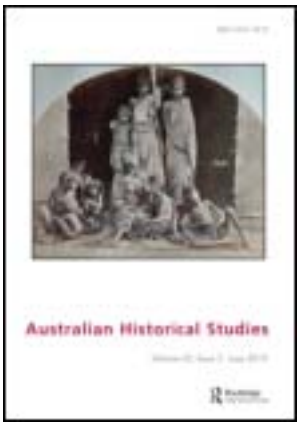

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Histories for Changing Times: Entering the Anthropocene?

Professor Libby Robin [a]

[a] Australian National University and National Museum of Australia

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Histories for Changing Times: Entering the Anthropocene?

LIBBY ROBIN

In 2000, Paul Crutzen proposed that the Earth had entered a new geological epoch, the Anthropocene, where humanity is changing planetary systems. Since this time, the Anthropocene has figured prominently (and controversially) in global change science, and increasingly in the humanities. The Anthropocene offers a new way to regard humanity, and provides a locus for a new planetary discourse of our times. This short reflective paper suggests a role for history in understanding the different expertise favoured to manage Earth's resources and global change. The discussion focuses on an anthology of historical documents about global change science, The Future of Nature, *using this as a 'worked example' of history in action.*

The Anthropocene idea

HISTORIANS ARE NOT ALONE in studying the past. As time-scales get longer and documents give way to different kinds of archives, scientific enquiry takes over the study of the past, and *histories* are written by scientists. If we consider the Earth's history over four and a half billion years, geological methods better describe time periods and change than the standard tools of the historian. The developing idea of the Anthropocene, a concept that considers the role of humanity as a historical force for change in planetary systems, demands both geological and historical time-scales, and writes planetary and human histories together.

In the 1980s, atmospheric chemists, Earth system scientists and meteorologists joined forces to express concern about global warming and 'unpleasant surprises in the Greenhouse'.[1] After over two centuries of industrial development, they were detecting measurable traces of carbon dioxide (CO_2) in the atmosphere. They noted that the planet's climate systems were changing quickly and unpredictably. The Earth's surface was being warmed by a 'greenhouse effect', created by the changed composition of the atmosphere.[2] The World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) to review all aspects of climate change and its impacts, with a view to formulating realistic international response strategies to this global concern. The IPCC was formed after the hot northern summer of 1988, sometimes called the 'greenhouse summer'.[3] Its first report was published in 1990. The IPCC does not undertake scientific work itself but rather reports a consensus position and

[1] Wallace S. Broecker, 'Unpleasant Surprises in the Greenhouse', *Nature*, no. 328 (1987): 123–6.
[2] 'Greenhouse effect' is the term used in the media of the 1980s. See Broecker.
[3] Mike Hulme, *Exploring Climate through Science and in Society* (London: Routledge, 2013). This term was used extensively in media in the northern hemisphere in the late 1980s.

recommendations for intergovernmental decision-making based on the published science on global climate change. This science is assembled by co-ordinating scientific groups such as the International Geosphere-Biosphere Programme (IGBP).

In 2000, Paul Crutzen, a Nobel prize-winning atmospheric chemist who was part of the IGBP team, declared that, on the basis of the published science he was reviewing, planet Earth had entered a new geological epoch, the Anthropocene, an epoch in which the actions of human beings affected the functioning of Earth's physical systems.[4] Increased CO_2 and other greenhouse gases (especially methane, CH_4) were warming the planet. Climate was changing, and the effects of anthropogenic climate change were widespread.

This was a bold statement on many levels. Geological epochs are the business of the International Commission on Stratigraphy, and are based on the composition and relative positions of rock layers at the Earth's surface, not changes in the atmosphere. Experts on the subject are usually stratigraphers, not chemists. Most epochs are determined by layers laid down in rock formations long in the past. How far into the future are these anthropogenic changes projected to hold? Will the Anthropocene last for an 'epoch' or even longer? Perhaps it should be described as an 'era'? Such questions remain to be answered. The Anthropocene is still strictly hypothetical, but it is gaining support within and beyond the geological community.[5]

Geological time is divided into slices according to the ages of rocks. Divisions between rock strata, evidenced by identifiable features in the rocks, mark the borders between time slices. Big slices are called 'eons'. Eons are typically subdivided into 'eras' and each of these comprises two or more 'periods', and these periods divide into 'epochs'. It is a very different way of imagining history, although the language is deceptively similar. Eons are very long times and the words *era*, *period* and *epoch* refer to the passage of time, but in ordinary English they are loosely interchangeable. By contrast, in geology they have a hierarchy, and are nested in strictly this order. In the Anthropocene present, where the focus is on carbon found in the atmosphere, it is interesting that the earliest named geological period was the '*Carboniferous*', described in Britain in 1822.[6] The slicing of geological time began with the Carboniferous, named after rock formations bearing coal beds (now dated to between 300 and 360 million years ago). Understanding the signals of coal-bearing in rock strata was urgent,

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[4] P. J. Crutzen, 'Geology of Mankind', *Nature*, no. 415 (2002): 23; P. J. Crutzen and E. F. Stoermer, 'The "Anthropocene"', *IGBP Newsletter*, no. 41 (2000): 17–18.

[5] Jan Zalasiewicz *et al.*, 'Are We Now Living in the Anthropocene?' *GSA Today (Journal of the Geological Society of America)* 18, no. 2 (February 2008), 4–8; Jan Zalasiewicz, Mark Williams, Alan Haywood and Michael Ellis, 'The Anthropocene: A New Era of Geological Time?', *Philosophical Transactions of the Royal Society A*, 369, no. 1938 (2011): 835–41; Jan Zalasiewicz, 'The Geological Basis for the Anthropocene' (paper presented at 'The History and Politics of the Anthropocene', conference at University of Chicago, 17–18 May 2013, convened by Dipesh Chakrabarty and Fredrik Albritton Jonsson).

[6] W. D. Conybeare and William Phillips, *Outlines of the Geology of England and Wales, Part I* (London: William Phillips, 1822), 323.

practical and important. Explorers and empire builders had been looking out for coal beds all over the world, as coal fuelled growing industries and naval ships. These careful observations became the first step towards a new scientific system, '*stratigraphy*', which dates rock strata across the whole planet.

When did the Anthropocene begin?

The first theory was that the Anthropocene began with the industrial revolution, in the period between 1750 and 1800. Crutzen and Stoermer in their foundational paper nominated James Watt's steam engine (1784) as an arbitrary starting date based on the data showing that 'during the past two centuries, the global effects of human activities have become clearly noticeable'. They noted that glacial ice cores showed 'the beginning of a growth in the atmospheric concentrations of several "greenhouse gases," in particular CO_2 and CH_4'. 'Biotic assemblages in most lakes' also began to show marked changes at this time.[7]

The onset of the Anthropocene has been widely discussed in the decade and a half since the term was coined. One reason that the Anthropocene is controversial is that it spans the past and future. By contrast, the most recent approved geological epoch, the Holocene, began 11,700 years ago at the end of the Pleistocene (the last Ice Age) and is defined as the recent warm period continuing *to the present*. The Holocene makes no claims on the future. The future dimensions of the Anthropocene create new tensions between the precision of the scientific measuring of empirical rocks, ice cores and lake matter, and the uncertainties of predictive modelling. Crutzen and Stoermer justified calling for a new epoch on the basis of future impacts: 'current human activities will continue over long periods . . . [B]ecause of the anthropogenic emissions of CO_2, climate may depart significantly from natural behaviour over the next 50,000 years.'[8]

Arguments about when it all began reflect the varying time-frames of different disciplines. Some scientists argue that the whole of the Holocene is the Anthropocene. The Holocene is often described as the epoch of 'human civilisation' as it spans the time of written history and the transition to urban living. The 'Holocene is the Anthropocene' advocates make their case on the basis of anthropogenic Pleistocene extinctions.[9] When hunters caused extinctions at the end of the Pleistocene, they certainly exercised changes in local ecological systems, but these effects were not global.

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[7] Crutzen and Stoermer, 17.
[8] Ibid.
[9] One example is the work of Erle Ellis; see E. C. Ellis and N. Ramankutty, 'Putting People in the Map: Anthropogenic Biomes of the World', *Frontiers in Ecology and the Environment* 6, no. 8 (2008), 439–47; Jed O. Kaplan, Kristen M. Krumhardt, E. C. Ellis, William F. Ruddiman, Carsten Lemmen and Kees Klein Goldewijk, 'Holocene Carbon Emissions as a Result of Anthropogenic Land Cover Change', *The Holocene* 21, no. 5 (2011): 775–91.

Climate scientist William Ruddiman has argued that the Anthropocene is an epoch that coincides with land-clearing and the agricultural revolution, between 5,000 and 8,000 years ago.[10] Land-clearing for agriculture certainly affected greater areas, but this was not a global effect, either spatially or temporally (suddenly at any particular date). While the particular model of agriculture that began in the Fertile Crescent has undoubtedly been widely influential, agriculture happened in different ways in different places, and the land-clearing it fostered spans many centuries, including the present century.

Anthropocene origin stories follow the deep wheel ruts of northern hemisphere history. They fix attention on key Old World nodes, the hunting of the Pleistocene extinctions, the agricultural revolutions (first wheat, then rice), and the industrial revolution. Yet the central idea of the Anthropocene is that people have made *global* changes, changes at global scales, and to systems with a global reach. Human history has, however, unfolded in different ways and at different times in southern Africa and in Australia from the places that inform so-called 'universal' human histories. People changed landscapes, habitats and ecological relations on large scales much more than 10,000 years ago in both Australia and southern Africa.

Australia became a place of 'Gum Boughs and Wattle Bloom', before it was a place of people.[11] Technically, the continent shifted from a dominance of rainforest species to 'sclerophylly' in response to climate change, with cool phases resulting in drying-out that favoured fire-adapted species like the Eucalypts. The changing composition of the interior desert species, shrublands and grasslands also reflected continental drying-out, some of it related to natural burns from lightning strikes, and later reflecting the new fire regimes that arrived with people.

Australia's biogeographical isolation made its ecological history very different. In Africa, prey animals co-evolved alongside hominids over periods up to 2.5 million years (the range of the genus *Homo*) or even longer (up to 4.5 million years) if the time-span of Australopithecenes (creatures intermediate between hominids and apes) is included. Anatomically-modern humans, *Homo sapiens*, appeared relatively late in evolutionary time, about 170,000–200,000 years ago in the rift valleys. By contrast, the biota of the Australian continent evolved entirely independently of hominids or primates until about 55,000 years ago. Such continental isolation gave its endemic animals no evolutionary exposure to hominid predators.[12] When the Australian megafauna encountered hominids, they met anatomically-modern humans with sophisticated technologies, including fire. The megafauna already lived in fire-prone habitats, but their food options changed in response to anthropogenic fire regimes. Animals such as Genyornis, a huge flightless bird, ran out of their

[10] William F. Ruddiman, 'The Anthropogenic Greenhouse Era Began Thousands of Years Ago', *Climatic Change* 61, no. 3 (December 2003): 261–93.
[11] Donald Macdonald, *Gum Boughs and Wattle Bloom, Gathered on Australian Hills and Plains* (London: Cassell, 1887).
[12] Tim Flannery, *Here on Earth* (Melbourne: Text Publishing, 2010).

preferred food.[13] Whether the megafauna in Australia were hunted to extinction, or forced to extinction because of changing habitats, their demise around 46,000 years ago was a story with anthropogenic dimensions long before the Pleistocene extinctions of Europe or North America.[14]

People made abrupt changes, widely affecting Australian animals and environments. The second wave of humans, the British settlers of 1788, brought European-style agriculture and the machinery of an industrial era. In Australia, there was no long rural pastoral tradition as there was in Europe. Effectively, its agricultural and industrial revolutions arrived simultaneously. In the words of George Seddon, the Australian continent 'had a radically new technology imposed upon it, suddenly, twice'.[15] The Australian story sits awkwardly with the global, and its human history is difficult to align with histories told in stratigraphic layers.

Global histories founded in rock

The concept of a geological epoch focuses the story on rocks, and on time-spans reflected by their strata. Rock patterns reflect local events, and only with corroborative evidence can they be used for global stratospheric dating. The initiative for the Anthropocene comes from the unbounded global circulation of what are sometimes called the 'twin oceanic systems', the sea and the atmosphere.[16] While stratigraphers will continue to look for evidence of boundaries or changes in rock strata, the case for a global effect is increasingly being demonstrated through many different variables, including the dynamic ocean and atmospheric systems.

The question of appropriate time-scales is part of the Anthropocene debate. One of the persuasive arguments made by William Ruddiman is that the way global change happens is like the hare and the tortoise—where although the hare could run much faster, the slow crawl of the tortoise won the race because of its much earlier start. So the tortoise in this analogy was agricultural changes from 8,000 years ago when the forests of China, India and Europe were being cut for croplands and pastures, which led to increasing CO_2 in the atmosphere, and methane concentrations began to increase from 5,000 years ago with the cultivation of rice and the herding of livestock.[17] Ruddiman's argument is about past changes with increasing present effects.

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[13] M. A. Smith, *The Archaeology of Australia's Deserts* (New York: Cambridge University Press, 2013).
[14] Tim Flannery, *The Future Eaters: An Ecological History of the Australasian Lands and People* (Melbourne: Reed Books, 1994).
[15] George Seddon, 'The Man-Modified Environment', in *A Nation Apart: Essays in Honour of Andrew Fabinyi*, ed. John McLaren (Melbourne: Longman Cheshire, 1983), 10.
[16] W. Steffen, A. Sanderson, P. D. Tyson, J. Jäger, P. A. Matson, B. Moore III, F. Oldfield, K. Richardson, H. J. Schellnhuber, B. L. Turner and R. J. Wasson, 'Executive Summary' of *Global Change and the Earth System: A Planet Under Pressure* (Berlin: Springer-Verlag, 2004), 4–39. Will Steffen, Keynote address, The Anthropocene Project, HKW, Berlin, 10 January 2013.
[17] William F. Ruddiman, *Plows, Plagues and Petroleum* (Princeton: Princeton University Press, 2005), 5.

The rapidity of present effects lends weight to future models of the Anthropocene. It is an epoch that is not so much back-dated as forecast. In the twenty-five years since the IPCC was established, consensus about dangerous anthropogenic climate change has gathered certainty. In 1988 there was a 'deep concern' that the actions of humans were changing the composition of the atmosphere. The IPCC's first report of 1990 noted that *if* such changes were happening, it could result in 'several degrees' of warming by the mid-2000s.[18] By 2001, when the IPCC published its third report, the possibility had become a strong probability, and the rate of change was 'without precedent for at least the last 10,000 years'.[19] The 'several degrees' had become a precise band—between 1.4 and 5.8 degrees Celsius. This band of possible future warming became the basis for a mechanism to implement the Kyoto protocol, signed by 178 governments (but not Australia or the United States) in Bonn in 2001.

In 2003, the language changed again. Climate change became a 'security threat', in a report to the Pentagon.[20] By 2007, the fourth (and most recent) report of the IPCC reported that anthropogenic harm was 'already evident'.[21] As statements about anthropogenic global warming have become more certain and situated in the present and immediate future, evaluations have broadened from biophysical indicators to those that span both environment and society. Global warming (or climate change) has become a broader concern about global change, which takes in such social indicators as population, wealth and globalisation itself.[22]

The cross-disciplinary consensus demanded by the procedures of the IPCC has created a new focus, not so much on when the Anthropocene began, as on the Great Acceleration of changes of all sorts since the mid-twentieth century. Many scholars, including John McNeill, the most prominent historian in the global change group, agree that the Anthropocene was 'clearly underway' by around 1950, because of a suite of widely different global factors that all began trending the same way from this time.[23] Hockey-stick curves indicate accelerating global anthropogenic change, not just in CO_2 and methane, but in such social factors as urbanisation and in ecological factors such as species extinctions. Chicago anthropologist Joseph Masco takes a different approach, but focuses on

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[18] J. T. Houghton, G. J. Jenkins, and J. J. Ephraums, eds, *Climate Change: The IPCC Scientific Assessment* (Cambridge: Cambridge University Press, 1990).

[19] Robert T. Watson and the Core Writing Team, eds, *Climate Change 2001: Synthesis Report* (Geneva: WMO; UNEP, 2001; Beijing: IPCC, 2001).

[20] Spencer Weart, 'The Development of the Concept of Dangerous Anthropogenic Climate Change', in *The Oxford Handbook of Climate Change and Society*, eds John S. Dryzek, Richard B. Norgaard and John Schlosberg (Oxford: Oxford University Press, 2011), 67–81.

[21] The fifth report of the IPCC is due in 2014.

[22] W. Steffen, A. Sanderson, P. D. Tyson, J. Jäger, P. Matson, B. Moore III, F. Oldfield, K. Richardson, H. J. Schellnhuber, B. L. Turner II and R. J. Wasson, *Global Change and the Earth System: A Planet under Pressure*, IGBP Book Series (Berlin and New York: Springer-Verlag, 2004).

[23] Will Steffen, Jacques Grinevald, Paul Crutzen and John McNeill, 'The Anthropocene: Conceptual and Historical Perspectives', *Philosophical Transactions of the Royal Society A*, 369, no. 1938 (March 2011): 842–67.

the same date. He argues that the new factor can be traced to 1945, when nuclear fallout is evident for the first time in the strata of the Earth, and that its evidence will persist for thousands of years in the future.[24]

How can the practice of history contribute to Anthropocene debates?

Precise history helps to provide a context for responding to the planetary crisis of our times, but Anthropocene futures are a challenge to an evidential craft. Global warming is, however, a slow catastrophe. Modelled futures tend to collapse the future into the present, creating discussions about crisis and solutions. Crisis is a volatile thing, hard to sustain over long periods, and studies suggest that fear does not help change behaviour in the longer term.[25] While the print and broadcast media can draw attention to crisis, they can also be captured by political interest groups who discredit it. Media reports about climate change dropped suddenly in 2010 (down 70 per cent on 2009).[26] 'Climategate', the hacking of scientists' emails to suggest uncertainty in the modelled numbers, provided a salutary example of the way numbers without context may be manipulated by 'Merchants of Doubt', as Oreskes and Conway argued.[27] Sociologist Sheila Jasanoff criticised the response to Climategate and the 'crisis of faith in climate science' in 2010.[28] It was an 'inward-looking response', she said, to focus on the Inter-Academy Council, established to advise national governments and international organisations, including the United Nations and World Bank, on global scientific, technological, and health issues. Since there was 'remarkably little scientific dissent around the claim that the globe is warming dangerously as a consequence of human activity', there was no need to shore up the science, thereby endorsing battle-lines dictated by political interest groups.[29] Jasanoff argued instead for a more robust 'cosmopolitan' deliberation of action, and a more open discourse. She felt the question of 'faith' in science needed to be approached differently, and looked for new frameworks for debate. In a crisis situation like this, history can usefully add meaning to numbers. A slower pace of story-telling can unpack the slow catastrophe and

[24] Joseph Masco, 'Bad Weather: On Planetary Crisis', *Social Studies of Science* 40, no. 1 (February 2010): 7–40.
[25] Saffron O'Neill and Sophie Nicholson-Cole, '"Fear Won't Do It": Promoting Positive Engagement with Climate Change through Visual and Iconic Representations', *Science Communication* 30, no. 3 (March 2009): 355–79.
[26] Miyase Christensen, 'Media and Arctic Climate Change', Higher Seminar, KTH Royal Institute of Technology, Stockholm, 29 April 2013. This figure was based on content analysis of the *New York Times*, the *Guardian* and *Dagens Nyheter* (Stockholm). It is corroborated by Sheila Jasanoff, 'Cosmopolitan Knowledge: Climate Science and Global Civic Epistemology', in *The Oxford Handbook of Climate Change and Society*, 129–43, and similar figures are widely quoted in media analysis.
[27] Naomi Oreskes and Erik Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury, 2010); Robert Manne, 'A Dark Victory: How Vested Interests Defeated Climate Science', *The Monthly*, no. 81 (August 2012).
[28] Jasanoff, 140.
[29] Ibid., 130.

defuse the panic. Economists sometimes 'discount the future' on the basis of what present markets are prepared to pay for ecological services such as clean air or water. Historians, on the other hand, can 'discount the present' by providing a deep past. Arbitrarily timed futures (2020, 2050, 2100) are useful to policy discussions in the present, but ultimately limit long-term discussions of global warming. History adds a different sort of depth to the present. If the context of discussion is too technical (such as in actuarial models of discounted futures), it is hard to understand what global warming might mean for everyday living.

While economists and historians, scientists and citizens, rich and poor, can all contribute to imagining life in the Anthropocene, we also need a common language for the debates between groups. Technical language can create barriers. The idea of humanity functioning as a 'plague species' to alter planetary systems sounds like science fiction, but has prominent scientific exponents such as Edward Wilson.[30] In biological sciences, *species* is a common word, but it is an imaginative challenge to see oneself as a member of a species, acting collectively to *force* planetary warming.

'Force' is another technical word in this context. Climate scientists use it as a transitive verb, and it is a way of talking about 'drivers' of global warming, anthropogenic and otherwise. Dipesh Chakrabarty, in his four theses about climate change, uses force as a noun, rather than a verb. Rather than conceiving of humanity as a 'driver' that is passive and involuntary, he uses force to include volition. It is a useful word, Chakrabarty suggests, because it has a post-enlightenment history as a concept in physics, but it also carries an earlier mystical meaning.[31] While humanity has no ethical responsibility for involuntary action, if an action includes volition (choice), it carries a responsibility as well. 'Force' as a dead transitive verb looks like an ordinary word, but it is not. Like that other dead transitive verb, 'impact' (as in 'the disaster impacted the community'), a passive pseudo-objectivity changes meaning and ethical import. If we are to have cross-cultural and cross-disciplinary debates about living in Anthropocene times, we need to recognise that as words shift into everyday use, technical meanings need scrutiny. History is important when it alerts us to changing meanings, and different weights in words at different times.

Another challenge of the Anthropocene is its global scale. Global forces are perhaps too big and bland to have agency in history. Writing imaginatively about humanity itself as a global force is difficult. However, the idea of 'nation', a bread-and-butter concept in history, has also been imagined. Benedict Anderson made famous the idea of the nation as an 'imagined community'.[32] Sociologists and literary critics are already talking about the 'Anthropocene

[30] Edward O. Wilson, 'The Riddle of the Human Species', *New York Times*, 24 February 2013.
[31] Dipesh Chakrabarty, 'The Climate of History: Four Theses', *Critical Inquiry* 35 (Winter 2009): 197–222.
[32] Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (London: Verso, 1983).

imaginary' in the context of the paradox of taking responsibility to a global scale, without becoming meaningless or anaemic.[33] The global scale is not unprecedented within history. David Christian, a historian of Russia, started teaching Big History, a history 'from the Big Bang to the Present', at Macquarie University in the 1980s.[34] He was inspired by the French Annales historians, including Fernand Braudel and Lucien Febvre.

History on a global scale has also been an initiative of scientists. A recent example is the Integrated History and Future of People on Earth (IHOPE) project, initiated by climate scientists interested in anthropogenic change, but now joined by a broader group of historians, archaeologists and other humanist scholars working on long time-scales. Scientists have sought to write global histories before, most notably in the period of post-war reconstruction. Julian Huxley, the biologist who also became the first Director-General of UNESCO, proposed a *History of Mankind* as a transnational initiative for peace. Annales historian Lucien Febvre was also part of this project.[35]

A history of nature's past futures

Another approach is to consider the history of the ideas that inform the global change community today. One historical project, Expertise for the Future, set out to document the history of key ideas behind Anthropocene. Historically, the future was not always dominated by models of changing climate. Sverker Sörlin, Paul Warde and I wanted to explore some 'past futures'.[36] We compiled an anthology of documents and commentaries entitled *The Future of Nature*, as a way to step back from 'reducing the future to climate', to use Mike Hulme's apt phrase.[37] Different expertise constructs futures differently, as our anthology reveals. Here, I briefly summarise some of its findings as an exemplar of a historical contribution to Anthropocene debates.

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[33] Jacob von Heland and Sverker Sörlin, 'Works of Doubt and Leaps of Faith: An Augustinian Challenge to Planetary Resilience', *Journal for the Study of Religion, Nature and Culture* 6, no. 2 (2012): 151–75 ('anaemic', 170). Von Heland's (unpublished) use of Anthropocene Imaginaries (plural) follows Charles Taylor, *Modern Social Imaginaries* (Durham, NC: Duke University Press, 2004). The literary tradition is singular, represented by Rosanne Kennedy, 'The Anthropocene Imaginary' (paper presented at 'The History and Politics of the Anthropocene', conference at University of Chicago, 17–18 May 2013, convened by Dipesh Chakrabarty and Fredrik Albritton Jonsson). The only published version of the phrase is Gillian Whitlock, 'Posting Lives', *Biography* 35, no. 1 (Winter 2012): v–xvi. Whitlock uses the term 'Anthropocene imaginary' (xiii), about the work of W. G. Sebald as critiqued by Rosanne Kennedy.

[34] David Christian, 'A Single Historical Continuum', *Cliodynamics* 2, no. 1 (2011): 6–26; David Christian, *Maps of Time: An Introduction to Big History* (Berkeley: University of California Press, 2004).

[35] Libby Robin and Will Steffen, 'History for the Anthropocene', *History Compass* 5, no. 5 (2007): 1694–719.

[36] Libby Robin, Sverker Sörlin and Paul Warde, eds, *The Future of Nature: Documents of Global Change* (New Haven, CT: Yale University Press, 2013).

[37] Mike Hulme, 'Reducing the Future to Climate: A Story of Climate Determinism and Reductionism', *Osiris* 26 (2011): 245–66.

The Future of Nature is a collection of documents by authors spanning three centuries. Each document is accompanied by a commentary that explains its historical and theoretical context. The anthology is not a literary canon, but rather offers a historical window on a cross-section of experts and how they gathered evidence that built a collective, interdisciplinary understanding of the Anthropocene. It might be read as a textbook in an arts course, a science course or a business course. Equally it might be used as a trove of background material for practising policy makers or speechwriters interested in the ways humanity has historically talked about managing planetary futures. It is a book pitched at a general audience. The documents are mostly abridged, or very short extracts, and the commentaries typically less than three pages.

A set of ten key concepts in global change provide the organising principle for the book. Each concept has a question associated with it. Take for example the concept 'population', where the question is 'are we too many or are we too greedy?' Some concepts have long histories. 'Sustainability', for example, was used by Hans Carl von Carlowitz in the context of German forestry in a publication in 1713. Carlowitz suggested ways to plant and harvest on rotation, to ensure trees were always available in the long term. When a 'timber famine' struck in the late nineteenth and early twentieth centuries across Europe, his work became more prominent than in his own time. Although some of our documents are from the eighteenth and nineteenth centuries, the overwhelming majority come from the twentieth century. There are also a few from the present century. Of particular interest to historians of the Anthropocene is the Crutzen and Stoermer document of 2000. It is accompanied by a commentary by climate science practitioner, Will Steffen, who was present when Crutzen coined the term. Steffen records:

> At a meeting of the International Geosphere Biosphere Programme Scientific Committee in Cuernavaca, Mexico, in February 2000, scientists from IGBP's palaeo-environment project were reporting on their latest research, often referring to the Holocene, the most recent geological epoch of Earth history, to set the context for their work. Paul, a Vice-Chair of IGBP, was becoming visibly agitated at this usage, and after the term Holocene was mentioned yet again, he interrupted them, 'Stop using the word Holocene. We're not in the Holocene any more. We're in the . . . the . . . the . . . (searching for the right word) . . . the Anthropocene!'[38]

Thus there was a *moment* when this idea was born, and this context is captured in this commentary. Such a moment is not something that *Nature* or other scientific journals could record, but it helps make the Anthropocene a story, not an abstraction.

In some contexts a decade feels a long time, and in others, several millennia may be a mere blip. A chronometer is not the only way to measure time. But in considering ethical futures and social justice, the human time-scale of history is very important. As the literary scholar Rob Nixon has argued, the environment of the world's poor is impoverished in ways that are slower than the eye can see.

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[38] Steffen, 'Commentary', *The Future of Nature: Documents of Global Change*, 486.

His concept of 'slow violence', violence that is never newsworthy but nonetheless a global or local disaster, is a reminder that time can be felt differently in different places.[39]

Global change science is even more interdisciplinary than environmental science or history: it is hardly a field, except in its focus on the policy world of the IPCC. So how did we choose this particular set of documents for *The Future of Nature*? Present concerns shaped the organising questions, but intellectual lineages proved diverse. It is, of course, a book of our own times, as we explain:

> A book like this would not have made sense in the 1780s. Nor would it make sense even in the mid-twentieth century, a time when many of the ideas about global thinking in science and society emerged. Then it was still a case of gathering data, synthesizing, calibrating, beginning to take the measure of *Man's role in changing the face of the earth*, as the influential Princeton conference put it in 1955 . . . It was not until the turn of the millennium, with the definition of the Anthropocene, that a collection of documents from a range of disciplines published over a total of three hundred years could be seen as forming a corpus of work belonging to or leading up to 'global change thinking.'[40]

What historical patterns were revealed in these documents? First, that the H. G. Wells era, where science fiction met globalisation (the period from the 1920s to the 1950s), was surprisingly prominent. The onset of the Great Acceleration coincided with an explosion of *ideas* about the whole planet, as well as the physical effects of globalising. Whenever the Anthropocene formally began, it is clear that the written documents of global change have accelerated greatly since the 1950s. Most of the authors of documents in this book were alive in the 1950s.[41] The institutions of the global, including UNESCO, date from this era, and the majority have headquarters in Europe.[42] European expansion and modernity are entwined and planetary models and global thinking are, in a sense, their children. The Western European bias of the documents of global change reflects the origins of the Anthropocene.

The Anthropocene heuristic

Planetary futures are increasingly unfolding as a journey, rather than a destination, so we need a sense of our history as an anchor in changing (Anthropocene) times. The future is no longer destined. Rather, it is something we 'create', according to social commentator and former Commissioner for the Future, Ian Lowe.[43] If so, we need to engage all possible creativity in making

[39] Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Cambridge, MA: Harvard University Press, 2011).
[40] Robin, Sörlin and Warde, 3.
[41] Ibid., 10.
[42] Robin and Steffen, 1694–1719.
[43] Ian Lowe, *Bigger or Better: Australia's Population Debate* (Brisbane: University of Queensland Press, 2012), 187.

that future: science, economics, history and the human imagination. No one can *predict* the future, but imagination can illuminate its relationship to history and the present condition of the world.

The idea of the Anthropocene is, on the one hand, an epoch in geological time. It is also a heuristic device that enables humanity to 'think like a planet'. The philosopher-biologist Aldo Leopold once suggested that an ethic for conservation demanded 'thinking like a mountain'.[44] The Anthropocene—despite its emphasis on humanity as a force that changes Earth systems—also demands thinking 'like a planet', beyond human scales. The survival of humanity and other non-human species depends on changing human lifestyles and energy choices. Living with altered biophysical circumstances requires a major reconceptualisation of the place of humans on Earth at every scale.

Professor Libby Robin
Australian National University and National Museum of Australia
Email: libby.robin@anu.edu.au

[44] Aldo Leopold, *In a Sand County Almanac and Sketches Here and There* (1949; reprint, Oxford: Oxford University Press, 1987), 129.