australia was traditionally largely applied science, and this was still true in the period under consideration. Science in Australia was also largely concentrated in public agencies of the states: Since the last third of the 19th century, the colonial governments had established diverse departments to gather and diffuse information on how to best use their natural resources. Consequently, much of Australia's wind erosion research was undertaken by various state institutions, especially by Departments of Agriculture as in the case of Victoria; the newly founded Soil Conservation authorities, for example in New South Wales; or at university level, as in South Australia. But the interwar years and especially the period of the Second World War also saw fundamental changes within Australia's scientific community. The federal level became important in the scientific landscape with the establishment of the CSIR in 1926. Also, science became gradually less practical, as Australians scientists turned to new research fields that were not necessarily linked to the export industry. As Australian science became more autonomous, imperial structures weakened and new ties were knit: If research depended to a large degree on already existing structures, it also actively engendered new structures. The influences of international soil conservation research, particularly from the US and Canada, was above all important.

The 1930s and 1940s saw a proliferation of research into wind erosion in Australia and the emergence of the discipline of soil conservation, which was closely analyzed in the fifth chapter of the thesis. It was largely driven by interest that emerged out of the domestic experience with wind erosion on the wheat growing lands of the south-eastern wheat belt and the sand drift problems of the pastoral areas, but was embedded in the international scientific

community. As a matter of fact, original research in Australia was relatively restricted, and most endeavours in the period under consideration aimed at applying international research to the Australian conditions. The research covered all aspects relevant for the occurrence of wind erosion: the soil, the vegetative groundcover and the climatic aspects of wind and (lack of) rainfall. Even if all aspects were of interest to scientists, there were clear preferences in some fields, which were also linked to the historically grown structures of the Australian scientific landscape.

Soil science was largely centered at the CSIR and the Waite Agricultural Research Institute at Adelaide. When the wind erosion crisis occurred, Australian soil science had just come of age, and Australian soil scientists were still gathering basic information on the continent's soils. Soil science in Australia borrowed largely from the US systems of soil classification. The CSIR Division of Soils began with surveys and mapping of soil erosion in the 1940s, for which it adopted the system of the US Soil Conservation Service. Thus, the wind erosion research further promoted the orientation of Australian soil science towards the US. In regard to wind erosion, Australian scientists also resorted largely to British and Canadian research on the phenomenon, for example studies by British Ralph A. Bagnold and Canadian William S. Chepil.

Most Australian wind erosion research focused on the studies of the vegetative cover, as it was there where the anthropogenic factor came into play, and where immediate solutions were hoped to be found. As a result of the public debate on the menace of wind erosion, the 1930s saw an increase in ecological research in the arid pastoral regions of South Australia and New South Wales. The first ecological studies into the sand drift problems of these regions had been undertaken around the turn of the century by government botanists and foresters, who had already pointed to the removal of the native vegetative cover as the major reason for movements of soil particles by wind. More extensive studies in the tradition of Clements theory of plant succession were undertaken starting in the mid-1920s in New South Wales, and especially in South Australia, where a 'school of ecology' was established at the University of Adelaide by Professor for Botany Osborn. From the mid-1920s, sand drift was closely linked with the disappearance of the natural vegetation of perennial shrubs, and experiments into plant succession were started to analyze the natural regeneration. Consequently, important data was already available when wind erosion became acute in the 1930s, and experts like Francis Ratcliffe looked for causes and remedies for the sand drift affecting South Australia's grazing regions. More ecological investigations followed in the wake of the erosion crisis, for example in the NSW Western Division by Noel Beadle of the

Soil Conservation Service. In regard to wind erosion on cultivated lands, scientific effort was largely directed to applied research that focused on drawing methods from the soil conservation arsenal of other countries and applying them to the Australian conditions. Pasture plants experiments were run within the diverse state departments of agriculture, and ryecorn, Lucerne and clover proved to be suitable cover crops. In order to increase the threshold velocity of the soil surface, the Canadian technique of stubble mulching was adopted. Finding adequate ploughing implements that allowed farmers to plough the soil with the crop residues left on the soil was, however, problematic, and the specific implements developed in North America were largely unsuited. Problems of adaptation were also posed by the soil conservation method of strip cropping, which was not applicable on the predominantly mixed-farms of Australia. Thus, multiple processes of adaptation were necessary. In regard to the use of windbreaks, most Australian conservation experts remained skeptical about the appropriate working of large shelter belts, and no large government funded scheme was initiated. However, there was one important tree planting scheme against wind erosion, which was initiated by an amateur botanist in cooperation with a mining company at Broken Hill, and which shows clear signs of influences stemming from by the US shelter belt programme.

Even though the climatic factors such as drought and wind were acknowledged as significant, there was only limited research into these aspects. The meteorological approach to wind erosion was in large parts limited to systematic observations of dust events. This lack of research was a result of the general weak position of meteorology in Australia, which centered on the needs of aviation. Consequently, the first extensive meteorologist study of Australian dust storms, by Fritz Loewe, emerged out of concerns about dust storms interrupting air traffic. The most sensational idea in regard to combating the Australian wind erosion problem was the plan to alter its climate through large schemes of irrigation and thus attack what some Australians considered as the major root of the problem: the arid climate. Once more, US influences were marked in these ideas of ‘watering Australia’s inland’. The schemes were extremely popular and found many supporters, so meteorologists were struggling to assert their professional opinion that such schemes were not based on scientific facts. All in all, scientific research in Australia during this time drew substantially from soil conservation developments in North America, and thus contributed to a reorientation of the scientific landscape. Even though Australian contributions were not significant on the international level, the period brought about significant findings in regard to Australia’s climate and ecosystem. Moreover, the knowledge production on erosion, even though not always original,

diffused widely outside the circle of scientists and helped to popularise ecological thoughts within the wider society.

Starting from the assumption that cultural concepts are important historical determinants, the third section of the thesis 'Conceptualising' analyzes in depth some important cultural concepts on wind erosion that Australians adopted in the wake of the erosion crisis. The analysis of public communication about wind erosion revealed that there were essentially two relevant ways that Australians conceptualised the erosion disaster: the first was that of wind erosion as a national menace; the second was an interpretation of wind erosion in ecological terms, here called the 'ecological vision'. The public communication on wind erosion was the point of departure of the thesis, namely the observation that wind erosion was elevated to a central topic by Australian media in the 1930s and the first half of the 1940s. As the sixth chapter of the thesis shows, this communication was characterised by a high sense of urgency and emotions, and cast in drastic words that compared wind erosion to a bitter enemy or to a life-threatening illness. Strong images of rolling dust storms and exposed mallee roots accompanied the heated discussion. The analysis of the public debate illustrates that in contrarst to earlier periods of highlighted concern about wind erosion or spreading deserts, the public discourse starting in the 1930s had a fundamentally new ring: wind erosion appeared as a menace not merely to some regions or social groups like farmers or pastoralists, but was conceived as a menace to the Australian nation as a whole. The understanding of soil erosion as a multi-level threat to the nation was historically contingent. While it was embedded in international fears of encroaching deserts, fueled by news of the US Dust Bowl, it was also anchored in the domestic experience of wind erosion as well as in the specific Australian historical situation, and was thus distinctively Australian.

As a matter of fact, wind erosion targeted the Australian nation on several levels, and thus linked a series of different anxieties. The first was the menace to Australia's economy, which seemed to be 'doomed by dust'. As wind erosion reduced the soils productivity and sand drift increased farming costs, wind erosion was a serious problem for an Australian economy that relied heavily on export of primary produce. Moreover, as wind erosion contributed to the abandonment of the rural areas, as for example in the Mallee, it seriously questioned long-standing ideas of the continent's vast potential. Additionally, the rural exodus caused great anxiety, since a high rural population was considered to be a recipe for a high birthrate. Thus, wind erosion seriously shocked the many Australians who were obsessed about attaining a high population of the continent. The obsession with a high population was closely linked with fear of an alien invasion, namely from Asia (that had been galvanised

during the First World War) and often fused with racial concerns about maintaining 'White Australia'. Moreover, fears of underpopulation were further sustained by international debates on Australia's large land reserves, which were characterised as a possible vent for overpopulated countries. Also, Australia's self-image was, despite its high urbanization, largely centered on rural life, and the yeoman was considered to be the backbone of the nation: virile, healthy, and morally superior to city people, it was he who represented the true Australian spirit. As drought, depression and dust brought more and more farmers to their knees, and dust storms made rural life not only unpleasant but even health wise dangerous, wind erosion threatened cherished Australian ideals. Thus, wind erosion generated a whole net of interwoven anxieties, which explains its vigour. The method of starting from the historical perspective and supplementing it by the analytical perspective of the historian has been productive. It has shown that several factors combined to elevate the phenomenon of wind erosion to the status of a national menace: In addition to the concrete negative effects of wind erosion on the lives of the people and the infrastructure of the adversely affected regions, intellectual concepts played an important role, too. The thesis has shown that a whole set of anxieties came together to spin the net about the environmental anxiety concerning wind erosion.

In the wake of the erosion crisis, Australians adopted an ecological vision of wind erosion, as the seventh chapter of the thesis has illustrated. This 'ecological vision' explained wind erosion as the result of the white settlers' disturbance of nature's balance and thus attributed most of the responsibility for its occurrence to humans. Scientific ecological concepts as described in the second section of the thesis played a crucial part in this process, but day-to-day experiences with wind erosion were equally important. As has been illustrated, the ecological vision spread throughout various domains of Australian society. Soil conservation experts like Sam Clayton or Bob Herriot adopted and diffused the ecological vision, just as South Australian pastoralists Dewar Goode or Jock Pick, whose ecological understanding of wind erosion stemmed from scientific ecological readings as well as from their own observation and experience on the land. Most interestingly, Australian art and literature adopted an ecological vision in the wake of the erosion disaster. Popular writers like Ion L. Idriess and William Hatfield were among the most influential in reaching a large public with their ecological messages. Among the ecological writers who elevated erosion to a literary topic were some of Australians most renowned literates of the time, such as Judith Wright, Eleanor Dark, Stella Miles Franklin, or Xavier Herbert. The poetry club of the Jindyworobak, even though rather marginal within the literary scene, produced a large corpus

of soil erosion poems. The erosion crisis also left its mark on Australia's fine arts. A journey through the wind eroded landscape of western New South Wales inspired Russell Drysdale to create a series of deeply ecological erosion sketches and paintings, which revolutionised Australian art, as they were a 'complete break' with the tradition of naturalistic landscape paintings by the Heidelberg school.

This spread of the ecological vision in the context of the erosion crisis and its far-reaching consequences have so far been largely neglected by environmental historians. The ecological vision represented an essential break with the earlier vision that had considered the Australian natural environment predominantly in terms of conquest. The ecological concept acknowledged the destructive forces of humans on nature and proclaimed a moral responsibility to protect nature. Furthermore, the erosion crisis illustrated the interdependence between humans and their environment: humans were not distinct from nature and able to interfere with it as they wished, but were fundamentally dependent of it. The rolling dust storms clearly illustrated that nature had not been conquered and was ready to fight back if abused. As the ecological vision proclaimed a moral component, it was an important step in the emergence of a new environmental ethic that has to be considered as a crucial intellectual step in the evolution of modern Australian environmentalism.

The eighth chapter of the thesis depicted how the ecological vision brought a series of changes to a range of other related cultural concepts Australians that had held for several decades. The fact that the 'ecological vision' thus unsettled long-standing certitudes explains why it met strong resistance in some parts of the society. A major change was the reassessment of the pioneer, Australia's long cherished idol. As the pioneers most important merit – clearing and tilling the land – was increasingly considered as a major cause for wind erosion, the figure of the pioneer was more and more seen in a critical light. Linked with the reassessment of the pioneering merits was a new vision of the indigenous population. Their nomadic lifestyle as hunter and gatherer, which had been one of the main arguments for their dispossession in the colonial period, was now seen in more positive terms and appeared as being more appropriate to the continent's natural environment. Consequently, the Aborigines were painted as 'ecological noble savages' that allegedly had lived in great harmony with their environment. As illustrated, the historicisation of this concept is of utmost importance, as it goes right into the heart of present disputes about Australians self-image. The ecological vision also brought a new understanding about land as a resource: more and more expert voices rose to highlight the fact that Australia's potential capacities in regard to future settlement and primary production had to be reassessed and that the agricultural and pastoral

expansion towards the interior had reached a limit. These mental changes probably contributed to a re-imagining of Australia in terms other than that of a rural society. Since the wind erosion crisis linked concern about the nation with the ecological vision, the period has to be considered a major phase of Australian eco-nationalism. Such an eco-nationalist stance was especially pronounced for a range of Australian writers – most notably the Jindyworobaks and Elyne Mitchell – who considered Australia's soil as the basis for Australia's culture and nationhood. As they were influenced by far-right or fascist German or British 'soil and blood' ideology, this poses questions about far-right eco-nationalism in Australia, questions that should be followed up by future studies.

The fourth and last section of the thesis analyses Australians' political responses to the soil erosion crisis of the 1930s and first half of the 1940s. The eighth chapter described how the domestic experiences with wind erosion, the perception of soil erosion as a multi-level threat to the nation and the ecological vision were all crucial prerequisites for the establishment of soil conservation legislation in Australia. At time of Federation, the states had retained public authority concerning land, so political action against soil erosion was in large parts done on the state level. The soil conservation policies of the three south-eastern states were, consequently, the focus of the ninth chapter of the thesis. The local experience with wind erosion in the different states was an important factor influencing the process of legislation, as the first initiatives to investigate the problem and establish legislation all stemmed from local concerns. International influences also played a role, as Australians closely looked at other countries in a similar position, especially the US, in their search for political solutions. As was shown, cultural concepts on wind erosion were important movers of political action, as the concept of wind erosion as a menace and the ecological vision of the erosion phenomenon implied human responsibility and therefore the need to take action to change human behavior. In this way, cultural concepts were a crucial prerequisite for the adoption of such legislation.

The first state to establish soil conservation legislation was New South Wales in 1938, followed by South Australia in 1939 and Victoria in 1940. Not only was there a certain unanimity in all of the states about the necessity to act through legislation, but there was also a high agreement throughout the party benches within each of the states, so legislation passed without significant opposition. Next to these similarities, there were also marked varieties in the shape of the soil conservation laws adopted, which were partly due to differences in regard to their respective land sizes, populations, systems of land tenure and settlement, actual wind erosion problems, and the local politics of the day. New South Wales was not only the

first state to pass legislation, it was also the most vigorous, as it established an autonomous Soil Conservation Service that was well-funded and assumed a large range of tasks, from original research to field operations, information and education. The case study of NSW has also revealed the significance of the individual person for actual political processes: in this case, Samuel Clayton and Roy Vincent can take much credit for the establishment of legislation, which was partly based on the US model.

The soil conservation body established through legislation in South Australia was relatively weak, as the Advisory committee on Soil Conservation, put under the Department of Agriculture, had no executive powers and suffered from financial and personnel restrictions during the wartime. It focused largely on education and practical fieldwork, but did no original research. Following the principle of education, South Australia focused on the involvement of the rural community and established soil conservation districts after the model of the US. It was, however, only after the war that South Australian soil conservation endeavours expanded significantly.

Victoria was analysed more closely, in regard to the focus on the Victorian Mallee put forward in the first section of the thesis. Despite early proposals for soil conservation legislation in the early 1930s that resulted from concerns about the sand drift problem in the Mallee, Victoria's Premier Albert Dunstan, of the Country Party, fended off initiatives to establish legislation. It needed a large amount of public and political pressure to finally introduce soil conservation legislation in 1940. As was illustrated, parts of Dunstan's opposing attitude was not so much the stubbornness of an outdated politician, but probably a reaction to the opposition of parts of the rural population that felt attacked by the 'ecological vision'. The established Soil Conservation Board was an autonomous body, but it was struggling with financial and personnel constraints, and only developed more extensively after the Second World War.

All of the states emphasised education, even if their legislation contained more or less potent ways of compulsion. This was certainly linked to the fact that in all of the south-eastern states, rural interests, who were in the majority opposed to strict compulsion, were largely represented in the governments. But it was also due to the widespread belief that spread of knowledge and education were privileged ways of changing human behavior. The emphasis on voluntary cooperation has more recently engendered criticism, particularly from John Bradsen, expert on Australian soil conservation law. It is true that the actual outcome of the soil conservation policies fell short of the expectations put forth at time of their inception. However, the priority given to education and volunteering most likely played a central role for

the diffusion of an ecological understanding of soil erosion and consequently of ecological vision in general, which contributed to the emergence of a new environmental ethic.

The Commonwealth, whose role was examined in the tenth chapter of the thesis, played only a secondary role in regard to political reactions to soil erosion. It was effective on three different levels. First of all, in analogy to the states, the Commonwealth became directly involved in soil conservation legislation of those territories under its own jurisdiction, namely the Northern Territories and the Australian Capital Territory. In this regard, the Commonwealth showed much less initiative than the states, and significant efforts for soil conservation legislation were delayed until well into the 1960s. Secondly, and most interestingly, the Commonwealth appeared on the political scene in its function as a federal authority. Since the mid-1930s, many Australians were arguing for federal involvement in soil conservation to fight off the 'national menace' of soil erosion. Many of those who demanded a stronger federal commitment referred to the US, where the federal government had taken a significant role in soil conservation during the 1930s. The first serious consideration of taking a federal approach to the erosion problem, namely the establishment of a national soil erosion bureau, was initiated at a Conference of Commonwealth and state ministers in August 1936 in Adelaide. However, the Conference assigned the authority in the matter to the states, a clear recognition of state authority which continued in the years to come. The Australian Natives Association was one of the most fervent promoters of the national idea; even if its efforts failed, it brought about heightened public attention to the question of a national approach. Curtin spoke in favour of a stronger federal role in soil conservation during the 1937 election campaign, and later, as Australian Prime Minister from 1941 onwards, he continued in a similar way, without any appreciable effects, however. During the drought and dust storm summer of 1944/1945, public voices who called for a federal approach became more and more audible. Several federal and state parliamentarians publicly spoke up for the need of a national approach to tackle the problem of the national menace of soil erosion. As a result of the mounting political pressure, the Agricultural Council discussed the matter in March 1945. Once more, the main responsibility in soil conservation was attributed to the states, but the Council suggested that the Commonwealth should have a role in co-ordination and cooperation, as well as in assisting the states in providing trained staff and undertaking research. After some delay, the states agreed to the recommendations at the Premiers' Conference on 24 January, 1946. In order to fulfill the assigned function, a federal Standing Committee on Soil Conservation was established as the main co-coordinator of soil conservation efforts in Australia in the decades to come.

Even though attempts at a direct federal involvement in soil conservation policies thus largely failed in the period under consideration, the Commonwealth influenced the soil conservation agenda of the day in an indirect way, namely through issuing guidelines for post-war planning of the rural sector. The rural sector was in a serious structural crisis in the 1930s and first half of the 1940s, and the Second World War brought a series of additional troubles for agricultural producers. Faced with the desolate situation of the rural sector, the Commonwealth decided in May 1942 to take action and to plan for Australia's post-war rural reconstruction. For this purpose, it established the Rural Reconstruction Commission, which issued a series of ten reports with recommendations for future policies. The reports furnished a set of guidelines for the future of Australia's rural industry that, even though they were not always immediately put into government policies, were important pools of information and contained general principles that most likely did indirectly influence ways of thinking. Past experience regarding soil erosion and ecological understanding are reflected in the reports, especially in those passages that speak about future land use and land settlement planning. As we have seen in the third part of the thesis, the ecological vision brought a new understanding of land as a resource. This is clearly reflected in the fact that the prime objective for rural reconstruction was neither to increase rural population nor even to expand primary production, but to develop an efficient and sound land use that included soil conservation. In regard to future settlement projects, the RRC and emphasised the need to consider the natural environment as an important factor for the planning of future agricultural settlement. It elevated the concept of a sustainable handling of the soils as a guideline for future settlement policies. The Commission also took a position in the much debated question of which land tenure system should be adopted in the future. It spoke in favour of a freehold system, arguing that security of tenure would automatically induce the landowner to maintain his land and therefore would naturally lead to a soil conservationist attitude.

The RRC reports had the most direct impact on the post-war soldier settlement, as the Commission's second report provided the basis for the post-war scheme under which just over 12,000 veterans were settled on the land. The failures of the soldier settlement schemes after the First World War were exhaustively analyzed and were the basis for future recommendations. Again, the past experience with wind erosion directly influenced the new concepts of soldier settlement schemes, as the report highlighted that the main criterion for the number of settlers that were to be put on the land should not be the number of applicants, but the availability of suitable land. Analyzing past experiences, especially of the settlement of soldiers in the marginal areas after the First World War, the RRC concluded that future

schemes for developing Crown lands for farming settlement should be located in the better rainfall coastal areas of equable climate, that the farms should be designed to suit the soils, and that scientific soil surveys were a prerequisite for any settlement. Consequently, soldier settlement after the Second World War focused on land with reliable rainfall or on irrigation farms.

The third level on which the Commonwealth became active in regard to soil conservation policies was the international level. The international alarm at soil erosion in the 1930s had put the topic on the agenda of the League of Nations. The topic of soil conservation was also part of the Hot Springs Conference in February 1943 that dealt with food and agriculture and established the UN Food and Agriculture Organization (FAO). The Conference recommended that every nation should invest in soil erosion surveys and research as well as adopt a soil conservation policy. With the United Nations Food and Agriculture Organization Act, assented to on 7th December, 1944, the Australian federal parliament approved the acceptance of the Constitution of the FAO of the UN.

The basic approach of analyzing the material side as well as the intellectual side of the wind erosion phenomenon – and interconnecting the two perspectives – has been productive. Only by using this approach has it been possible to more clearly see how the historical occurrence of wind erosion in south-east Australia and the contemporary scientific and cultural concepts all interrelated with each other in a way that was crucial for how Australians responded to the crisis. Especially the thorough analysis of the cultural concepts has revealed the importance of the period for the evolution of environmental thought in Australia: In the context of the erosion crisis, an ecological vision on the phenomenon of erosion shaped ecological understanding of the relationship between humans and their natural environment, and this spread to large parts of the Australian society. Thus, we can say that the environmental crisis of wind erosion in Australia during the 1930s and first half of the 1940s was an important step in the evolution of Australian ecological thought and should have an important part in every history of Australian environmentalism.

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The newspaper titles that have been accessed for the thesis for the period under consideration (circa 1930-1946) and have been online as part of the ANDP on the 30 March 2016 have been marked with a *:

**The (Adelaide) Advertiser*

**The (Melbourne) Age*

**The (Melbourne) Argus*

**The Australasian*

**The Australian Women's Weekly*

**Barrier Daily Truth (Broken Hill)*

**Barrier Miner (Broken Hill)*

Birchip Advertiser

**Cairns Post*

**The Canberra Times*

**The Central Queensland Herald*

**(Adelaide) Chronicle*

The Countryman

**The Courier-Mail (Brisbane)*

**The Farmer&Settler*

Hamilton Spectator

The (Melbourne) Herald

**The Horsham Times*

**The Independent (Deniliquin, NSW)*

Kerang New Times

**The Land (Sydney)*

**The (Adelaide) Mail*

**Northern Times (WA)*

Ouyen Mail

Ouyen North West Express

**Pinnaroo & Border Times*

Pix

Pyramid Hill Advertiser

Rural Life (Organ of the National Catholic Rural Movement)

**Queensland Country Life*

Quorn Mercury

**The (Sydney)Sun*

Sun News Pictorial

**Shepparton Advertiser*

Sunraysia Daily

Swan Hill Guardian

**Sydney Morning Herald*

**The Weekly Times (Melbourne)*

**The West Australian*

**Western Mail(Perth)*

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