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WILDERNESS AND AESTHETIC VALUES IN THE ANTARCTIC

VOL 1

Thesis submitted by

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Diploma in Landscape Architecture, Diploma in Polar Studies,

to the Department of Geography, Faculty of Social Sciences, The Open University

for the degree of Doctor of Philosophy

December 1998.

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DATE OF SUBMISSION: 8 DECEMBER
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DATE OF AWARD: 13 APRIL
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ABSTRACT

The 1991 Protocol on Environmental Protection to the Antarctic Treaty requires parties: 'to identify within a systematic environmental-geographical framework ... areas of outstanding aesthetic and wilderness value' (Annex V, article 3.2). In order to develop these frameworks, procedures and techniques used in environmental planning are considered for their applicability and practicality in the severe Antarctic environment.

The phrase in the Protocol is taken as two separate topics. Concepts of wilderness are examined first, and it is concluded that the whole continent should be seen as wilderness, with this designation being modified only for those areas in which human influence is visible.

In order to understand 'aesthetic values', interpretations given to landscape are considered, before examining the techniques developed in the United Kingdom for landscape assessment, and those used in the United States which are termed visual resource management.

Procedures, primarily based on the most recent practice in the United Kingdom, are developed, before testing by fieldwork on the Peninsula. Landscape assessment is seen as a wide-scale planning procedure, distinct from, though essential to, the site-specific techniques required for environmental impact assessment (EIA). Objective description and classification of the landscape forms the basis of the methodology, with subjective aspects following in the form of clearly stated criteria so as to identify 'areas of outstanding value'. During evaluation comparisons may only be made on a 'like with like' basis, eg glaciers with glaciers, islands with islands. If desired, areas may then be designated under the procedures given in the Protocol.

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Plan 2	Landscape Sub-region (W edge of mainland - Camp Point to Cape Rey - with offshore islands) at 1:500 000

Acronyms used in text

AONB	Area of Outstanding Natural Beauty
ASMA	Antarctic Specially Managed Area
ASPA	Antarctic Specially Protected Area
AT	Antarctic Treaty
ATCM	Antarctic Treaty Consultative Meeting
ATCPs	Antarctic Treaty Consultative Parties
ATPs	Antarctic Treaty Parties
ATS	Antarctic Treaty System
ATSCM	Antarctic Treaty Special Consultative Meeting
BAS	British Antarctic Survey
BGLE	British Graham Land Expedition
BLM	Bureau of Land Management (USA)
CCD	Countryside Commission Document
CCP	Countryside Commission Publication
CCS	Countryside Commission for Scotland
CRAMRA	Convention on the Regulation of Antarctic Mineral Resources
CPRE	Council for the Protection of Rural England
DoE	Department of the Environment
EIA	Environmental Impact Assessment
FIDS	Falkland Islands Dependencies Survey
FS	Forestry Service (USA)
GA	General Assistant
GIS	Geographic information system
GOSEAC	Group of Specialists on Environmental Affairs and Conservation

HMSO	Her Majesty's Stationery Office
ICCROM	International Centre for the Study of the Preservation and the Restoration of Cultural Property
IEA	Institute of Environmental Assessment
IGY	International Geophysical Year
ILA	Institute of Landscape Architects
IUCN	International Union for the Conservation of Nature and Natural Resources
LI	Landscape Institute (formerly the Institute of Landscape Architects)
LRG	Landscape Research Group
LDU	Landscape description unit
LT	Landscape tract
NEPA	National Environmental Policy Act (United States of America) signed in 1969, but came into force on the 1 January 1970. Both dates are quoted in relation to the document, but in this study 1970 is used.
NGO	Non-Governmental Organisation
nd	No date
nts	Not to scale
NWI	National Wilderness Inventory (Australia)
OU	Open University
PCT	Personal Construct Theory
RGS	Royal Geographical Society
RRS	Royal Research Ship
SCALOP	Standing Committee on Antarctic Logistics and Operations
SCAR	Scientific Committee on Antarctic Research
SOED	Shorter Oxford English Dictionary
SPRI	Scott Polar Research Institute
SPA	Specially Protected Area
SRA	Specially Reserved Area
SSSI	Site of Special Scientific Interest
TAE	Trans-Antarctic Expedition, 1955-1958
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USDA	United States Department of Agriculture
WCMC	World Conservation Monitoring Centre
WCS	World Conservation Strategy

Statement

As required by the Award Regulations of The Open University (RD 6, 1996), I declare that this thesis contains no more than 100,000 words (approximate totals: abstract - 250 words; chapters 1 to 11 - 73,025 words; appendices - 10,500; references - 8350; contents etc - 3150 words, totalling 95,275 words).

Since registration with the Open University on the 1 June 1993, I have had four papers published, and one put forward at an international meeting. Reprints are submitted in a folder. The first was a continuation of my earlier studies of tourism in the Antarctic: The precursors of tourism in the Antarctic. In: Hall, C. M. and Johnson, M. E. (editors). 1995. *Polar tourism*. Chichester, John Wiley, p 167-177.

Due to logistic problems, fieldwork was postponed from February 1996 to February 1997. I used the unprogrammed period of summer 1996 to look at the subject of art executed in the Antarctic, examining especially artists' responses to polar regions. The subject was vast, so an outline chronology and overview were established, before two topics were examined in greater detail. Two papers resulted:

The Antarctic paintings of Edward Seago (1910-1974). *Polar Record* 33 (186): 213-222. (July, 1997.)

HMS *Challenger* in the Antarctic: pictures and photographs from 1874. *Landscape Research* 22 (2): 191-208. (July, 1997.)

The last of the published papers was:

Concepts of wilderness in the Antarctic. *International Journal of Wilderness* 3 (3): 35-39. (September 1997.)

This has been reprinted in:

Dingwall, P. R. (editor). 1998. *Antarctica in the environmental era*. Wellington, New Zealand, Department of Conservation, p 31-37.

I submitted a paper to the Foreign and Commonwealth Office: 'Wilderness and aesthetic values in Antarctica'. It was put forward as an information paper at the XXII Antarctic Treaty Consultative Meeting, held in Tromsø, Norway, in May 1998.

In this thesis, reference is also made to my dissertation *Tourism in the Antarctic: its present impact and future development*, submitted on the 10 May 1979 as part of the Diploma in Polar Studies, Scott Polar Research Institute, University of Cambridge.

Other published papers are also quoted. Up to 1981, papers are referenced under my maiden name of Reich but from 1982 I use my married name of Codling.

Format of the text

The format of the text and references follows the 1994 conventions of *Polar Record* (33 (184): 86-88), with the addition of a numbering system for sections. Some documents have spelling and grammatical mistakes, or follow other spelling rules. All incorporated quotations are as written in the original and no use is made of *sic*.

Acknowledgements

I am grateful to many people for their help in the preparation of this thesis. My supervisors, Dr John Heap (formerly Director, Scott Polar Research Institute, Cambridge) and Dr Phil Sarre (Dean of Social Sciences, The Open University), were supportive over a long period.

I thank the administrators of the British Antarctic Territory, Foreign and Commonwealth Office, for their financial support of my fieldwork, and for the encouragement and advice given by Dr Mike Richardson of the Polar Regions Section. As a summer visitor, I wish to thank the British Antarctic Survey for enabling me to carry out my fieldwork. The stay at Rothera during February to March 1997 and the voyage to the Falkland Islands provided opportunities that were both productive and enjoyable. I appreciated the 'freedom of the bridge' given to me by Captain John Marshall, of RRS *Bransfield* during the voyage. During the 1997 austral winter and the 1997-98 summer, Nigel Milius took photographs for me at Rothera and I thank him for his persistence and generosity. At the British Antarctic Survey headquarters in Cambridge, Mrs Janet Thomson, Dr David Walton and Dr John Shears answered many questions, and also posed some interesting ones in return. I am also grateful to the BAS MAGIC team for assistance with maps.

The Scott Polar Research Institute continued to be a welcoming community, and I am grateful to William Mills and the Library staff, together with Robert Headland and Phillipa Hogg in Archives. Dr Peter Clarkson, executive Secretary of SCAR gave freely of his time and was skilled in asking questions that demanded considerable further thought. Dr Charles and Mrs Mary Swithinbank were also generous in many ways.

Christopher Stratton and Patricia Shears of the Landscape Partnership provided much appreciated comment and support at a critical time.

Dr James Palmer of the State University of New York College of Environmental Science and Forestry was very helpful in providing American documents, and commenting on aspects of American approaches.

Nearer to home, the staff at Plumstead Road Branch Library, Norwich, are thanked for their perseverance in obtaining material. Mr and Mrs Alfred ('Steve') Stephenson and Mr and Mrs Derek Searle also offered encouragement at different times. I also thank Christina Haylock for proof-reading the text, and both Peter Codling Architects and Signs Express, of The Old Church, Norwich, for their generosity in allowing me photocopying facilities.

Finally, at home, my husband Peter and daughter Rachel are thanked for their tolerance. This thesis is dedicated to them.

1 INTRODUCTION

1.1 Aims of the study

In 1991 the Protocol on Environmental Protection to the Antarctic Treaty was signed in Madrid by the Antarctic Treaty Consultative Parties (ATCPs) and by some delegates from non-Consultative Parties to the Treaty, a total of thirty eight nations (ATCPs, 1993). Now generally referred to as the Madrid Protocol, or simply the Protocol, it came into force on the 14 January 1998, together with Annexes I-IV. A further Annex V (appended in folder) was negotiated and adopted two weeks later than the main Protocol, and has to be separately approved under different procedures (Richardson, 1998).

This study examines one issue raised in the Protocol and first mentioned in article 3 (1) where Antarctica is described as having 'wilderness and aesthetic values', a phrase which recurs, with minor variations, three other times in the Protocol and its Annexes. In the final Annex concerning Area Protection and Management there is a requirement for 'a systematic environmental-geographical framework' to identify areas to be designated as Antarctic Specially Protected Areas (Annex V, Article 3). 'Areas of outstanding aesthetic and wilderness value' are to be designated.

The aims of the study are therefore twofold; first to consider, within an Antarctic context, the meanings of 'wilderness and aesthetic values', and second, to suggest methodologies that could be used to develop the 'systematic environmental-geographical framework'.

1.2 The Antarctic

The study is cross-disciplinary, including consideration of approaches and techniques from the wider fields of environmental planning and landscape planning. It is set in the Antarctic, the ocean, land and ice that lies to the south of the Antarctic convergence, where cold polar water meets the warmer waters of the Southern Ocean. The first landings on the continent were probably in 1820 and since that date both sea and land have been explored, and in earlier years, exploited. Sealers and whalers decimated certain populations and the effects of their actions continue.

More recently, scientific research has been dominant. The value of science has been brought to the attention of a wider public by issues such as ozone depletion. The place of science is firmly established and concerns moving out of the immediate scientific

discipline are cautiously approached by many Antarctic workers, even though it is obvious from reading accounts of visits that almost all acknowledge the continent to be 'beautiful' or 'magnificent'.

1.3 'Wilderness and aesthetic values'

The concept of values or evaluation in any form raises many questions. The combination of 'wilderness' and 'aesthetic' with 'values' seemingly complicates issues even further. Yet this phrase, presumably used as a summary for larger underlying concepts, is in the Protocol. The meaning has to be questioned so that it may be more adequately defined, in order that the intentions behind its inclusion can be understood and the necessary action taken. With thirty eight signatories including nations from every continent of the world, with differing ethical, social, cultural and religious backgrounds, it is not possible to represent all views in a single document. In such a wide field, hopes of achieving consensus may be improved by pushing the development of the 'systematic environmental-geographical framework' as far as possible by objective means, before introducing the ultimately inescapable, but more contentious, subjective issues. This study, based in the United Kingdom but also considering American and Australian approaches, is offered as a starting point.

Throughout the Protocol the words 'wilderness' and 'aesthetic values' appear together. The coupling may seem appropriate, but it is necessary to develop a separate understanding for both, because not all areas with 'aesthetic value' are 'wilderness', and conversely but less obviously, not all 'wilderness' areas have widely accepted 'aesthetic value'.

1.3.1 Wilderness

Taking a straightforward dictionary definition, few deny that the Antarctic is a wilderness. Away from the continent, the term has generated a vast body of literature. In the wider context, Eckersley (1992) highlighted wilderness preservation as one of two 'litmus' issues that illustrated the impact of environmentalism upon contemporary political and philosophical thought. Much debate has centred on whether wilderness is an anthropocentric concept, or whether land may have egocentric or intrinsic values independent of human interest. These issues are considered before a further option is suggested. Nash's *Wilderness and the American mind* first appeared in 1967 and is recognised as a seminal work, but care needs to be exercised in applying American texts on wilderness to the Antarctic. The extensively developed 'wilderness theory' has

inevitably been influenced by the North American historical pattern of settlement and competing land pressures. Many of the foundations upon which the theory has been built are not found in the Antarctic. Native populations and the pressures of economic developments such as timber production or water storage are not paralleled in the Antarctic, although mining and recreation are issues which have been raised. Indeed, environmental groups concerned with the possibility of Antarctic mining were among the first to highlight the value of the continent as a wilderness.

1.3.2 Aesthetic value

Discussion about aesthetics has taken place for centuries but in Britain, the 18th and 19th centuries saw increased interest in the application of aesthetic values to landscape. More recently, there has been a demand for the development of practical procedures that can form part of a wider planning process. This has led to 'landscape assessment' in the United Kingdom and 'visual resource management' in the United States. These methodologies differ, so detailed appraisal is necessary. Any process to be used in the Antarctic will also need to work in extreme climatic conditions, with all the logistical and safety difficulties imposed by the nature of the continent.

Article 12 of the Protocol, describing the functions of the Committee for Environmental Protection, requires the Committee to provide advice on 'the state of the Antarctic environment' (section 1(j)). This remit gives the opportunity for examining a wide range of issues, including landscape assessment. This methodology should be proactive, and be part of the planning tool that provides the background canvas onto which details, such as site-specific studies, may be added.

Recent British work has also sought to include landscape *perception* within survey procedures. Perception may be expressed in a wide variety of forms, frequently not easy to map or tabulate, but none the less real. Sources such as technical studies, literary references, photographs, paintings and films are seen as contributing to a greater understanding as to how the landscape is seen or appreciated. Even in the early days of exploration, logs and diaries contained descriptions of the Antarctic, and from the turn of the century expeditions regularly took artists and later photographers with them. Such documents are informative on both objective and subjective counts.

1.4 A 'systematic environmental-geographical framework'

Annex V of the Protocol covers Area Protection and Management, and seeks to designate

areas so as to protect: 'outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research' (Article 3.1). The following section (Article 3.2) appears to expect that a single 'systematic environmental-geographical framework' could be used for identification of all the different values. This study questions the proposition, and examines existing methodologies for assessment of both wilderness and aesthetic values. Fieldwork gave the opportunity to test survey techniques, thus enabling conclusions to be reached for both concerns.

1.5 Summary

The Protocol, by including 'wilderness and aesthetic values', widened the principles under which activities in the Antarctic are to be constrained. Despite the vast size of the continent there is merit in assessment of both landscape and wilderness, to provide information that may inform future planning and management decisions. This study is offered to assist ATCPs in their Antarctic activities.

2 THE ANTARCTIC

Antarctica is often described as 'a continent for science' but while coastlines and mountain ranges have been mapped and volume on volume of scientific information has accumulated, human perception of the Antarctic scene has been deepening too. (Fogg and Smith, 1990: 63)

2.1 Scope of the chapter

Fogg and Smith summarised two of the possible approaches to the Antarctic - measured objectivity and more subjective consideration of perception. Both are valid, although until relatively recently respect was primarily for data-based work.

The continent was first seen less than two hundred years ago, but even by the mid-1950s atlases recorded: 'Most of the continent is completely unknown and unexplored' (Cartographic Department of the Clarendon Press, 1955: 90). The prime concern of explorers had to be with charting previously unrecorded features, yet even in the early years of discovery, scientific study was also important. During his two summers in the Antarctic, 1840-41 and 1841-42 James Clark Ross not only explored the great ice barrier, later named the Ross Ice Shelf, but also completed extensive magnetic surveys and observations. Scott and his party died returning from the Pole in 1911, still carrying on their sledges over 15 kg of geological samples which they chose not to abandon. The American, Richard E. Byrd, emphasised the place of science: 'served by a soundly constituted polar expedition (on the last we served twenty-two branches)' (1958: 12) and the primary reason for the majority of Antarctic activity is still scientific.

This chapter continues with brief notes about some of the physical features of the Antarctic, before suggesting a physiographic classification that is ultimately used in further assessments of the continent.

2.2 Sources for background information

A comprehensive bibliography of the Antarctic was drawn up by Meadows, Mills and King (1994). It covered many categories, providing concise annotations of selected literature. A synthesis of both polar regions is found in Sugden (1982). Single volume accounts of the area may be found in Scientific Committee on Antarctic Research (SCAR, 1980), Reader's Digest Services (1985), Bonner and Walton (1985), and Fothergill (1993). Summaries containing views from the environmental movements include Brewster (1982), Mosley (1986) and May (1988).

Polar Record is the leading academic journal, with *Antarctic*, the quarterly bulletin of the New Zealand Antarctic Society, providing a commendable account of current activities.

Recent work by the British Antarctic Survey (BAS), the Scott Polar Research Institute (SPRI) and the World Conservation Monitoring Centre, under the auspices of SCAR, resulted in the production of the Antarctic Digital Database (ADD). It resulted from collaboration between 11 nations and represented: 'a major development in Antarctic mapping, providing access to the first seamless digital map of Antarctica' (BAS and others, 1993: vii). A copy of the 1:10 000 000 paper map derived from the project *Antarctica - a topographic database* (BAS, 1993a) is appended to this study as Plan 1.

2.3 The continent

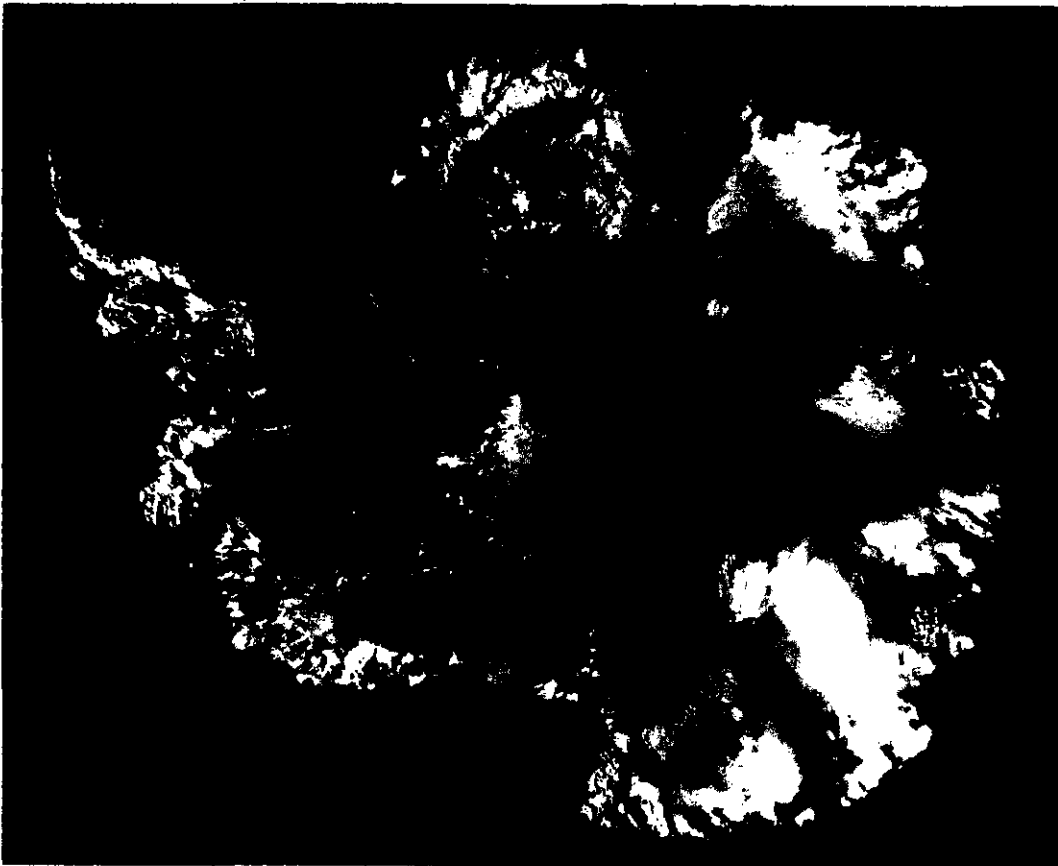
The satellite image and isometric view included as part of Figure 1 (on following page) show the form of the continent. Also included are several quotations found during the literature search which conveyed ideas far more successfully than many lengthy documents.

Antarctica is a continent of superlatives. It is the coldest, windiest, highest and driest continent on earth. More importantly for this study, it is almost unimaginably vast. It is, as Figure 1 shows, approximately circular, with two major indentations (the Ross and Weddell Seas); a panhandle pointing out towards South America; a huge mountain range stretching almost from side to side, and a scattering of mountains pushing through the ice round the rim of the continent. To cross from side to side is a distance of over 3200 km (2000 miles), much the same as crossing America or Australia, or going from Norway's North Cape to Cyprus. These distances stretch the comprehension of most Europeans, but are perhaps more understandable to Americans or Australians. Those who have travelled widely over the continent, whether by flying or creeping slowly over it on the ground, say that the sense of vastness is increased by the essential sameness of the landscape. Huge swathes of Antarctica are unvarying - white snow from horizon to horizon with no discernible difference in any direction. Yet on the continental scale there are differences - features which punctuate these apparently endless vistas of whiteness. This study attempts to make sense of the samenesses and the differences of the landscapes of the Antarctic.

Although an obvious truism, the fact that all those who visit the Antarctic do so from



The hill-shaded isometric view is orientated as if the light source is situated at the base of the map, with the true viewpoint, looking southwards, of 135°E.



Antarctica classified as:			
contiguous continent	11 900 000 square km	(87.1% of total)	
islands	193 000 square km	(1.4%)	
ice shelves	1 568 000 square km	(11.5%)	
Total area	13 661 000 square km		

Of the contiguous continent and the islands, 48 310 square km (0.4%) is exposed rock.

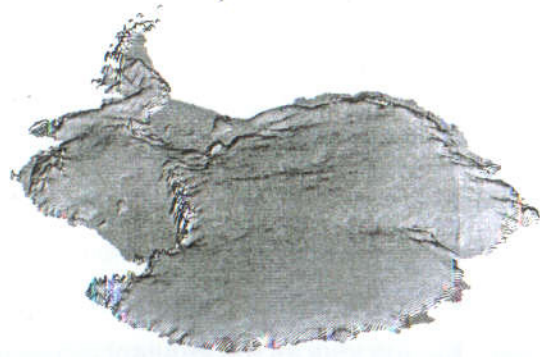
Geologically speaking, Antarctica is not one continent but two, lying either side of the indentations made by the Ross Sea and the Weddell Sea. Two forms of nomenclature are in use; either East and West Antarctica (as suggested by Nordenskjöld in 1904 (1977: 69)), or Greater and Lesser Antarctica. There are problems in using the first set:

In parts of East Antarctica West Antarctica is east, in others west. This of course depends on if you are in east East Antarctica or west. However, if you are in west West Antarctica, East Antarctica is west unless you want to go to west East Antarctica in which case it is east. The same holds for east West Antarctica only in reverse except that if you want to go to west East Antarctica, you still go east. (Hayes, quoted by Swithinbank, 1988: B11)

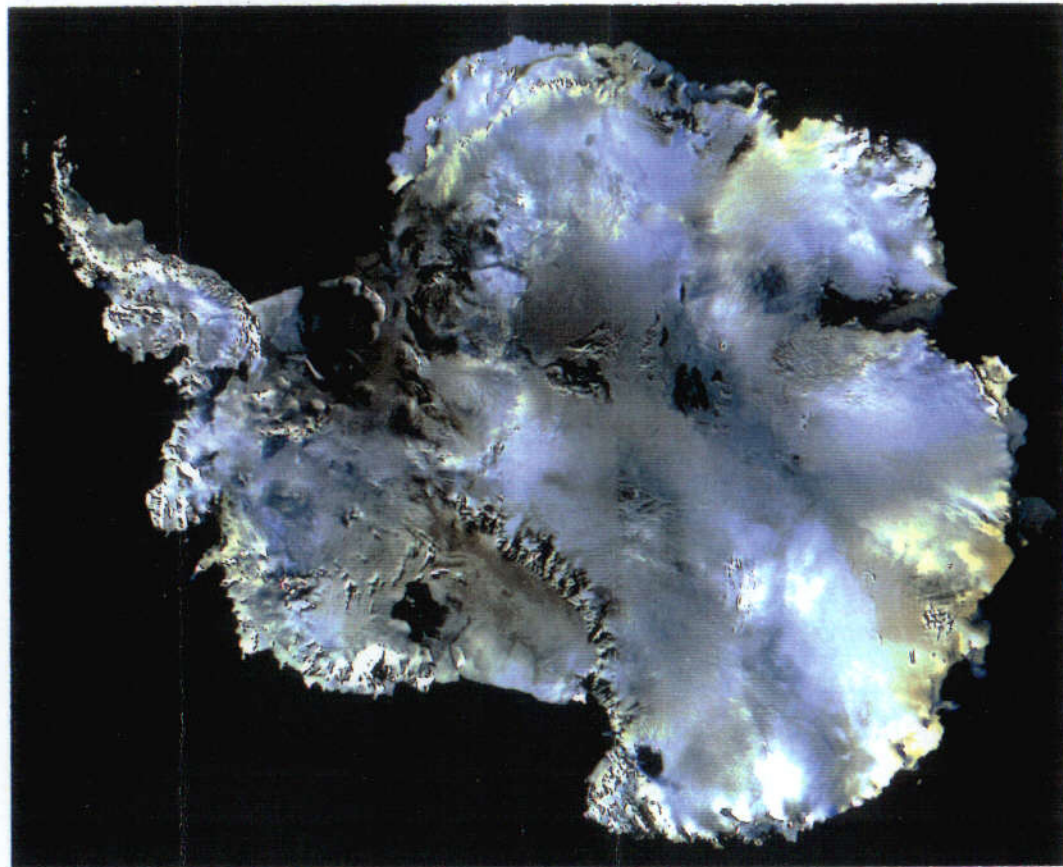
Despite the difficulties, these terms are more widely used.

Figure 1 Antarctica: isometric view, satellite image and photographs

View and data from the 1993 BAS map: *Antarctica - a topographic database* (scale 1:10 000 000) and personal communications with BAS.



The hill-shaded isometric view is orientated as if the light source is situated at the base of the map, with the true viewpoint, looking southwards, of 135°E.



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Figure 1 Antarctica: isometric view, satellite image and photographs

View and data from the 1993 BAS map: *Antarctica - a topographic database* (scale 1:10 000 000) and personal communications with BAS.

Icebergs may be produced wherever the ice sheet meets water. Over 1400 cubic km are calved each year, sometimes in the form of giant bergs with surface areas of over 8000 square km. Studies of iceberg drift have revealed that distances travelled may average over 10 km per day, with rotational movement of over 10° per hour.



Griffith Taylor, a geologist on Scott's last expedition summarised the Antarctic food chain in the *South Polar Times* (1911, no pagination):

Big floes have little floes all around about 'em,
And all the yellow diatoms couldn't do without 'em.
Forty million shrimplets feed upon the latter,
And they make the penguins and the seals and whales
Much fatter.



The relative simplicity of the terrestrial ecosystem is illustrated by Campbell: 'Consider this: one leaf of an Amazonian palm - one leaf out of the trillions in that 3,000-kilometer-wide swatch of tropical forest - may have living on top of it more species of mosses, fungi, lichens, protozoans, mites, and insects than are found on the entire continent of Antarctica.' (1992: 57)



Only two vascular plants are native to the continent, a grass (*Deschampsia antarctica*) and a pearlwort (*Colobanthis quitensis*). Algae, fungi, lichens and mosses occur, but growth is very slow, and these forms are easily damaged. 'A carelessly placed boot in a mature stand of lichens can eradicate tracts of the equivalent of an ancient forest in a few seconds.' (Lewis Smith, 1996: 47)

'The most hostile environment on Earth is Antarctica. In reality, the region is a cold desert, characterized by low snowfall, lack of water, exposure to wind, and soils that lack organic matter.' (Hambrey and Alean, 1994: 151) 'Neither natural vegetation nor the handiwork of man can be said to soften or to modify the austerity of a landscape where ice in its many forms is dominant, and where naked rock brings welcome relief.' (Linton, 1963: 274)



'In simple terms it can almost be said that there is only one glacier in Antarctica, although it is ten times the area of all the rest of the world's glaciers put together.' (Swithinbank, 1988: B4) The ice sheet is up to 4.5 km thick, representing 90% of the world's fresh water. Precipitation is scant, yet it is sufficient for a net snow accumulation from year to year. Whilst the landscape has been shaped by ice, land exposed after ice retreat has been modified by cold desert weathering processes as the extreme aridity means that very little water is available for geomorphic processes.



In the Indian Ocean sector it has been calculated: 'that on each blizzard day 240,000 tons of drifting snow crossed each kilometer of the coast. Extrapolation to an annual total gave 18 million tons per kilometer, a figure ... believed to be a minimum.' (Swithinbank, 1988: B55)

places far to the north, and proceed more or less meridionally towards the South Pole, will help an appreciation, in broad physiographic terms, of what such travellers are likely to see. It is important to emphasise the word 'see'. This study is not about why Antarctic features are as they are (although aspects of their development will be considered), but about the perception and impact of this almost alien landscape.

Across the 'roaring forties' of the Atlantic Ocean: 'great westerly gales rush shrieking after one another and there is nothing to stop their course. The elements rage together continually in a welter of great nothingness hundreds of miles from land. Cold water, chilled by contact with the Antarctic pack-ice and by its melting, meets warmer water in these latitudes' (Ommanney, 1969: 13). The first hint of the Antarctic to the sea level visitor is when the air and sea temperatures plunge into small single figures. Often foggy, the Antarctic Convergence marks the outer frontier of the Antarctic. South of it, the waters are cold and the biota is dominated by krill, and the Antarctic defining species of whales, seals and penguins.

Further south come the icebergs. They are flat topped and sometimes so vast that it is almost impossible to believe that they are afloat. They are broken off from huge areas - a couple of them the size of France - of floating ice, sometimes 180-1200 m thick (600-1310 ft), known as ice shelves, fed by glaciers and snow.

Then comes the sea ice, vaguely menacing as it closes round a ship. The oceanographer Sir George Deacon gave a clear description of the next stage of the journey towards the Pole:

Going south in summer a ship is likely to meet outlying streams of small snow-covered floes and broken ice, and to see ahead the bright sky known as ice blink where the clouds are whitened by reflection from the more continuous ice, sometimes with one or two patches of darker sky above leads of open water. It is then that she comes to a dazzling white and blue seascape, often of calm water, in which the main body of pack ice emerges as a white line along the horizon. Its edge is fairly compact, but irregular and variable. It begins with a fringe of small floes where most of the wave energy is expended and in bad weather, churning fragments are a danger to ships (Deacon, 1984: 121).

In winter, this sea ice increases to cover 22 million square km of the ocean. This is the largest seasonal change on the planet, doubling the size of the contiguous continent.

This succession of Convergence, icebergs and sea ice holds with respect to almost any approach to the Antarctic continental mass in spring (itself a strange word to use about a polar desert), but on reaching the coastline differences begin to occur. The most easily appreciated sort of coastline, because it is by far the most common throughout the non-polar world, is where the sea meets a rocky coastline and hinterland. Yet in the Antarctic, this pattern is very unusual, accounting for under 5% of the coastline. All the rest is where the sea meets some sort of ice cliff. 44% of the coastline consists of 'ice fronts', the seaward limit of an ice shelf, whilst 38% are 'ice walls', the seaward limit of a glacier which is aground along the line where it meets the sea. The remaining 13% of the coastline is also an ice cliff, virtually similar to an ice front, but is the seaward limit of rapidly moving ice streams or outlet glaciers often showing as ice tongues (lower part of Figure 2, on following page).

All these ice cliffs form insurmountable barriers to further progress southwards - no one would choose to scale a crumbling ice cliff - but there are points where visible rocks come to the sea and it is possible to get round the edges of the ice, or where an ice front drops to near sea level, such as in the Bay of Whales in the Ross Ice Shelf where first Amundsen and then Byrd found a foothold in Antarctica.

Having reached the surface of an ice shelf, a flat, unbroken snow surface may be found, until the landward margin is revealed. Sometimes this is obvious, but on occasions it is difficult to define an edge within 15 km (Swithinbank, personal communication, May 1998). Having reached 'land', however, the visitor will find a snow surface which slopes upwards more or less steeply. The less the slope, the fewer the crevasses and *vice versa*. In some places it could provide an unbroken highway to the Pole, or it could be punctured by nunataks or terminate against a mountain range through which the ice flows in glaciers great and small. And then, by whatever route has been followed, the South Pole is reached, at about 2800 m (9200 ft) on the slowly moving ice sheet of the polar plateau and virtually featureless in all directions except for the wind-carved surface of the snow (sastrugi).

On this imaginary journey to the Pole, the aspect which should stand out is that except possibly for that brief moment of crossing from sea to land, the journey has been on ice. Rock, whether mountain ranges or isolated nunataks, may have been seen, but the overriding impression will have been that of snow and ice.

2.4 Physiographic classification

All these samenesses and differences embody just two elements - water and rock: water in the form of sea, lakes (few and usually frozen) and snow and ice in all their multitudinous forms; rock in the form of small coastal strips, and mountain ranges and nunataks. Figure 2 shows diagrammatically some of the factors that contribute to the landscapes of the continent.

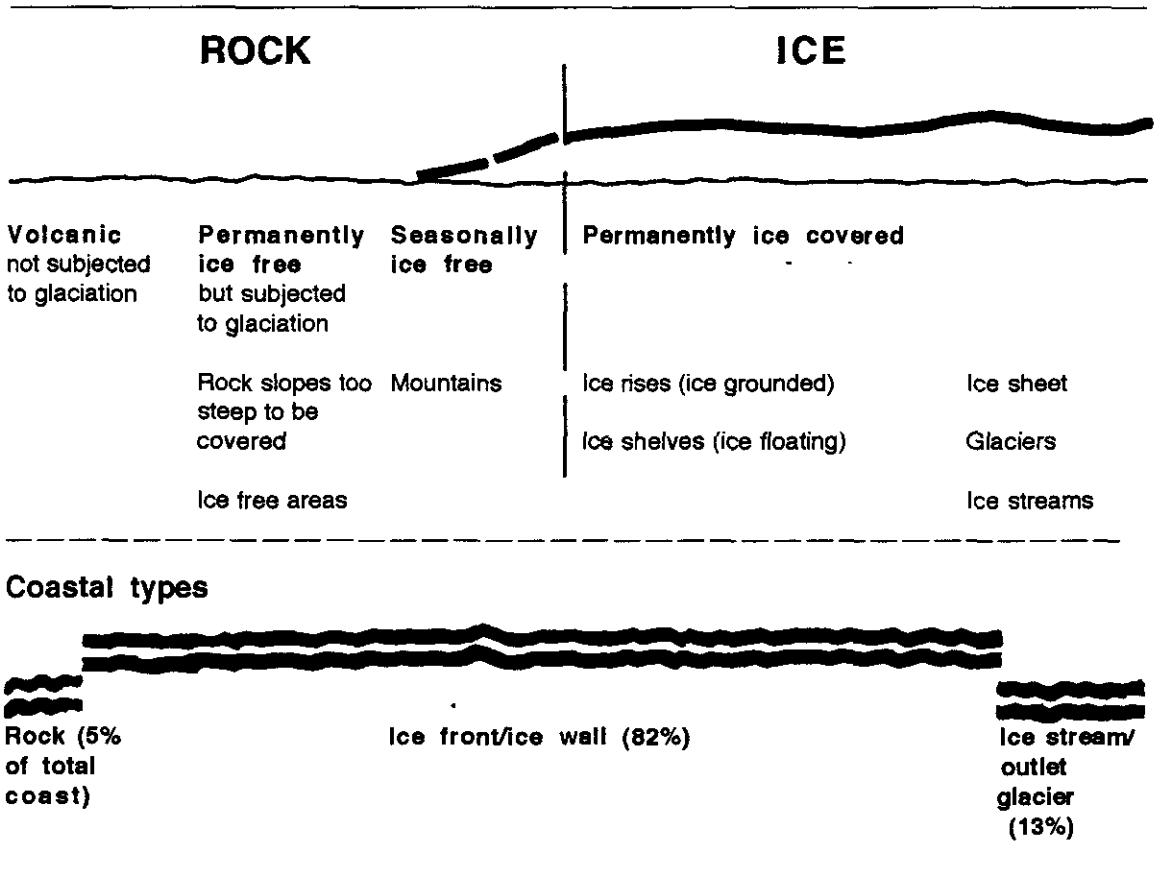


Figure 2 Factors contributing to the landscapes of Antarctica
(Coastal types from Swithinbank, 1988: B4)

The broad categories are:

Rock Small unglaciated volcanically associated landscapes such as Deception Island, Penguin Island and Bridgeman Island in the South Shetland Islands.

Ice free areas where snow is evaporated by cold dry winds descending from the polar plateau - eg the Dry Valleys of Victoria Land; the Bunger Hills in Wilkes Land; the Vestfold Hills in Princess Elizabeth Land, and small areas in the Peninsula. These 'oases' are estimated to cover a total

of about 3000 square km, a minute proportion of the continent (under 0.02%), but nevertheless an identifiable landscape type.

Rock and ice Areas defined in terms of mountain ranges where rock and ice are in a more equal partnership.

Rock either completely covered or dominated by ice Vast areas defined in terms of ice sheets where ice is the dominant feature and where rock in the form of nunataks is very much the junior partner.

Ice Ice sheet; glaciers and ice streams; ice rises and ice shelves - all large areas of ice and snow, often flat or gently undulating.

2.4.1 Form of physiographic classification

Throughout this study work was carried out in two different directions; the desk-study began with the continent and worked 'down' to differing levels of detail, whilst fieldwork gave the opportunity to build 'up' an understanding of the environment from specific to wider aspects. Feedback between the different approaches and stages of the study was continuous. The initial continental perspective was essential, but it soon became clear that it would be helpful to reduce the size of areas under consideration to something more manageable. This began the process developed to meet the 'systematic environmental-geographical framework' required by the Protocol (chapters 8-10).

Physiographic classification of Antarctica had already been proposed by Markov and others (1970), and their work was examined to see if it offered a platform for this study. The Soviet geographers based their classification on: 'characterization of snow landscapes ... the physico-mechanical properties of the snow-firn layer, the temperature regime and the forms of glacial micro- and macrorelief.' (Markov and others, 1970: 321) This resulted in ranges such as the Transantarctic Mountains being described as 'bedrock outcrops', and as such, were not shown on the continental map (Markov and others, 1970: 326). This approach was not appropriate to the concept of landscape used in this study (chapter 7, section 7.3) so whilst aspects of their zoning have been used, modifications have been made.

Many sets of terms have been used to describe areas of land (Mitchell, 1991: 21-23, his Table 3.1). Typical classifications are strongly based on geology and/or geomorphology, but as detailed knowledge of the Antarctic is limited by glacial conditions, present-day relief has been given a more dominant part. A hierarchical classification primarily based on the relief of the two main components - rock and ice - has been

utilised. The simplicity of handling just two factors is counteracted by problems associated with the vast size of the continent, as well as the availability, or otherwise, of appropriate data. It has also been considered important to include features such as ice shelves, even though there may be major changes taking place in the areas that are at present covered.

The following terms are used for the physiographic classification:

- Province The largest scale, based on a broad homogeneity of features and relief.
- Region Sub-divisions of provinces with a smaller range of surface forms, perhaps having had a similar geomorphic evolution.
- Sub-region Recurrent pattern of linked features.

Lists follow a similar pattern. Areas are initially grouped as: ice; rock either completely covered, or dominated by ice; rock and ice. Further ordering is then taken in a clockwise direction from the Greenwich meridian, or in the case of the Peninsula from south to north, from areas more typical of the main continent to the maritime islands of the South Atlantic.

2.4.2 Mapping scales

Mapping scales have been dictated by various factors. Whilst availability of data was critical, the grain of the landscape was also important. As an example, the East Antarctic central ice sheet has few major permanent features, and the crevasses, sastrugi and other irregularities to the surface, although critical to individuals when on the polar plateau, are not relevant at a continental scale. The 1:10 000 000 map resulting from ADD (BAS, 1993a) was the format that was most useful in the initial stages. It presented relief, areas of rock outcrop, ice cover over land and ice shelves. This data, together with geological information, enabled 12 Provinces to be identified over the whole continent (section 2.5). In certain areas such as Dronning Maud Land, the next terrain unit of Regions could also be identified at 1:10 000 000. In other areas such as the Antarctic Peninsula, larger scale maps were required to identify Regions, and this work was carried out at 1:3 000 000.

2.4.3 Notation

A system has been adopted to show the linkage between the Physiographic units of Provinces, Regions and Sub-regions. The 12 Provinces use 'P' followed by a number (example: Antarctic Peninsula is P12). Regions use 'R' followed by a number (example: Alexander Island in short form is R3 but can have the longer, unique reference of P12:R3).

These two designators continue to be used for identification of Sub-regions, with the addition of a suffix lower-case letter (example: western part of Alexander Island is R3a, eastern part is R3b. Their unique references would be P12:R3a and P12:R3b respectively).

2.5 Physiographic Provinces of the Antarctic

Twelve Provinces (P1 - P12) have been identified and are shown in Figure 3 (on page 31), together with brief notes about each Province.

Boundaries for the Provinces, Regions and Sub-regions have generally responded to permanent physical features identifiable from maps of varying scales. Factors influencing decisions included: geology; contours/formlines (whether on rock or ice); slope; rock exposure; ice shelves. On occasions, somewhat arbitrary lines have been drawn along ridges, so that a single feature such as a peninsula may be seen as the boundary between two Regions.

2.6 Physiographic Regions and Sub-regions

Two Provinces have been studied in greater detail, so as to identify Physiographic Regions and Sub-regions. The Antarctic Peninsula (P12) was the major study area and was covered by a desk study supported by fieldwork (chapters 9 and 10). A desk study was also carried out on the Shackleton Range (P4.R5, chapter 10, section 10.6). For both these areas plans showing Physiographic Regions and Sub-regions are included in their respective area Landscape studies in chapter 10 (Figures 21, 22, 26 and 28).

2.6.1 Landform and landscape

There comes a point when categorisation based on physiographic features - 'landform', has to be married with a wider understanding of 'landscape' (chapter 7, section 7.3). Physiographic zones or features may be identified, but overall impressions of the area do not follow such convenient boundaries. As an example, it is suggested that Alexander Island, George VI Ice Shelf and the mainland of the Antarctic Peninsula are three distinct Physiographic Regions, yet the landscape character of the area derives from the juxtaposition of the three Physiographic Regions. The Shelf is seen bounded by mountains on both sides; the slopes and moraines of Alexander Island to the west, and the more obviously snow-covered peaks and glaciers of the mainland to the east.

This wider consideration may lead to regrouping of physiographic units so as to establish Draft Landscape Regions. This is considered in chapter 10.

ICE

P1 Ronne and Filchner Ice Shelves

The two ice shelves are contiguous, occupying an embayment in the Weddell Sea. They include three major ice rises, Henry Ice Rise, Korff Ice Rise and Berkner Island, the world's largest ice rise. It is an independent ice cap, 378 km long by 150 km wide rising to about 1000 m above sea level, which has developed over a shoal on the continental shelf.

P2 Ross Ice Shelf

A region larger than France, occupying an embayment in the Ross Sea and contained by the Transantarctic Mountains and the snow-covered coast of West Antarctica.

LAND EITHER COMPLETELY COVERED, OR DOMINATED, BY ICE

P3 East Antarctic central ice sheet

A vast plateau over 3000m high, over an old continental shield which once formed the central part of the Gondwana supercontinent. Much of its concealed rock surface lies above sea level.

P4 East Antarctic ice sheet slopes from 45°W-5°E

P5 East Antarctic ice sheet slopes from 40°E-160°E

Ice flows downhill from the higher areas of the icecap under the influence of its own weight.

The rate of flow varies from a few metres per year in the interior, to a much higher figure at the margins. Movement is fastest at the surface, and slower at the bedrock, resulting in deformation throughout the depth of the ice. Downslope katabatic winds are characteristic and snowfall is higher than on the plateau.

P6 West Antarctic central ice sheet and ice sheet slopes

Geologically, the rocks of West Antarctica are of far more recent origin than East Antarctica. The underlying rock has a present average elevation of over 400m below sea level, thus forming a series of archipelagoes and islands. The central ice sheet is lower than E Antarctica, reaching to just over 2000 m. The potential instability of the ice sheet has been noted, because the major ice streams are largely unprotected from the sea by ice shelves (Swithinbank, 1988: B124).

LAND AND ICE

P7 Transantarctic Mountains and the mountains of Victoria Land

A 3000 km long chain of mountains, forming the margin to East Antarctica, and transected by many outlet glaciers on the Ross Sea side of the continent.

P8 Mountains of Dronning Maud Land

Ice shelves fringe the land, which is covered by ice slopes and glaciers. A sinuous escarpment, sometimes exposed, sometimes hidden, lies about 100 km from the coast. These mountains dam the inland ice sheet and deflect its main drainage into broad ice streams to the east and the west.

P9 Mountains of Enderby and Mac Robertson Lands

Scattered groups of mountains that break through the ice. In places, the ice sheet rises steeply from the coast. Surface flowlines from the massive Lambert Glacier extend 400 km upglacier from its grounding line. It flows into the Amery Ice Shelf which occupies an estuary-like bay.

P10 Mountains of Marie Byrd Land

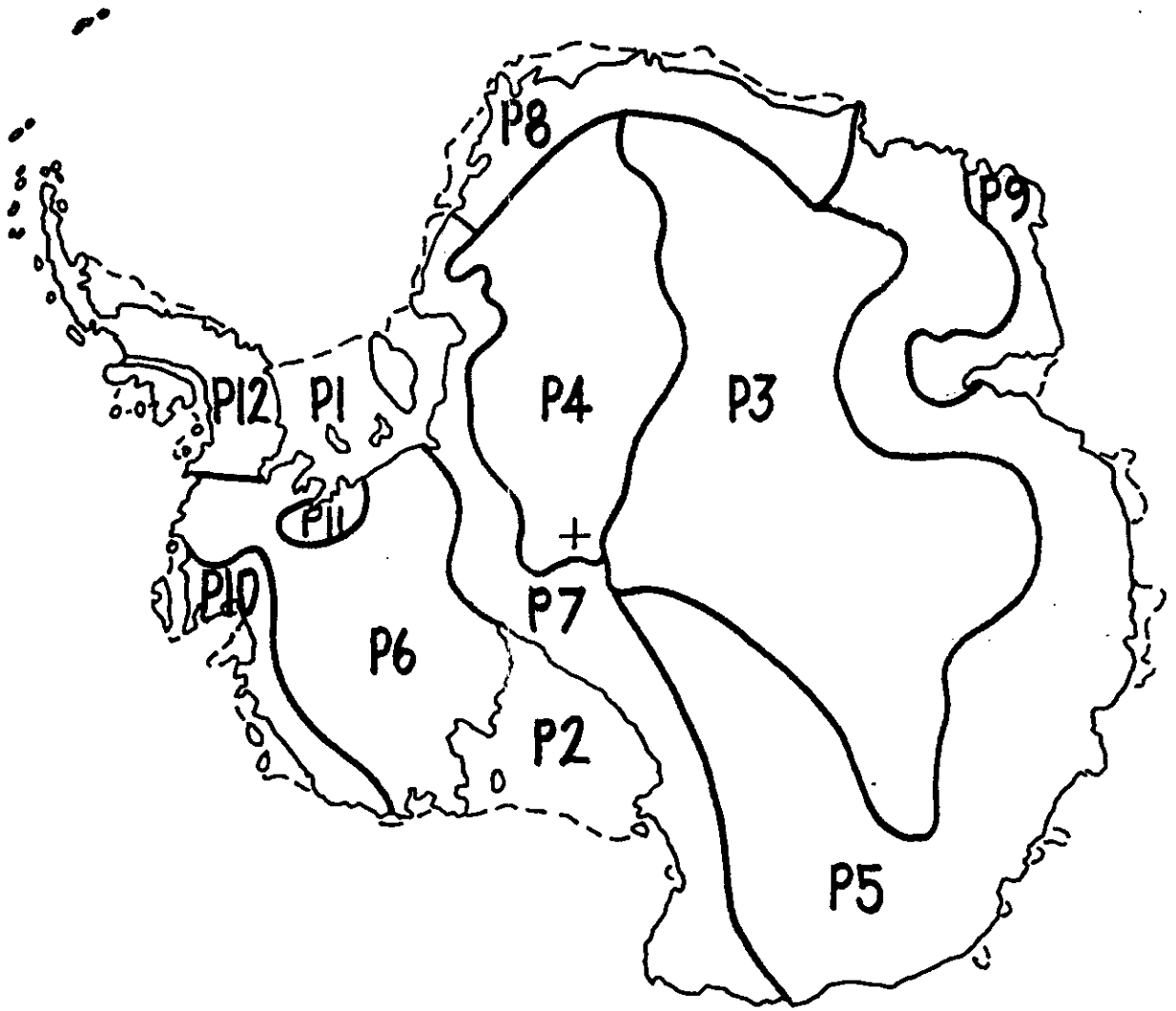
A chain of volcanoes parallels the coast, sometimes interrupting the flow of inland ice to the sea. Ice shelves fringe most of the coast.

P11 Ellsworth Mountains

Made up of two ranges, the Sentinel Range and the lower Heritage Range. The highest peak in the continent, Vinson Massif stands at 4897 m, in the Sentinel Range.

P12 Antarctic Peninsula, including islands of S Shetlands and S Orkneys

Southern limit taken as a line joining Evans Ice Stream with Rydberg Peninsula. A snow covered plateau rising to over 2000 m is linked to the ice cap of W Antarctica. The west margin is fringed by islands, the east is edged by extensive ice shelves.



1000 km _____
1000 miles _____

Figure 3 **Physiographic Provinces
of the Antarctic**
(Modified from Bonner and Walton, 1985;
Denton and others, 1991; Hattersley-Smith,
1991; Mitchell, 1991; Sugden, 1982.)

3 PERCEPTIONS OF THE ANTARCTIC

3.1 Scope of the chapter

Fogg and Smith (1990), a scientist and an artist, not only presented a history of Antarctic exploration in the traditional sense, but also examined the wider realm of visitors' responses to the oceans and the land, an extension of concern beyond traditional Antarctic research. Similarly, in providing an account of their work for non-specialists, SCAR began with a collection of quotations spanning 150 years, giving many personal impressions of the continent (Fifield, 1987). More recently, this approach has been repeated by Crossley (1995), writing primarily for school children. She illustrated the different ways Antarctica has been presented, from poetry to contemporary art. This chapter outlines human involvement with the continent, including particular landscape dilemmas arising from its polar nature. It then considers different perceptions of the Antarctic.

3.2 Human involvement with the continent

3.2.1 Discovery and exploration

The first landings on Antarctica appear to have been in the austral summer of 1820-21 (Headland, 1994) but it was not until 1899 that an expedition, led by Borchgrevink, actually set out to winter on the continent. Many have recorded the exploits that led to the discovery of the continent and its gradual exploration. Hugh Robert Mill was a notable early polar historian, publishing *The siege of the South Pole* in 1905 as well as contributing historical notes to other works such as *Southern lights* (Rymill, 1938) which was the official account of the 1934-37 British Graham Land Expedition (BGLE), and *The Polar Book* (edited by Bernacchi, 1930). Kirwan's history *The white road* presented a good summary and was revised in 1962 as *A history of polar exploration*. Deacon's work on *The Antarctic circumpolar ocean* (1984) also began with a useful chronological survey. A popular presentation covering both polar regions can be found in Imbert's *North Pole, South Pole* (1992).

An overview of different periods is offered by Headland in his *Antarctic chronology* (1989, updated by personal communication 1996), which may be helpful to set in context the various expeditions and voyages mentioned, particularly in chapter 9 and appendix A5:

'Terra Australis'	to 1780
Sealing period	1780-1892

Continental exploration	1893-1918
Whaling period	1919-1942
Permanent stations	1943-1958
Treaty period	1959-1987
Politicised period	1988-current
(Headland, personal communication 1996)	

3.2.2 The place of science

Exploration and scientific study have frequently been combined. During early expeditions such as Cook's voyages, botanists recorded their discoveries and other logs and diaries contributed to scientific knowledge. In the following century, James Clark Ross made magnetic surveys, and the *Challenger* oceanographic expedition of 1872 - 1876 explored the pack ice between 78°E and 98°E, taking the first known photographs of Antarctic icebergs (Codling, 1997b). Sixty years later, Scott was described by the physicist on his first voyage as having a: 'deep and reverent attitude towards nature and a most genuine love of science' (Bernacchi, quoted in Savours, 1992: 28). More recently, scientific co-operation was the impetus for the International Geophysical Year which led to the Antarctic Treaty (chapter 4, section 4.2). Sir Vivian Fuchs in his book *Of ice and men: the story of the British Antarctic Survey 1943-73* (1982) included an appendix 'The purpose is science', which gave a clear statement of British developments during a formative period. A comprehensive and enjoyable account is found in Fogg's *A History of Antarctic science* (1992), whilst Laws (1991) and Drewry (1993) considered the future of Antarctic scientific research.

3.2.3 Tourism

Tourists visited the peri-Antarctic Macquarie Island in 1891 (Codling, 1995) and first reports of a proposed cruise to the continent date from November 1910 (Reich, 1979). Cruises began in 1958 and tourist ships have visited the Antarctic every year from 1966 onward. (Reich, 1979, 1980; Codling 1982a, 1982b; Enzenbacher, 1992, 1994; Headland, 1995) There were day flights which did not land on the continent from 1977 to 1980. These stopped after the crash of an Air New Zealand DC 10 with the loss of 257 lives (Reich, 1980) but have since restarted (Headland and Keage, 1995). Flights using smaller aircraft have also taken place and have been monitored by Swithinbank (1993, 1994, 1995, 1996, 1997).

There has been reserve in the scientific community about the presence of tourists on the

continent but more recently it was reported: 'there was consensus that tourism is a legitimate Antarctic activity.' (SCAR, 1995a: 90) The vast majority of these visitors see the continent from the sea, with only a very small minority seeing inland areas.

3.2.4 Motives for visiting

This study has confirmed one suspicion - mention of visits to the Antarctic almost always leads to questioning about reasons for going. Some have been able to respond relatively easily - Sir Edmund Hillary believed: 'that a demanding and constructive adventure is worthwhile for its own sake' (1968: 70). At that time, Antarctic tourism in any form was viewed with some suspicion, and the opinion of such a well-known figure was influential in its gradual acceptance (Reich, 1979). Adventure was also cited by Debenham, but he suggested other considerations usually backed it up: 'interest in the work itself ... fame ... [the] prelude to a career.' (1959: 240)

Others have been more introspective, seeing personal fulfilment as their motivation. Saunders, a laboratory technician and photographer with the Discovery Committee Research Expeditions in the 1920s and 1930s wrote:

The question has often been asked me, why did I, knowing as I did the hardships, the rigours of the climate and the difficulties, return repeatedly to South Polar regions for a period covering a total of fifteen years. ... the thought of the *Discovery* // sailing for Antarctica and leaving me behind made me feel ill. I just had to sail with her. I felt that my scientific work, and more particularly in my photography, I had a job to do to the best of my ability, and which I was going to see through to the end. I felt I was doing a worth while job, and infinitely preferred it to catching the 8.50 a.m. train to town and the 5.10 p.m. train back home. ... I loved the mountains, their beauty, their grandeur, the loneliness, and the penguins which made their nests on those bleak shores. ... it was the ice that called, and it was to the ice that I returned. (Saunders, 1950: 155)

Exploration and research have also been cited, perhaps most poignantly by Cherry-Garrard in the conclusion of his book about Scott's second expedition:

There are many reasons which send men to the Poles ... the desire for knowledge for its own sake is the one which really counts and there is no field for the collection of knowledge which at the present time can be compared to the Antarctic. ... If you march your Winter Journeys you will have your reward, so long as all you want is a penguin's egg. (1948: 562)

The last sentence refers to the arduous journey - the 'worst journey in the world' - made with Edward Wilson and 'Birdie' Bowers to the Emperor penguin rookery at Cape Crozier. Deep into the polar winter the three undertook a 36 day journey as part of Wilson's research into the embryology of Emperors. The harrowing account by Cherry-Garrard (chapter 7 in his book) can only give an indication of the difficulties the men faced. Two photographs by Ponting at the outset and on return, captured something of the men's fatigue (Reader's Digest Services, 1985: 194).

Rymill's response was similar:

Day after day we had travelled through silence which was absolute, not a depressing silence as of the dead, but a silence that had never known life. Even more impressive had been the sheer immensity of the country and the atmosphere of mystery which seemed to dwarf us - great mountains which have stood there untroubled for countless years and glaciers slowly forcing their way downwards, occasionally muttering in their depths to remind us that even here time goes on. And to think that when we return to England one of the first questions we shall be asked - probably by a well-fed business man whose God is his bank-book - will be, "Why did you go there?" How can one reply other than flippantly to such a mentality? (1938: 238)

Swithinbank analysed clearly his life-long fascination with polar regions (in May, 1988:153-155). He identified: 'A degree of humility also comes from seeing a mountain range that nobody has worked in before, that has been there for 1,000 million years, and saying to yourself I am in here for a moment of time in terms of this mountain.' (1988: 155)

Perhaps the most abstract account came from Lopez, who visited the Antarctic with the American National Science Foundation's Artists and Writers Program in 1987 and 1988. 'What the continent offers in abundance is a provocation to thought. ... Antarctica ... allows us to think hard, and with little distraction, upon our biology. To confront the tenuousness of it all.' (1992: 1) He goes on to suggest: 'Whatever it is that occupies the majority of our time ... we are also, many of us, trying to understand the way in which Antarctica is different from what we already know.' (1992: 3)

Polar workers writing about themselves present one approach, but it has been of interest to find a study by an individual who gave no indication of having had any personal polar experience. Tuan (1993) looked at the motives of polar explorers in a

contribution to a collection of studies concerning aesthetic responses to nature. In *Desert and ice: ambivalent aesthetic* he questioned the objectives of explorers, taking Byrd and Nansen as: 'perhaps the most introspective and philosophical' polar explorers (1993: 148). Unfortunately, Tuan appeared only to look for evidence to support his thesis: 'Explorers of desert and ice may be said to be half in love with piercing beauty and half in love with death' (1993: 155).

Taking Byrd's book *Alone* as his primary polar source, Tuan ignored critical events that occurred during the course of Byrd's experience. No mention was made of the fact that Byrd, living by himself at an isolated weather station, was almost killed by carbon monoxide fumes from the stove and a faulty electrical generator. Under those circumstances it was understandable Byrd's thoughts occasionally turned to death. To base an argument for the whole of the polar community on this and a limited selection of Nansen's writings, seems unreasonable and it is concluded that Tuan did not prove his case. Vilhjalmur Stefansson, a controversial but experienced Arctic explorer, took a position which suggested a solidity and dependability totally unrelated to desires for death: 'No one (unless it be some journalist) will dispute the statement that "blessed is the exploring expedition the story of which is monotonous".' (1913: 143)

3.3 Landscape dilemmas presented by the Antarctic

Within disciplines of landscape or environmental planning, techniques are continually being developed to identify and/or assess both natural and human factors. Difficulties remain - Litton termed factors such as season, light and weather 'ephemeral landscape' (1979: 81) and recognised that: 'those diverse and transitory effects ... defy cataloguing' (1972: 273), but for the majority of areas within the temperate zone, the major factors that contribute to the character of any landscape would be identifiable at any time of the year. Seasonal variations might be noted, but their influence would be relatively small - autumnal leaf fall changes visual aspects of deciduous plants, but their basic structure remains. Thus it would be assumed that surveys would have a validity throughout the year.

It is not so in Antarctica. The peculiarities of the continent need to be stated in order that both the extent, as well as the limitations, of survey may be recognised. On a broad-scale landscape assessment (chapter 7, section 7.4), ephemeral changes are probably not important, but if the survey is being completed for a site-specific Environmental Impact Assessment, greater care would be necessary to ensure that the situation was

surveyed under the most searching of conditions.

3.3.1 Visual aspects of ice

There are few other places where consideration has to be given to landscapes that are discernibly moving and often disintegrating. Sand dunes migrate, but not at the scale and speed of icebergs. The sculptor Andy Goldsworthy recognised this difficulty when he worked in the Arctic in 1989. In his diary he wrote:

I keep referring to the place as a 'landscape' - the landscape in which I work. And to some degree there are hills, but I am talking about water. When I was riding over the ice I thought, this isn't land, this is water, so is it a waterscape? But it is as solid as the earth, for the moment. The more I work with the snow and ice, the more I realise there is so much to learn about the land and the processes and forces that make up the land and life. In that everything is fluid, even the land, it just flows at a very slow rate. (Goldsworthy, 1994: 64)

One Antarctic worker spoke of the thrill of seeing the calving of an iceberg, not just because it resulted in floating ice, but also because it exposed an ice face never seen before.

Examination of an Antarctic landscape may show that many factors contributing to the landscape are floating ice not linked to land, whether large bergs or small floes. In time, *whether in the ensuing hour or during the next summer season, these features will change.* On practical grounds a line has to be drawn. It is suggested that when landscape descriptions are made, presence of floating ice not linked to land should be recorded as an ephemeral factor, but play no further part in subsequent classifications or evaluations.

3.3.2 Seasonal change and light

Antarctica has been described as a 'pulsating continent' (Mitchell and Tinker, 1980: 5) as in winter it more than doubles its size. Pack ice stretches up to 1100 km from the coast, yet this solid but temporary extension is mainly seen in the restricted winter light. For the purposes of this study, logistics demand that assessment takes place during the austral summer. Winter pack ice is therefore excluded on two counts; limitations imposed by the season and the complications, if not impossibility, of assessing relatively rapidly moveable or disintegrating landscapes.

Differences in light levels due to climatic change also cause difficulties. Scott remarked

that distant objects later seen on sledging journeys could assume 'extraordinary false appearances' (quoted in Savours, 1992: 41), whilst Charcot, the French explorer wrote:

nothing is so productive of error as the eyesight in polar regions. The least change in the weather alters one's estimates in truly fantastic manner, and all distinction between different levels vanishes. No Polar explorer, I feel sure, will contradict me when I state that it is impossible without a guiding mark to judge a distance in the Antarctic by the naked eye with any pretence of exactness.

(Charcot, 1978: 89)

Similar difficulties have been found with photographic material of the Antarctic, especially aerial views (chapter 8, section 8.4).

3.3.3 Whiteout

Whiteout is the loss of visual perception, usually due to a uniformly cloudy sky over a snow-covered surface. The light is so diffuse that there are no shadows or contrasts between objects. 'Most people are sceptical about the effects of white-out until they experience it and find it dramatically disconcerting, especially when they realize that loss of a sense of orientation can cause acute nausea.' (Sugden, 1982: 61) Bowers, on Scott's second expedition, recounted one experience:

Suddenly a herd of apparent cattle would appear in the distance, then you would think: 'No, it's a team of dogs broken loose and rushing towards you.' In another moment one would be walking over the black dots of some old horse droppings which had been the cause of the hallucinations. (quoted in Cherry-Garrard, 1948: 155)

It is temporary so makes no long-term effect on the process of landscape assessment, but in one sense it is the most extreme landscape dilemma because of the total severance of visual relationship between man, land and sky.

3.3.4 Aurora and other optical phenomena

The aurora is initiated by the sun and displays occur when large numbers of subatomic particles from the solar wind enter the earth's magnetosphere. Wright, a physicist on Scott's last expedition wrote:

Those who have seen only the pale travesties of the aurora which appear in low latitudes can have no conception of the awesome aspect of the exceptionally bright polar phenomenon - curtains or draperies of fire, swiftly changing in form and in colour, violet and green and red in quick succession and giving sufficient light to read small print. (1930: 38)

Many others have written of the visual splendours of the aurora, from Bischoe in his expedition journals during the years 1830-32 to Byrd over a century later (1958: 147).

Byrd also wrote of optical phenomena such as mirages:

I saw the blank north-eastern sky become filled with the most magnificent Barrier coast I have ever seen, true in every line and faced with cliffs several thousand feet tall. A mirage, of course. Yet, a man who had never seen such things would have taken oath that it was real. (1958: 61)

Other unusual sky effects occur, such as parahelia and parselenae. Edward Wilson recorded many of them in his watercolours, painted during both of Scott's expeditions. After the National Antarctic Expedition of 1901-04, a volume of *Photographs and Sketches* was published which included six plates by Wilson of meteorological phenomena and seven plates representing various types of auroral displays seen during the winter months. Wilson also supplied the descriptions, one of which indicated the frustrations of an artist attempting to record material as a scientific statement:

as the curtain appears to fold in one direction, it is waved out of sight in another, while the varying intensity of the vertical beams of light which compose it, now brilliant, now vanishing altogether, now stealthily appearing or disappearing imperceptibly, gives the onlooker a strange feeling of expectation and bewilderment, to which is added the conviction that the whole is very beautiful, but quite impossible to represent on paper. (National Antarctic Expedition, 1908: 290)

3.3.5 Vegetation

There may be other areas in the world, such as arid deserts, in which vegetation does not make a major visual contribution to the landscape, but in the the Antarctic the amount of land with any form of vegetation cover is minuscule. These areas are often measured in square metres, with average height in centimetres. Because of its rarity, all vegetation is important, and assessment of visual aspects demands a different approach from those appropriate for well-vegetated areas.

3.4 Geographic descriptions of the Antarctic

Traditionally, geographical reporting has taken the form of straightforward accounts with reluctance to use subjective expressions. Fogg and Smith noted that Weddell's account of his expeditions from 1819-22 was: 'in spare, clear English but with no indication of his

appreciation or otherwise of the Antarctic scene.' (1990: 24) Over a century later Sir Douglas Mawson gave a presidential address entitled *The unveiling of Antarctica* to the Australian and New Zealand Association for the Advancement of Science. Only once in a text of about 22,000 words did he use a descriptive word. Coats Land, discovered and named by the Scottish explorer Bruce, was said to be: 'a fine stretch of undulating ice-clad land' (Mawson, 1936: 21). The journal *Polar Record* first appeared in 1931, but it was not until the fourteenth number, published in July 1937, that one subjective word concerning the appearance of the Antarctic appeared. Part of the coast of the Peninsula seen by the British Graham Land Expedition was described as 'magnificent' (*Polar Record*, 1937b: 146). Before this, all articles or reports covered Antarctic work in simple and severely restrained prose.

When presented with accounts that included subjective material, respect was guarded at best, totally lacking at worst. The polar historian Mill, wrote of the 'racy narratives' of seventeenth century 'English buccaneers' which hardly suggests that he read them with any degree of academic regard. He continued: 'Antarctic icebergs swam into the ken of literary men and were immortalized in such romantic tales as Coleridge's *Ancient Mariner*.' (Rymill and others, 1938: 2) 'Literary men' appeared to be a separate race to polar men.

Passages from Captain Cook's *Journals* had not only informed but also inspired Coleridge. Yet Fogg and Smith suggested that Cook: 'was in some respects of a prosaic cast of mind' (1990: 20). It is debatable whether he was prosaic or merely cautious, but it is interesting to see that later writers highlighted Cook's descriptions of sea ice. Neider (1972) and Porter (1978) refer to Cook's descriptions, especially those from the ice-edge cruises of his second voyage with the *Resolution* and *Adventure*, 1772-75. Cook's entry for 24 February 1773 read:

the Islands of Ice... great as these dangers are, they are now become so very familiar to us that the apprehensions they cause are never of long duration and are in some measure compencated by the very curious and romantick Views many of these Islands exhibit (edited by Beaglehole, 1961: 98)

Cook's use of the term 'romantick' is interesting. Fogg and Smith recognised that Cook: 'lived at a time when the Romantic Movement and a consciousness of the sublime in the natural world were developing in Europe' (1990: 20) and they acknowledged that he was on familiar terms with the London intelligentsia before his Antarctic voyage. Cook was probably aware of the developments then taking place in various aspects of English

cultural life. Born in 1728, he was brought up at Great Ayton on the edge of the North York Moors, living in the area until his late teens. In later life he continued to have contact with the county of his birth as between his first and second voyages he recorded that: 'having business to transact down in Yorkshire, as well as to see an aged father' he obtained three weeks' leave (quoted in Barrow, 1941: 114). Less than thirty miles from his village, the architect and dramatist Sir John Vanburgh had designed much of the house and landscape at Castle Howard for the 3rd Earl of Carlisle. Most of the landscape work took place between 1710 and 1746, the period of Cook's boyhood. It can only be conjecture, but it is likely that information about the project would have spread by word of mouth, as well as local demands for labour to carry out the large earth moving schemes. Conceived on a vast scale, it is a masterpiece that shows the: 'transition from classicism to romanticism in England' (Jellicoe and Jellicoe, 1975: 235).

Cook also saw one of the precursors of this movement to romanticism. In sailing on the Thames, he would have seen Greenwich Park rising up the steep slope on the south bank, together with the majestic classical buildings by Wren and others. These designs would have been part of Cook's 18th century cultural background. Despite the dangers facing him and his seamen, he was able to appreciate the beauty of the 'ice islands' and write of them in his *Journal*, in a style true to his age. He saw their beauty in terms that were then current and therefore understandable to his immediate readers.

The reports produced by expeditions contain material that deserves detailed examination especially in the context of this study. General descriptions of the land were given, on a scale that enabled overall impressions to be conveyed. As an example, after the return of Scott's second expedition reports on the physiography of four regions were produced. The most detailed was by Taylor (1922), a trained physiographer who covered McMurdo Sound and Granite Harbour, but clear descriptions were also made by the physicist Wright who visited the Beardmore Glacier (1923), and the geologists Debenham and Priestley who reported on the Ross Archipelago (1923) and the Robertson Bay and Terra Nova Bay regions (1923) respectively. Subsequent studies may have revised some of their conclusions, but their wide-scale descriptive approach is helpful. Rymill and others (1938), writing about the Antarctic Peninsula, followed their pattern.

3.5 Landscape perceptions of the Antarctic

The word 'landscape' has been given varying interpretations. These are examined in

chapter 7, section 7.3. For the purposes of this immediate overview it is necessary to use the definition established there. Landscape is taken to refer primarily to the environment as visually perceived; the appearance of the land, ice and sea. A further input is consideration of subjective matters such as perception, so as to give a wider and richer picture. This approach has been supported by many, including the Countryside Commission: 'The way in which a landscape is perceived and valued adds a significant extra dimension.' (1990: 34) Whilst giving a geographer's overview, Baker suggested that landscape had a cumulative character which demanded more than factual descriptions. He argued that studies: 'necessitate an historical perspective. Because landscapes have histories they possess a compelling human significance.' (1992: 7)

Even though man's impact on the Antarctic continent has been limited, in both time and extent, material is abundant. Books, journals, diaries, logs, literary references, paintings, films and photographs exist, as well as guidebooks and picture postcards, though not in the profusion found in more settled areas of the globe. Detailed coverage on a continental scale is impracticable but a brief overview of these sources is given. On occasions, these amount to no more than lists, but they are included to show the range of available material. A more detailed study of the area of the Peninsula between 65°-75°S is included in chapter 9 and in Appendix 5.

3.5.1 Sources

The bibliography drawn up by Meadows and others (1994) offered a beginning to identification of material. The early years of the 20th century were especially rich. During the 'heroic age' of polar exploration, many began to describe the Antarctic, by words, paint or photographs. King highlighted one group, the 'wealth of literary talent' in those who were on Scott's last expedition (1994: 142). Cherry-Garrard, Priestley, Lieutenant Evans, Ponting and Griffith Taylor all wrote accounts, in addition to the journal of their leader. Diaries such as those kept by Wilson and Wright have also been published. Sketches and watercolours were made by Wilson, whilst photographs and films were taken by the 'camera artist' Ponting. From these sources, a wider image of the expedition and its settings emerges, beyond a straightforward record of exploration or accumulation of scientific data.

3.5.2 Explorers' perceptions of the Antarctic

In both Europe and America, Edmund Burke's idea of the 'Sublime and Beautiful' has been strongly influential in the development of aesthetic thought from the 17th century

through to the present. His essay *A Philosophical Enquiry into the Origin of our Idea of the Sublime and Beautiful*, (published in 1757), discussed the distinctions between the sublime, with its associations of infinity, darkness, solitude, terror and vacuity, and the beautiful, which consists in relative smallness, smoothness, and brightness of colour. (Drabble, 1989: 948)

In his 1996 book, *I may be some time: ice and the English imagination*, Spufford's detailed examination of Burke's influence included references from both Sir James Clark Ross's expedition of 1839-43, and the Scott expeditions. During the earlier journey, a blacksmith named C J Sullivan wrote a diary for one of the sailors on board HMS *Erebus*. It can only be supposed that Sullivan was using language he heard from officers, for he wrote:

My friend if i could only view and Steady the Sublimity of nature - but Lo i had to pull the brails. This noble battery of Ice that fortifyd. the Land two hundred feet high and floating islands in all directions this Strange Scenery was Remarkably Striking and Grand. ... It would take A man of Talents to describe this unequal Sight. For no imaginative Power can convey an adequate idea of the Resplendant Sublimity of the Antarctic Ice wall. (Savours, compiler, 1961: 598-599)

Spufford concluded that to Scott's expedition the Antarctic landscape was:

Like a Gothic villain ... in some senses [it] took the initiative away from the heroes. Its sublime authority could not be gainsaid; and the explorers responded by identifying themselves with its sublimity, glorying in the place even as it thwarted or even hurt them. (1996: 37)

From examination of explorer's diaries, it appears that relatively few passages described desolation without also responding in some way to grandeur. On his first expedition, Scott experienced moments of desolation, as recorded in his sledging diary for the 30 November 1903, when on the polar plateau: 'The scene about us is the same as we have seen for many a day, and shall see for many a day to come - a scene so wildly and awfully desolate that it cannot fail to impress one with gloomy thought' (Scott, 1929: 605). He later suggested that the interior of Victoria Land: 'must be considered the most desolate region in the world. There is none other that is at once so barren, so deserted, so piercingly cold, so windswept or so fearsomely monotonous' (Scott, 1929: 607), yet even when sledging on the arduous three-month Southern Journey, Scott could write:

As one plods along towards the midnight sun, one's eyes naturally fall on the plain ahead, and one realises that the simile of a gem-strewn carpet could never be more aptly employed than in describing the radiant path of the sun on the snowy surface. It sparkles with a myriad points of brilliant light, comprehensive of every colour the rainbow can show, and is so realistic and near that it often seems one has but to stoop to pick up some glistening jewel. (4 December 1902; 1929: 441)

More recent accounts of the same landscape do not follow the same pattern. Another long-term visitor to the polar plateau, although not an explorer in the same sense as Scott, spoke of her uninterrupted flat ice 'view' of 360°:

When you're sitting there drilling you can be totally entertained just watching the sky and watching the surrounding area and people say "Well, isn't it white all the way round?" Well, I guess it is, but its quite beautiful, quite beautiful. People just don't understand the beauty of it all sometimes. (an unnamed American worker in the BBC Radio 4 broadcast *The Big White*, 10 and 25 August 1996)

Perhaps her appreciation was also influenced by a feeling of security (chapter 9, section 9.5).

Ice consistently seemed to be considered the greatest terror. On approaching Cape Adare in 1899 with Borchgrevink's British Antarctic Expedition, Louis Bernacchi wrote:

Approaching this sinister coast for the first time, on such a boisterous, cold and gloomy day, our decks covered with drift snow and frozen sea water, the rigging encased in ice, the heavens as black as death, was like approaching some unknown land of punishment, and struck into our hearts a feeling preciously akin to fear It was a scene, terrible in its austerity, that can only be witnessed at that extremity of the globe; truly a land of unsurpassed desolation. (quoted in Reader's Digest Services, 1985: 135)

The feelings generated by the 'land of punishment' cannot have been long-term. Bernacchi returned to the Antarctic with Scott's *Discovery* expedition in 1901, and continued polar activities for many years.

Icebergs have played a considerable, if not dominant part, in polar literature. On the *Challenger* in 1874, the first iceberg brought most hands on deck to see it (Codling, 1997b). Even when the dangers of ice were fully recognised, the beauty of the scene was appreciated. Charcot wrote in his diary for the 14 January 1910:

The icebergs are becoming more and more numerous. There are some superb ones, and as, inspite of the great quantity we have been permitted to see since our arrival in the Antarctic, we are not altogether *blasé* by their marvellous architecture, I pass quite close a few to enable us to photograph them. ... The mighty sea and the monstrous icebergs are playing their giant's games under the grey and lowering sky, caressing or fighting, and in the midst of these marvellous manifestations of nature, which are not made for man, we feel that we are merely tolerated, although a kind of intimacy may be created between us and our magnificent hosts. (1978: 289)

Thoughts of bleakness and desolation have also been expressed:

I don't think that any of us will ever forget what it was like in the Devil's Graveyard: the sunless corridors of waste waters; the fog that sometimes thinned but never lifted; the crash of the gales, and occasionally over that uproar the heavier sounds of bergs capsizing in the storm; and everywhere those stricken fleets of ice, bigger by far than all the navies of the world, wandering hopelessly through a smoking gloom. (Byrd, 1958: 22)

References to the beauty of the continent are multitudinous and may be found in writings belonging to every generation of polar visitor. In the introduction of a biography of Bowers, who died with Scott on the return journey from the Pole, Cherry-Garrard wrote:

It has been my happiness to see two of the most beautiful parts of the world. The one was England ...The second is the Antarctic. In its grandeur, its vastness and, in a way, its purity the Antarctic is the most beautiful thing in the world. If you could live a month at Hut Point when the sun is going away for four months you would agree with me. (1938: xiii)

Many other examples may be found, for instance in Wilson (1966), Laws (quoted in Hedley-Lewis, 1977) and Johnson (1990).

Spufford's contribution is a beginning to understanding more about perceptions of the Antarctic, but in his review of the book Dodds identified at least some omissions, such as the culture of polar exploration in late twentieth century Britain (1997b: 157).

Understanding perception is influential in developing preferences and the adoption of criteria for assessment (chapter 8, sections 8.9 and 8.10), so further research would be helpful.

3.5.3 Academic studies

Increasing numbers of studies about the Antarctic defy easy classification, although they have been variously described as following the: 'tradition of lyrical science writing' (publisher's blurb for Green, 1995) or environmentally-sensitive analysis.

One of the first full-length books, Pyne's *The Ice: a journey to Antarctica* (1987) was praised by Schama as an: 'environmental history ... chronicling the ice-world of Antarctica' (1995: 13). Not all shared Schama's enthusiasms. The book was summarised by a reviewer as: 'a philosophical treatise interspersed between chapters of astonishing imagery.' (Clarkson, 1989: 318) Ice was described with a freedom that on occasions disregarded fact and pursued obscure directions:

Here is a world informed by ice ... ice that is both substance and style ... The journey of the ice from core to margin, from polar plateau to open sea, narrates an allegory of mind and matter. (1987: 2)

Yet there were also descriptions that illuminated:

Antarctica ... is already abstracted, minimalist, conceptual. Here is not another case of information overload but of underload. The ice has already filtered and reduced the landscape to the simplest environment on Earth. (1987: 202-203)

Pyne's presentation is unbalanced. Clarkson found many sections were: 'perhaps the product of a hyperactive imagination driving the pen of a philologist; a less sympathetic reviewer might have called it verbal diarrhoea' (1989: 318) but as one of the first to break away from either a traveller's tale or a philosopher's treatise, Pyne is to be commended. Campbell (1992) was more successful in *The crystal desert: summers in Antarctica*. He conveyed aspects of the *genius loci* of the continent and as an ecologist, saw a wider spectrum than Pyne whilst avoiding extremes of verbiage.

Other texts have moved further away from science. Simpson-Housley published *Antarctica: exploration, perception and metaphor* in 1992. The title gave hope of a wide-ranging consideration of environmental perception, but the study was disappointing, using mainly secondhand sources while drawing few conclusions. Mills (1993) suggested that more questions had been raised than answers given. A far more satisfactory approach is made by Dodds (1997a) in 'Antarctica and the modern geographical imagination (1918-1960)'. He outlined the: 'intersection between photography, aerial vision, cartography, geopolitics, and changing representation of Antarctica.' (1997a: 50).

3.5.4 Popular presentations

Perhaps because of its transience, more popular presentations have not been frequently studied, although Pringle attempted to survey: 'the ways in which the polar landscape has carried various ideological messages over the last 150 years' (1991: 43). He covered both Arctic and Antarctic, including references to literature, press coverage, paintings, films and cigarette cards. The range was too great, geographically, chronologically and materially, to present an adequate survey.

On many occasions, material is emotionally presented with apparently minimal regard for accuracy. The magazine for Midland Bank customers *Meridian* contained a critical article entitled 'White wilderness under threat' calling for increased protection for the continent as: 'scientists have already done their share of harm.' (Pain, 1990: 27) No references were offered in support of her claims. Petitions, such as that run by the WWF and Greenpeace during the early 1990s, received varied publicity, ranging from the National Federation of Women's Institutes journal *Home and country* (April 1991) to Christmas gift catalogues (1992 for the World Wildlife Fund). Protection as a World Wilderness Park was propounded as 'the best way to save Antarctica'. The aims could be understood, but information was presented in a biased form.

3.5.5 Postcards and guidebooks

BAS has produced a series of high-quality coloured postcards. A total of 74 different cards had been published up to November 1995. BAS is primarily a scientific research organisation, so perhaps it was not surprising that the majority illustrated aspects of their work and the necessary buildings and transport. Only four cards (just over 5%) were photographs specifically taken to show land, water or ice without human presence. Two were aerial photographs, one showed icebergs, and the last the so-called 'Kodak Crack' - the unofficial name for the southern entrance to the Lemaire Channel where it has been suggested that in any Antarctic season the amount of film used guarantees Kodak's profits (Appendix 5, section A5.10).

The only available comparisons are two sets, each of ten cards, published by the National Committee for Antarctic Research of the People's Republic of China. They were received during the 1990s, but there is no indication of the date when they were first published. None of these Chinese cards show humans. Only three out of the twenty have any indication of buildings or man-made artifact. Clearly there is a very different emphasis in selection criteria between the two countries.

In the 1970s and 1980s, tour companies produced handouts and files for their clients, which gradually improved as material was collected and reproduction procedures became more sophisticated. It was inevitable that guide books to the Antarctic would ultimately appear. A 'travel survival guide' covering the continent in the Lonely Planet series was one of the first to appear in this country (Rubin, 1996). The following year Wheeler published her 'travel companion' to Antarctica, the Falklands and South Georgia. One of her qualifications was listed as 'belly dancing' (1997: iii), but the relevance to Antarctica was not explained. Her writing was in guide-book style and easily read, but some of her opinions would not be accepted by many Antarctic workers. Wheeler had published an earlier book *Terra Incognita: travels in Antarctica* (1996) which included accounts of her stay at a British base in the austral summer of 1994-95. The picture she presented was considered to be inaccurate and was not well received (many personal communications from Rothera personnel, 1997; see also review by Walton, 1997b). Her accounts of life on an American base were more sympathetic.

3.5.6 Fiction

Meadows and others (1994) have several pages covering fiction, ranging from Biggles to Beryl Bainbridge. Additional material abounds, including science fiction from Arthur C. Clarke in *The fountains of paradise* (1989), to a thriller by Wilbur Smith, who used an Antarctic tourist cruise as the setting for his typically fast-moving novel *Hungry as the sea* (1978). Improbable though it may seem, a cruise is also used by Heley for a teenage novel highlighting problems caused by dyslexia (1992).

3.5.7 Poetry

The Rime of the Ancient Mariner is a frequently quoted verse with an Antarctic setting: 'The ice was here, the ice was there' (Coleridge, 1798). The sources of Coleridge's story and imagery were traced by Lowes, a professor of English in several American universities, but Cook's journals of his second voyage with the '*Resolution*' and '*Adventure*' were particularly influential. Doré's well-known engravings illustrating the poem did not follow until 1875, but they provided respectable images of terror for the Victorian readership.

A more abstract approach may be found in the vision linked to Antarctica in T. S. Eliot's *The Waste Land*. Although his primary theme was Christ's journey to Emmaus, he added:

The following lines were stimulated by the account of one of the Antarctic expeditions (I forget which, but I think one of Shackleton's): it was related that the party of explorers, at the extremity of their strength, had the constant delusion that there was *one more member* than could actually be counted. (Eliot, 1961: 73)

Gardner described this passage as: 'a momentary vision, which may be the illusion of exhaustion, or may be supreme reality' which then entered: 'a region of nightmare and delirium, outside time' (1979: 76).

3.5.8 Theatre

Stage plays with polar connections have been presented for many years. During the Victorian period there were considerable numbers of short plays, sometimes no more than interval-filling tableaux, that appear to be polar orientated. A key-word search of Volume 6 of Nicoll (1965) produced many titles, probably inspired by the interest in the Arctic generated by Franklin's doomed expedition. In *Polar theatre: two Victorian plays* I briefly considered Henry Farnie's *Antarctic* and Wilkie Collins' *The frozen deep* (Codling, 1984). More recently, authors such as Ted Tally (*Terra Nova*) and Manfred Karge (*The Conquest of the South Pole*) have written dramas based on Antarctic expeditions.

3.5.9 Photography, films and television

The works listed by Meadows and others (1994) summarised the best of still photography on the continent, from the heroic era of Ponting and Hurley to the more recent work of Porter (1978) and Johnson (1990).

Ciné films were also taken in the early years and by many subsequent expeditions such as the British Graham Land Expedition of 1934-1937. The value of such records was not always recognised. In 1921, Herbert G. Ponting published his book *The Great White South*, his record as 'camera artist' of Scott's last expedition. The library of Scott Polar Research Institute holds an autographed copy that belonged to George Seaver, the biographer of both E. A. Wilson and 'Birdie' Bowers. Seaver attached various newspaper cuttings to the book, mainly letters to the press, that illustrated the difficulties in establishing the validity of films.

On the 16 January 1928 *The Daily Telegraph* published a letter from Seaver about the 'marvellous collection of visual records' of Scott's last expedition, held by Ponting. According to Seaver, the photographer could not afford to present them to the nation, but was willing: 'to let England acquire them for less than half the sum that America would

have to pay for them.' Seaver appealed for a public-spirited person or organisation to save the films and photographs for the nation, in language bearing a remarkable parallel with the Churchill papers episode in 1995.

A few days later, a short article by Alder Anderson suggested:

It is at last beginning to be realised that the life-like records of current events which the photographic camera is able to capture and fix on a strip of celluloid will be regarded by posterity as priceless heirlooms. To hand them on intact for the benefit of future generations will probably be regarded, in the near future, as one of the duties of enlightened citizenship. (*The Daily Telegraph*, 21 January 1928.)

Yet Mr Anderson said the British Museum had been offered the film of the expedition as a gift a few years previously, but declined it. An editorial in the paper later called this a 'disagreeable fact' (23 January 1928). Seaver's cuttings include a report from *The Times* on 23 November 1928 that Ponting's film had been purchased for the nation on the previous day. It was the first time a film had been acquired and it was then held by the British Empire Film Institute as the nucleus of a national film museum.

In 1948 Ealing Studios produced *Scott of the Antarctic* for which Vaughan Williams wrote the music (section 3.5.10). An account of the making of the film may be found in James (1948). Debenham, as a member of the expedition, gave a personal opinion of the film in *Polar Record* (1949). He admitted initial reservations but was able finally to say:

Yet it did happen, and here we are ... saying, in spite of ourselves, "Yes, that is pretty well how it all was". The finest tribute I can pay to the film people is to say that at the first viewing the emotions aroused were well nigh insupportable. (1949: 314)

Television interest in the continent over the last ten years has been high, with the commercial channel Anglia producing *Antarctica: the last frontier* (1989), followed by the BBC's longer series *Life in the freezer* (1993). Between the two documentaries, the BBC also visited the continent during the travels of Michael Palin in his *Pole to Pole*.

Both documentary series were supported by books of the same name. Anglia also produced a brochure to accompany the series and set up *Antarctica Discussions*, forums intended for viewers' contributions to debates about the future of the continent. The BBC series, extending to six programmes, and led by Sir David Attenborough concentrated on wildlife. A well-reviewed CD-Rom is available, based on the series.

The coverage in the *Radio Times* was extensive with advertisers also using the opportunities given to them. The photogenic value of penguins were exploited by both the Prudential Assurance Company and Colman's, although the support given by the food company to Scott's expeditions was not mentioned. All of the television series had spectacular, high quality sequences.

3.5.10 Music

The number of pieces directly inspired by the Antarctic is limited. Vaughan Williams was commissioned to write film music for *Scott of the Antarctic*, a British production that went on to win first prize at the 1949 Prague film festival. He later distilled the best of what had already been written into a new work, his *Sinfonia Antartica*, which he dedicated to Ernest Irving, the musical director of Ealing Films (Day, 1972). Although not generally regarded as one of his finest works, the *Sinfonia Antartica* was: 'a necessary stage in his pilgrimage. Without it, the final phase would have been impossible.' (Mellers, 1989: 205) The descriptive nature of film music may still be recognised in the *Sinfonia* and perhaps it is inevitable for those who have seen the film to link images with musical themes. The final movement has been described as:

disquieting; it is so deliberately, because the outcome of the work is not merely remote but also cruel. It does not peer into unknown regions; it is as flat and featureless as the dead landscape which inspired the whole symphony. (Day, 1972: 150)

More recently, the British composer Nigel Westlake has echoed Vaughan Williams, and written *Suite: Antartica* for solo guitar and orchestra. During the 1997-98 austral summer, the composer Peter Maxwell Davies visited the continent with BAS. Before his visit, he said in a radio interview that he hoped for 'very unfashionable inspiration' for the orchestral work which had been commissioned.

3.5.11 Art

Art in the Antarctic deserves a major study. Jacobs' study *The painted voyage: art travel and exploration 1564-1875* (1995) only briefly considered polar areas, and even then concentrated on the Arctic. A better overview may be gained by looking at the illustrations in one of the general Antarctic books, such as Imbert's *North Pole, South Pole* (1992) or Reader's Digest Services *Antarctica* (1985). A wide range of references may be found in the bibliography by Meadows and others (1994).

The southern continent has been portrayed by many, beginning with work to be found in the logs and journals of the early explorers. Naval officers were expected to be able to sketch, so as to record coastlines or other maritime features that might aid navigation. On occasions, artists were taken as expedition members, such as Hodges with Captain Cook (Smith, 1969; Joppien and Smith, 1985) or Wild with the *Challenger* (Codling, 1997b).

The lot of a polar expedition artist was not easy. Although tolerated as necessary craftsmen, they were frequently expected to take on other tasks such as secretarial or administrative duties as well as recording events, often under pressure of time or in severe physical difficulties. Prior to the development of reasonably compact cameras with film capable of being used in extreme conditions, expedition artists were frequently seen as draftsmen rather than artists. Nevertheless, in some cases the work they produced can stand judgement under stern criteria. Hodges, on Cook's second voyage; Wilson, who was with Scott on both the *Discovery* and the *Terra Nova* expeditions; Seago, who visited the Peninsula in the mid-1950s (Codling, 1997a), and David Smith all produced works of high quality.

Challenger was probably the first official expedition to carry a photographer as well as an artist and a survey of the illustrations and photographs made during their three week voyage in polar waters during February-March 1874 showed a fascination with ice (Codling 1997b). The work of the official artist was supplemented by drawings and watercolours by several of the ship's officers and scientists, as well as a unique lower-deck collection by a cooper. It is apparent that amateur artists more frequently felt able to produce 'action pictures' showing events as if they had been spectators. The eight existing photographs are the earliest known images of southern icebergs and several were used as the basis for later illustrations, sometimes heavily re-worked so as to heighten dramatic effect.

This appears to have been typical. Especially in sketches made whilst in the Antarctic, artists would portray the sights they saw in a straightforward manner, but later studio works might be developed for specific purpose - as in Burn-Murdoch's 'Scottish Whaling Antarctic Expedition', a large work (177 x 128 cm) and therefore presumed not to have been painted when the artist was in the south. It is primarily a record of the vessels showing three of the four ships that made up the expedition. The setting is clearly Antarctic, because of the presence of tabular bergs and the inevitable penguins, but no

land is shown (Reader's Digest Services, 1985: 127).

3.6 Imagined landscapes

Even with the visual knowledge given by present day media presentations, the Antarctic will be an imagined landscape for the majority of this generation. They will never have the opportunity to visit the continent so their Antarctic landscape will be imagined. This is not a new situation. Roots' suggested that in naming both the Arctic and Antarctic before the areas had been discovered or explored, Greek philosophers had established concepts of geographical places, but without visual knowledge (1995: 120, quoted in chapter 6, section 6.2). Even those who have visited the Antarctic have imagined polar landscapes. One participant in the Personal Construct Theory survey (chapter 9, section 9.10) named and freely talked about a location on the Peninsula which they had never seen, thus demonstrating the importance to them of an imagined landscape.

Although not relating to the Antarctic, a further instance of the importance of imagined landscapes was seen in Leeds City Art Gallery. An exhibition entitled 'Points of vision' had been mounted during the summer of 1997 and eight participants, from different sections of a large legal firm in the city, had chosen works from the gallery's collection loosely related to 'landscape'. One choice was Henry Moore's 'Nine Imagined Views of Norway' 1923. A planned trip to Norway fell through, but in writing to a friend to tell her of the cancellation, Moore included a page of nine pen and ink miniature sketches. He listed the sketches as: '1-4 A fiord, 5 Descent of fiord, 6 Glacier thawing, 7 Norwegian village, 8 Myself 1000 ft up, 9 Just to fill up the page' (a landscape with a pond in the foreground and trees on the skyline). On page 2 of his letter Moore wrote: 'Norway is wonderful according to the Guide Book and what I remember of my school geography - (Page 1 is composed of scribbles of what I remember of the latter.)'

The individual who had chosen the Moore letter wrote a caption:

... I thought it was interesting to include in our exhibition a landscape of a place that the artist had never been. On our introductory session to this project we were asked to discuss the meaning of landscape and what landscape meant to us. As part of this we soon realised that everyone had preconceived or stereotypical ideas about various landscapes they too had never seen, which had come about through various media: literature, word of mouth, television and film. This is what Moore is giving us here. ...

These three episodes came together. During different eras, and in differing places in the world, people had responded to landscapes they had never seen, and could only imagine. The Greeks developed thoughts, the survey participant described in words, and Henry Moore had drawn in pen and ink, but all were attempting to convey their imagined landscape to others.

3.7 Summary

Early explorers not only mapped their discoveries, but also described their experiences. That pattern has continued in ever-widening ways. It is not always easy to interpret approaches or motives, but these subjective factors are part of the human response to the continent and with care can be used to understand reactions to the Antarctic.

4 ANTARCTIC TREATY SYSTEM

4.1 Scope of the chapter

A simple chronological sequence has been adopted to outline the political development of the Antarctic Treaty System (ATS) and the influence of other organisations, as they relate to this study. This approach has the drawback of mixing governmental and non-governmental organisations, but shows the development of environmental concerns that led up to the 1991 Protocol. The central thread in the sequence is identification of the progression that led to 'wilderness and aesthetic values' appearing in the ATS. Figure 4 (on following page) gives in abbreviated form the main events or reports outlined in the text and distinguishes their status.

The *Handbook of the Antarctic Treaty System: eighth edition*, 1994, edited by John Heap, comprehensively covers the development of the System from 1959 up to the 1991 Protocol. A legal commentary is found in Watts (1992).

4.2 1957-1958 International Geophysical Year and 1959 Antarctic Treaty

During the International Geophysical Year (IGY) in 1957-1958, 12 nations were active in the Antarctic. Co-operation experienced during the IGY was described by the veteran Antarctic research worker Paul Siple as: 'a decided contrast to animosities elsewhere in the political arena' (quoted in Central Intelligence Agency, 1978: 42). Following this success, the US invited representatives to Washington during 1959. There the Antarctic Treaty (AT) was negotiated and agreed by the governments of Argentina, Australia, Belgium, Chile, the French Republic, Japan, New Zealand, Norway, the Union of South Africa, the Union of Socialist Soviet Republics, The United Kingdom of Great Britain and Northern Ireland and the United States of America.

Other nations have since acceded to the Treaty. The most recent summary is given by Headland (1993; updated by personal communications, 1996 and 1998). Figure 5 (on page 69) shows a modified form of his table, together with membership of the Scientific Committee for Antarctic Research (SCAR, section 4.3) and signatories of the Protocol (section 4.8).

The AT opens by: 'recognizing that it is in the interests of all mankind that Antarctica shall continue for ever to be used exclusively for peaceful purposes' (text in Heap, 1994: 11). Within the Treaty the importance of science is stressed. There is also a clause

asking Contracting Parties to consider measures for the: 'preservation and conservation of living resources in Antarctica' (Article IX.1.(f)) During the Third Reading of the Antarctic Treaty Bill in Parliament, one Member welcomed the legislation and suggested that: 'it will go a long way to protect the essential character and quality of the fauna and flora, and perhaps the beauty too of the Antarctic continent.' (Griffiths, 1967, *Hansard* column 1590) His interpretation was wider than the concerns indicated by the text, in which there is no mention of concepts such as 'the Antarctic environment'. Watts took this as: 'an indication of the rapidity with which environmental concerns have become an established part of international agenda.' (Watts, 1992: 255)

4.3 1958 Scientific Committee on Antarctic Research (SCAR)

It was recognised that the scientific effort put into Antarctic research during the IGY merited continued international action. A Special (now Scientific) Committee on Antarctic Research (SCAR) was set up under the auspices of the International Council of Scientific Unions (SCAR, 1959). It was agreed that nations active in Antarctic research could appoint a delegate to SCAR, supported by specialist advisers. Since 1958 SCAR has continued to co-ordinate scientific activity in the area south of the Antarctic convergence, including certain peri-Antarctic islands.

The place of SCAR and its relationship to the ATCPs has been discussed by many, including Roberts (1978), Gjelsvik (1984), Caflisch (1992) and Drewry (1993). Caflisch classifies SCAR as an influential non-governmental organisation (NGO) and commends the Antarctic community for: 'a pioneering attitude both in institutionalising recourse to scientific advice and in entrusting the advisory function to an NGO.' (Caflisch, 1992: 161) At the 1985 Brussels ATCM, SCAR was given observer status (ATCPs, 1986, Recommendation XIII-2). Recommendations adopted by the ATCPs at their Consultative Meetings are contained in regular *SCAR Bulletins*, published in *Polar Record*.

4.4 The development of wider environmental concerns

4.4.1 1961 SCAR: *Conservation of Nature in Antarctica*

SCAR Bulletin 8 (1961) noted the acceptance by the Executive Committee of a report by the Working Group on Biology concerning *Conservation of Nature in Antarctica*. The report's general principles stated:

The Antarctic flora and fauna are of outstanding scientific importance and every effort should be made to minimize interference by man. ... The Antarctic fauna

contains species which are of world-wide appeal and interest, existing in an environment of great scenic beauty which has so far been little impaired by man. This situation, which is now unique among the great land masses, merits preservation as a world heritage. (SCAR, 1961: 533-534)

No detail was given as to the appropriate format for 'preservation as a world heritage' but the suggestion came many years before the 1972 World Heritage Convention (chapter 7, section 7.8).

4.4.2 1961-1979 Antarctic Treaty Consultative Meetings

The first Antarctic Treaty Consultative Meeting (ATCM) took place in Canberra during July 1961. Recommendation I-VIII contained a simple document entitled *General rules of conduct for preservation and conservation of living resources in Antarctica* (quoted in Heap, 1994: 2047). In about two hundred words, straightforward guidelines were given for all persons entering the area, although no mention was made of habitats.

The third ATCM took place in 1964, and the 'Agreed Measures for the Conservation of Antarctic Fauna and Flora' were annexed to Recommendation III-VII (quoted in Heap, 1994: 2048-2053). Under these measures the Treaty Area was considered to be a 'Special Conservation Area', a term defined by the stated Measures.

From the mid-1960s to the late-1970s Consultative Meetings regularly considered issues such as 'Man's impact on Antarctic environment'. Despite the apparent scope of the title, the concerns were limited. Recommendation IX-5 arising from the Ninth ATCM, held in London during 1977, illustrates this. The representatives said they were 'deeply aware that the Antarctic environment is unique' and that they were 'determined to protect the Antarctic environment from harmful interference' but in the declaration that followed the statement appears to refer to ecosystems, rather than consideration of any wider understanding of 'environment'. (ATCPs, 1978: 93)

Watts states that environment has never been defined in any of the AT instruments, but suggests that: 'it is probably convenient to use "environment" in an extensive sense, rather than in a limitative one.' (1992: 255) He then lists a wide range of environmental concerns, including aesthetic and wilderness qualities. An alternative surmise is that the word has been used in different ways at different times, and that its meaning is best understood only in each individual context.

Delineation of the boundaries between SCAR and the ATCPs may be illustrated by events following the VIII ATCM in Oslo, 1975, when a Recommendation concerning the effects of mineral exploration was adopted. Aware of the political sensitivity of the issue SCAR concluded that their competence was limited to areas 'where scientific knowledge and advice can be beneficial.' They suggested that SCAR could be called upon to: 'identify special natural features worthy of protection, to advise on the potential environmental impact on any given area of a proposed exploration ...' (SCAR, 1977: 635). Again, the emphasis was upon ecosystems.

SCAR published *Possible environmental effects of mineral exploration and exploitation in Antarctica* in 1979, with Zumberge as editor. Under the heading 'Construction effects', a passing comment was made about potential land surface changes: 'By modifying the landscape, the aesthetic quality of the locale may be degraded, thereby evoking some adverse public reaction.' (1979: 28) This should be noted as one of the few observations from SCAR that ventured beyond their usually restricted understanding of 'environment'. Whilst it may be commended for this, the statement has to be questioned. It could be understood as suggesting all modifications to the landscape are inevitably detrimental. The use of 'may' just gives the benefit of the doubt to offset the challenge that it is a wholehearted condemnation. It is accepted that using standard wilderness arguments (chapters 5 and 6), any ground modification would be deemed unacceptable, but once it is accepted that a development may take place, the area can no longer be considered a wilderness and a different set of parameters then exist. Although the 1979 SCAR statement was made in relation to mineral workings which under the Protocol are now prohibited (ATCPs, 1993, article 7), the main thrust of the comment was that all human construction activity is aesthetically degrading. Two observations are offered to counter this; first, a scan of man-made sites listed under the World Heritage Convention (chapter 7, section 7.8) would suggest other 'modifications of the landscape' that have not degraded the locale, and second, the comment of a British architect who said: 'I am glad Bath was built.'

It was during this period that the American polar biologist Professor W. S. Benninghoff, writing about protection of polar desert landscapes, said he: 'would hazard the opinion that we are ready to raise esthetic qualities of landscapes into our valuation lists.' (1974: 97) Although those comments were made by Benninghoff writing as an individual, it should be noted that at the time he was also a member of the SCAR Working Group on Biology (SCAR, 1975) and therefore influential within the polar community. His

comments are examined in greater detail in chapter 7, section 7.6.3.

4.4.3 1980 SCAR: *A visitor's introduction to the Antarctic and its environment*

For some years SCAR had proposed to draw up a leaflet providing background information for visitors to the continent. In 1980 the Conservation Sub-committee of the Working Group on Biology produced *A visitor's introduction to the Antarctic and its environment*. The 'leaflet' had grown to a 28 page booklet which was sent to members with the encouragement to use the text, together with illustrations, as a national publication. In Britain this was done by BAS, keeping the same title (1984b) with further information being given in *British scientific research in Antarctica* (1991).

The SCAR document was a good summary, recognising: 'a general awareness of the value of unspoilt nature or wilderness. The last remaining extensive wilderness is the Antarctic.' (SCAR, 1980: 26) Reference was made to the uniqueness of the continent's scenery and wildlife, but these factors were only covered in a broad manner.

4.4.4 1986 SCAR and IUCN

SCAR and the International Union for the Conservation of Nature and Natural Resources (IUCN) had co-operated in many matters for over 20 years, but in 1985 they came together in a more formal way to hold a symposium on the scientific requirements for Antarctic conservation (Bonner, 1985). The resulting report *Conservation in the Antarctic* (IUCN/SCAR, 1986) examined Antarctic activities before identifying data gaps and research requirements. Amongst these was the recognition that as protected area concepts such as wilderness or park designation had already been suggested by a variety of organisations including SCAR, IUCN and other NGOs, the possibilities should be further explored (IUCN/SCAR, 1986: 49). The report also identified the centrality of Environmental Impact Assessment (EIA) and called for agreement on procedures applicable to all Antarctic activities. The place of EIA is considered further in chapter 7, section 7.4.

4.5 'World park' proposals

The possibility of designating the Antarctic as a world park or world heritage site has reoccurred over many years. During the tourist cruise of the *Navarino* in 1968, with Peter Scott (son of Captain Scott) as one of the guest lecturers, the possibility of creating an 'Antarctic International Park' was discussed (Reich, 1979: 63 and 114). More pronouncements came from the Second World Conference on National Parks, held in the

United States in 1972. A recommendation was passed, calling on the ATCPs to: 'establish the Antarctic Continent and the surrounding seas as the first world national park, under the auspices of the United Nations.' (quoted in Barnes, 1982: 59) New Zealand spoke in favour of the concept at the Eighth ATCM in 1975 in Oslo (Mitchell and Tinker, 1980), but their view was not reflected in Recommendations arising from the meeting. NGOs, meeting in Kenya in 1982, on the tenth anniversary of the Stockholm conference, also pursued this theme, requesting the ATCPs and the United Nations (UN) General Assembly to consider: 'declaring Antarctica a World Park, in recognition of its inestimable value to humankind, and its status as global commons.' (quoted in Barnes, 1982: 64)

The following year, the UN held its first discussion on the 'Question of Antarctica'. The procedures have been followed by Beck (annually from 1984 to 1995, and 1998), perhaps with a growing feeling of weariness due to the repetitive nature of the discussions. In the context of this study, the 1989 and 1990 UN proceedings are most relevant and are considered in their appropriate chronological sequence.

The matter was also raised at a US Senate hearing in 1989. R. Tucker Scully, Director of the Office of Oceans Affairs in the Bureau of Oceans and International Environmental and Scientific Affairs, was asked if he thought the idea of an Antarctic park would be workable. His response illustrated both the then-current thinking as well as the amorphous nature of the issue:

In attempting to answer this question, it should be noted that there is no agreed understanding as to what is meant by an Antarctic park. The term, and related expressions ("world park", "wilderness park"; "wilderness reserve"), have been used to refer to a number of objectives ranging from stricter regulation of activities in Antarctica to a ban on mineral resource activities or even a prohibition of all human activities there. ... probably the most common perception of an Antarctic park is that it involves a permanent ban on mineral resource activities (United States Senate, 1989: 29).

Designation often seemed to be proposed as a preventative measure against mining, rather than having a positive benefit in its own right.

The 'world park' proposals persisted. Keith Shackleton's article (1985) in *Country Life*, gives an indication of popular presentation of the issues, whilst in the American *National Geographic* magazine Peter Scott continued to promote the idea (1987). A more rigorous

approach may be found in Rothwell (1990). Greenpeace continuously pressed for 'world park' designation (1985, 1988, 1990, [post October 1991]), suggesting most recently that it should be for the whole area to the south of the Antarctic convergence [1994 or 1995]. Cross noted, with no further explanations, that: 'As a concession to South American sentiment, Greenpeace's Spanish-language propaganda talks of a "natural park" rather than a "world park" (1991: 32) but this subtlety has not been found in English texts. In the same article, Greenpeace's Antarctic worker Dalziell is quoted as saying: 'We don't care who runs it as long as the environment is protected' (in Cross, 1991: 32).

4.6 1988 Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA)

The events surrounding the Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA) have been extensively documented (see, for instance, Beck, 1989a; Blay and Tsamenyi, 1990; Davis, 1992; Watts, 1992; Elliott, 1993 and 1994). The Convention was adopted by consensus in 1988, but has not yet come into force: 'and indeed the prospects for it doing so are clouded. Yet its provisions are still an important contribution to the Antarctic regime' (Watts, 1992: 5). It is these provisions that are to be examined, rather than the fierce political debate they generated.

The Fourth Special Antarctic Treaty Consultative Meeting on Antarctic Mineral Resources began in Wellington, New Zealand in June 1982 and ended there six years later after many formal and informal negotiating sessions. Before consideration of environmental issues, note should be taken of provisions in Article 26. This provided for an Advisory Committee, to provide a forum for consultation and cooperation in the collecting and evaluation of information. Article 26.4(a) required the Advisory Committee to assess: 'the adequacy of existing information to enable informed judgements to be made' (Heap, 1994: 217). This was a potentially powerful clause giving the Advisory Committee considerable authority. It marked a step beyond a merely hortatory position.

In the Preamble of the Convention, the Parties noted: 'the unique ecological, scientific and wilderness value of Antarctica and the importance of Antarctica to the global environment'. Later they called for respect of 'Antarctica's scientific value and aesthetic and wilderness qualities' (Article 2.3(d)). In Article 4 which covered the 'Principles concerning judgments on Antarctic mineral resource activities' it was agreed that: 'no Antarctic mineral resource activity shall take place until it is judged ... that the activity in question would not cause ...

degradation of, or substantial risk to, areas of special biological, scientific, historic, aesthetic or wilderness significance.' (Article 4.2(e)) Thus in three places in the document wilderness is mentioned, and in two of those instances it is grouped with aesthetic qualities. No further interpretation is given. Watts, who was closely involved with the drafting of the Convention, termed them 'abstract considerations' (1992: 255) and went no further.

It is interesting to note that the Australian National Wilderness Inventory (chapter 5, section 5.6.1) had been initiated in 1986: 'as a result of community concern over the rapid decline in the area and quality of relatively remote and natural land' (Lesslie and others, 1993: i). In May 1989 the Australian government announced it would not sign CRAMRA and called for a comprehensive environment protection convention which: 'would establish Antarctica as a wilderness reserve.' (Jackson, 1989: 6) Davis (1992) identified this position as resulting principally from the pro-conservation stance of the Prime Minister, an attitude which may have been encouraged by wider electorate pressure.

4.7 1989-1990 Events leading to the Protocol

At the preparatory meeting for the XV ATCM it was suggested there was a need to review environmental protection and to consider whether matters previously covered in hortatory terms should be strengthened by casting them in mandatory fashion (Heap, 1989). Previously, only Article III of the Agreed Measures for the Conservation of Antarctic Flora and Fauna contained the mandatory 'shall' (Heap, 1994: 2049). This concern may be seen as an early step in events that led up to the 1991 Protocol.

4.7.1 1989 XV ATCM Recommendations

Similar phraseology occurred in the Recommendations emanating from the XV ATCM in Paris in October 1989 (ATCPs, 1990). Recommendation XV-1 called for comprehensive measures for the protection of the Antarctic environment and dependent and associated ecosystems. This Recommendation led to development of the Protocol adopted in 1991 (section 4.8 below). The aim of this first Recommendation from Paris was to ensure that: 'human activity does not have adverse impacts on the Antarctic environment or its dependent or associated ecosystems or compromise the scientific, aesthetic or wilderness values of Antarctica.' (ATCPs, 1990).

In following Recommendations, two new categories were established under the Antarctic Protected Area System - Specially Reserved Areas and Multi-use Planning Areas. For

both categories, the Representatives sought recognition and protection for areas of outstanding 'aesthetic, scenic, or wilderness value' (Recommendations XV-10 and XV-11). In so far as both categories have been replaced under the new framework of the 1991 Protocol (section 4.8), the details of the 1989 designations are inconsequential, but to the recurrent presence of 'wilderness and aesthetic values' had been added a 'scenic' value. The question must be asked as to whether the Representatives present had clear understanding of the subtleties between 'aesthetic' and 'scenic'. Both of the categories were American proposals (Heap, personal communication, 1998) and appear to reflect approaches more often found in the United States, as 'scenic' is frequently found in American literature on visual resource management (chapter 7, section 7.6).

As an example, part of the North Dufek Massif in the Pensacola Mountains, an area of approximately 500 square km, was named as a Specially Reserved Area:

on the grounds that the area contains outstanding geological, geomorphological, aesthetic, scenic, and wilderness values. It is presently in a pristine condition and it is important to protect these values while allowing multiple use to permit access to scientists and others. (BAS and others, 1993: 6-24)

No indication was given as to how the values were assessed. Technically, the designation has not come into force. Although discussed by the ATCPs in their Bonn meeting from the 7-18 October 1991, it had been overtaken by the conclusion of Annex V during that meeting.

4.7.2 1989 SCAR: *Objectives of conservation in the Antarctic*

In 1988 SCAR set up a new Group of Specialists on Environmental Affairs and Conservation (GOSEAC). In the following year a report was published that suggested a more searching approach to the wider issues of the Antarctic environment. A paper entitled *Objectives of conservation in the Antarctic* (1989) commented on the World Conservation Strategy (WCS) published by IUCN in 1980:

WCS is concerned with resource conservation; it is a strategy to allow the material processes of life on this planet to continue. Other, aesthetic, factors are also important to humankind, however. With a human population increasingly concentrated in urban centres, ... "wilderness" is seen to have intrinsic value. Scenic resources (which may overlap with wilderness) are also valued for their aesthetic appeal. ... The scenic values of the Antarctic are especially high and it has some, though because of its recent discovery, few, historical and cultural sites. (1989: 181-182)

The SCAR group identified their objectives and suggested it was necessary to minimise disturbance by human activity so that: 'unique features, localities or complexes of features and sites of scientific importance are undisturbed ... cultural values, such as scenic beauty, inspirational quality, wilderness status and recreational potential can be maintained.' (1989: 182) These comments are expansive in comparison to other statements. Then follows an analysis of the nature of Antarctic systems which has been further developed by the Working Group on Biology into the 'Ecosystem classification matrix for protected areas' (SCAR, 1994). This document has been considered during the development of assessment methodology (chapter 8, section 8.7).

4.7.3 The UN and the Antarctic

The disagreements about CRAMRA (section 4.6) dominated Antarctic diplomatic activities in 1989. Australia and France had refused to ratify the Convention, thus preventing its entry into force. In May the Australian Prime Minister Bob Hawke announced that his government would urge their Antarctic Treaty partners to develop a comprehensive environment protection convention for the continent which: 'would establish Antarctica as a wilderness reserve.' (Jackson, 1989: 6) A month later, President Mitterand was reported as suggesting that: 'the Antarctic must become an international nature reserve'. (quoted in Doherty, 1989: 9.13) The ATCM was held in Paris and Recommendation XV-1 was drawn up. A few weeks later, the UN returned to the Antarctic question for a seventh time. Beck noted: 'the critics hoped to profit from the emerging rift within the ranks of the hitherto united ACTPs.' He went on to say that during the General Assembly: 'all governments used the opportunity to display their concern about the global environment and acquaintance with the vocabulary of environmentalism.' (1990: 323) Beck's account of the following debates and resolutions was not encouraging. An emerging environmental focus was discernible, with the call for establishing Antarctica as a nature reserve or world park, but as has already been discussed (section 4.5), this was a long-standing suggestion frequently made by various parties with little detail regarding practical issues (see, for instance, Shackleton, 1985; Greenpeace, 1990).

Environmental factors re-appeared in the 1990 UN debate, (Beck, 1991) held almost simultaneously with the Antarctic Treaty Special Consultative Meeting (ATSCM) being held at Viña del Mar, Chile. Following Recommendation XV-1 from the 1989 Paris meeting, work began which led to the 1991 Protocol. Pressure from NGOs continued and

Laws notes that during the ATSCM: 'SCAR achieved a measure of rapport with the environmental protection activists of the Antarctic and Southern Ocean Coalition' (1995: 70).

In 1995 Beck suggested that the twelfth successive UN session held in December 1994 saw a major change of direction:

On the surface, consensus was restored, but it is debatable how far the outcome represented merely a papering over of the cracks rather than the basis for an enduring solution to the problems dividing ATPs and their critics. (1995: 419)

This consensus approach was reaffirmed in 1996, and the 'Question of Antarctica' has now been put on a three-year cycle, so will not be placed on the UN agenda again until late 1999 (Beck, 1998).

Within the Antarctic community, the question has been raised as to whether it is appropriate or helpful for the UN to be involved in the Antarctic. This scepticism is shared by Zimmerman, writing on global environmental issues, when he commented: 'calling for the UN or some other centralized organization to protect the planet is like inviting foxes to guard the henhouse.' (1994: 330) Beck's monitoring suggests that concern about UN involvement is immaterial, as it is inevitable that political pressures from certain nations will continue, resulting in further UN debates about the 'Question of Antarctica'.

4.7.4 1991 IUCN report *A strategy for Antarctic conservation*

IUCN thinking culminated in a major report *A strategy for Antarctic conservation* (1991).

Reference is made to the situation in January 1991, so it is assumed that the document predates the Madrid meeting and was probably drawn up as a contribution to the debate. Throughout the report, references were frequently made to 'aesthetic and wilderness values' and 'wilderness qualities' together with mention of 'magnificent scenery'. An examination was made of the situation then current for the protection of special areas (1991: 47-54). Certain additions were welcomed but gaps and defects were highlighted. 'For example, no attempt has been made to establish Antarctic protected areas chosen by virtue of their landscape quality ... Some SPAs are of high scenic quality, but this is incidental.' (1991: 51, para 154)

IUCN considered: 'management planning is vital for successful attainment of protection goals.' (1991: 52, para 161) They called for: 'recognition and protection of outstanding Antarctic Landscapes. Virtually all the coastal and mountainous areas of Antarctica are of

high scenic quality, and there is worldwide feeling that this wilderness quality of Antarctica is in itself a prized resource.' (1991: 53, para 162) As may be seen from careful reading of this last quotation, it was assumed there is a relationship between aesthetic values and wilderness values. As a further example of this approach there was reference on the opening page to 'the aesthetic value of a great wilderness' (1991: 1, para 3). It will be argued that problems arise when aesthetic values are attached or mixed with wilderness (chapter 5, section 5.3.4).

The IUCN report also suggested that: 'parts of Antarctica are of a quality that would merit their consideration for designation as World Heritage sites under the Convention concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention) if this could be applied to Antarctica' (1991: 53, para 163) but later in the paragraph it recognised that the legal mechanisms would probably not be applicable. The suggestion to use the World Heritage Convention had already been made by Suter (1980), Mosley (1986) and Rothwell (1990) and was taken up again by Holdgate in 1992 (section 4.9). The advantages of such a designation were not spelt out, but are assumed to be the credibility given by international recognition, using an already established system. The Convention is examined in detail in chapter 7, section 7.8.

In making this suggestion, IUCN listed four Antarctic areas that might be considered for 'thorough evaluation'. They were: .

the Victoria Land Dry Valleys, with their near-sterile desert soils and saline lakes, perhaps extended to take in a wider area of the Transantarctic Mountains in Victoria Land and the shores of McMurdo Sound with the historic relics of early 20th century exploration. Other outstanding areas are the Beardmore Glacier and adjacent ranges, Vinson Massif, and the Antarctic Peninsula between Marguerite Bay and Bransfield Strait. (1991: 53, para 163)

Inevitably, outline lists raise queries. How had the initial selection been made? Was McMurdo Station, subject of extensive criticism to the extent of once being described as a slum, to be included? Nevertheless, the IUCN report is to be commended as recognising wider concerns and having the courage to make initial proposals, a position which was restated by Dingwall and Lucas (1992) for the IUCN at the IVth Congress on National Parks and Protected Areas held at Caracas, Venezuela. The 1991 document and its immediate precursors were also the first major documents to use extensively the word 'landscape' in relation to the Antarctic. Read in context, it is understandable as a

term was required to cover broad areas of land but in other environmental situations, its usage might be queried. This is considered further in chapter 7, section 7.3.

4.8 1991 Protocol on environmental protection to the Antarctic Treaty

The Protocol (including Annex I - Environmental Impact Assessment; Annex II - Conservation of Antarctic Fauna and Flora; Annex III - Waste Disposal and Waste Management, and Annex IV - Prevention of Marine Pollution) was agreed in Madrid on the 4 October 1991, and finally entered into force on 14 January 1998, as it had been ratified by all ATCPs that were party to its negotiation (Richardson, 1998). Annex V - Area Protection and Management - was not initially included, and still has to enter into force, but in the interim period between signing and ratification, ATCPs have agreed to implement its provisions as far as practicable on a voluntary basis. Figure 5 (on following page) shows the signatories, together with a list of the international governmental and non-governmental organisations represented at the Madrid meeting.

The Protocol is a legally binding agreement, establishing the basic framework for environmental protection. Its objective is to be found in Article 2 where the Parties: 'commit themselves to the comprehensive protection of the Antarctic environment and dependent and associated ecosystems and hereby designate Antarctica as a natural reserve, devoted to peace and science.' (ATCPs, 1993) Watts pointed out that the phrase 'natural reserve' is: 'not a concept in common international usage and it does not have any established meaning' (1992: 277). He suggested the designation had greater political than legal significance.

Article 3 is the heart of the Protocol and covers principles to apply to all Antarctic activities. Drewry, when Director of BAS, understandably emphasised the place of Antarctic science. 'The high accord given to scientific research was reaffirmed ... in the Protocol ... which states: "Activities shall be planned and conducted in the Antarctic Treaty area so as to accord priority to scientific research and to preserve the value of Antarctica as an area for the conduct of such research"' (Drewry, 1993: 37). He quoted from the latter part of Article 3: Environmental Principles, but it should be noted that the opening section of the Article also refers to the intention to cover all activities in the area and to protect: 'the Antarctic environment ... and the intrinsic value of Antarctica, including its wilderness and aesthetic values'. It is the first time in the Protocol that the terms 'wilderness and aesthetic values' are used. Later in the same Article, the variant 'aesthetic or wilderness significance' is used (3.2.(b) (vi)). There is nothing to suggest

	Antarctic Treaty	SCAR	Protocol Original signatories
Argentina	X	X	X
Australia	X	X	X
Austria	+		X
Belgium	X	X	X
Brazil	X	X	X
Bulgaria	X	+	X
Canada	+	+	X
Chile	X	X	X
China	X	X	X
Colombia	+		X
Cuba	+		X
Czech Republic	+		
Denmark	+		X
Ecuador	+	X	X
Estonia		+	
Finland	X	X	X
France	X	X	X
Germany	X	X	X
Greece	+		X
Guatemala	+		X
Hungary	+		X
India	X	X	X
Italy	X	X	X
Japan	X	X	X
Korea (Pyongyang)	+		X
Korea (Seoul)	X	X	X
Netherlands	X	X	X
New Zealand	X	X	X
Norway	X	X	X
Pakistan		+	
Papua New Guinea	+		
Peru	X	+	X
Poland	X	X	X
Romania	+		X
Russia	X	X	X (as USSR)
Slovak Republic	+		
South Africa	X	X	X
Spain	X	X	X
Sweden	X	X	X
Switzerland	+	+	X
Turkey	+		
United Kingdom	X	X	X
United States	X	X	X
Ukraine	+	+	
Uruguay	X	X	X

x indicates a Consultative party to the Treaty, a full member of SCAR or an original signatory of the Protocol

+ indicates a non-consultative party to the Antarctic Treaty or an associate member of SCAR

Observers attending the 1991 Protocol meeting at Madrid: Antarctic and Southern Ocean Coalition, SCAR, Commission for the Conservation of Antarctic Marine Living Resources, Commission of the European Communities, Intergovernmental Oceanographic Commission, World Meteorological Organisation, IUCN.

Figure 5 Adherents to Antarctic agreements
(Compiled from Headland, 1993; 1996 and 1998 (personal communications), and ATCPs, 1993.)

that the change of order has import.

Annex I concerns EIA, with the first three Articles covering the Preliminary Stage, Initial Environmental Evaluation and Comprehensive Environmental Evaluation. Article 1.1 allows that impacts: 'shall, before their commencement, be considered in accordance with appropriate national procedures. If an activity is determined as having less than a minor or transitory impact, the activity may proceed forthwith'. This has been strongly criticised. For instance, Hemmings and Goldsworthy suggest that: 'a substantial proportion, perhaps two thirds, of the Antarctic treaty nations have little experience with implementing environmental regimes at home, let alone in Antarctica' (1993: 45). There is also no oversight of the early stages of an assessment as: 'the judgement as to whether an impact is likely to be minor or transitory, or otherwise, is the responsibility of the individual national operator.' (Elliott, 1994: 199) The powers given to the CRAMRA Advisory Committee (section 4.6) would have been far more stringent in these circumstances.

Annex V to the Protocol provides a new framework for specially protected and managed areas in the Antarctic. The groups originally agreed by the ATCPs:- Specially Protected Area (SPA); Site of Special Scientific Interest (SSSI); Specially Reserved Area; Multiple-use Planning Area, Historic Sites and Monuments, and Area of Special Tourist Interest have been replaced in the Annex by two categories entitled Antarctic Specially Protected Area (ASPA) and Antarctic Specially Managed Area (ASMA). The essential difference between ASPAs and ASMAs is access. Entry into an ASPA requires a permit issued by an 'appropriate authority' appointed by each Party (Annex V, Articles 3.4 and 7), whilst entry into an ASMA does not require a permit (Annex V, Article 4.3). Both categories require management plans detailing, as appropriate, such factors as the value or values for which special protection is required; a description of the area including means of access, and permitted activities (Annex V, Article 5).

Greater guidance is given for areas which may be designated as ASPAs. Annex V, Article 3.1 outlines the classification: 'Any area, including any marine area, may be designated as an Antarctic Specially Protected Area to protect outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research.' The section that follows specifies eight categories, concluding with a ninth 'catch all' to cover 'such other areas as may be appropriate' (Annex V, Article 3.2.(i)) For all the categories, Parties are required to

identify areas 'within a systematic environmental-geographical framework' (Annex V, Article 3.2). Subsection (g) covers 'areas of outstanding aesthetic and wilderness value' but again, with no definition.

There is a discrepancy between Annex V, Article 3.1 and Annex V, Article 3.2.(g). In the first, it is clearly stated that designation may be for 'aesthetic or wilderness values, whilst in the second the phrase is 'aesthetic and wilderness values' (my emphasis). When used on the two earlier occasions in the Protocol, the conjunction used is 'and'. Strictly speaking, these three occurrences imply that both aesthetic value and wilderness value are required as a condition for designation, but this goes against Annex V, Article 3.1, which clearly covers 'any combination of those values', thus allowing one and not the other.

It is concluded that the Protocol intended to cover both aesthetic values and wilderness values. The interpretation of these phrases has been one of the central considerations of this thesis, and specific sections relating to the issues are found in chapter 5 (especially section 5.3.4 Wilderness values and aesthetic values); chapter 6 (especially section 6.4.4 Differentiation between 'wilderness' and 'wilderness values'), and chapter 8 (especially sections 8.8 Criteria for evaluation and 8.10 Antarctic evaluation groupings).

In Annex V the requirement is made that designation as an ASPA is based on identification 'within a systematic environmental-geographical framework' (Article 3.2). The reason for such designation was in order to protect: 'outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research.' (Article 3.1)

This list covers a wide range of values, studied by a number of very different disciplines. It would be convenient (to say the least) if a single 'systematic environmental-geographical framework' could cover the whole gamut, but such a system is wishful thinking. This study suggests (chapter 5, section 5.3.4) that even the two items coupled together in Article 3.2(f), aesthetic values and wilderness values, require separate consideration. The Protocol's 'systematic environmental-geographical framework' has to be understood as a series of frameworks, each responsive to the needs and disciplines related to the area under consideration.

It should be noted that the Protocol does not differentiate between the purposes of

activities on the continent. Scientific research and tourism are both mentioned in Article 3 (4), but with no further categorisation. In terms of environmental conservation, this is appropriate. In an earlier study I wrote:

the impact of visitors on the polar environment does not necessarily depend on whether the individual is a member of a cruise, a diplomat or a station cook. The off-duty diesel mechanic, if ignorant about the nesting habits of penguins, or the damage caused by a misplaced boot on a clump of moss, is potentially as destructive in environmental terms as a cruise tourist. (Reich, 1979: 17)

This is the view adopted by the Protocol. A foot is a foot, whether that of a scientist, a support worker, or a fare-paying visitor.

4.9 1992 SCAR/UCN *Developing the Antarctic Protected Area System* (edited by Lewis Smith and others, 1994)

In the summer of 1992 a workshop on Antarctic Protected Areas was held in Cambridge. The Foreword indicated the expanded scope of concerns: 'In 1991, the negotiation of the Protocol ... offered an ideal opportunity for fundamental change. ... new thinking allowed for much more detailed management plans, active management to protect conservation values, recognition of aesthetic as well as scientific criteria for designation' (Walton and Dingwall, 1994: ix). The workshop drew up recommendations to be considered by the XVII ATCM to be held in Venice later that year and these included reference to 'wilderness and aesthetic values', 'distinctive or special landscapes' and 'heritage landscapes' (Recommendations 2, 3, 6 and 22).

The report is valuable as a summary of past action taken by both the ATCPs and SCAR. It also highlighted some of the difficulties raised by the Protocol. 'For example ... no mention is made of what a "systematic environmental-geographical" framework consists of' (Kriwoken and Keage, 1994: 41). A reoccurring theme was the need for clarity at all levels - from definition of objectives at the beginning of a designation, through to long-term management requirements.

The 'heritage debate' already mentioned in sections 4.5 and 4.7.4 was continued. Recommendation 22 read:

That the Treaty Consultative Parties be urged to consider, and to discuss with the relevant international agencies, the opportunities for applying international protected area designations to areas of exceptional and universal conservation value in Antarctica, and in particular to explore the possibility of designating

Antarctic Heritage Landscapes, analogous to World Heritage Sites under the World Heritage Convention. (Lewis Smith and others, 1994: 10)

Legal difficulties expressed in the IUCN (1991) report were recognised, but an alternative yet parallel route was suggested by use of the term 'analogous'. The reasoning behind Recommendation 22 was given by Holdgate. He proposed exploring a system based on four designations:

- a) Antarctica as a natural reserve devoted to science
- b) Antarctic Heritage Landscapes
- c) Antarctic Biosphere Reserves
- d) Antarctic Historical and Geological Monuments (1994: 102).

If 'landscape' is understood as including factors such as historical significance or geological interest (chapter 7, section 7.3), these designations seem unnecessarily divisive.

The ATCPs would need to agree a procedure for designations. Holdgate suggested that once the process had been adopted, sites could be selected. Conservation and management plans would be integral and both sites and plans subject to independent scrutiny, followed by evaluation of the scrutineer's report before confirmation of the judgement of the evaluating body at an ATCM. At first sight this appears an unnecessarily complex procedure, but it may be indicative of the sensitivity of the issues.

For Antarctic Heritage Landscapes Holdgate suggested: 'the criteria of the World Heritage Convention might be used to define the most outstanding natural areas.' (Holdgate, 1994: 102) The World Heritage Convention, properly the *Convention concerning the Protection of the World Cultural and Natural Heritage* is examined in chapter 7, section 7.8.

'Wilderness' received less attention, perhaps because it was suggested that: 'the identification and selection of wilderness areas will test the ATS.' (Kriwoken and Keage, 1994: 40) The difficulty appeared to be the relative compatibility of wilderness designation standards used in different countries with the pattern of scientific work in the Antarctic. The problem was identified, but no solutions offered. Suggestions were made for new ASPAs: 'to improve the geographical representation of protected areas or where human impact may threaten specific conservation values.' (Lewis Smith, 1994: 32) Of

the list that followed, eight included a 'wilderness' component but always with other attributes. For example: 'Coats Land: Shackleton Mountains (geomorphology, wilderness, lakes, vegetation)' (Lewis Smith, 1994: 33). No assessment methodology was proposed.

The value of this workshop appeared to be the pooling of ideas and a recognition of shortcomings and difficulties to be faced. Apart from the suggestion that heritage landscape designation should follow 'comparable criteria and procedures' already adopted by the World Heritage Convention (UNESCO, 1994: 11), no methodologies were offered.

4.10 1996 IUCN Cumulative environmental impacts in Antarctica: minimisation and management (edited by De Poorter and Dalziell, 1996)

A workshop held in Washington DC examined cumulative impacts in Antarctica, in the context of the 1991 Protocol. The workshop's report included a paper by Hemmings, which specifically addressed 'Cumulative impact on Antarctic intrinsic, wilderness and aesthetic values.' Hemmings began by saying: 'the concepts of "intrinsic", "wilderness" and "aesthetic" value are poorly understood and applied ... The Protocol does not even define our terms, far less integrate them into its broader environmental management regime.' (1996: 62) He suggested that a: 'substantial corpus of guidance is surely available in the domestic and environmental legislation of Treaty Parties' but gave no examples of appropriate procedures.

Hemmings continued:

Conventional wisdom seems to hold that only when one reaches the nth activity need consideration of cumulative impact (of any sort) occur. However, there is no *a priori* logic in this. The first activity is as much a contributor to any cumulative impact as any later activity. ... A wilderness value may be appreciably or even completely eroded by the first activity.' (1996: 64)

It was commendable that thought was given to basic principles. It is therefore regrettable that Hemmings also totters on the edge of the 'aesthetic degradation' pit by assuming human activities will always be negative (1996: 63, see also section 4.4.2) He concluded by identifying that adjudication of values is required, probably with assistance from specialist expertise outside the Antarctic scientific community.

In other contributions to the workshop, Naveen described the Antarctic Site Inventory relating to tourism sites. The Inventory was begun in 1995 to compile baseline data and information about sites so as to: 'minimize the environmental impacts of tourism and non-governmental activities in the Antarctic Peninsula area.' (1996: 139) The procedures for collecting information were clearly stated, together with the call for precise documentation. Berkman introduced the 'scientific research continuum' to illustrate the relationship between natural processes and anthropogenic impacts (1996: 121). As the ecosystem changed from 'pristine' to 'disturbed', he suggested science moved from 'basic' to 'applied'. It was helpful because it suggested a variable inter-relationship, rather than a precise either/or position.

4.11 Summary

Since the adoption of the Protocol, many have examined its contents (see, for instance, Greenpeace, [post October 1991]; Beck, 1992; Blay, 1992; Hemmings and Goldsworthy, 1993; Lewis Smith and others, 1994). Occasionally, the tenor of these comments is critical. 'The text of the Protocol is also replete - from the principles to the technical annexes - with undefined or weak terms. Unless these are defined and rigorously interpreted, literal compliance with the Protocol need not translate into appreciably improved environmental performance.' (Hemmings and Goldsworthy, 1993: 45) Greenpeace said: 'many loopholes exist throughout the instrument.' [post October 1991: 1] Whilst not wishing to adopt the sometimes aggressive approach, it is agreed that some terms do require closer definition, including 'wilderness and aesthetic values'.

Certain documents have been published based on the Protocol as it stands. Royds Consulting Ltd were given a brief to audit the New Zealand Antarctic Programme under the terms of the Protocol. The Protocol was included as an appendix to their report, as was the 1993 Act intended to bring the Protocol onto New Zealand's statute books. In the Act's opening interpretations 'Antarctic environment' included: 'the intrinsic value of Antarctica, including its wilderness and aesthetic values and its values as an area for the conduct of scientific research' (The Antarctic (Environmental Protocol) Act, 1993, lines 12-14, quoted in Royds Consulting Ltd, 1994: Appendix 3). Throughout the document, 'Antarctic environment' was used extensively, yet when the evaluation of impacts was considered only air quality, noise, ground disturbance, flora/fauna disturbance, marine pollution and radiation were itemised.

A second example may be found in a current single-page SCAR document *Principles of*

protection of the Antarctic environment recommended by SCAR which is issued to all candidates for membership. They are required to agree with its statements, thus showing their intent to abide by SCAR principles. 'Protection of cultural values, such as scenic beauty and inspirational quality, wilderness status and recreational potential' are included (SCAR, nd).

Concern about impacts is shown by the Foreign and Commonwealth Office in their *Guide to EIA activities in Antarctica* (1995). Aesthetic, wilderness and historic values are recognised as: 'difficult or impossible to quantify or even predict. ... However, such impacts should not be ignored. Instead, an objective and qualitative determination of such impacts using value judgements should be made. ... It is important that the basis on which value judgements are made is clearly stated'.

These examples illustrate the pattern that has emerged from examination of many Antarctic documents, whether emanating from the ATS or others. Whilst it is commendable that there has been growing recognition of wider environmental concerns, it has to be concluded there is little understanding as to how such factors are to be considered. Although now firmly established in the ATS, wilderness and aesthetic values remain mere phrases. Neither the ATCPs or the NGOs have clearly stated what is meant, and there have been no attempts at systematic identification, let alone establishment of safeguards for identified areas. As necessary interpretations have not been forthcoming from the ATCPs or interested NGOs, wider environmental sources have been examined (chapters 5 and 7) so as to establish procedures.

5 WILDERNESS AND ENVIRONMENTAL ISSUES

5.1 Scope of the chapter

As concern for environmental issues has grown, the range of study areas has correspondingly increased. Broad-brush treatments of 'the environment' are often frustratingly vague so it is necessary to identify more precisely concerns linked to this study. It is recognised that: 'no two people see the same reality. No two social groups make precisely the same evaluation of the environment' (Tuan, 1974: 5) but listing some of the many definitions of 'wilderness' enables differing positions to be examined. Nash's *Wilderness and the American mind* (third edition 1982) is a seminal work, but examination of wilderness in the British mind is also required, to see if there are differences of approach between nations. Following this, an assessment is made of wilderness as part of wider environmental issues, together with identification of values underlying different approaches. Finally, approaches to wilderness in the Antarctic are considered. A working approach to the concept, within the terms of the Protocol, is developed in chapter 6.

5.2 Definitions of wilderness

It is not appropriate to go over ground already well-trodden - an unsympathetic metaphor as far as 'wilderness' is concerned, but a selection of definitions indicates areas of significance. In the autumn of 1960 Roderick Nash began a study of the history of the American wilderness idea. The first edition of *Wilderness and the American mind* appeared in 1967 and has been acknowledged as both wide-ranging and authoritative. Nash identified the difficulty in defining wilderness and even from his work it is not possible to extract a simple definition. He illustrated the dilemma:

a universally acceptable definition of wilderness is elusive. ... Wilderness ... is so heavily freighted with meaning of a personal, symbolic, and changing kind as to resist easy definition. ... Of equal importance to ...actualities are the feelings they produce in the observer. Any place in which a person feels stripped of guidance, lost, and perplexed may be called a wilderness. (1982: 1-3)

Whilst Nash was writing, the 1964 Wilderness Act in the United States became a legal bench mark. In Table 1 that follows, a dictionary definition is given first, followed chronologically by other statements. Meanings that are basically variants of either Nash or the Wilderness Act are not included. It is notable that all emanate from predominantly developed 'western' sources.

Table 1 Definitions of 'wilderness'

Notes in square brackets give source for the quotation, though not necessarily the nationality of the author.

Shorter Oxford English Dictionary (1974)

1.a. (without article) Wild or uncultivated land. b. A wild or uncultivated region or tract of land, uninhabited, or inhabited only by wild animals ME. c. A piece of ground in a large garden or park, planted with trees, and laid out in an ornamental or fantastic style, often in the form of a maze or labyrinth 1644. 2. *in transferred use* or *generally*. A waste or desolate region of any kind, e.g. of open sea 1588. 3. *in figurative use*.

Something figured as a region of a wild or desolate character, in which one wanders or loses one's way; in religious use applied to the present world or life as contrasted with heaven or the future life ME.

1921 Leopold [USA]

A continuous stretch of country preserved in its natural state, open to lawful hunting and fishing, big enough to absorb a two weeks' pack trip, and kept devoid of roads, artificial trails, cottages, or other works of man. (quoted in Nash, 1982: 186)

1964 Wilderness Act [USA]

An Act to establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes.

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and, (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

(complete Act quoted in Irland, 1979: 191-97)

c1970 National Wildlife Federation [Australia]

A wilderness is a community of life 'untrammelled by man', roadless, undeveloped, and without human habitation; ... Overall quality should be given paramount consideration, with important recognition for the desirability for preservation of areas of different types of terrain, scenic variations, or unique plant and/or animal ecological systems. (quoted in Amett, 1980: 2)

1976 Helman and others [Australia]

A wilderness is a large area of land perceived to be natural, where genetic diversity and natural cycles remain essentially unaltered. ... dimensional criteria: a minimum core area of 25,000 ha; a core area free of major indentations; a core area of at least 10 km in width; a management (buffer) zone surrounding the core area of about 25,000 ha or more. ... As such it is a resource which needs to be managed, to allow only those uses which do not significantly reduce wilderness quality.' (quoted by numerous authors in Mosley editor, 1978: 115, 133, 158 etc)

1977 Aitken [British]

In geographic terms, wilderness is a most curious will-o-the-wisp: it is not a place, but a quality of place: a value - or an absence of value - which man ascribes to part of his environment. Paradoxically, in its absolute sense, wilderness is a human concept of a natural environment devoid of human influence. (quoted in Sidaway, 1989, no pagination)

1980 Resolution passed at the Second World Wilderness Congress held at Cairns, Far North Queensland, Australia, 8-10 June 1980

The Second World Wilderness Congress adopts as a working definition of Wilderness: It is a large tract of entirely natural country. It is a place where one stands with the senses entirely steeped in nature and where one feels free of the effects of modern technology. (Second World Wilderness Congress, 1980: 2)

1991 Coates [USA, specifically about Alaska]

Wilderness, like frontier, is a cultural concept (and therefore ethnocentric) as much as an empirically identifiable physical entity. (Coates, 1991: 33)

1993 Australian Heritage Commission

It is generally accepted that relatively remote and unmodified environments are valuable and that the comprehensive identification and assessment ... is a prerequisite for successful wilderness management and protection ... The evaluation of wilderness in the National Wilderness Inventory is based on the concept of wilderness as part of a continuum of remote and natural conditions which vary in intensity from pristine to urban. (Australian Heritage Commission, 1993: 1-2)

1994 IUCN guidelines for protected area management categories

Protected areas managed mainly for wilderness protection ... Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition. (IUCN, 1994: 18)

Table 1 Definitions of 'wilderness'

5.3 Controversial issues

In an earlier study, having given the Shorter Oxford English Dictionary definition of wilderness, I suggested this: 'covers its common usage, and in this sense, its application to Antarctica is perfectly understandable and acceptable. In connection with planning, however, the word has developed more specialised meanings, especially in North America.' (Reich, 1979: 62) In the intervening years, definitions have become even more labyrinthine. Table 1, or a text such as Bergon's *The wilderness reader* (1980) show the range. Meanings attached to words differ, although this may not be immediately apparent. All too often Humpty Dumpty comes to mind: 'when I use a word ... it means just what I choose it to mean - neither more nor less.' (Carroll, 1872, chapter 6)

'Wilderness' gives no image of the character of the land, as to whether it is rainforest or sand desert. This is implied by Aitken's 'quality of place' (Table 1) and supported by the Countryside Commission for Scotland's report (1971: 3) which clearly argued that wilderness is a land use type, rather than a description of the land. As such it should: 'be identified at a much later stage in the planning process than the inventory and classification of landscape resources.' (1971: 3)

If wilderness is taken to mean an unmodified environment, it is a non-renewable resource (see, for instance, Berger Commission, 1977: 30). Although primarily considering the 'wild country' of Britain, Sylvia Crowe identified one of the consequences:

In all other landscapes we can take our present needs and with them create a new picture, but in the wild landscape we are debarred from creation. Yet it is these landscapes, more than any others, which are most vulnerable (1962: 36).

Passmore in his study *Man's responsibility for nature* (1974) initially avoided the single word 'wilderness', although he entered into territory which some would see as only marginally less fraught, when he used the word 'preservation'. He suggested it was:

the attempt to maintain in their present condition such areas of the earth's surface as do not yet bear the obvious marks of man's handiwork and to protect from the risk of extinction those species of living beings which man has not yet destroyed. (1974: 101)

He then freely used the word 'wilderness' within this framework without further definition. This approach may be seen as either a legitimate device to avoid emotive language or as side-stepping the issue. However, the ATCPs have used 'wilderness', so the context of this study demands a closer examination of factors associated with the word.

5.3.1 Size

A literature search soon shows that almost all of the factors linked to 'wilderness' are subject to contentious debate from one direction or another. There is little agreement about any minimum or ideal size for a designated area. Leopold's 'two weeks' pack trip', the Wilderness Act's 5,000 acres (approximately 1,620 ha) and Helman's minimum area of 25,000 ha plus a buffer zone of 25,000 ha differ greatly. Aitken, by definition, has no size requirement.

5.3.2 Recreation

In two definitions (Leopold and the Wilderness Act, Table 1), recreational use is

specifically mentioned. Indirectly, the seemingly obscure dictionary definition 1c (Table 1) also relates to a form of recreation, albeit in past centuries. 'The wilderness' was the name given to a wooded feature, a 'natural' labyrinth, supplying in the landscape garden: 'that element of mystery and surprise ... the "explorer" might seek his own spiritual origins and experience the sensation of being lost (though comforted by the knowledge that he would emerge safely in the end).' (Coote, 1986: 604) These desires are not dissimilar from views about the value of wilderness in the 20th century (see, for instance, Shoard, 1982: 58; Moss, 1988: 190).

Initially, concern for the protection of wildlife led Aldo Leopold, then a young forester, to develop plans for wilderness preserves. In 1921 an article for the *American Journal of Forestry* contained his much-quoted definition (Table 1). His influence in developing American attitudes, especially regarding hunting, has led to recreation becoming an important facet. This may be seen in the Wilderness Act of 1964 (Table 1). On occasions, the assumption has been made that wilderness designations are primarily made for recreational purposes (see, for instance, Jubler, 1972; Mosley, 1978) although this attitude has been challenged by Knuffke (1993). In the Antarctic this approach would cause difficulties. In my early study I wrote: 'recreation, whether cruises, mountaineering or other kinds of expeditions, demands the most sophisticated and organised support simply to preserve life, let alone enjoy the experience.' (Reich, 1979: 64) Whilst tourism is now generally accepted in the Antarctic (chapter 3, section 3.2.3), it will be necessary to ensure that any mention of 'wilderness' is not taken to imply priority for recreation within the area.

Many have emphasised that the recreational aspect of wilderness should be seen in a global context. Stankey commented: 'that the future of wilderness lies in the city' (1980: 9), an approach already adopted by others, including the influential Outdoor Recreation Resources Review Committee of America (1962), Chadwick (1966), Dower (1971) and Brooks (1980). Although language differed, all suggested a recreational hierarchy of 'paved to primeval', arguing that if adequate recreational facilities were available, starting in urban communities where population density is highest, and then in appropriate patterns throughout settled areas, more fragile zones would be under less pressure. The implications of this move far beyond the remit of the 1991 Antarctic Protocol, but still lie in the jurisdictions of the governments of the ATCPs.

5.3.3 Nature of the land and indigenous people

value' and in the definition offered by the National Wildlife Federation, which contains a reference to 'scenic variations' (Table 1). It is suggested that such combinations of aesthetic values with wilderness values are inappropriate and confusing. Whilst aesthetic values are considered more fully in chapters 7 and 8 (especially section 8.9), and wilderness in chapter 6, it is necessary to examine basic principles at this point, whilst recognising the difficulties of using phraseology that will be more closely examined later in the study.

Consideration of two simple statements illustrates the issue:

- 1 Not all areas with widely accepted aesthetic value are wilderness areas.
- 2 Not all wilderness areas have widely accepted aesthetic value.

The first statement may be easily illustrated as probably everyone can suggest areas with 'aesthetic value'. Within the county of Norfolk, the Broads and the North Norfolk coast could be cited, but they would never meet any wilderness criteria as they are landscapes greatly influenced, if not predominantly formed, by man's actions. A salient example to illustrate the second statement is the polar plateau. Unbroken ice sheet extending for hundreds of thousands of square kilometres undoubtedly has a strong character, but for many would probably have limited aesthetic appeal, yet the area is without question a wilderness.

Examples of those who have mixed the two concepts include Addison, who in the early 18th century linked the 'Wildness of Nature' with the 'Elegancies of art' (quoted in Malins, 1986: 2). Opie identified a move in the 1920s to see an 'aesthetic acceptability' in the American deserts and by the middle of this century: 'a blend of new aesthetic consciousness and the interests of wilderness preservation combined' (Opie, 1983: 17). Benninghoff (1974) indirectly linked the two ideas in his paper on polar deserts (chapter 7, section 7.6.3). Australia's 'Father of Wilderness', Myles Dunphy, offered 'preferably scenic' as one of the key comments in his definition of wilderness (quoted in Mosley, 1978: 112). Brooks, giving a paper entitled *People and wilderness* at the Cairns Wilderness Congress spoke of 'preserving the aesthetic quality' (1980: 3).

Nash identified the linkage of differing values once in his book (1982: 242-244 and passing reference on p 327). He analysed the position of Eric Jubler, a Los Angeles attorney who styled himself 'a former member of the Sierra Club.' (Nash, 1982: 242) Jubler advocated 'access philosophy' to wilderness areas, so that all could enjoy the

views. One of his articles, 'Let's open up our wilderness areas' appeared in the American edition of the *Reader's Digest*. In giving the Muir Trail in California as an example, Jubler mentioned 'its magnificent Wilderness scenery' (1972: 127). Nash commented: 'confusion stems from equating "scenery" and "natural beauty" with "wilderness".' (1982: 244)

There are others who take the view that the two forms of appreciation should be considered separately. Sharp, one of the influential prewar British town planners, recognised that beauty: 'may be present in infinite measure in entirely natural (*i.e.* primeval) landscapes' (1945: 19) but he clearly did not see it as inevitable. The Council for the Preservation (now Protection) of Rural England (CPRE) was asked to carry out a Landscape Survey in 1942. Their 'wild country' category was divided into two divisions, 'of impressive scenic value' and 'of value chiefly as solitude'. One could be present without the other, and either could be examined or described independently of the other. Feilden considered practical issues of conservation of any form of cultural property including wildlife and nature. He suggested that values may be consciously assigned under three major headings: 'cultural values, use values and emotional values' (1979: 27). Under cultural values he specifically separated 'aesthetic value' and 'landscape and ecological value'.

The National Wilderness Inventory (NWI), being carried out by the Australian Heritage Commission, base their wilderness assessment on factors that are independent of aesthetic values. In the *Handbook of principles, procedures and usage* (Lesslie and others, 1993), it stated that: 'the inventory is designed to assess wilderness quality across the Australian landscape' (1993: 1) with assessment based on four indicators: 'remoteness from settlement, remoteness from access, apparent naturalness and biophysical naturalness'.

There is some confusion over the title given to the third indicator. In the detailed NWI study for the Cape York Peninsula the indicator was consistently called 'aesthetic naturalness' (Lesslie and others, 1992: 3, 12 etc). From references given in the study, this term has clearly been favoured by the authors in earlier papers and reports. The NWI Bulletin no 1 (May 1993) used the term 'apparent naturalness' yet the Bulletin no 2 (May 1994) reverted to 'aesthetic'. Despite this uncertainty about the title, the explanation remained constant: 'the degree to which a site is free from permanent structures associated with modern technological society.' (1993: 2) 'Values for this ... are

obtained simply by calculating distance to the nearest defined structure.' (1993: 7) The structure is defined according to its scale and permanence, suggesting the assumption is that any man-made structure is detrimental to wilderness quality. There is no assessment of the 'value' or 'quality' of the structure - it could be Sydney Opera House or a decrepit wind pump. With this understanding, the term 'apparent naturalness' is to be preferred as being both reasonable and straightforward.

It is both possible and, as later arguments will show, preferable to separate 'wilderness' from 'aesthetic values'. The approach developed in this study is based on this position.

5.4 Wilderness in the British mind

The definitions listed in Table 1 were selected after a wide search in an attempt to cover the whole sweep of approaches, yet with the exception of the dictionary definition and that offered by Aitken, all derived from the 'New World' of North America and Australia. This is understandable, as these countries have considerably more areas that might fall under this heading. Since the first edition of Nash's *Wilderness and the American mind*, other writers have explored the subject, notably Oelschlaeger (1991). Many of these subsequent studies originate from North America and consequently continue to see the background to 'wilderness' as Nash did - in the American context.

In the preface to the third edition Nash explained that he considered: 'wilderness was the basic ingredient of the American civilization' (1982: xi) but came to realise: 'that the first white Americans carried in their intellectual baggage concepts of wilderness shaped by the Old and New Testaments and refined by the experience of the European frontier of the Dark and Middle Ages.' (p xii) Thus he began with a chapter entitled 'Old world roots of opinion' but the time span is vast with consequently sparse coverage. Apart from the evidence offered by Nash, there are further indications that the cultural and intellectual baggage carried by the 'British mind' differs from the 'New World' view.

5.4.1 Romanticism

The period from the late 17th to the end of the 18th century defies all precise, systematic categorisation. Romanticism flourished, bringing expansive ideas about man and nature. The Gothic novel developed; Coleridge sought to portray polar seas in *The Rime of the Ancient Mariner*; Ruskin wrote long and complex studies about nature and art; Holman Hunt is said to have waited for the Jewish Day of Atonement to take a goat into the Palestinian wilderness, so he might paint *The Scapegoat* more realistically, and Conan

Doyle's first detective story featuring Sherlock Holmes included a graphic description of an American desert wilderness, so as to portray a man threatened but not conquered by nature. Changing English attitudes were examined by Nicholson in her *Mountain gloom and mountain glory* (1959) and later writers such as Glacken (1967), Thomas (1983) and Spufford (1996, see also chapter 3, section 3.5.2) have expanded aspects of her thesis.

John Wesley had visited America (1735 - 1738) although his work was mainly in the more inhabited areas of Georgia. He made his own translation of the New Testament with extensive footnotes, published in 1754 or shortly after, so as: 'to assist serious persons, who have not the advantage of learning, in understanding' (1840: 3). His understanding of 'wilderness' deserves further study. Whilst recognising there were occasions when this should be understood as being a barren or desolate place, he suggested that the more frequent New Testament meaning was: 'a common, or less cultivated place, in opposition to pasture and arable land.' (Wesley, 1840: 14) This introduced a far more gentle biblical view of wilderness. It would be interesting to explore if Wesley's views were known in America, particularly as he was writing in the period when wilderness there continued to have 'sinister connotations' (Nash, 1982: 38) and 'remained the obstacle to overcome.' (Nash, 1982: 39)

The images presented by authors or artists may not have been accurate, but fascination in wilderness increased, whether polar seas or arid desert. Ideas flourished expansively with the freedom of Romanticism being expressed in many ways, whether in revolt against classical form or in outspoken pressure against authoritarian government.

5.4.2 The 20th century

Sir Francis Younghusband became President of the Royal Geographical Society (RGS) in 1920, and through his inaugural address stimulated the geographer Vaughan Cornish to examine 'scenery' (see also chapter 7, section 7.5.1). From Cornish's writings it becomes clear that he searched for the picturesque. Writing about the Scottish Highlands, he recorded: 'the view from the heights is mostly monotonous. The attractive features are the glens.' (1946: 44) Yet at the same time others such as Trevelyan, Dower and Tansley (1945) argued passionately for the preservation of natural scenery for its 'wildness'. Within the main body of the Scott Report of 1942, (the Committee on Land Utilisation in Rural Areas), 'beauty' is synonymous with agricultural cultivated areas, and only in the minority report by the economist Professor Stanley Dennison, is there the challenge that: 'There is no means of proving ... that pastoral country provides

more amenity than wild moorland.' (Ministry of Works and Planning, 1942, section 43-45: 112-113) Dennison was advocating a form of cost-benefit analysis to be applied to all aspects of land use, but the technique was: 'hardly understood anywhere. Naturally, his voice went largely unheeded.' (Hall, 1986:101) Although not specifically advocating the merits of 'wilderness' or 'wildness', Dennison is to be commended for attempting to put values of differing parts of the countryside on an equal footing.

Continuing concern about 'wild country' was expressed by Sylvia Crowe, one of the few qualified and experienced landscape architects in the immediate post-war period. In *Tomorrows landscape* (originally published in 1956) she identified some of the issues relating to wild country in Britain:

Today our need for scenes where nature is supreme is greater than ever and we are faced with the hard problem of preserving our few remnants of comparatively wild country without, by our very care, destroying their greatest value. In all other landscapes we can take our present needs and with them create a new picture, but in the wild landscape we are debarred from creation. Yet it is these landscapes, more than any others, which are most vulnerable to our change of scale and destiny. (1962: 36)

Her approach was more tangible than that offered by the ecologist, Frank Fraser Darling, in the 1969 Reith Lectures *Wilderness and Plenty*. Initially, he was comprehensible when he advocated: 'active thinking and working on preservation of the few untouched plant and animal communities and their habitats, the positive sense in which I am using the word "wilderness"' (1970: 14), but later he moved in more obscure directions.

Passmore's summarised the series as demonstrating the: 'intellectual incoherence of the Western mystical tradition' (Passmore, 1974: 173).

A more considered approach may be seen in Huxley's contribution to *Conservation in practice* (1974), a book emanating from the conservation course at University College, London. Aitken's PhD thesis *Wilderness areas in Scotland* (1977) has also been widely quoted in Great Britain, especially by Sidaway (1989). Aitken appears to be one of the earliest in Great Britain to have questioned visitors about their perception of wilderness although the interviews by Shoard (1982) give an indication of views from five people who she described as the British wilderness lobby of the 1980s.

More recently, the Countryside Commission explored the possibility of allowing limited

areas of England to return to 'wildness'. The most interesting part of the commissioned report, *The scope for wilderness* (Landscape Design Associates, 1994), was the collation of comments from interested parties, which ranged from the flippant to more considered views. Micklewright suggested: 'From an ecological viewpoint a wilderness would be defined as an ecosystem which is not managed directly by people but where natural processes are dominant' (1994, Appendix 5, no pagination), an approach which took wilderness beyond an exact state to a continuous process of natural regeneration. This was one of the few comments that went beyond more immediate concerns, as generally, the feasibility and politics of the idea were dominant. One involved party suggested the idea was dropped because of political sensitivity, rather than for any other reason.

Four years later media reports outlined a study of British hill farming by the National Farmers' Union (NFU). *The Times* quoted the Chairman of a NFU committee as saying: 'The crisis facing hill farming is threatening to turn some of our country's most beautiful landscapes into unmanaged wastelands' (*The Times*, 2 September 1998: 6). The report and its long-term implications deserves further consideration, but not within the pages of an Antarctic study. Initially, it seems to be a case of: 'I know what I like, and I like what I know', perhaps combined with the trait frequently found in British gardening traditions of 'tidiness' reigning supreme. It certainly illustrated much underlying confusion of thought that probably typifies 'wilderness in the British mind' at the present time.

5.4.3 Future patterns?

A recent manifestation of British interest in wilderness may be influential in future years. At present (1998) London Examinations offer an Advanced level Geography syllabus which includes a module entitled 'Managing wilderness regions', and it is said that this unit has been exceptionally popular, attracting several thousand students each year. It is interesting to speculate on future patterns, as the approach presented to them during their A level studies may well be influential in their later thinking.

Chaffey's *Managing wilderness regions* (1996) is a core text. The publisher's blurb give a convenient summary:

... It begins by looking at the concept of wilderness and then examines specific wilderness landscapes and ecosystems through the use of detailed case study material. Examples are taken from a range of locations, including ... Antarctica ... and much of the material used is previously unseen. The book also investigates

strategies for resource management in wilderness areas and tackles the management issues for conservation and recreation in these environmentally sensitive but resource-rich parts of the world. (back cover of Chaffey, 1996)

Seen from the approach developed in the course of this present study, much of Chaffey's approach must be challenged. His use of the word 'landscape' is particularly confusing. A diagram initially suggests that 'landscape' should be applied to 'physical processes + relief and landforms + the physical landscape', but the text takes this further and combines this definition with ecosystem to give: 'a more overall view of landscape, the "perceived" landscape' (1996: 52). No mention is made of any aspects of historic or cultural associations (chapter 7, section 7.3). Yet there is no indication how to interpret the frequent uses of 'landscape' elsewhere in Chaffey's text - is it to mean only landform, or landform combined with ecosystem? Much in Chaffey requires further examination, because of his use of language and the assumption he appears to make. Some would question a statement such as: 'wilderness landscapes have great scenic appeal' (1996:31). His linkage of 'wilderness' with 'scenic appeal' runs contrary to one of the basic premises of this thesis (section 5.3.4).

An overview of attitudes and approaches in the United Kingdom towards wilderness at least indicates that a more detailed analysis is desirable. The study may not reach the magnitude of Nash's *Wilderness and the American mind*, but 'the British mind' deserves further attention.

5.5 Environmental issues

In recent years 'the environment' has gained in importance as an issue. Some have argued that this has occurred because of a change in values which in turn has changed the relative importance of issues (Murphy and others, 1993). Any literature search covering *environmental values* reveals infinite views, ranging from describing environment as a commodity to mysticism of an undefined nature. On occasions, an approach is made that attempts to avoid specific positions. In a recent publication the President of the IUCN suggested:

The admonition to care for the land is a common theme of our ethical inheritance. The American Indian and oriental wisdom express the idea as living as one, in harmony with the land. Our Judeo-Christian heritage speaks of stewardship, a holding in trust for those who are to follow. ... Environmentalism draws its inspiration from the ethical impulse to care for the land, to act with prudence in our

use of the Earth's bounty. (Hair, 1995: 254-255)

Palmer's bibliographic essay offered an excellent overview of wider environmental ethics (1994), but a more focussed examination, centring on 'wilderness', is required for this study.

Concern for the environment is not a recent development, although the present intensity of awareness may have reached new heights. Thomas (1983) examined man's relationship to the natural world and argued that it is necessary to go back to the 16th century at least, in order to begin to understand the development of modern attitudes. He acknowledged his debt to G. M. Trevelyan, and ended his book with a quotation from the social historian which identified a major concern especially related to this study:

Whether trees, or animals, ought to be preserved 'for their own sakes' is an interesting question on which different opinions might be held. But the argument for the preservation of natural scenery and the wild life of English fauna and flora may be based on motives that regard the welfare of human beings alone, and it is those arguments alone that I wish here to put forward. (quoted in Thomas, 1983: 302)

The opposing ideas of anthropocentric values against intrinsic or ecocentric values have long been recognised (see, for instance, Passmore, 1974; Irland, 1979; Birch, 1982). In her study *Environmentalism and political theory* (1992) Eckersley discussed the differences and identified wilderness preservation as a 'litmus' issue that highlighted the disparities between the two positions. Whilst the ecocentric theorist would be prepared to set aside tracts of wilderness: 'regardless of whether such preservation can be shown to be useful in some way to humankind' (1992: 29), the anthropocentric response would not support widescale preservation unless it expressed a strong human-centred justification. The strength of opinion should not be underestimated. One commentator cited examples of environmental activists who saw the destruction of human life as being no more tragic than the destruction of the wilderness (Veith, 1994: 74-75).

5.5.1 Wilderness understood from an anthropocentric position

Nash (1982: 270) described wilderness as: 'an entirely human concept, an invention of civilized man'. This is echoed by Aitken's succinct definition: 'a human concept of a natural environment devoid of human influence' (Table 1). Both imply that wilderness is present only because man has given it a name and as such, it only exists because of man. This view had already been adopted by the Countryside Commission for

Scotland when it stated that wilderness was a land use type, rather than a description of the land (1971: 3).

Eckersley suggested the most exhaustive classification of the anthropocentric arguments to date was provided by Warwick Fox, a 'deep ecologist'. He identified nine arguments for preserving the nonhuman world on the basis of its instrumental value to humans:

the "life support," "early warning system," "laboratory" (i.e., scientific study), "silo" (i.e., stockpile of genetic diversity), "gymnasium" (i.e., recreational), "art gallery" (i.e., aesthetic), "cathedral" (i.e., spiritual), "monument" (i.e., symbolic), and "psychogenetic" (i.e., psychological health and maturity) arguments. (quoted in Eckersley, 1992: 41)

Antarctic examples illustrating all of Fox's categories may easily be found. The SCAR document *Objectives of conservation in the Antarctic* made specific reference to all of Fox's categories in just one section covering 16 lines (1989: 182) and, in a more general way, Roots (1995) made a comparable summary. Outside the Antarctic community, similar responses also occur. The 'laboratory' metaphor was used in *The Times'* Third Leader during the CRAMRA debate. The continent was identified as: 'a unique laboratory ... [which] may be crucially important for future generations of scientists. It is irreplaceable' (6 June 1988).

5.5.2 Wilderness understood from an intrinsic value position

Passmore suggested four approaches that support an intrinsic value position: attitudes to animals; the principle of diversity; the principle that men ought to reverence life, and the principle that it is wrong unnecessarily to destroy life. He begins by examining attitudes to inflicting pain on animals and concludes that it has been accepted, for at least a century, that man: 'ought not unnecessarily to inflict pain on animals. This means that they recognise at least one point at which their relationships with nature are governed by moral principles.' (1974: 111) His second heading, covering the principle of diversity, is similar to those expressed by those holding the anthropocentric position, although they would argue that the benefits of diversity would only be appreciated and used by humans. When considering the suggestion that men ought to reverence life, Passmore concluded that even with the present and possibly incomplete awareness of micro-organisms, it is impossible. 'We kill by remaining alive.' (1974: 123) The final approach was based on the principle is that it is wrong unnecessarily to destroy. He admitted that it has not received much attention from western moralists, but cited Jewish teaching,

in Deuteronomy 20, verses 19-20:

When you lay siege to a city for a long time, fighting against it to capture it, do not destroy its trees by putting an axe to them, because you can eat their fruit. Do not cut them down. Are the trees of the field men, that you should besiege them? However, you may cut down trees that you know are not fruit trees and use them to build siege works until the city at war with you falls. (New International Version)

Later Rabbinical commentators developed this into a general moral principle of 'Thou shalt not destroy.' The grounds that Passmore presented offered some basis for recognition of intrinsic values, but he admitted to finding the specific arguments for wilderness preservation more difficult than when approached from an anthropocentric rationale.

A frequently quoted paper challenging the anthropocentric basis of wilderness was Stone's *Should trees have standing?* (1974). The essay was written in 1972 in response to a legal case in the American courts concerning the development of Mineral King Valley in the Sierra Nevada Mountains, California. The author, a Professor of Law in the University of Southern California, used the case as a vehicle to bring to the Court's attention the notion of nature having rights. Although the US Supreme Court upheld the decision already made by a lower court, which to all intents and purposes 'lost' the environmental case, the essay received wide publicity and has been seen as an influential contribution to continuing legal and environmental debates.

Stone specifically limited himself to a discussion of: 'non animal but natural objects' (1974: 9, note 26). He argued that throughout legal history rights have been gradually extended, and so presented a case for changing the 'rightlessness' of natural objects in American common law. Stone offered a solution by proposing the property rights used by the legal system to create monetary value be extended to 'eagles and wilderness areas'. He then suggested: 'the violation of rights in them to be a cost by declaring the "pirating" of them to be an invasion of a property interest.' (1974: 29) Stone examined current American legislation, including the National Environmental Policy Act (NEPA) and pointed out that in the preambulatory *Declaration of National Environmental Policy* the emphasis is on the maintenance of: 'environmental quality "to the overall welfare and development of man" as well as for creating and maintaining "conditions under which man and nature can exist in productive harmony."' (NEPA, 42 U.S.C. sections 4321-47, 1970)' (Stone, 1974: 42). The pressure for care still rested on a concern for man, rather than the

environment, but Stone argued that: 'the time is already upon us when we may have to consider subordinating some human claims to those of the environment. Consider, for example, the disputes over protecting wilderness areas from development that would make them accessible to greater numbers of people.' (1974: 42)

At about the same time as Stone was writing in a specifically American context, Passmore was examining the issue in a wider sphere. He assessed the differences between having interests and having rights and considered that the former does not lead to the latter. He concluded that: 'the idea of "rights" is simply not applicable to what is non-human.' (1974: 116) Berry also criticised rights language, which he suggested implied: 'a static relationship between rights-giver and rights-claimer. In fact the relationship between humankind and nature is a dynamic one; it involves a moral involvement on our part, not an unthinking acknowledgement of a situation.' (1995a: 26)

Lesslie and Taylor, writing about the Australian wilderness policy, (1985: 311) expressed concern about the anthropocentric approach, because it primarily emphasised: 'the experiential benefits which can be derived from direct human use of undeveloped lands, particularly as a result of recreation.' (1985: 312) They postulated an alternative biocentric concept, with only indirect human benefits resulting from the preservation of natural ecosystems. This appears to have been an attempt to move beyond assessment of human benefit as the sole measure of wilderness value. They suggested the confusion associated with the definition of wilderness could be eased by: 'attempting to identify the essential attributes of those areas traditionally regarded as wilderness.' Aitken tried this approach in Scotland in the mid-1970s with members of the public, but concluded that respondents followed romantic interpretations that bore little relationship to known facts.

There have been consistent attempts to argue a case for recognition of intrinsic value in the environment. They do not appear to have received widespread governmental support, with the possible exception of New Zealand. Eckersley cited with approbation section 2(1) of their 1987 Conservation Act which defined conservation to mean:

"the preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values". ... Natural resources are defined in the Act to include not only plants and animals, but landscapes and landforms, geological features and "systems of interacting living organisms, and their environment" (Eckersley, 1992: 203, note 44).

5.5.3 A further position

Taking sides with the anthropocentric or the ecocentric view appears to offer a bleak future as boundaries have already been rigidly drawn. A further position would offer opportunities for conciliation between the established camps.

A landscape architect and planner wrote: 'One sometimes hears West Hampstead described as wild. Foulness more often. The poles always. But what about the moon, Pluto or the outer galaxies? It would be presumptuous to describe them with reference to man.' (Turner, 1992, personal communication) His geographic span went beyond this study but the underlying thought was stimulating, as it recognised both anthropocentric values, typified by the North London public open space of 'West Hampstead', as well as intrinsic values, typified by 'galaxies'.

Any further position need not agree or accept all arguments offered by either camp, and neither should it be seen as an approach based on the lowest common denominator. It demands a rigour in approach so as to offer a reasoned position with firm foundations.

Kennedy, as Director of the National Park Service in the United States, wrote:

I believe it is our obligation to act respectfully toward all living things and to manifest an approach to life in which the dignity of all species is sustained and common interests flourish. (National Park Service, 1993: i)

Such a statement may appear commendable in so far as it portrays a wide-scale perspective but no value system is suggested on which 'our obligation' may be founded or developed.

The proposition is that a biblically based theology offers a value system that can respond to both views. It leads to an acceptance of the intrinsic value of the world as well as a human-centred approach, providing this is always seen as being under the overall authority of God. Berry argued that: 'Christianity, properly understood, leads to a responsible stewardship of the environment and not to flagrant abuse of escapist mysticism; it converges with and provides an undergirding to secular thinking as expressed by the Bruntland Commission (on sustainable development) and the Economic Summit Nations (on environmental ethics).' (1991: 3) Others such as Moss (1975, 1976, 1982), Elsdon (1992) and Osborn (1993) offered biblically based positions, yet for many years the Judeo-Christian tradition has been the subject of considerable attack in environmental circles. Berry recognised this. He asked: 'Does the "environmental crisis" expose the stupidity (or worse, the danger) of Christian faith?'

(1991: 5) Perhaps inevitably, Lynn White is mentioned.

In 1967, when professor of history at the University of California, White published '*The historical roots of our ecological crisis*', a paper which castigated the Judeo-Christian tradition. It has been widely quoted. Some have challenged his arguments (see, for instance, Atfield, 1983; Osborn, 1993; Berry, 1995a) whilst others have applauded his analysis. Rather than re-examining White's essay yet again, it is more relevant to this study to consider his apparent influence on Ian McHarg, a landscape architect of Scottish birth now living in the United States. McHarg has contributed to landscape planning techniques in both North America and Great Britain, especially through his book *Design with Nature* (1969). With the current pressure for sustainable development in the United States, it is not surprising that it was re-issued in 1991. Reviewed by one leading British landscape architect as a 'new guidepost in our work' (Tandy, 1970), it advocated an ecologically-based approach to landscape planning.

Ten years after publication, McHarg gave the 1979 Reflection Riding Lecture at The Royal Society of Arts in London. The meeting was chaired by Dame Sylvia Crowe, a Past President of the Institute of Landscape Architects. In introducing McHarg she referred to *Design with Nature* as 'something of a Bible to all of us'. Some would see her choice of words as unfortunate, considering the direction and vehemence of his attack. In both the initial discourse of *Design with Nature* and the Royal Society lecture, McHarg critically stated his view of the Judeo-Christian position. Much of his wrath centred on the so-called 'multiply and subdue' mandate of Genesis 1 v 28, which he interpreted as: 'the sanction and the injunction to conquer nature - the enemy, the threat to Jehovah.' (1969: 26)

One of the grounds for challenging McHarg's arguments is that he limited his case to an attack on a single chapter, before taking a selective part of a single verse in that chapter and submitting it to superficial and emotive criticism. Berry's summary of McHarg was: 'gross exaggerations' (1995a: 27), but at least McHarg suggested that Christianity was not alone as other value systems such as capitalism and communism had adopted a similar course.

There was a further link between Lynn White and McHarg. One of White's closing accusations spoke of the: 'orthodox Christian arrogance towards nature' but he then went on to argue that: 'since the roots of our trouble are so largely religious, the remedy

must also be essentially religious' (1967: 1207). McHarg began his lecture by saying that his major proposition is 'that society needs an explicit metaphysic, a world view which demonstrably corresponds to reality' (1979: 133). More recently, Oelschlaeger echoed their approach by also seeking a religious/metaphysical basis. He began his study by an examination of White and ended with 'a theory for interpreting religion in a time of ecocrisis.' (1994: 2) There are limitations in the route suggested by Oelschlaeger because he wrote within such a distinctly American context, with few references beyond North American boundaries.

A rigorous approach is essential, which must be based on a wider foundation than a single biblical verse, although it is recognised that there may be difficulties of interpretation. Osborn wrote: 'No book, not even the Bible, can be read *de novo*. Whenever we begin to read we bring some pre-understanding to the text; we rely upon a tradition of interpretation to make sense of what we read.' (1993: 81) He advocated: 'the Christian approach to ethics must be by way of theology' (1993: 131), a statement implying the necessity of a thorough, analytical approach. It is essential to examine the sweep of biblical teaching to meet Berry's requirement for properly understood Christianity. As an example of such an approach, Elsdon's *Green house theology* (1992) which set out to examine the biblical perspective on care for the environment, used references from over three-quarters of the 66 books in the Bible.

5.5.4 Development of a biblical position

First, a wider view indicates that because 'the earth is the Lord's and everything in it' (Psalm 24 v 1) it has real, intrinsic value to both God and also to man, made in his image. This intrinsic value is further identified by Russell, who wrote that in the book of Job: 'we are given an idyllic picture of an Earth that is free from human interference and in which God delights.' (1994: 143, referring to Job 36 v 22 to chapter 37 v 24, and 38 v 2 to chapter 41 v 34) Moreover, the creation narrative in Genesis 1 continually stresses the goodness of all things that were created.

Although primarily written to caricature the position of the 18th century Irish philosopher Berkeley, Knox's two limericks capture God's concern and continuing involvement with creation:

There was a young man who said, 'God
Must think it exceedingly odd
If he finds that this tree

Continues to be
When there's no-one about in the Quad.'

REPLY

Dear Sir:

Your astonishment's odd.
I am always about in the Quad.
And that's why the tree
Will continue to be,
Since observed by
Yours faithfully,
GOD.

(quoted in Brown, 1969: 65)

Second, man, who is both part of nature, yet also detached from nature, has been created with real moral responsibility to God for his actions. The command to subdue 'is not a licence to unrestricted exploitation, but rather a responsible realisation of an authority given by God, to be exercised only in responsible moral decision with reference to God' (Moss, 1974: 342). Berry said 'our domination is exercised on God's behalf (1991: 9), whilst Stott, expressing a similar view, said succinctly: ' "dominion" is not a synonym for "domination", let alone "destruction".' (1990: 121) Further understanding of man's relationship to God may be seen in Psalm 39 where David, once a shepherd but later king of Israel, described himself as God's 'passing guest' (Psalm 39 v 12, Revised Standard Version). I have examined some implications of this status (Reich, 1978) but in summary there were not only rights to be claimed but also obligations to be met.

DeWitt's 'fruitfulness principle' is linked to this approach:

Thus, while expected to enjoy Creation, while expecting to partake of Creation's fruit, we may not destroy the fruitfulness upon which Creation's fullness depends. ... We should let the profound admonition of Ezekiel 34:18 reverberate and echo in our minds. (DeWitt, 1995: 13)

The text he cited is:

"Is it not enough for you to feed on the good pasture? Must you also trample the rest of your pasture with your feet? Is it not enough for you to drink clear water? Must you also muddy the rest with your feet?" (Ezekiel 34 v 18, New International Version)

It may be argued that these are theological answers devised in the 20th century to counter current attacks. It is instructive to read both Augustine and Calvin who both responded with pleasure to creation. Writing about 397 AD, Augustine was able to say: 'All things are beautiful because you are their Maker' (*Confessions*, Book XIII, 1961: 329). He saw human awareness of creation when: 'men go out and gaze in astonishment at high mountains, the huge waves of the sea, the broad reaches of rivers, the ocean that encircle the world, or the stars in their courses.' (*Confessions*, Book X, 1961: 216) Nash recounted that Petrarch, having climbed Mount Ventoux, read these words and understood them as admonishing men not to take joy in creation, but rather to look after their own salvation. Nash said Petrarch 'responded as a Christian' believing that nothing is wonderful but the soul (1982: 20). This is both a limited view of Augustine's position and an unbalanced view of Christianity. Augustine held that if man was in a right relationship with God, the creation might be fully appreciated within that relationship. He was aware of the danger of simply seeing beauty without responding to the Creator:

The eyes delight in beautiful shapes of different sorts and bright and attractive colours. I would not have these things take possession of my soul. Let God possess it, he who made them all. He made them all *very good* [translators footnote: Genesis 1v 31], but it is he who is my Good, not they. (*Confessions*, Book X, 1961: 239)

Calvin, writing over eleven hundred years later prepared a commentary on *Genesis*, originally published in Latin in 1554 and translated into English in 1578. On Genesis 2 v15 he wrote:

the custody of the garden was given in charge to Adam to show that we possess the things which God has committed to our hands, on the condition, that being content with a frugal and moderate use of them, we should take care of what should remain. ... let every one regard himself as the steward of God in all things which he possess. (1975: 125)

He recognised man's position under God as an integral part of stewardship as well as seeing the place of moderation and conservation. In a wider context, Calvin suggested that God's 'gifts of Providence' were created for our good, and that God: 'consulted not only for our necessity, but also for our enjoyment and delight.' (*Institutes*: Book three, Chapter X, Section 2).

Almost a century later, a 17th century Chief Justice of England, Sir Matthew Hale,

repeated this extended vision when he saw man's responsibilities to: 'preserve the face of the Earth in beauty, usefulness and fruitfulness.' (quoted in Black, 1970: 56) Black commented: 'In Hale's view there was clearly no escape from man's responsibility to God for the proper management of the earth ... and, be it noted, to maintain the beauty as well as the productivity of the earth.' (Black, 1970: 57) Sensitivity to God's creation may also be seen in a prayer from the 1754 *Geneva Liturgy*, which followed Calvin's reformed position: 'If we commune with the earth, it instructs us. If we question the animals, and even the plants, they all tell us that they were fashioned by your hand.' (quoted in Marcel, 1976.)

These perspectives support the more recent concern of Osborn to expand the present Christian concept of stewardship because: 'it does not exhaust what the Bible and Christian theology have to say about the relationship between human beings and the natural world.' (1993: 142) He presented a case requiring respect for the integrity of the non-human creation and the maintenance of the present diversity of creation against further damage. Osborn suggested that this fuller understanding of stewardship also recognised a freedom to engage in scientific research, as: 'motivated by love for God and concern for our fellow creatures, it seeks to nurture the diversity of the world.' (1993: 144)

The writings of Edward Wilson bring this issue into the polar realm. He wrote: 'the whole creation calls me to worship God' (quoted in Seaver, 1957: 35). Wilson mentioned three sets of verses from the Psalms 'that always express what I feel' - Psalms 36 v 9, 71 v 17 and 92 v 4-5 (quoted in Seaver, 1963: 99). All three refer to God's omniscience and his place as creator, sustainer and guide. Wilson was aware of the possibility of misinterpretation. Writing to his future brother-in-law he presented: 'a collection of ideas which have helped me ... though they might make some people think that I was a pantheist and considered the universe as identical with God. I don't; I believe in a personal God who is also omnipresent.' (quoted in Seaver, 1957: 41)

Wilson saw no conflict between his Christian faith and his scientific work. Indeed, it is apparent that his faith encouraged and supported his endeavour (Seaver, 1963: 49, 51). During his first expedition with Scott on the *Discovery*, he jotted down phrases and rhymes which finally appeared under a pen-name in the *South Polar Times* (the expedition's own newspaper) in 1911:

... Though secrets hidden are all forbidden
Till God means man to know,

We might be the men God meant should know

The heart of the Barrier snow ...

(cited by Seaver, 1963, 1979)

The purpose of this summary has been threefold: first to challenge assessments made by individuals such as White and McHarg, both to their accuracy and their relevance; second, to state a biblical approach to stewardship, and third, to suggest stewardship provides a value system meeting demands held important in the definition and conservation of wilderness. The signatories of the Protocol cover a wide range of ethical and religious backgrounds not all holding the Christian faith. Nevertheless, common ground can be found. Having served on three different committees, two secular and one Christian, Berry has been led to think a world ethic for sustainable living may be possible (1995b and 1996).

5.5.5 Stewardship

Stewardship has been seen as a valid concept by others who do not necessarily work within a biblical faith. Colman described it as 'a form of ethically motivated behaviour' and a commitment to be encouraged (1995: 15). Sarre suggested: 'a more modern version of stewardship sees responsibility to future generations rather than to God.' (Sarre and others, 1991: 34) Whether it truly is 'more modern' is questionable. Biblical understanding of the importance of generations is strong - the injunction to remember 'children's children' is regularly found, especially in the Old Testament. However, it is recognised that many find it more acceptable to base their arguments on posterity rather than Christian belief. The validity of the position has been recognised by others including deGroot (1992), and Thorsell, writing the introduction to the IUCN volume on World Heritage natural sites:

... we have a duty to posterity. This, of course, is the essential idea behind the concept of World Heritage - it implies there is something to be inherited by the generations that will follow us. (1995: 9)

In the United States, the Committee on Antarctic Policy and Science saw stewardship as 'a new approach' to the future (United States [1993]: 16) and considered the concept provided: 'a philosophical basis for governance of the continent.' ([1993]: 18) They went further, stating: 'the concept of stewardship is embodied in Article 3 of the Protocol, with the five Annexes providing detailed rules for some aspects of environmental protection' ([1993]: 44), although recognising some gaps.

5.6 Continuum approaches

In his prologue Nash said:

A possible solution to this problem [the definition of wilderness] is the conception of a spectrum of conditions or environments ranging from the purely wild on the one end to the purely civilized on the other - from the primeval to the paved. ... Wilderness and civilization become antipodal influences which combine in varying proportions to determine the character of an area.' (1982: 6)

The benefit of a continuum approach is that it recognises the difficulties of establishing clear-cut divisions. In turn, this can also be a drawback as on occasions precision may promote action, whereas apparently looser statements encourage 'further consideration', and easy but gradual dilution.

5.6.1 Australian National Wilderness Inventory

On a continental level, a wilderness continuum was developed for the Australian NWI (Figure 6), aspects of which have already been examined in section 5.3.4.

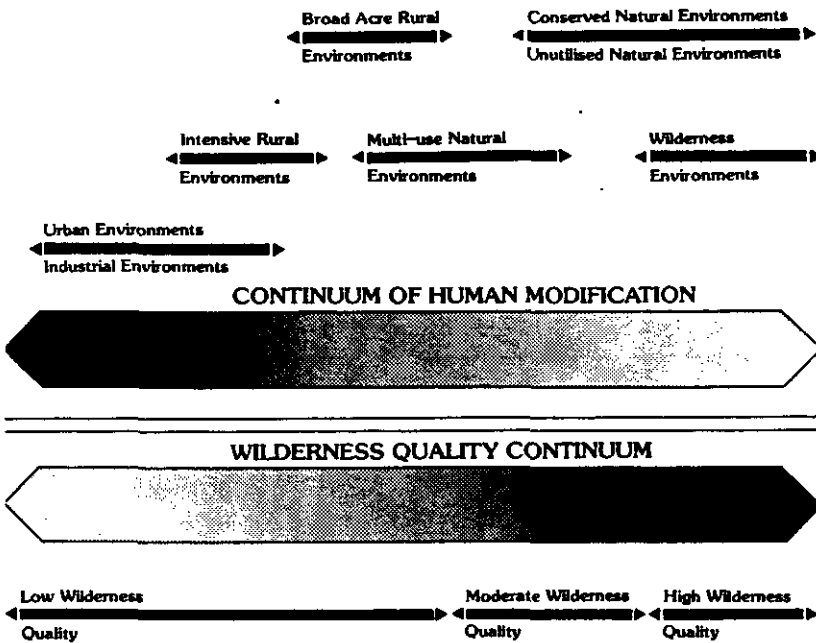


Figure 6 Wilderness continuum (Lesslie and others, 1993: 3)

Their diagram offers an interesting approach. Two factors, 'human modification' and 'wilderness quality' are juxtaposed with the 'high - low' range of one corresponding exactly to the 'low - high' range of the other. This results in the description of an urban environment as having a 'low wilderness environment'. This may be considered self-evident, but in the widest understanding of the word, wilderness may still be found in a city (Footnote 1).

At the other extreme it would appear that all wilderness environments inevitably have 'high wilderness quality'. This is somewhat confusing, as other publications from the NWI show 'high, moderate, and low' ratings for wilderness quality (see, for instance, *NWI Bulletin 2*, May 1994). It might have been more appropriate to modify the correlation so that it is recognised that there may be areas where the concept of wilderness is simply not applicable. This approach was adopted by Lesslie and Taylor in an earlier paper, where 'settled land' was considered to have 'no wilderness quality', leaving undeveloped land to be graded from 'low' to 'high wilderness quality' as it became increasingly remote and primitive (1985: 16).

The sampling grid used in Australia was 500m for complex environments with remaining parts of the continent covered at 1000m. The areas covered at 500m totalled about 25% of the continent and comprised the eastern fringe from Cape York in the north to Tasmania in the south, then along the southern coast as far as the eastern fringe of the Great Australian Bight. The southwestern corner of Australia was also covered at this interval. The NWI is commendable as a coherent study of assessment at a continental scale.

Footnote 1 Although not immediately contributing to a thesis concerning the Antarctic (and thus relegated to a footnote) the following passage occurs in the novel *The woman in white* by Wilkie Collins, first published in 1887. It illustrates the dictionary's figurative definition or Nash's definition of a wilderness as: 'any place in which a person feels stripped of guidance, lost, and perplexed' (1982: 3; see also Tuan, 1973: 112), but it also serves as a particular warning to any involved in urban design.

Is there any wilderness of sand in the deserts of Arabia, is there any prospect of desolation among the ruins of Palestine, which can rival the repelling effect on the eye, and the depressing influence on the mind, of an English country town in the first stages of its existence, and in the transition stage of its prosperity? I asked myself that question as I passed through the clean desolation, the neat ugliness, the prim torpor of the streets of Welmingham. ... every creature I saw, every object that I passed, seemed to answer with one accord: The deserts of Arabia are innocent of our civilised desolation; the ruins of Palestine are incapable of our modern gloom! (1974: 503)

5.6.2 Other examples

Both Litton (1979) and Feilden (1979) adopted a continuum approach to aspects of conservation and in some respects their contributions are similar. Both resulted from wide practical experience; Litton as a landscape architect and Feilden as an architect, who directed the UNESCO International Centre for the Preservation and Restoration of Cultural Property. Because Feilden identified more clearly the integration of future management into initial conservation decisions, his approach is examined in greater detail. Whilst his terminology is primarily building-orientated, the principles are applicable to a wider range of conservation activity (Table 2).

Prevention of deterioration (Indirect Conservation):	pro-active action to prevent damaging agents becoming operative.
Preservation:	to keep the object in the same state.
Consolidation (Direct Conservation):	the physical addition of materials into the actual fabric in order to ensure its continued durability.
Restoration:	revive the original concept.

Table 2 Feilden's 'degrees of intervention', levels 1-4 (1979: 31)

Feilden suggested the values underlying conservation under the three major headings of cultural, use and emotion (1979: 27). He considered it essential to prepare adequately documented inventories prior to the establishment of an appropriate 'level of intervention'. He recognised that: 'interventions practically always involve some loss of "value" in cultural property, but are justified in order to preserve the objects for the future' and in any situation: 'several degrees may take place simultaneously in various parts of the "whole".' (1979: 31) The first four of Feilden's seven degrees of intervention are of immediate relevance to polar regions.

Consolidation or Direct Conservation is the only level of intervention that is not immediately applicable to natural features and the historic expedition huts are probably the only Antarctic feature covered by this category. Similarly, Restoration probably has limited use, in relation to negative items such as refuse or abandoned fuel depots which have been identified by many (see, for instance, Harris, 1991a, 1991b).

5.6.3 Management under a continuum approach

Stankey also suggested 'the notion of a biocentric to anthropocentric continuum' and recognised that 'deciding where along this continuum management will focus is a critical

is a sensitive issue, bordering on anathema to some. Nash recognised that 'wilderness management is a contradiction in terms' (1982: 384) but suggested that controls are necessary. Waterman implied that wilderness management was in fact user management and that controls on humans protected wilderness areas (1978). This approach would be appropriate in the Antarctic, as access is the major difference between the two designations outlined in the Protocol (1991, Annex V, Articles 3-5). Entry to an ASPA requires a permit, ASMAs do not, but as management plans are essential for both classifications, the opportunity for controls are available, should they be considered necessary.

5.7 Summary

An Australian philosopher remarked:

... a social critique of deep ecology may be backed by such disparate authorities as Ginsberg, Castenada, Thoreau, Spinoza, Buddhist visionaries, and Taoist physics. With a cast of prima donnas like this on the stage it is very hard to follow the script. (quoted in Fox, 1984: 194)

His criticism was specifically directed towards deep ecology, and was robustly countered by Fox, but many would feel that his words could also be applied to environmental thinking as a whole. Clarity of thought has been lost and the script is in danger of being confused by multitudinous words. 'Wilderness' has generated a large share of these, so attempting to identify factors that might be relevant to the Antarctic has been the purpose of much of this chapter. It is proposed to proceed on the premise that the Antarctic is a wilderness, in the general understanding of the word, and that the implications of this approach require examination and development (chapter 6).

The underlying ethical basis may be summarised as stewardship. It is recognised that *this term can be approached in a number of different ways. For me, the most satisfactory context is within biblical Christianity, but sufficient ground exists for common principles to be found that are acceptable to a range of ethical positions.*

6 WILDERNESS IN THE ANTARCTIC

6.1 Scope of the chapter

In chapter 5 an examination was made of the thinking underlying 'wilderness', first in an international context, and then with specific reference to both American and British thought. These approaches are now related to the Antarctic. It is not appropriate to simply transfer terminology to polar areas, as Antarctic conditions make demands that cannot be ignored. This chapter then considers the Protocol's requirement to identify 'areas of outstanding ... wilderness value' (1991, Annex V, article 3.2.(g)) and suggests the alternative phraseology of 'wilderness status'. A working approach is given.

6.2 The Antarctic as wilderness

No evidence has been found to suggest serious argument against the concept that the Antarctic is a wilderness, either on grounds of common usage or on technical/planning definitions. Roots cut through much semantic debate when he wrote: 'Whatever definitions are used for *wilderness*, for those societies that use the term, the polar regions of the world include large areas that are typical examples.' (1995: 118) He suggested that in naming both the Arctic and Antarctic, Greek philosophers established: 'mental wilderness concepts even before those who had these ideas knew anything about them or that they existed.' (1995: 120) Even before the years of exploration, the area was perceived not only as unknown, but also as a region which inspired awe or terror.

The word 'wilderness' was only used infrequently in the opening years of Antarctic interest and its regular use only occurred during the last thirty to forty years, but it now dominates presentations of the continent, especially from environmental and popular quarters. Examples are not difficult to find. On 5 November 1981, the leading letter in *The Times* was from Dr R. M. Laws, then Director of BAS. He was responding to two previous letters and presented a measured summary of conservation agreements adopted by the Treaty nations. The editorial heading for the letter was *Protecting the Antarctic wilderness*, although there was no obvious phrase in Laws' letter to suggest this title. Brewster's 1982 book, written under the auspices of Friends of the Earth was called *Antarctica: wilderness at risk*. Sir Peter Scott, son of the explorer, wrote of 'the fragile Antarctic wilderness' in a letter to *The Times* on the 29 December 1986. Messner regularly referred to the Antarctic 'wilderness' (1991: 34, 37, 167). A tourism advertisement in the *Radio Times* during the first week of David Attenborough's BBC television series *Life in the freezer* had the heading 'Antarctica - the last true wilderness

on earth' (*Radio Times*, 13 -19 November 1993: 68), a phrase which occurred on the back cover of the book that resulted from the series (Fothergill, 1993).

An examination has already been made of the Treaty System, together with inputs from interested NGOs (chapter 4), but few texts examine the concept in depth. Stankey and Nash (1990) whilst writing about 'International concepts of wilderness preservation and management', included a section about Antarctica, but it only amounted to a historic summary of the Treaty and mention of the world park concept. The Greenpeace collection of essays entitled *Antarctica: the scientist's case for a world park* (1991) concluded that 'science will not be compromised if Antarctica were designated a World Park' (1991: 3), yet the document stated that:

a World Park would be guided by the fundamental principles of:

Protection of wilderness values.

Complete protection of all wildlife and the environment.

Maintenance of a zone of scientific activity ... (1991: 50)

No meaning was given to 'values' or indication as to how scientific activity could practically continue without conflict of interests.

After a wide literature search, it appears that the issue had been examined in any depth only by Mosley (1986), Roots (1995), and in a special edition of the *International Journal of Wilderness* (Cessford; Dingwall; Dalziell and de Poorter; Walton, and Codling, September 1997).

Writing from an Australian viewpoint, Mosley asserted: 'the reasons for retaining wilderness have been argued many times ... have changed little and have surely earned increased validity as time has progressed.' (1986: 31) Those from countries without wilderness may not have heard the debate so frequently, but Mosley's arguments were presented as a coherent summary concerning values related to the Antarctic. He considered the 'value of the Antarctic wilderness' (1986: 30-35) and summarised the present benefits to the world as:

- 1 the maintenance of the flow of benefits from the natural environments and its living resources;
- 2 the advantages derived from co-operation in management and administration; and
- 3 the avoidance of major disturbances of the physical systems which would have consequences for the whole globe. (1986: 30)

He suggested: 'maintenance of the wilderness or fully natural state is the condition that provides the best guarantee for the satisfaction of all three interests' (1986: 30) and developed his argument by itemising the benefits from the natural environment as fish and krill; a source of knowledge as well as inspiration and recreation. However, he did not identify potential conflicts, such as the issue of motorised transport, which need to be faced in order to develop a working approach to the meaning of wilderness in the Antarctic.

Roots' approach was historically wider, providing an analysis that separated European fascination with polar wilderness from the indigenous view. He suggested that northern peoples had been able to prosper within the Arctic environment: 'because they have become a functioning part of the regional ecosystem' (1995: 122) and that this integration has precluded exploitation of any part of the natural system for human gain whilst treasuring another undisturbed portion as 'wilderness'. Recent trends indicated that the uses of polar wilderness could be categorized into commercial, political or scientific uses. Although not citing references or formulating working procedures, Roots gave a convincing overview of the concept of polar wilderness. He concluded:

What do polar wildernesses contribute? They have provided essential elements of history, culture, knowledge, psyche, and spirit, for better or for worse, for at least the past 2,300 years. Today, particularly, they are important to our self-awareness, our environment, and to what actions we can take towards a sustainable future. To whom do they contribute? To each of us, no matter where we live. (1995: 127)

The five articles in the special Antarctic edition (September 1997) of the *International Journal of Wilderness* covered a range of specifically polar issues, and have since been reprinted as *Antarctica in the environmental era* (edited by Dingwall, 1998). Cessford considered tourism, whilst Dingwall gave a summary of human interest in the continent and events leading to the Protocol. It is interesting to note he interprets the Protocol's 'aesthetic values' as 'landscape values' (1997: 24), although no indication is given of approaches to assessment. Dalziell and de Poorter reported on a 1996 workshop which considered cumulative environmental impacts. Five existing mechanisms were identified that would: 'provide opportunities for addressing cumulative impacts.' (1997: 28) In this thesis I conclude (chapter 11, section 11.2) it would be advantageous to take one step further back, and adopt higher design standards for every aspect of human involvement on the continent. In discussing environmental monitoring, Walton suggested importance

should be attached to: 'the change in mentality brought about by the Madrid Protocol' (1997a: 32). He also saw the Protocol as: 'an excellent set of rules for sensible management of the Antarctic environment.' (1997: 33) I considered concepts of wilderness, outlining a working approach (see section 6.4)

This edition of the *International Journal of Wilderness* probably typifies the range of issues seen as relevant in current patterns of wilderness thought. Together with the five Antarctic articles were features examining ethical issues, including the place of guilt, as well as a detailed consideration of social and ecological manifestations in the development of the wilderness concept in New Zealand.

6.3 Factors influencing the concept of wilderness in the Antarctic

There appears ambivalence in polar circles in using the description of wilderness for the Antarctic. On the one hand it is a convenient summary but on the other, there is reticence possibly due to apprehension about the implication of factors in established definitions. It is suggested the difficulties stem primarily from the place of human beings; the permanency of occupation and use of motorised transport.

6.3.1 The place of human beings

The most extreme position is that presence of a single human being negates wilderness. Watts addressed this issue:

A particular factor frequently overlooked in general discussion is that in the real world environmental protection is seldom an absolute. *Any* human activity in Antarctica will have *some* environmental impact, and the only form of complete protection for the Antarctic environment would be one which excluded human activity there altogether (and even then, the environment would remain susceptible to influences from outside Antarctica). The questions to be faced in practice are whether the value of the activity to be undertaken outweighs the environmental impact which will inevitably accompany it, and whether those impacts can be minimised without undermining the value of the activity giving rise to it. In short, a balance has to be struck. (1992: 253)

The value and place of Antarctic science (chapter 3, section 3.2.2) has been vigorously advocated by workers such as Laws (1991) and Drewry (1993). Laws projected the scale of development by estimating that 50 occupied stations each covered an average of two square km resulting in an area of about 100 square km which may have been

significantly polluted. He estimated this left 99.999% of the Antarctic: 'virtually unaffected by the impact of human activity. Is the "polluted" 0.001% sufficiently important to weigh against the value to the world of Antarctic science, much of which has an essential global role?' (1991: 4)

Studying possible improvements to Antarctic stations, Wilkniss, Director of the Office of Polar Programs in the United States, met a designer who took the extreme stance. She said that 'anytime you set foot in the Antarctic ... you violate everything.' Wilkniss said he agreed she was right, but continued:

So we have to convince people that the science we do in Antarctica is worth the impact we make. Our very existence on this planet has environmental impact - in Antarctica, and Kansas, and everywhere else. The best any of us can ever hope to do is make sensible choices. Mankind has extended its reach - for good and for bad - to the ends of the earth. We could not turn back if we wanted to. The paradox of McMurdo is the paradox of life itself. (*Antarctic Journal of the United States*, 1993: 9)

Although it has points in common with Watts's statement, aspects of Wilkniss's response are open to question. Even if total 'turning back' is not an option, many would argue that controls are necessary. The Protocol itself was drawn up as a response to the need for an agreement that was stronger than previous hortatory statements.

It is suggested that at least some of Wilkniss's problems are linked to a particular perception of the Antarctic. Wilkniss's comments appear below a designer's drawing entitled 'Aerial view - proposed town center' with the editor's further caption 'Design team's proposed town center shows changes to improve habitability and efficiency of McMurdo Station.' (*Antarctic Journal of the United States*, 1993: 9) Such a description suggests a complex providing patterns of living not immediately recognised by many Antarctic workers. Fogg and Smith had already made an observation which bears on this issue:

Our technological ability to insulate ourselves from a harsh environment ... is cutting ourselves off from direct apprehension of the Antarctic world. Such separation from the thing itself is seen most acutely at the base at McMurdo. ... The scientists get out into the field, but as soon as possible they and their data are taken back to civilization ... The base personnel who provide the back-up for scientists are insulated by extra comforts and artificial distractions against the unfriendly environment. It seems that few go outside the confines of the base

and few wish to remain longer than they have to. (1990: 72)

The American writer Lopez also touched on this issue of isolation from the environment. He was concerned that:

more and more often, Antarctica is seen as a place from which to take the measure of the planet, or of the space in which the planet turns. ... It is disquieting to think about a time when people will come here to work not because its Antarctica but in spite of that fact, when the human encounter with this landscape will have become largely electronic. It is exactly at this point ... where human culture begins to separate itself from a real, physical place, and all the subtle responsibilities that that relationship implies, that we see emerge the first strains of long-term environmental degradation. (1992: 3)

Sensitivity to the environment can only be based on experience together with a sympathetic awareness. If the concept presented is 'town' with no mention of setting, the response will be different to that generated by 'research station' situated in 'the great, wild, austere beauty of Antarctica', quoting another American, the photographer Elliot Porter (1978: 16).

6.3.2 The permanency of occupation

Many wilderness definitions describe man as a 'transitory' visitor. Yet McMurdo Station, 'may as well be regarded as permanent' (*Antarctic Journal of the United States*, 1993: 4) and the financial commitments made by other nations for buildings and landing strips indicate at least the hope for a degree of permanence.

Nevertheless, efforts can and should be made to reduce the impact of human presence on the continent. 'Low energy' living has been attempted with varying degrees of success. Scott used a windmill on the *Discovery* to generate power for electric light. (Savours, 1992: 47) Greenpeace, in giving an overview of human impacts in Antarctica, suggested alternative methods of energy supply [1994 or 1995: 28-29]. The Standing Committee on Antarctic Logistics and Operations (SCALOP) of the Council of Managers of National Antarctic Programmes has a Sub-group on Alternative Energy, encouraging national programmes to develop appropriate technologies (SCAR, 1995b: 460). Continuous attention to detail and higher standards of design can also be advantageous in reducing impacts.

6.3.3 The place of motorised transport

It is usually accepted that mechanical transport is not appropriate in wilderness areas. This has been adopted by many (Table 1, see for instance, Helman, 1976; Second World Wilderness Congress, 1980) and most recently by the IUCN in their 1994 *Guidelines for protected management categories*. Their 'Guidance for selection' notes read:

The area should offer outstanding opportunities for solitude, enjoyed once the area has been reached, by simple, quiet, non-polluting and non-intrusive means of transport. (1994: 19)

When on skis Messner was occasionally able to use parachute sails as a means of propulsion to aid his crossing of the continent. He wrote: 'we wanted to travel "cleaner" than the pioneers who had not troubled themselves with ecological questions.' (1991: 85)

Whilst this may be taken as a recent example of the feasibility of non-motorised travel, there can be no doubt that scientific work would be affected if such limitations were introduced. Pragmatically, if Antarctic scientific work is to continue, total restrictions cannot be imposed.

6.4 Wilderness in the Antarctic: a working approach

In a global context, the range of opinions about wilderness extends from 'a foot violates everything' at one extreme, to total dismissal of the concept in favour of unrestrained and unregulated access at the other. The Protocol, by identifying the value of the Antarctic as an area for scientific research and also as a wilderness (1991, both Article 3) lies somewhere between the two. The severity of the Antarctic climate demands that in most circumstances, visitors use both motorised support, whether base generators or for transport, and fixed accommodation. This leads to the conclusion that commonly accepted definitions of wilderness applicable elsewhere in the world require modifications.

This study proceeds on the premise that human presence should not be seen as totally nullifying the concept of wilderness. Every effort should be made to reduce impact, but the adoption of an approach is necessary that recognises varying levels of effects and finds practical solutions. In areas where land use patterns are more complex, it is essential to adopt the Countryside Commission for Scotland's approach (1971: 3), and only identify wilderness after the process of inventory and classification of landscape

resources, but in the case of the Antarctic it is suggested that the nature of the continent permits the immediate use of the term.

6.4.1 Wilderness in the Antarctic and Areas of human influence

Two well-established procedures may be used to test the concept of wilderness in the Antarctic. Using the IUCN *Guidelines* (1994: 18), designation of the vast majority of the continent is appropriate, providing an understanding is reached about the use of motorised transport. At the most straightforward level, this approach is common sense. A complementary approach is to take the methodology of the Australian NWI (Lesslie and others, 1993, see chapter 5, sections 5.3.4 and 5.6.1) and modify it for Antarctic use. The first two indicators (Remoteness from Settlement and Remoteness from Access) merge, as access in the Antarctic is limited to settlements (taken to include both existing and former stations) and their immediate surroundings. The other indicators, *Modifications of Apparent Naturalness and Biophysical Naturalness*, will also be predominately linked to stations, although there may also be isolated areas which have also been modified by human action. Whether these modifications, seen in a continental perspective, amount to a level that would lower an assessment of Naturalness, can only be ascertained by site survey. Thus the measures coalesce into a single indicator showing the presence of man.

This led me to suggest in the information paper submitted to the XXII ATCM at Tromsø that a reasonable working definition of wilderness is: 'Any part of the Antarctic in which *neither permanent habitation nor any other permanent evidence of present or past human presence is visible.*' (Codling, 1998: 2)

I continued:

Such a definition would allow field work to be pursued, using motorised transport and temporary accommodation, without prejudice to the longer term wilderness state of the area in which the fieldwork was done. While relatively simple and objective in its application this definition requires that any area which does not count as wilderness (eg scientific stations) be identified. Such identification would be based primarily on visibility at ground level, with further considerations given to the extent of noise and access routes.

The size of each area will differ greatly, mainly due to ground relief. At the simplest level, a study related to a base would result in a plan which answered

the question: 'How far do I have to go away from this base to be unaware of human presence?'

The Area of human influence would correspond to the total base area, including all outlying structures such as refuges, masts etc, plus an Assessment of visibility from the surrounding land, which should also make allowance for noise factors (section 6.4.2).

Diagrammatically, the Area of human influence could be represented by two concentric circles, (total base area, surrounded by area from which the base can be seen and/or heard) although in practice the outer area would be greatly influenced by local topography. This approach is straightforward and if adopted, would result in the designation of a very high proportion of the Antarctic as having wilderness status.

6.4.2 Noise

There appears to have been very little published about specific studies relating to noise in the Antarctic, although it is known to be one factor that current Australian work is considering (Riddle, personal communication, February 1998). A limited number of references have been found, the most illustrative being the experience of a scientific worker in RRS *Discovery II* :

Herbert Ponting, Scott's photographer, had said that he could hear whales blowing five miles away in the still air of this very place [the Bay of Whales]. And I had always found this difficult to believe, like many of the stories Antarctic explorers tell, but as I stood there ... on the great Ross Barrier in seventy-eight degrees south, I gave posthumous acknowledgement to Ponting that this expeditioner's tale at least was true and, indeed, I could better it for I heard distantly the sighing of the sea under the barrier cliff six or seven miles away. (Ommanney, 1969: 166)

This clearly suggests that in the Antarctic noise can be heard at greater distances than would be considered normal in other parts of the world.

During my brief visit to the Peninsula in 1970 I visited four active bases and at each generator noise was continuously present. During the recent fieldwork, only two bases were visited, Rothera and the Ukrainian base Vernadsky (formerly the British base Faraday) but at both generator noises were not so apparent, possibly due to newer plant and improved insulation.

Whilst on the field trip to Stokes Peaks, the noises that were most apparent were from our skidoos and also from the helicopter of HMS *Endurance* then assisting BAS in

mapping work. The helicopter was spasmodic, but a clear reminder of 'civilisation'. Our own skidoos encapsulated a paradox of Antarctic travel - a necessary machine for anything more than an adventurer's sortie, but one that detracted from the immediate surroundings. Therefore, noise from a variety of sources is a factor related to bases for which allowances should be made.

6.4.3 Control of motorised transport

The paper in the *International Journal of Wilderness* (Codling, 1997c) suggested that all of the Antarctic should be considered a wilderness, omitting only areas of 'base plus surroundings'. It also proposed that if biological and chemically uncontaminated locations called 'pristine areas' (Lewis Smith, 1994: 33) were identified, a surrounding buffer zone could possibly be used for motor-free recreation. This proposition was intentionally controversial. Even though the vast majority of the continent was considered to be wilderness, the suggestion meant that vehicles would still be permitted, which would almost certainly be anathema to many involved in wilderness issues. Conversely, to many in the Antarctic community the banning of skidoos over a 'pristine area plus buffer zone' might not be considered reasonable. My hopes of stimulating debate have not come to fruition. As of October 1998, no comments have been received and the 'Aunt Sally' remains disappointingly unscathed.

In reality, the best approach to control of motorised transport would be through the management plans required by the Protocol for both ASPAs and ASMAs (1991, Annex V, Article 5). The plans: 'shall include, as appropriate: ... pedestrian and vehicular routes within the area' (1991, Annex V, Article 5.3 (e) (iii)), and thus can be tailored to meet needs in a specific area.

6.4.4 Differentiation between 'wilderness' and 'wilderness value'

In this study, 'wilderness' or 'wilderness status' have been preferred, even though the Protocol uses the phrase 'outstanding ... wilderness value' (1991, Annex V, article 3.2.(g)). It has to be questioned whether 'values' can be established in an Antarctic wilderness area. Once wilderness status has been given, do valid criteria exist for evaluation into higher or lower classifications? Studies such as the Australian NWI have developed approaches that ascribe weighting factors to differing grades in the indicator groupings (chapter 5, section 5.6.1), so it has to be asked if such techniques are applicable in the Antarctic.

There may be areas of the continent, such as King George Island in the South Shetlands, where environmental pressures are at a greater intensity in relatively small areas, thus suggesting a requirement for finer-grained study. Harris (1991a, 1991b) was critical of the pattern of activities, but the 'Area of human influence' concept may be sufficient to cover such concerns. Fieldwork testing would be required.

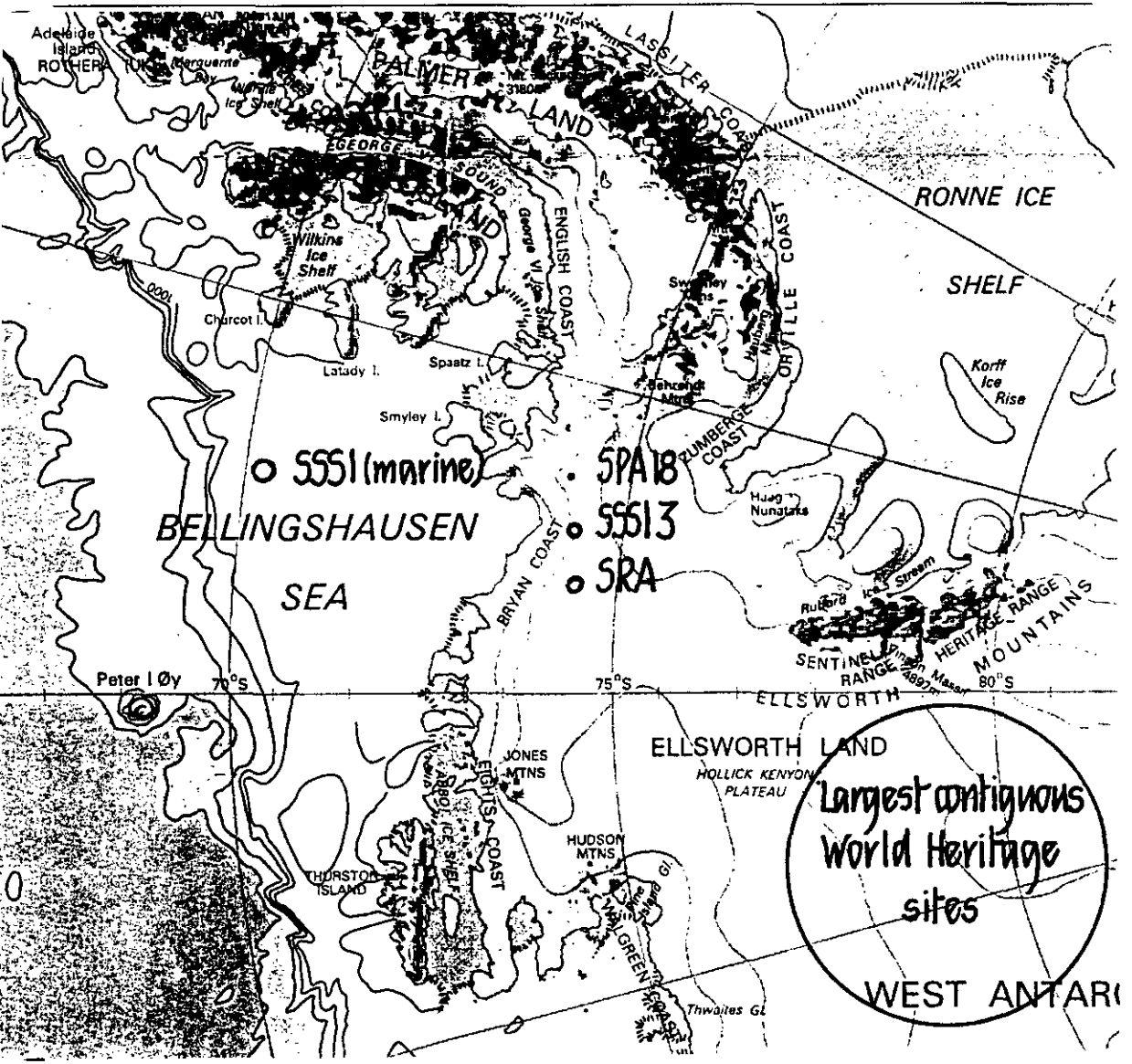
In principle, it is considered that once beyond the Area of human influence, there are no factors specifically relating to wilderness that would indicate 'outstanding wilderness values'. There may be situations when specific areas already given a wilderness status might also be considered to merit higher ratings for Special values or Resource values (see chapter 8, section 8.9), but this would not affect their degree of 'wilderness' although it might raise an overall appreciation of the area.



Conversely, there are situations when a higher rating under the Special value grouping would seem to detract from 'wilderness'. A simple example - on the one hand, the continued presence of the disused Falkland Islands Dependencies Survey (FIDS) Base Y on Horseshoe Island base shows 'human influence' and therefore results in a non-wilderness status to at least part of the island and surrounding sea. On the other, this base is now designated under the ATS as an Historic Site and Monument which many, perhaps most, would consider a positive factor when considering Antarctic evaluation groupings (chapter 8, section 8.9). Both approaches are valid, so assessment should indicate which approach is being preferred.

6.5 Comparative sizes of designated areas

In the past, the criteria for establishment of Antarctic protected areas: 'required that the size of areas be the minimum required to serve their intended purposes. In practice, this has resulted in the creation of many protected areas of very limited extent.' (Dingwall, 1994: 49) Comparative sizes of designated areas are shown in Figure 7 (on following page), taking the largest areas for each of the Pre-Protocol designations, together with an international example. Circles to scale have been randomly superimposed on a 1:10 000 000 extract from ADD.

It should be noted that in North America, three existing World Heritage sites (the Wrangell-St Elias and Glacier Bay National Parks in Alaska and Klauane National Park in Yukon) are already contiguous and together cover 163,900 square km. It was expected that a fourth site in British Columbia (the Tatshenshini-Alsek Provincial Wilderness Park)



100 km 
 100 miles 

SPA 18	North Coronation Island, S Orkney Islands	50 sq km	(ie circle radius 4 km)
SSSI 3	Barwick Valley, Victoria Land	300 sq km	(ie circle radius 9.7 km)
SSSI 35 (marine)	West Bransfield Strait, S Shetland Is	1030 sq km	(ie circle radius 18 km)
SRA	North Dufek Massif	480 sq km	(ie circle radius 12 km)

Helman's definition (Table 1) - similar in total size to the SRA shown above

Wilderness (minimum core area)	250 square km	(ie circle radius 9 km)
Surrounding buffer zone	250 square km	totalling 500 sq km (ie circle radius 12.6 km)

World Heritage sites - largest contiguous sites 173,480 sq km (ie circle radius 235 km)

Figure 7 **Comparative sizes of designated areas (1:10 000 000)**
 All dimensions are approximate

would be accepted for designation (IUCN, 1995). The fourth area covers 9580 square km, bringing the combined sites to 173,480 square km, which may be represented by a circle with a radius of approximately 235 km. This will: 'constitute the largest World Heritage site, and in fact the largest protected area, on the globe.' (IUCN, 1995: 325) This claim takes no account of Article 2 of the 1991 Protocol which designates: 'Antarctica as a natural reserve, devoted to peace and science.'

6.6 Wilderness status

Many wilderness considerations are not easy to handle, and the ATCPs should be commended for including such aspects in their deliberations. However, it is considered that the Protocol's requirement to identify 'areas of outstanding ... wilderness value' is inappropriate and that reference to 'wilderness' or 'wilderness status' is preferable. Initially, it is necessary to accept that the Antarctic is a wilderness, prior to identifying Areas of human influence which would be excluded from designation. Management plans would be the mechanism by which motor vehicles would be controlled. This would result in the designation of a very high proportion of the Antarctic as having wilderness status. It is offered as a procedure that recognises the natural wildness of the continent, yet also accommodates the needs of scientific workers. Ideally, boundaries should relate to areas defined under landscape assessment procedures (chapters 8-10).

7 AESTHETIC VALUES

7.1 Scope of the chapter

The term 'aesthetic values' covers a vast range of ideas, spanning not only philosophy but also aspects of fine art. It is appropriate to examine meaning within the boundaries of this study. The survey made in chapter 3 reviews terminology used in the Antarctic Treaty System. From those documents came the phrases 'aesthetic and wilderness values' or 'significance', with an occasional use of 'scenic'. SCAR documents were broader, referring also to 'cultural values such as scenic beauty' (SCAR, 1989: 182). Before 1990, terms such as 'environment' or 'area' were typical, rather than 'landscape'. A brief examination is made of this apparently straightforward word.

Both the IUCN report (1991) and the joint SCAR/IUCN proceedings (Lewis Smith and others, 1994) refer to the World Heritage Convention, so this UNESCO document is examined. The essential differences between 'landscape assessment' and 'environmental impact assessment' are established before giving detailed consideration to procedures from Britain and the United States. Finally, conclusions are drawn for the methodology most appropriate for Antarctic use.

7.2 Interpretations of 'aesthetic values'

Approaches to consideration of 'aesthetic values' differ. The span of concerns has added richness but also caused difficulties. Scruton commented: 'Aesthetics is a neglected branch of philosophy, though not because few people write about it. On the contrary, more drivel is produced in aesthetics than in any other area of the subject.' (*The Times*, 1 June 1995: 38) Whilst there has been a great deal of argument about the relative value of natural beauty and works of art, less consideration has been directed to natural beauty for its own merit (Passmore, 1974). The title of Berleant's study *The aesthetics of environment* (1992) appeared promising, but his primary concern was to give a historical development of philosophical ideas rather than a practical approach. Identifying concerns and approaches related to the specific subject of this study is therefore essential.

By using the phrase 'aesthetic values' the Protocol unwittingly isolated part of a wider process which seems to be unknown to most in the Antarctic community, although it is well established in the planning systems of some ATS nations. Statements relating to 'aesthetic values' are generally accepted as being one of the products that may be

derived from the process of landscape assessment. The principles and practices of this strategy have been examined.

Many meanings and values have been attributed to landscape. In 1989, Swanwick concluded that despite forty years of considerations no consensus had been found, but she identified, as had Punter (1982), three broad research categories; professional, formal, aesthetic or landscape quality studies; behavioural studies dealing with the perception of the physical environment, and humanistic studies embracing concepts of landscape interpretation. More recently, Schama has pursued the place of culture, suggesting that: 'landscapes are culture before they are nature, constructs of the imagination projected onto wood and water and rock.' (1995: 61)

The question implicitly imposed by the Protocol (Annex V, Article 3) is whether it is possible to distinguish between areas of lesser or greater ('outstanding') aesthetic value, indicating a need to examine Swanwick's first category; professional, formal, aesthetic or landscape quality studies. By 1998, Swanwick was able to speak of *methodological developments over the last 20 years that have led to the acceptance in Great Britain of landscape assessment* (section 7.5). In the United States, the chronology has been different, and the most comparable procedure is termed 'visual resource management' (section 7.6).

7.3 Interpretations of 'landscape'

The Dutch word *landscap* was introduced in the late 16th century by art dealers and critics, who: 'translated it as meaning a "picture of (Dutch) inland scenery". Thereafter it remained identified with an aesthetic experience, either of a kind of painting or of rural scenery.' (Jackson, 1986: 81) Further historical background and comment is given by Jackson (1975), Tuan (1974: 132-133) and Schama (1995: 10-11) whilst wider aspects have been examined in *Valued environments*, edited by Gold and Burgess (1982); *The aesthetics of landscape* by Bourassa (1991); *Landscape: politics and perspectives* edited by Bender (1993) and *Ideology and landscape in historical perspective*, edited by Baker and Biger (1992). Baker's introduction to the last volume is a helpful overview of current thinking.

The breadth of interpretation is vast. Recent work by cultural geographers have extended patterns of thought, sometimes in radically different directions. Writing about Northern Australia, Morphy suggested:

Landscape is a frame for discourse that encourages the development of metaphors, which enables the exploration of old topics in new ways, and which may provide the framework for the construction of new theories. Of course, landscape does not exist in a theoretical vacuum: it takes up the flavours or the sophistication of the age. Today's 'landscape' is inevitably processual and transforming, integral to processes of objectification and the sedimentation of history, subjected to poetic and hermeneutic interpretation and a place where value and emotion coincide. (1993: 205)

Such an approach is stimulating, opening up many avenues, but work in the field requires a degree of practicality.

7.3.1 Interpretation in Britain

Some have argued that 'landscape' should be avoided. Mitchell used the word 'terrain' for his study of data 'concerned with the surface of the earth's crust' (1991: 5). Terrain is defined by the SOED (1974) as: 'a tract of ground, considered with regards to its natural features, configurations, etc.' As such, it adequately covers physical features, without cultural inputs. This understanding was initially adopted by Chaffey, in *Managing wilderness regions* (1996: 52), but unfortunately he confused the issue by then using the word 'landscape'.

Reduction in this way to purely physical features removes factors that should be considered. Whittow's summary is helpful as it sees the wider issues:

Landscape (or scenery) combines the topographic forms with all the complex mosaics created by human endeavour and is in reality an expression of the total environment. Landscape is, of course, dynamic; it changes through natural forces and by human activities. (1974: 25)

Current British methodologies argue that perception is an integral part of assessment and if clearly identified and presented, should enhance surveys (section 7.5.3) This approach to understanding landscape was taken up by Warnock and Brown (1998), who suggested that there are: 'three aspects of the landscape - aesthetic qualities; cultural associations; natural and human environments' (1998: 45, their Figure 1). This enabled them to differentiate between 'Landscape character' which focused on the nature of the land and was assessed by the second and third of the aspects, and 'Scenic beauty' which resulted from the first two aspects and was heavily influenced by personal preferences - 'hence the difficulty in using beauty as a basis for decision

making.' (1998: 45)

7.3.2 Interpretation in the United States

A wide range of definitions may be seen in the eight brief statements offered by Smardon and others (1986: 311). Some interpreted landscape to mean only natural scenery, some included man-made developments whilst others indicated intangible aspects, such as 'vague emotional stimulus' which would vary from person to person (Santayana, quoted in Smardon and others, 1986: 311). Several suggested that in the United States definitions tended towards the 'natural' rather than environments modified by the presence of man.

A British commentator reinforced this view. Penning-Rowsell's statement may be considered either provocative or whimsical, but his basic position is borne out when comparison is made between the two countries. The emphasis is as given by the author:

Values and traditions are clearly crucial to landscape meanings. American and English concepts of landscape are often assumed to be homogeneous but the English view is closely tied in with *heritage* whereas the American perspective links more closely with *environment*; England has LANDSCAPE, the USA just landscape. (1986:116)

7.3.3 Landscape in the Antarctic

In the Antarctic, human aspects may be both reduced in scale and simplified in their intricacy, but are still present. Other facets contribute to the mosaic, suggesting that smaller-scaled issues need to be identified before wider concepts are handled. Figure 8 (on following page) shows a diagrammatic representation of an Antarctic landscape, illustrating the way in which aspects overlap. To use 'landscape' only to mean the mappable and quantifiable aspects of landform, as implied by Chaffey (1996) or Dodds (1997), is inappropriate if the Protocol's 'aesthetic' is to be fully understood.

In this study, a modified version of definitions offered by the Countryside Commission (1993: 4) and Appleton (1990: 21) is used. Landscape will be taken to refer primarily to the environment as visually perceived; the appearance of the land, ice and sea, including factors such as shape, colour and form and the way in which various components combine to create specific patterns and pictures, distinctive to particular localities. It is not a purely visual phenomenon, because its character relies closely on both physiography

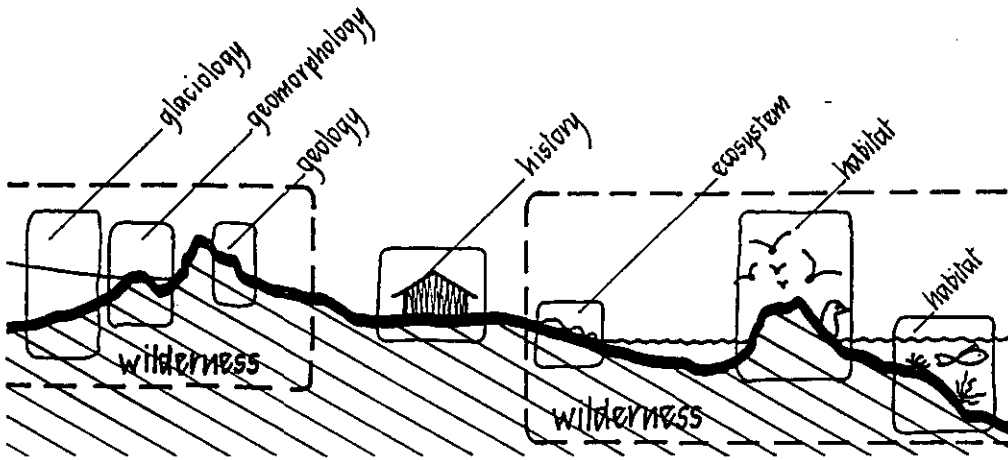


Figure 8 Antarctic landscape (wilderness as defined in chapter 6)

and a range of other factors including geology, glaciology, ecology, historical and cultural associations. As a composite concept, it is more than the sum of its component parts.

7.4 Landscape assessment and Environmental Impact Assessment

Occasionally, there is confusion in understanding different terminology, so before making detailed studies in sections 7.5 (British approaches) and 7.6 (American approaches), two definitions are offered to clarify practices:

- 1 Landscape assessment is a planning tool that provides a statement of landscape resources. It is essentially broad-scale rather than site-specific, and can stand in its own right as well as providing component information for other procedures.
- 2 Environmental Impact Assessment (EIA) is defined by Wood as:
an anticipatory, participatory, integrated environmental management tool which has the ultimate objective of providing decision-makers with an indication of the likely consequences of their decisions relating to new projects or to new programmes, plans or policies. (1996: xiv)

It is essential these procedures are seen as separate but related, within the planning process.

7.4.1 Landscape assessment

In the late 1980s, Great Britain saw a renewed interest in finding acceptable, structured approaches to landscape assessment, partly stimulated by the growth of structure planning, but also by the development of EIA. Cope and Hills noted:

The emergence and evolution of EIA to evaluate processes affecting the physical environment and to inform responses to them has, therefore, been paralleled by, and in some cases has actively stimulated, work in other fields of concern where procedures have also been sought for assessing the consequences of change. (1988: 175)

Before 'the consequences of change' can be assessed it is necessary to have a statement of present condition. Landscape assessment is an essential part of that survey.

7.4.2 The development of EIA

An early EIA study was that edited by Munn (1975) which included an outline of procedures developed in the United States, following the influential National Environment Policy Act (NEPA, section 7.6.2). Munn included a simple diagram showing the scope of planning and assessment at national and regional levels (1975: 24). Because current terminology and practice is complex such simplification is open to debate, but the diagram indicates the principle of the funnelling process from comprehensive planning to environmental statement (Figure 9, on following page).

In Britain the process developed during the 1970s and 1980s, with texts such as Wathern's *Environmental Impact Assessment, theory and practice* (1988). In 1988, the European Community's directive on environmental assessment came into effect for major developments. The Countryside Commission published a technical report, *Environmental assessment: the treatment of landscape and countryside recreation issues. CCP 326*. (Prepared by Stiles, Wood and Groome of the EIA Centre, University of Manchester, 1991) It was orientated towards project evaluation within an environmental assessment, clearly differentiating between this and wider landscape assessment.

Within Great Britain there has been a reticence in central government to integrate Environmental Assessment into mainstream planning. During the summer of 1995 the Institute of Environmental Assessment and the Landscape Institute (IEA and LI) published *Guidelines for landscape and visual impact assessment*. At its launch Lord

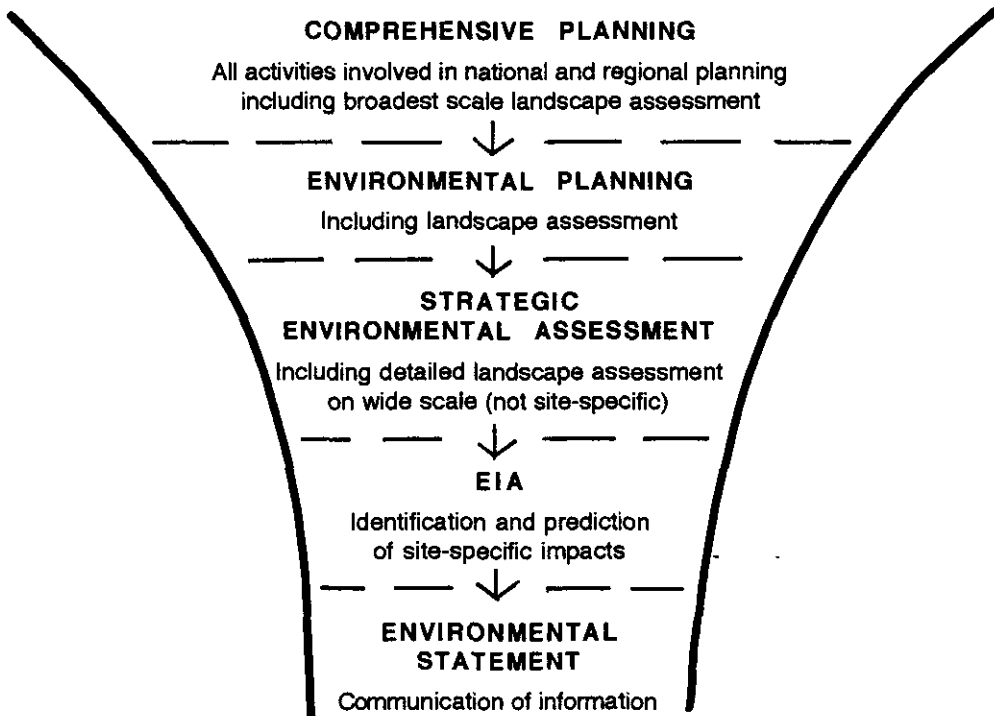


Figure 9 Stages in the planning process
Modified from Munn, 1975: 24.

Ullsworth, then Minister of State at the Department of the Environment, identified it as an aid to best practice, but was: 'careful to distance the DoE from the principle of Environmental Assessment further penetrating the statutory planning process' (*Landscape Design Extra*, 57: 1, July 1995).

Because it emanated from two of the leading professional institutes concerned with environmental matters, with funding from the Countryside Commission, the Countryside Council for Wales and Scottish Natural Heritage, *Guidelines for landscape and visual impact assessment* stands as a recent statement of British procedures. It is regrettable that the title of the book is confusing - does it cover 'landscape assessment' and/or 'visual impact assessment'? - especially as possible interpretations refer to two different procedures. The text shows that it is primarily concerned with the latter, ie project-specific Environmental Assessment procedures. The section on 'baseline studies' (IEA and LI, 1995: 36-45) identifies wider issues that are essential foundations for project specific studies and baseline studies of landscape and visual resources are advocated.

The suggested technique is derived from the studies by the Countryside Commission (1993), the Countryside Commission for Scotland (1991) and an unpublished study by the Countryside Council for Wales (1993).

7.4.3 EIA in the Antarctic

The concept of EIA is well known to ATCPs. Benninghoff and Bonner produced a study in 1985 in which they defined EIA in the Antarctic context as 'the evaluation of the potential impact on the Antarctic environment of a given activity' (1985: 21). Heap (1994: 2031-2040) summarised the development of EIA, especially the discussions that led to Recommendations XII-3 and XIV-2, which were the precursors of Article 8 and Annex I of the 1991 Protocol. This Annex states requirements for Initial Environmental Evaluation and Comprehensive Environmental Evaluation as well as Monitoring. Further guidelines were produced by the Council of Managers of National Antarctic Programmes (SCAR, 1992) and suggestions for the evaluation of procedures have been made by Lyons (1993).

In 1992 SCAR and IUCN held a workshop on Protection, Research and Management of Subantarctic Islands. The proceedings make a valuable contribution to conservation issues, including those in the Antarctic. The discussion on EIA was summarised by Daizell who reported that:

The workshop recognised that there was usually insufficient baseline knowledge about the environment of the islands to judge exactly what these impacts are. There is, therefore, a widespread and urgent need for more environmental assessment, as this is a process which provides information about the current state of the environment. (1995: 147)

This identifies the differences between landscape assessment and EIA. Landscape assessment forms part of the wider 'environmental assessment' that provides baseline knowledge. In Figure 9 (section 7.4.2), the broadest scale landscape assessment may be included in 'comprehensive planning', with detailed landscape assessment as an essential part of 'strategic environmental assessment.'

Previously, the ATS has not identified landscape assessment, probably because it does not fall into one of the more distinct scientific categories. Gradual change is now taking place, perhaps unintentionally prompted by the Protocol, but also by widening of environmental concerns.

7.5 Landscape assessment in Britain

7.5.1 The development of landscape assessment

Systematic assessment of landscape was suggested in the 1920 Presidential Address to the RGS by Sir Francis Younghusband. He said: 'What men naturally do, and what I would suggest Geography should deliberately do, is to compare the beauty of one region with the beauty of another, so that we may realise the beauty of each with a greater intensity and clearness.' (quoted in Lowenthal, 1978) A geographer, Dr Vaughan Cornish heard the address. His earlier work had been used on Scott's first Antarctic expedition with Shackleton making a 'study of the waves on Vaughan Cornish's plan' (Markham, 1986: 80) but in his latter years, Cornish became the 'pilgrim of scenery' (1946: 44). He:

'responded immediately to this appeal, and in works since published have recorded the advance in my investigation. This has now reached the stage when the subject can be formulated in a manual, for which the present time is especially appropriate, on account of the need for education in scenic amenity in preparation for the re-planning of town and country' (1946: 15).

He was a prolific writer about 'scenery' (his choice of term): 'the general appearance of a place and its natural features from the picturesque point of view' (1946: 68). He wrote at least six books containing lengthy passages of descriptive prose. As such, they were not helpful in any systematic way, but he was an influential figure in the 1930s and 1940s, eager for the visual improvement of both town and country.

Development of techniques to make more systematic assessments tentatively began in 1942 with a Landscape Survey on behalf of the Ministry of Works and Planning. The aim was: 'to provide the Ministry with an expert opinion on the more important national and local areas of outstanding amenity and scenic value' (quoted in Higgins, 1967: 28).

Working on current 1/2 inch to the mile maps, the first two zones recorded were:

- I Wild country
 - a. of impressive scenic value;
 - b. of value chiefly as solitude.
- II Other scenery of outstanding and general landscape interest
 - a. of outstanding interest;
 - b. of general landscape value.

During the Second World War, John Dower was commissioned by the government to report on the establishment of National Parks. One of his prerequisites was 'wildness' (Countryside Commission, 1978: 15). His work led to the passing in 1949 of the

National Parks and Access to the Countryside Act.

An explosion of landscape assessment methods took place in the 1960s and 1970s and summaries of that period may be found in Clamp (1981) and Penning-Rowsell (1989). The influence of the Landscape Research Group (LRG) was considerable. It was established: 'to advance education and research, encourage interest and exchange information for public benefit in the field of landscape and any related field' (statement on the inner back cover of their journal, *Landscape Research*, Winter 1995). LRG has been a respected and influential study group not only in the UK, but also in the United States (Zube, 1986).

7.5.2 British approaches leading to current practices

With hindsight, it is possible to identify at least some of the stages that led to the adoption of current practices. Their chronology, together with the main American practices is shown in Figure 10 (on following page). Abbreviations have been used in titles of reports and papers.

On occasion, there has been confusion regarding the author of some reports, especially those published by the Countryside Commission. The Commission has employed consultants and reference has then been made to the firm or individual in charge of the work. For clarity, the British Library's method of referencing has been used, with bracketed notes following, so that the part played by certain individuals may be seen.

Of the reports listed below, the last two are the most comprehensive and may be seen as statements of current practice within the United Kingdom. They emanate from two leading consultants and in order to see the outworking of their methodology, examination is made of two area surveys, one carried out by each office during the development and publication of their respective study. In chronological order the six reports are:

- 1 Countryside Commission for Scotland. 1971. *A planning classification of Scottish landscape resources*. (Prepared primarily by John Herbert of Land Use Consultants.)
- 2 Countryside Commission. 1987. *Landscape assessment*. CCD 18.
- 3 Countryside Commission. 1988. *A review of recent practice and research in landscape assessment*. CCD 25. (Prepared primarily by Carys Swanwick, under the auspices of the Landscape Research Group, for the Countryside Commission.)

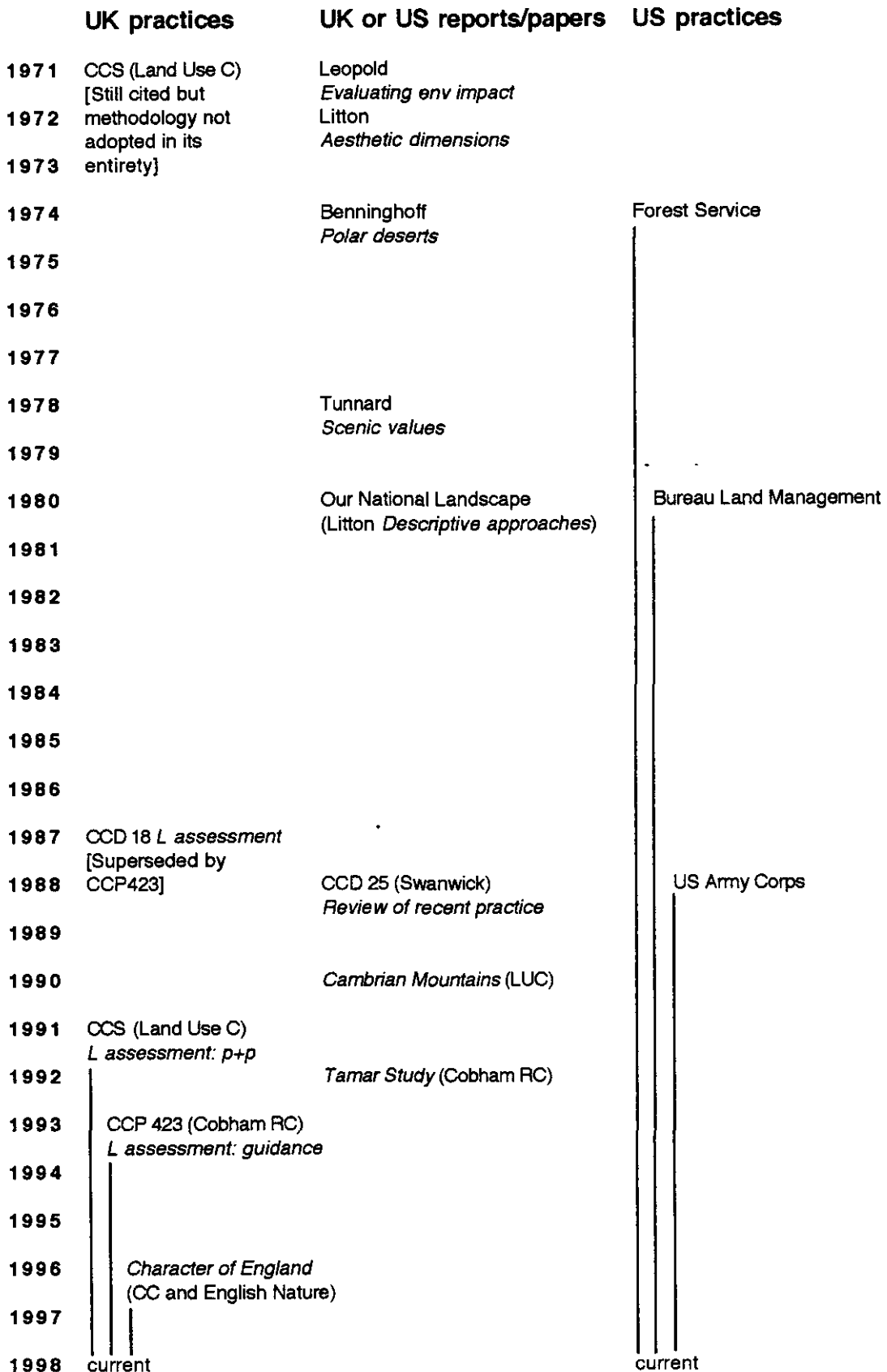


Figure 10 Landscape assessment: a chronology

- 4 Swanwick, C. 1989. *People, nature and landscape: a research review*. (Summary and overview produced by the Landscape Research Group for the Economic and Social Research Council as an end of award report.)
- 5 Countryside Commission for Scotland. 1991. *Landscape assessment: principles and practice*. (Prepared by Carys Swanwick of Land Use Consultants.)
Linked area study: Countryside Commission. 1990. *The Cambrian Mountains landscape. CCP 293*. (Prepared by Land Use Consultants.)
- 6 Countryside Commission. 1993. *Landscape assessment guidance. CCP 423*. (Prepared by Cobham Resource Consultants.)
Linked area study: Countryside Commission. 1992. *The Tamar Valley landscape. CCP 364*. (Prepared by Cobham Resource Consultants.)

A four page unpublished operational handbook by the Countryside Council for Wales (1993) is not listed. It was written as interim guidance for their staff, making reference primarily to the Countryside Commission's 1993 report CCP 423. It stated that the Council should: 'be supportive in principle of local landscape assessments; advise that site-specific landscape impact assessment should always be undertaken (1993: 1), thus clearly identifying the two different procedures of landscape assessment and EIA (section 7.4).

7.5.3 Outline of six reports

- 1 Countryside Commission for Scotland. 1971. *A planning classification of Scottish landscape resources*.

This report was influential on two counts. First, it suggested that the most meaningful approach to landscape assessment should be based on survey and classification of landscape character, with evaluation of quality only taking place after establishment of character. This position was clearly argued with insistence that it was only feasible to compare like with like: 'It is unrealistic to compare the quality of a mountain-top with the quality of a marsh; each may be good of its kind, but whether a mountain-top is "better" than a marsh depends on personal preference.' (1971: 49)

Second, recognition was given to both perception of landscape and preferences for landscape, although no methods of handling such information were given. An appendix proposed a scoring system to determine landscape quality and, with hindsight, it appears that this approach discouraged wider adoption of the report.

A link should be seen between this study and the work of Litton in the United States. A reference is included in *A planning classification of Scottish landscape resources* to a 1968 Forest Service research paper by Litton, showing that the British author Herbert was familiar with American work. In 1972, Litton contributed a paper to *Natural environments: studies in theoretical and applied analysis* (edited by Krutilla) in which he too called for the characteristics of the visual landscape to be recognised as a basic concept. Litton contributed a paper to the *Our National Landscape* conference in 1979 which developed this approach (section 7.6.4).

A reviewer of the Scottish report commended it as: 'methodical and thoughtful ... a comprehensive discussion of methods of classifying landscape' (Moggridge, 1972: 40). The main body of the report has been widely quoted and the premise that landscape character offered an objective foundation on which to base a system of landscape resource classification has not been challenged.

2 Countryside Commission. 1987. *Landscape assessment. CCD 18.*

CCD 18 was a modest working document which defined an approach specifically for the Commission's own work, but acknowledged that other organisations such as local authorities would be interested. In practice, the principles and methodology were widely quoted and used in Britain.

The Commission's position was summarised as: 'a broad, multi-dimensional approach based on aesthetic taste operating within the context of informed opinion, the trained eye and common sense' (1987, section 2.8). The approach of recognising both objective and subjective characteristics resulted in a wide-ranging checklist of factors affecting natural beauty, to enable a systematic record to be made, as well as a consideration of 'reactions and feelings' (1987, section 4.9).

A key paragraph occurred in section 4.2:

The method adopted for landscape assessment must not be so complex as to be incomprehensible and off-putting to both the assessor and the user of the assessment. Conversely, a method adopted should not be sloppy and unstructured so that information is not readily available to an outside party trying to understand the process and the justification which the assessors went through in reaching their decision. (Countryside Commission, 1987)

The explanation of the method that followed was short, covering just over two type-written pages of A4. Such brevity is two-edged; it may be commended for its simplicity, but also opens itself to charges of imprecision. It was suggested that it was necessary to define the purpose of the exercise, which in turn would influence how it was to be done; carry out a desk-study, including the development of a survey sheet; carry out a field survey; analyse material from structured survey; refine criteria; evaluate by judging the landscape against the criteria; record the decisions in writing.

3 Countryside Commission. 1988. *A review of recent practice and research in landscape assessment. CCD 25.* and

4 Swanwick, C. 1989. *People, nature and landscape: a research review.*

These two documents may be linked, as Carys Swanwick was principal author for both. Swanwick's outline of the background to these two documents is found in the introduction to the 1989 research review (no pagination):

In 1985 the ... LRG was fortunate to reach an agreement with an American Foundation to establish a three year programme of research funding under the title "The Nature Experience Research Programme." ... To place this research within a broader context ... LRG decided to undertake a 'State of the Art' review. The aim was to review recent work and work in progress ... to determine directions in the research and specific gaps which need to be filled.

Funding was assembled from other sources, including the Countryside Commission, which published the Review document as CCD 25 in 1988. It was not intended to duplicate earlier reviews, including the extensive American document *Our National Landscape* emanating from a conference held in 1979 (section 7.6.4), but to consider them in the light of more recent developments. Although CCD 25 is now ten years old, it remains a major analytical study.

The scope of CCD 25 was: 'with ways of looking at and understanding landscapes, and with ways of finding out what landscapes are valued, by whom, and why' (section 1.1). The division between practical studies and theoretical research was identified, followed by that between: 'objective studies which are concerned with aspects of the landscape itself [and] subjective studies which are concerned with peoples reaction to the landscape' (section 1.6).

CCD 25 assessed weaknesses and strengths of differing approaches. It examined queries such as 'public' versus 'professional' evaluation, and assessment of 'whole

views' or 'components only'. References were predominantly from Britain but also included US agency methodologies. Several conclusions were very specific; there is need of precision in the use of words (section 7.4.i) and clear definition of purpose is essential prior to the adoption of appropriate methodology (sections 7.4.ii and iii). The closing paragraph looked forward:

It appears that what is needed for the future is an open and flexible approach to landscape assessment which recognises the distinction between description/inventory/classification and evaluation, and which accepts that there is no single value system. ... Above all, assessment methods must be able to respond to and represent whatever it is that gives any landscape its special "sense of place" and to address the question of why this is important and to whom.' (section 7.10)

5 Countryside Commission for Scotland. 1991. *Landscape assessment: principles and practice* and linked area study: Countryside Commission. 1990. *The Cambrian Mountains landscape*. CCP 293.

Key points from the report summary (1991: ii-iii) are shown in Table 3 (on following page). Omitted material refers to Scottish issues.

Landscape assessment: principles and practice included guidelines for the role of landscape classification prior to designation. It suggested:

Once landscape types have been mapped and described it is possible firstly to judge which types most merit designation, and for what reason, and then to make an evaluation to identify those areas which best represent the characteristic features of each type. These areas might be the targets for designation. (1991: 18)

There are clear links with the earlier Scottish document (Countryside Commission for Scotland, 1971), also by Land Use Consultants. Two points stand out - identification of landscape character is paramount, and like may only be compared to like.

Landscape assessment: principles and practice offered three checklists for field use, but a cautionary note warned of the the dangers of assuming them to be: 'the core of the method, as if the very act of filling them in is, in itself, enough to give an understanding of the workings of the landscape. (Countryside Commission for Scotland, 1991: 6) Their use should be as a tool to encourage careful and rigorous observation, preferably: 'in

- 2 The term landscape assessment embraces many different ways of looking at, describing, classifying and evaluating landscape. It is currently being used for two main purposes:
- (i) to identify landscape character and make proposals for its conservation, management and enhancement.
 - (ii) to assess the impact of new forms of development or of land use change.
- 3 Informed professional judgement is a crucial part of the landscape assessment process, and must incorporate both objective and subjective aspects of landscape.
- 4 There are four key steps in the process of landscape assessment:
- (i) definition of purpose; (ii) desk study (iii) field study; and (iv) analysis.
- 6 Analysis of all the information gathered must be designed to contribute to one or more of the following products of landscape assessment:
- (i) An inventory and description which should seek to provide a rational, largely objective documentation of the landscape which is being assessed.
 - (ii) A classification which divides the landscape into areas of distinct and homogeneous landscape character and maps their distribution.
 - (iii) An evaluation which makes judgements about the relative value and importance of different landscapes as a basis for designation, planning policy, or other specific decision-making purpose.
- 7 Designation involves identifying areas which are judged to have special value and importance, and affording them special protection to maintain their essential character and quality.
- 10 It is concluded that designation of important ... landscapes should be based upon a national landscape classification, which could also provide a valuable foundation for other planning purposes.
- 12 Evaluation for designation purposes must draw upon a wide range of factors which have a bearing on the value attached to a landscape. The following groups of criteria are suggested:
- (i) landscape as a resource (including rarity and representativeness/typicality);
 - (ii) scenic quality (combination of landscape elements, aesthetic quality and intangible qualities);
 - (iii) preference (public preference and informed consensus); and
 - (iv) special values (wild land qualities, cultural associations and other special heritage interests).
- 13 Informed and experienced judgement must be exercised in deciding which areas rate highest value for each criterion. Special designation may be merited because of high value according to any number of criteria. Explicitly stated criteria provide a reasoned justification for designation and help to express the special qualities which designation is intended to protect. ...
-

Table 3 Key points: *Landscape assessment: principles and practice*
(Countryside Commission for Scotland, 1991: 2-3)

pairs ... because each surveyor provides a "sounding board" for the other to test reactions to the landscape.' (1991: 7)

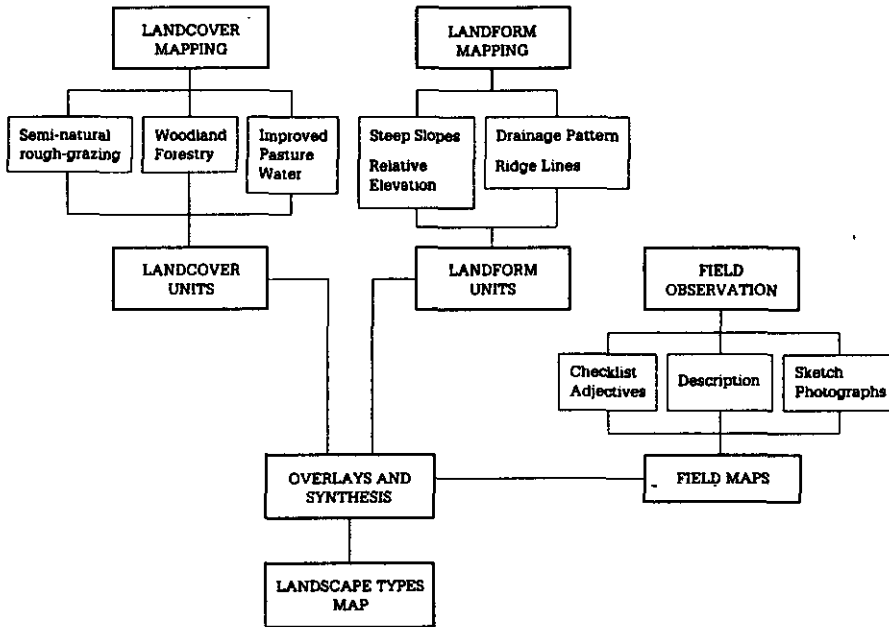
The first and longest list related to landscape elements or features, with two shorter lists covering aesthetic and perceptual qualities. It suggested aesthetic qualities listed in checklist 2: 'can be judged in a rational, if not wholly objective way, and should therefore be less personal to the surveyor concerned.' Checklist 3, perceptions/impressions, covered: 'subjective factors and responses [which] are likely to vary between surveyors.' (1991: 9) This last list marked the point where subjective factors were introduced. These three checklists were influential in the development of fieldwork practices for the Antarctic and are discussed further in chapter 9, section 9.8.

The study of the Cambrian Mountains was made in 1986, but not published until 1990. It was: 'a classification system based on an inventory of physical landscape data, followed by an evaluation of landscape types using literature and the subjective judgements of the surveyors.' (Countryside Commission for Scotland, 1991: 34-35) The 1991 report therefore had the opportunity for large-scale testing and refinement. The flow chart from the Cambrian Mountains' study illustrated the methodology and is shown in Figure 11 (on following page) together with the flow charts from two American federal reports discussed in sections 7.6.5 and 7.6.6.

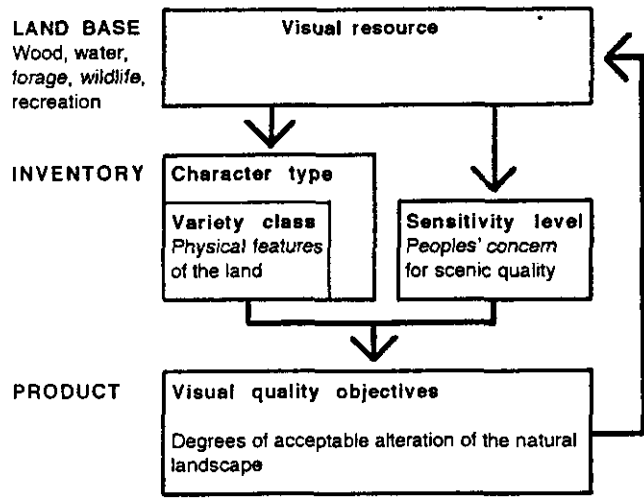
6 Countryside Commission. 1993. *Landscape assessment guidance. CCP 423.* and linked area study: Countryside Commission. 1992. *The Tamar Valley landscape. CCP 364.*

The summary statement was both concise and clear: 'Landscape assessment provides a systematic means for describing and classifying landscapes that takes into account subjective and qualitative aspects as well as physical, cultural and historic ones.' The scope of the document was: 'for the purposes of planning, ... and creative conservation at the broad scale rather than at a detailed site-specific scale.' (1993: 3) Impact analysis of the effects of a proposed development was identified as a separate process.

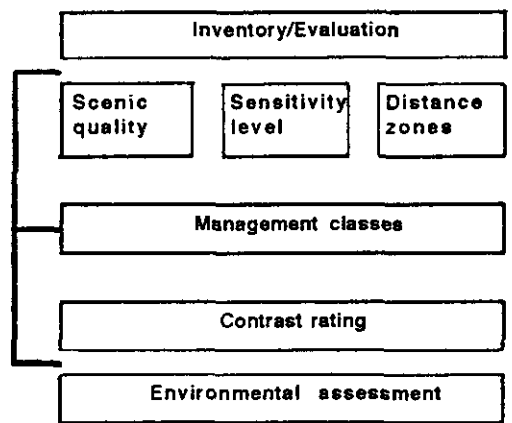
The approach was described as: 'very similar to that put forward by the Countryside Commission in 1987 in CCD18 and subsequently developed in *Landscape assessment: principles and practice* (1991).' (1993: 8) Details of appropriate techniques were given, including literature review and landcover analysis, and examples of survey sheets, maps and sketches. Definitions are concise, and reproduced in Table 4, with



Cambrian Mountains



Forestry Service



Bureau of Land Management

Figure 11 Landscape assessment flow charts
 Cambrian Mountains (CCS, 1991: 35); Forestry Service (1974: 9), and
 Bureau of Land Management (1980a: 16).

the passage concerning differences between objective and subjective issues.

Landscape assessment is a general term for the process whereby landscape is described, classified and evaluated. These three activities should be distinguished clearly one from another:

Landscape description is the process of collecting and presenting information about the landscape in a systematic manner, and usually forms the initial basis for any landscape assessment.

Landscape classification is a more analytical activity whereby the landscape is sorted into different types or units, each with a distinct, consistent and recognisable character.

Landscape evaluation means attaching a value to a particular landscape, landscape type, or landscape feature, by reference to specific criteria. Generally an evaluation should be based upon a prior classification.

Objectivity and subjectivity

The distinction between landscape classification and landscape evaluation is especially important, with the former focusing on relatively objective recording and analysis of the intrinsic qualities of the landscape itself, and the latter including a greater degree of subjective opinion and judgement about the landscape. In practice, though, all landscape assessments require a combination of objectivity and subjectivity. The key point is that the assessment process should be **systematic and structured**. The reasons for particular decisions or judgements on landscape character or quality should always be clearly articulated. They are likely to be based on known facts, informed consensus, professional opinion, and aesthetic judgement - or more commonly, a combination of all of these factors.

Table 4 **Key points: *Landscape assessment guidance***
(Countryside Commission, 1993: 4)

The paragraph covering objectivity and subjectivity offered a balanced position, following the thrust of the earlier report CCD 18 (1987, their section 2.8) and the position taken by the Countryside Commission for Scotland (1991: 2 and 9).

Landscape assessment guidance is the only report to have considered the place of computer-aided processes. A present lack of facilities and expertise was identified, but it was considered that the technique: 'was still only partially successful in building visual factors into the classification.' (1993: 17) The illustrated example, although covering the Midlands, a large region of Great Britain, resulted in only six classifications giving no clear detail of the landscapes.

The Tamar Valley study was specifically prepared 'to inform the designation process' (Countryside Commission, 1992: 3) when the area was being considered as an Area of

Outstanding Natural Beauty. The report presents a non-technical description of the character and quality of an estuary and agricultural landscape having an important industrial heritage. The final chapter listed criteria used in assessment: 'the combination of features ... Visually, it is a delight to visit, and its aesthetic qualities are matched by a special concentration of wildlife and heritage features of national importance. The perceptions of artists, writers and visitors to the area all confirm this view.' (Countryside Commission, 1992: 29)

7.5.4 Future issues

At a recent conference, and in a later journal report, Swanwick (1998) raised an interesting issue. She was speaking within a UK context, where there has been growing emphasis on the need to develop approaches to historical landscapes. Such pressures are not so immediately apparent in the Antarctic, but her main question is of wider scope. She asked if landscape assessment was:

an integrating process which brings together other specialist areas of resource assessment (ecological, historical, visual/aesthetic) or is it but one of three parallel strands alongside ecological and historical assessments, which together can be integrated with each other into an overall assessment.' (Swanwick, 1998: 9)

In this study, 'landscape' has been taken as a portmanteau term covering many aspects of the environment (Figure 8, section 7.3), but many, if not all of these facets of landscape, are distinct identities capable of independent assessment. The Protocol's Annex V, Article 3 lists many. Is landscape assessment in the Antarctic to be seen as an integrating process or as a parallel strand?

If 'landscape' is taken as covering multitudinous factors, the ideal might seem to be for landscape assessment to be the integrating process, but realism, with a degree of humility, suggests that in the Antarctic it should be seen as a parallel strand. Scientific research has been long-standing, and an internationally recognised body of knowledge is established. For many factors there are generally accepted values, and known procedures for designation. Landscape assessment is an untested procedure in the South, and whilst it may be ultimately capable of handling many different forms of assessment as an integrating procedure, such a suggestion at this stage of its development would be inappropriate. It is more important for basic principles and methodology to be understood and accepted.

7.5.5 Summary of current British practices

The two reports, by the Countryside Commission for Scotland (1991) and the Countryside Commission (1993) stemmed from a considered theoretical base, supported by field testing. The 1991 document was a more rigorous analysis, whilst the 1993 report offered a wider selection of practice examples. The two area studies illustrated the possible range of results that can emanate from a similar approach. *The Tamar Valley landscape* gave an overall assessment in general terms; *The Cambrian Mountains landscape* presented a detailed technical examination of variations within the landscape, whilst retaining an understanding of the total significance. This assessment, tested over an area of over 1,500 square km, illustrated and confirmed the validity of the approach.

A similar approach was adopted in the *The character of England: landscape, wildlife and natural features*, an A2 sized map depicting the 'natural and cultural dimensions of the landscape' (Countryside Commission and English Nature, [1996a], no pagination). Covering both ecological and landscape character, the framework was intended to be a strategic tool for policy development. Ecological resources were shown as 'Natural Areas' which were subdivided into 'Character Areas', if cultural and historical dimensions suggest a finer-scale description. Each area was described on a double-sided A4 sheet, giving the 'Characteristic features of nature conservation and landscape interest' (Countryside Commission and English Nature, [1996b]). One of the significant statements made in the brief description that accompanied the map was: 'Landscape character exists everywhere in equal measure, even if we value it more in some areas than others.' (Countryside Commission and English Nature, [1996a], no pagination)

This clearly shows both the extent and the boundaries of the project, and also summarises current British practice. Analysis and description provide the foundation from which judgements concerning value may be made, according to agreed criteria.

7.6 Visual resource management in the United States

7.6.1 Concern for 'visual quality' and the Wilderness Act, 1964

The aesthetic arguments that took place in Great Britain during the 17th and 18th centuries also influenced thought in the United States. Summaries of the debate in America during the 18th and early 19th centuries may be found in Jackson (1975), Nash (1975) and in *Foundations for visual project analysis* edited by Smardon, Palmer and Felleman (1986), a widely-quoted American text.

Intense environmental concerns developed in the 1960s. At federal level the 1964 Wilderness Act came into force and five years later McHarg published his influential book *Design with Nature* (chapter 5, section 5.5.3). During the Lyndon Johnson administration (1963-69) the Federal government widened its concern to include quality of landscape (Litton, 1986). President Johnson, in his message to Congress on 5 February 1965, conveyed the prevailing spirit:

Our conservation must be not just the classic conservation of protection and development, but a creative conservation of restoration and innovation. Its concern is not with nature alone, but with the total relationship between man and the world around him. Its object is not just man's welfare but the dignity of man's spirit. ... In this conservation the protection and enhancement of man's opportunity to be in contact with beauty must play a role. (quoted in Zube and others, 1975: vii)

The place of recreation was thus firmly established as a factor to be incorporated into planning procedures. In the same year (1964) Johnson held a White House Conference on Natural Beauty. Despite the name, emphasis was on human-made landscapes (Zube, 1986: 11), but it served as a stimulus for activity with 34 states holding similar conferences between 1965 and 1968 (Zube and others, 1975: viii).

Johnson was speaking with the knowledge that the Wilderness Act had been passed in 1964, the culmination of 'landscape preservation' which had begun with the establishment of State and National Parks. This led to the creation in 1916 of the National Parks Service, but it was almost 50 years before: 'at long last, the aesthetic and spiritual values of sublime wilderness ... received official recognition' (Zube, 1986: 10). The Wilderness Act spoke in more restrained language of: 'undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions' (quoted in Schwarz and others, 1976: 231). The legislation was established although Zube conceded that: 'economic and aesthetic interests still come in conflict when the issue of landscape preservation is raised.' (1986: 11)

7.6.2 NEPA and subsequent developments

Johnson's successor, President Nixon, signed the National Environment Policy Act (NEPA) of 1969 which came into force on the 1 January 1970, and underpins all subsequent American developments. It applies to all projects on federal lands, and those on private lands that involve use of federal funds. It was: 'a reaction by the US

Congress to the prevailing public opinion that the conventional planning processes of the executive branch did not adequately account for environmental factors.' (Hymen, 1988: 7) and required US federal agencies to: 'insure that presently unquantified environmental amenities and values may be given appropriate consideration' (Bureau of Land Management, 1980a: 9). It also demanded:

a systematic and interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and decision making which may have an impact on man's environment. (Bureau of Land Management, 1980a: 9)

An environmental impact statement had to be prepared for federal schemes that might significantly affect the quality of the human environment. Guidelines were first issued in 1973, with the status of recommendations, rather than legally binding regulations. It revealed evidence of the lack of appropriate methodology and agencies were challenged to develop valid procedures, especially in the realm of visual values and assessments. 'The NEPA ushered in an era of interdisciplinary environmental planning in which visual values could be included in the planning and design decision-making process.' (Zube, 1986: 13)

Within the Forest Service (FS), the late 1960s was the period in which there was a: 'strong impetus and build up for Visual Resource Management' (Smardon, 1986b: 306). There was debate and disagreement, but a system was adopted and incorporated into the *Forest Service Manual* in 1974. Because of personnel movement between agencies, some of the opposing views expressed in the Forest Service in the early 1970s crossed into the Bureau of Land Management (BLM). Although there had been references to a 'scenic quality component' within the BLM's Recreation Information System as early as 1966, the adoption of a comprehensive visual resource management system was not officially accepted until 1975 (Smardon, 1986b: 310). During the next five years the system was refined, together with a greater use of computer graphics, and in 1980 a series of new publications appeared. Smardon suggested that the BLM had a deliberate strategy of developing in-house manuals in great detail, followed by publication when the system became more refined (1986b: 313).

In addition to the developments within these two agencies, 1971 saw publication of *A procedure for evaluating environmental impact* by L. B. Leopold and others under the auspices of the Geological Survey, part of the United States Department of the Interior.

This procedure advocated the use of a matrix, a method that created a simple model of causal relationships. A number of such approaches to environmental issues had been developed, largely in response to NEPA (Hymen and others, 1988: 15). The sample matrix appended to Leopold's report had space for 100 'proposed actions which may cause environmental impact' and 88 headings for 'existing characteristics and conditions of the environment' (1988, plate 1). Such numbers of factors have been severely criticised not only for the 'shopping list' approach which suggests that if enough is listed, all factors or impacts will be adequately covered, but also for the inevitable complexity of generated 'results'. Nevertheless, this report went through five printings in 1971, its first year of publication, which indicated the interest in Leopold's approach. The procedure was used by the United States in the Antarctic Dry Valley Drilling Project during the early 1970s (Parker, 1978b: 125) and also for the Environmental Impact Statement covering the Ross Ice Shelf Project (Parker, 1978a: 24).

7.6.3 Widening concerns

Aesthetic concerns were extended on a global scale. In 1974 the American polar biologist, Professor W. S. Benninghoff presented a paper on 'Macrobiology and ecology in polar deserts'. He stated his intention to give: 'a brief review of the major biological and ecological features of polar deserts which I believe deserve consideration in planning the occupation, exploitation, and management of these regions.' (1974: 91)

Having given his overview, Professor Benninghoff concluded his paper with two paragraphs:

We face the question of what is so precious about these polar desert landscapes that we would go to such efforts to preserve them. I believe the answers lie in the fact that we do not yet know how to maintain them in their natural condition in contact with pressures of Western culture, nor do we know how to convert them into useful or pleasant domesticated landscapes. Therefore, our choice is to try to protect them until our understanding is complete.

Stepping still farther beyond my own speciality, I would hazard the opinion that we are ready to raise esthetic qualities of landscapes into our valuation lists. Polar landscapes in their natural states seldom fail to impress their beholder; therefore they have intrinsic esthetic value. This value might be expected to increase as the wilderness areas of lower latitudes undergo the continuing attrition and damage that show no signs of slackening. It is only fair to acknowledge, however, that often the human eye's delight in a wild landscape is heightened by

a sign of harmonious human occupancy, a cabin, or a fishing boat, by people finding part of their sustenance in the land. We seem to have innate appreciation for the human presence in a compatible relationship with the landscape. (1974: 97)

His comments raise many issues, concerning environmental values, landscape aesthetics and landscape management. It can only be conjecture, but it is tempting to see in his use of the term 'valuation list' the influence of matrix methodology in general, and possibly Leopold's work in particular. Benninghoff's closing comments on the delight offered: 'by a sign of harmonious human occupancy' go in the direction often referred to as the 'prospect and refuge' theory, proposed and expounded by Appleton in his books *The experience of landscape* (1975) and *The symbolism of habitat* (1980). Appleton's theories are linked to the work of R and S Kaplan, members of the same university as Professor Benninghoff. It would have been of great interest to have had further understanding of the conclusions to his 1974 paper, but Professor Benninghoff died in 1993.

Another influential figure within the American universities during the 1960s and 1970s was Christopher Tunnard, an English landscape architect who emigrated to the United States, after working almost alone with the modern architectural movement in England during the 1930s. He taught landscape design at both Harvard and Yale, and at the end of his life published an extended essay *A world with a view* examining the lacuna of then-current environmental concerns: 'the absence of an esthetic conscience in man's dealings with the environment.' (1978: xi) His study was discursive, rather than offering a technical or methodological approach, but drew on a wide range of subjects to illustrate his points. His own background was primarily within the liberal arts, but the first chapter of his study looked at 'Landscape and science'. He went on to argue the reasons for highlighting 'esthetic' concerns but concluded that basic issues in safeguarding the future were political: 'Man must take on the role of custodian of nature and of the past; he is the sole animal who understands the contributions of civilizations other than his own, contributions psychologically important to his own welfare.' (1978: 185)

Benninghoff's paper and Tunnard's essay came at a time of much professional activity in the overall discipline of landscape planning. It is important to see their comments within the context of the federal systems that were shortly to be published. Strict chronology would require that the Forestry Service's system, as the earliest of the federal

procedures, should now be examined, but to ease comparisons the four schemes to be considered will be grouped (section 7.6.6).

7.6.4 'Our National Landscape' 1979

The conference 'Our National Landscape' held in Incline Village, Nevada, resulted in 750 pages of proceedings, which included over a hundred papers. Litton, then Professor of Landscape Architecture at the University of California, Berkeley contributed a paper 'Descriptive approaches to landscape analysis' (1979). He began with historical background, giving examples of early landscape description such as those by Repton in 18th century England, before passing to Americans such as Thoreau and Brewer in the 19th, and Leopold and Olson in this century. Litton continued by identifying the value of inventories, based on description, as: 'rational documentations of observed landscape. They are the foundations for succeeding assessment and analytical interpretation.' (1979: 80) Litton was clear such inventories were not assessments. Base-line information should be provided to represent landscape in a straightforward way: 'not as it may be judged to have particular values.' (1979: 80) He saw it as essential that both typical and atypical landscapes are integrated for protection in order to maintain overall scenic quality. Visual inventories could be followed by evaluations, whether by professional judgements or by some form of public participation.

This paper by Litton is helpful because of his clarity in identifying difficult issues. Mention has already been made of his 'ephemeral landscape' (chapter 3, section 3.3) - factors such as weather and light conditions that exist but cannot be quantified. Litton's frankness is refreshing: 'The reasons for omitting these several things from evaluations are simple enough. We do not know how to do it' (1979: 81). He also commented on qualitative and quantitative evaluations. He saw value in the use of assumed numerical values, but only if their use was directed to comparative evaluations. 'Arbitrary numbers are merely labels which are no better than the criteria they represent or the reliability with which they are used.' (1979: 82) He stressed the value of visual integrity and suggested that: 'in many respects we are only beginning to recognize that the whole landscape is a scenic resource - not just the rare and spectacular.' (1979: 84).

The main points of his summary (Table 5) bear comparison with those offered in 1991 by the Countryside Commission for Scotland, (Table 3, section 7.5.3) Perhaps because he was writing after the publication of the FS method (1974) and development of the BLM method (published 1980), he appears to have had greater influence on British

thought rather than over American methodology. Both highlighted objective, descriptive inventories as fundamental, prior to evaluation; both recognised the place of professional judgement as well as identifying the difficult questions of public preference and perceptual aspects, and both stated that assessment by a descriptive approach has a wide planning application.

-
- 1 Roots of landscape description especially relevant to visual inventories can be discovered in ... literature.
 - 2 Objectivity of landscape description and of related inventories is a professional responsibility. It rests upon astute field observation and straightforward documentation of both typical and atypical landscape elements.
 - 3 Landscape evaluations cannot be made without prior inventories. Evaluation criteria need to be clearly expressed and have to be tangibly related to the landscape being studied. Identification of visual units within an area assists the evaluation.
 - 4 Quantitative landscape evaluations are frequently misnamed ... resulting assessments are comparative rather than quantitative. Qualitative approaches are the norm for present landscape evaluations.
 - 5 Preference evaluations of landscape quality expressive of public participation are extremely difficult to obtain ... Expressions of preference also contain many hidden dimensions.
 - 6 Physical-visual landscape criteria used by landscape architects need to be correlated to perceptual values of an interested public. Values identified for a certain locale cannot be dependably attributed to other places. Perceptual values can also be expected to shift over time.
 - 7 Descriptive visual inventories present tools for several kinds of combined research ... their use is not restricted to immediate problems of landscape planning.
 - 8-9 [Refer to site-specific impact studies.]
 - 10 Descriptive landscape analyses have application to development of both general landscape planning goals and more detailed landscape design policies.
-

Table 5 Key points: *Descriptive approaches to landscape analysis.*
(Litton, 1979: 86)

7.6.5 Outline of procedures used by federal agencies

Smardon examined three federal agencies in the United States that had developed visual resource management schemes - the Bureau of Land Management (BLM), the United States Forest Service (FS) and the Soil Conservation Service and offered a useful summary of their procedures (1986a). Individual papers by staff of each agency were included in 'Our National Landscape' conference (Schauman and Adams, 1979, for the Soil Conservation Service; Bacon, 1979, for the Forestry Service; Ross, 1979, for the Bureau of Land Management). More recently, the US Army Corps of Engineers adopted a *Visual resources assessment procedure* (Smardon and others, 1988).

Publications resulting from activity in the late 1960s and 1970s still stand for three of the agencies involved. One report noted that additional research was required and that investigations were underway. It was said that: 'changes will be made in the process as findings are published' (FS, 1974: 18) but no updated reports have been found. Detailed technical manuals, presumably for staff but available externally, have been produced, sometimes on a loose-leaf basis, which can aid revision (see, for instance, BLM, 1978 and 1986) but the original publications remain. It is understood that a new Forest Service scenic management system is being developed, but drafts are not yet available (Palmer, 1994 and 1996, personal communications).

7.6.6 The reports

1 Soil Conservation Service. 1978. *Procedure to establish priorities in landscape architecture. Technical Release 65.*

Because the Soil Conservation Service is almost entirely limited to: 'human-modified landscapes' (Schauman and Adams, 1979: 672), such as countryside or suburban settings, their system has been devised within this framework, with only infrequent application to 'wildland or wilderness'. Their approach differs from other resource management systems: 'primarily in its contextual consideration of social resources.' (Schauman and Adams, 1979: 672) As such, it is not appropriate to Antarctic use.

2 Forest Service. 1974. *Visual management system and*

3 Bureau of Land Management. 1980a. *Visual resource management program.*

The systems used by the FS and the BLM have similarities and may be examined together. The resemblance of titles can be confusing and all further references will simply be by their agency acronyms - FS or BLM. The flow charts offered by both the FS and the BLM illustrate their procedures (Figure 11, section 7.5.3). Both may operate in two stages, initially for overall landscape assessment before becoming site-specific if required. The divide between the two stages has been added to the flow chart.

Smardon's analysis (modified to cover just the two systems) may be taken as a summary. He suggested that the visual resource management systems were designed by both the FS and BLM to:

- 1 Inventory and simultaneously evaluate visual landscape quality based on primarily physical landscape factors with aesthetic modifiers (form, line, color, texture).
- 2 Inventory amount of use of the landscape, travel through the landscape, or

attitudes towards the landscape indicating degree of sensitivity.

3 Map degree of visibility or distance zones from which the landscape can be seen.

4 Combine this information to establish appropriate levels of management of visual quality. Under these management levels, certain intensities and types of activities are allowed or not allowed.

5 Assess visual impact absorption limits or thresholds to severity of visual impact allowed for specific landscape sites and provide guidance for ameliorative redesign or change in location of impacting activity.

6 Integrate all of the above into appropriate levels and times of environmental decision making.

Smardon (1986a: 166)

The stage entitled 'Inventory' highlighted the need for careful definition of terms. To the FS it included Character Type, Variety Class and Sensitivity Level. To the BLM, 'Inventory' indicated Scenic Quality, Sensitivity Level and Distance Zone. Examination of these terms showed that in both cases 'Inventory' included not only objective information but also a wide variety of subjective judgements and qualitative assessments. It was not only the land that was under consideration, but also factors such as use levels and people's concerns.

4 US Army Corps of Engineers. 1988. *Visual resources assessment procedure*.

The procedures outlined in the Corps manual were intended to: 'provide a method to evaluate visual resources affected by the Corps water resources projects.' (Smardon and others, 1988: 8) In the context of this study this may be seen as a limiting factor, but examination of the report is useful as it is a more recent statement of practice in the United States. It was similar to the FS and BLM methods in being two staged. Existing visual quality was classified, with the move to site-specific visual impact assessment following if required. The procedures were summarised as:

Define study area, identify regional landscape, determine management classification system class ... inventory existing visual resources, forecast without-plan conditions, forecast with-plan conditions (Smardon and others, 1988: 8).

The stages involving identification of the regional landscape and the preparation of an inventory of existing visual resources, 'in a holistic manner' (Smardon and others, 1988: 9), appeared relatively straightforward. A series of forms gave structure for surveyors'

responses. They were required to: 'describe the visual resources of the zone. In doing so, try to describe the elements that unify the area so that it can be considered a zone.' (Smardon and others, 1988: 23) This was similar to establishment of landscape character as advocated by both the Countryside Commission for Scotland (1971) and Litton (1979). Evaluation followed and public response was invited as contributing to the overall assessment. Reference was made to the value of a literature search (Smardon and others, 1988: 17), but it was limited to technical documents rather than wider sources such as literary references or paintings. The procedure resulted in the adoption of five management classification system classes. These were: preservation class; retention class; partial retention class; modification class, and rehabilitation class (Smardon and others, 1988: 36-37), a list which has echoes of Feilden's 'levels of intervention' (chapter 5, section 5.6.2). The procedure then became strongly site-specific and moves beyond the context of this study.

7.6.7 Summary of current American practices

This study is aimed at establishing an approach for use in the Antarctic. The position of these American schemes within the United States is not being examined, so if some aspects are challenged or criticised, it is to enable material to be sieved or refined for possible Antarctic use.

All three agencies had no difficulty in the initial stage of defining survey areas. Firstly, the Regional Landscape was to be established before smaller areas were identified, but only the Corps system defined this stage in any detail. All agencies appeared to develop an inventory of the land under consideration but the meaning attached to this word varied greatly. Both the FS and the BLM included qualitative assessments and also factors involving use levels and people's concerns. In their worked examples there was only passing mention of written landscape descriptions. Their approach resulted in maps that indicated, for example, 'distinctive scenic quality' (FS, 1974: 12-15) but with little indication of the make-up or character of the landscape. It might have been 'distinctive', but no guide was given as to whether it was 2000m high mountains or old deciduous woods with diverse flora.

In comparison, the Corps system primarily used the term 'inventory' in relation to existing visual resources (Smardon and others, 1988: 8). The second of their checklists had the headings 'Access' and 'User Activity' which go further than purely landscape description, but overall, their interpretation was more restricted than the other two systems. It

demanded a generalised description of the landscape before moving to assessment of visual quality. From the worked example (Smardon and others, 1988: 23), it was possible to gain a mental picture of the landscape under consideration and this would enable those using reports based on this system to envisage initial survey conditions. There was also recognition of the value of both: 'a professional assessment and public assessment of existing and projected landscape quality' (Henderson and others, nd: 14).

7.7 Consideration of British and American practices in the context of Antarctic use

Ideas have been exchanged between Britain and the United States, but accepted practices in the two countries appear to have diverged. Development by American federal agencies began at an earlier date than in Britain, but once adopted, the systems have remained unchanged in principle and apparently also in detail. Although slower to appear, the British systems have been developed, showing a greater degree of flexibility and sensitivity to on-going research.

The crux of the issue is the stage at which any form of subjective judgement is used. In America, the FS and BLM systems were based on 'inventory and simultaneously evaluate visual landscape quality' (Smardon, 1986a: 166). No straightforward description of the landscape was made. The Corps system brought in fewer qualitative factors, but they were still included in an initial stage. Statements or definitions of the subjective factors were not clearly given.

This approach of simultaneous description/evaluation must be considered acceptable in the United States, because it appears to have lasted for many years. This may be because it is being used within a single nation that has (or is assumed to have) a common cultural heritage. This assumption cannot be made for the Antarctic with the various members of the ATS with their diverse cultural heritage. It is necessary, therefore, that in the process leading to landscape evaluation, objectivity should be maximised, and subjectivity minimised. A further factor militates against the use of simultaneous description/evaluation. If there is to be a fair comparison of 'like with like' it is much more difficult, if not impossible, if description and evaluation are both involved during the first stages of the process.

In Britain, it has come to be accepted that an objective statement, identifying landscape character is the most appropriate way to begin a landscape assessment. Moggridge

went so far as to say it was: 'regarded as the only objective foundation on which to base a system of landscape resource classification.' (1972: 40) This difference is considered to be fundamental and preference is therefore given to a descriptive approach.

7.8 The World Heritage Convention

Because of the suggestions to designate Antarctic Heritage Landscapes by procedures analogous to those in the World Heritage Convention (chapter 4, sections 4.7.4 and 4.9), it is appropriate to examine relevant sections of the original document. The *Convention concerning the Protection of the World Cultural and Natural Heritage* (often known as the World Heritage Convention) was drawn up under the auspices of United Nations Educational, Scientific and Cultural Organisation (UNESCO) in Paris, during November 1972.

Article 2 says:

For the purposes of this Convention, the following shall be considered as 'natural heritage';
natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;
 geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation;
 natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty. (UNESCO, 1982: 131)

It should be noted that 'landscape' is not used within this article, reference only being made to features, formations, areas or sites. In Article 1 mention is made of 'combined works of nature and man' (UNESCO, 1982: 131) later interpreted as 'cultural landscapes' (UNESCO, 1994: 10, section 35 and 36).

The *Operational guidelines for the implementation of the World Heritage Convention* (UNESCO, 1994) gives four criteria for the inclusion of natural properties in the World Heritage List. Nominated sites should:

- (i) be outstanding examples representing major stages of earth's history ... or
- (ii) be outstanding examples representing significant on-going ecological and

biological processes in the evolution and development of ... ecosystems ... or
 (iii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; or

(iv) contain the most important and significant natural habitats for in-situ conservation of biological diversity ... (UNESCO, 1994: 12-13, section 44a)

The guidelines state that most sites already inscribed have met two or more criteria, although in principle a site could be included as long as it satisfies one. It is probable that sites satisfying any of the four categories are to be found in the Antarctic but this study is most closely related to category (iii).

Conditions of integrity are required. These differ for each of the four categories, but that for (i) reads:

The sites ... should contain all or most of the key interrelated and interdependent elements in their natural relationships; for example, an 'ice age' area should include the snow field, the glacier itself and samples of cutting patterns, deposition and colonization (eg striations, moraines, pioneer stages of plant succession, etc) ... (UNESCO, 1994: 13, section 44b)

Condition for integrity for category (iii) reads:

The sites ... should be of outstanding aesthetic value and include areas that are essential for maintaining the beauty of the site; for example, a site whose scenic values depend on a waterfall, should include adjacent catchment and downstream areas that are integrally linked to the maintenance of the aesthetic qualities of the site. (UNESCO, 1994: 13, section 44b)

Difficulties of designation have been clearly outlined by Thorsell who recognised: 'the evaluation process is complicated by the fact that the convention does not provide definitions of the terms "universal", "outstanding" or "natural" ... These terms are not easy to measure.' (IUCN, 1995: 8-9). He went on to suggest two approaches; first, comparison with other sites and second, use of five factors which together provide an indicator of conservation importance. These were distinctiveness, integrity, naturalness, dependency (relating consideration of the site's importance to key species and ecosystems) and diversity. Given examples clearly showed that like would be compared with like. A site under consideration for diversity was compared with a similar site in the same global region. Thorsell emphasised the point of the exercise was: 'to provide objective advice to the committee on the relative merits of sites in order to ensure that only the "best" sites are accepted and the "currency" does not become devalued.'

(IUCN, 1995: 8)

A management plan is required, together with regulatory or institutional protection. The boundaries of the site should reflect: 'the spatial requirements of habitats, species, processes or phenomena that provide the basis for its nomination' and 'should include sufficient areas immediately adjacent to the area of outstanding universal value in order to protect the site's heritage values' (UNESCO, 1994: 14, section 44b). Evaluation of nominated sites is carried out by the IUCN and consists of four stages; data assembly, external review, field inspection and panel reviews.

The value of designation has been debated. Advantages were reported to include:

possible access to additional, though limited, international finance; retention of sovereign authority ... and the means for the World Heritage Committee to intercede with national Governments concerning undesirable developments affecting World Heritage sites, and thereby enhancing their protection.

(Richardson, 1995: 216)

These advantages could not be fully applicable to the Antarctic because of the legal difficulties regarding sovereignty which led to the suggestion for analogous designations (chapter 4, section 4.9). Disadvantages primarily relate to management problems generated by possibly increased visitor numbers. If Antarctic landscapes are to be publicly designated, under whatever heading or title, consideration of such credits and debits needs to be made.

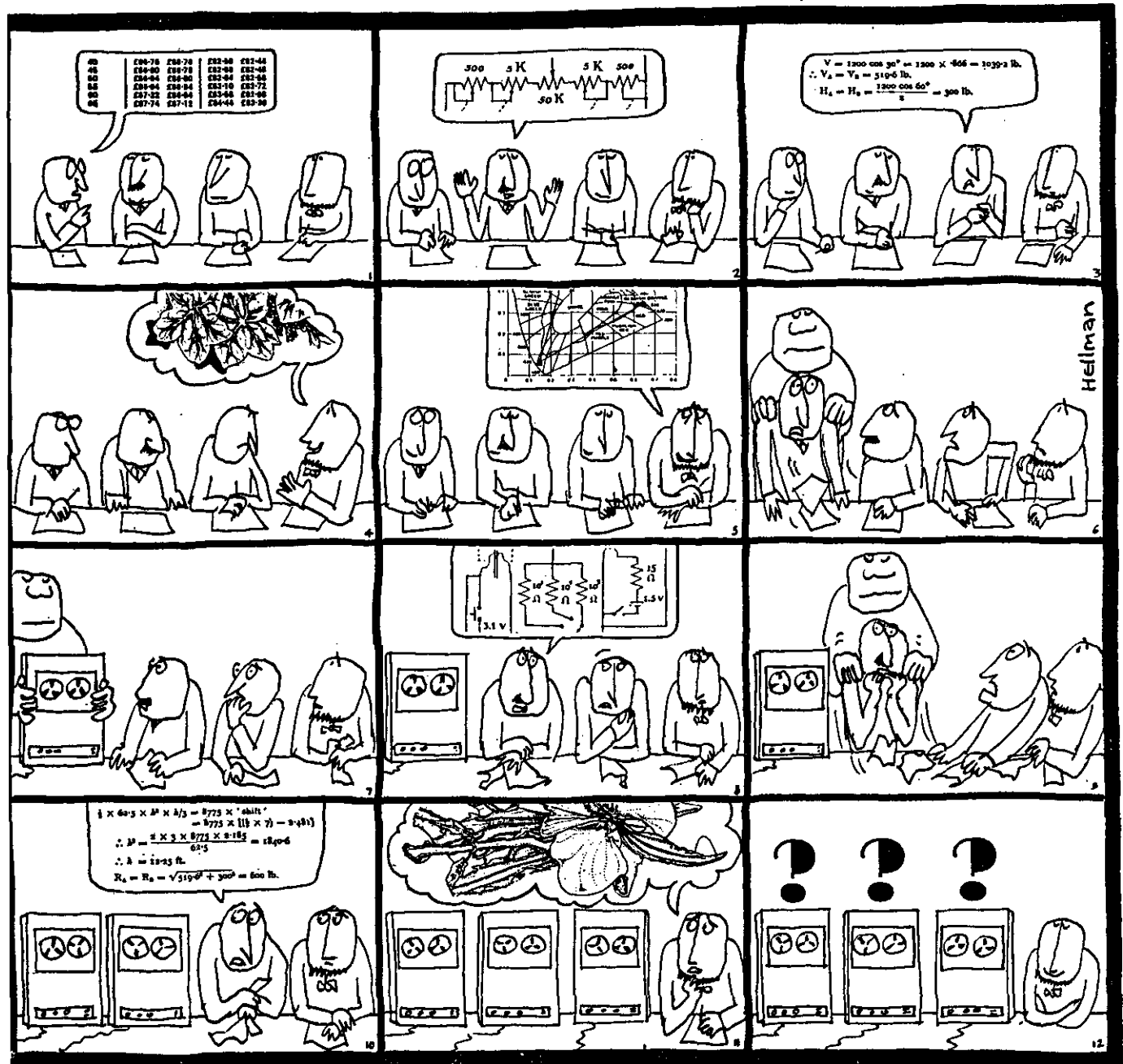
The Convention is a statement about recognition or identification of values and as such, gives guidelines rather than detailed methodology for the identification of features that might merit recognition.

7.9 Summary

It is proposed to use a form of landscape assessment based on a descriptive approach. This has had support from a limited number of American practitioners and academics such as Litton (1979). Its use by the Countryside Commission for Scotland (1991), the Committee for Wales of the Countryside Commission (1993) and the Countryside Commission (1993) suggests a strong measure of acceptance in the United Kingdom. The model initially adopted for field testing was based on the CCS 1991 *Landscape assessment: principles and practice* with input from the Countryside Commission's 1993 *Landscape assessment guidance*.

The suggested procedures may ultimately be applied to the process of evaluating landscape for designation. It is crucial that criteria used for evaluation are described fully, along with the rationale for their selection. The wide range of ATCPs may make establishment of such criteria difficult, but proposed Antarctic evaluation groupings have been suggested (chapter 8, section 8.9).

Finally, it is recognised that some may find difficulties in adopting approaches with subjective components. The last illustration of this chapter (Figure 12, on following page) is by an architect, Hellman (not to be confused with Helman, the writer on wilderness issues quoted in chapter 5). Aspects of aesthetic value can and should be presented in an objective and structured way (cartoon box 5), but there are factors that go beyond such documentation (box 11), although they should be expressed without smugness or complacency. The Hellman cartoon is linked with thoughts expressed by Tunnard, the English landscape architect and American-based academic (section 7.6.3).



'Each situation has its esthetic statement to make ... the philosophers tell us the ultimate satisfactions are esthetic ones.' (Tunnard, 1978: 184)

Figure 12 Cartoon by Hellman (*Architects' Journal*, 4 July 1973: 17)

Caption from Tunnard added.

Volume 2 of 2

UNRESTRICTED

Continuation of:

WILDERNESS AND AESTHETIC VALUES IN THE ANTARCTIC

Thesis submitted by

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to the Department of Geography, Faculty of Social Sciences, The Open University

for the degree of Doctor of Philosophy

December 1998.

AUTHOR'S NUMBER: M7163581

DATE OF SUBMISSION: 8 DECEMBER 1998

DATE OF AWARDED: 13 APRIL 1999

8 DEVELOPMENT OF A SYSTEMATIC ENVIRONMENTAL-GEOGRAPHIC FRAMEWORK TO IDENTIFY AREAS OF OUTSTANDING AESTHETIC VALUE

8.1 Scope of chapters 8-10

Annex V, Article 3 of the 1991 Protocol encourages ATCPs: 'to identify, within a systematic environmental-geographical framework ... areas of outstanding aesthetic or wilderness value'. This is the purpose underlying the development of a feasible form of landscape assessment for the Antarctic. Chapter 8 covers the initial stages of the development of the methodology for the form of landscape assessment based on a descriptive approach; chapter 9 includes the pre-fieldwork study of the Peninsula and the fieldwork itself, and chapter 10 illustrates the use of the chosen methodology.

As the ATCPs come from a wide range of cultural backgrounds, the probability of reaching a consensus about 'outstanding aesthetic values' would almost certainly be increased if the process of evaluation was seen to be founded on an objective basis. A descriptive landscape assessment would provide this basis, although the requirements of accepted methodology have to be set against the sheer size and climatic extremes of the Antarctic. Patterns may have to be modified, whilst retaining the integrity of the concept.

The search for 'values' means there can be no escape from the ultimate need for subjective judgements. Clear statements of criteria for evaluation will show the extent of the subjectivity. When combined, the two parts of objective description and subjective evaluation come together to provide a systematic environmental-geographical framework to identify areas of outstanding aesthetic value. The process may be summarised by the simplest of questions:

'What is where? Why do we like it? What are we going to do about it?'

8.2 Scope of this chapter

The decision to adopt a form of landscape assessment based on a descriptive approach raised issues that required further development, especially in relation to the demands of a polar environment. These issues varied in magnitude. Some were fundamental, involving underlying principles, and others emerged because of technical advances, such as the development of geographic information systems (GIS). Within the fields of *environmental and landscape planning* no issue was totally unprecedented, but particular problems imposed by the polar setting had to be resolved. The desk-

study gave opportunity to explore these issues. Some were under continuous assessment, both during and after fieldwork, either because of further published papers or because of experience gained in the field.

8.3 Remotely sensed data and Geographic Information systems (GIS)

The value of remotely sensed data in both polar regions is undisputed. The 17 papers in a special edition of *Polar Record* (1995, 31:177) show the range of applications, and within landscape and environmental planning, utilisation of such material is also commonplace. Nevertheless, it has been necessary to explore how far available data and techniques can be used for the development of systematic environmental-geographic frameworks for aesthetic values. The critical issue was identified in an early study by Duffield and Coppock:

the primary deficiency for landscape assessment lies in the system's inability to cope with the spatial composition of landscape, as opposed to its resource content ... Clearly the appreciation of landscape is primarily aesthetic and derives as much, if not more, from the spatial relationship of visible resources as from their mere presence in the scene. (1975: 146)

8.3.1 Recent studies

A search was made through the literature of the last 25 years to see if there have been further developments. Several titles initially appeared hopeful, but on examination were put to one side, for one of three reasons:

- 1 They were developed specifically for small-scale project-based EIAs, rather than wide-scale studies, and their methodology had limitations that were not capable of modification.
- 2 They did not clearly identify differences between objective and subjective issues.
- 3 They were based solely on the use of photographs or videos, as their only form of representation, with no fieldwork verification (section 8.4).

These sieves reduced numbers, but results from three large-scale projects have influenced the adopted approach. They were examined to ascertain how data was assembled and used, especially to determine whether the inadequacy identified by Duffield and Coppock had been overcome with the increasing sophistication of procedures. In chronological order, Crawford reported on an Australian study of a river catchment area (1993 and 1994); Brabyn's paper outlined landscape classification using

GIS and national digital data bases in New Zealand (1996), and the Countryside Commission examined the landscape character of England (Chris Blandford Associates, 1997; Countryside Commission, 1996a and 1996b).

Crawford used remote sensing and GIS to replicate an earlier 1974 study of visual quality originally conducted by survey (including field work) and analysis. A two stage programme was established - first, the delineation of 'landscape units' before a visual quality assessment. In the remote sensing/GIS study, the stage one process resulted in a generalised landcover map which was combined with a landform map to enable 'landscape units' to be defined. When compared with the earlier procedures, there were some differences, but results were considered to be sufficiently similar to proceed. There was no further assessment or grouping of the 'landscape units' into areas of similar character - all further work took place directly onto the 'landscape units'.

During the second stage, Crawford concluded that intangible values such as any 'cognitive aesthetic response' could not be handled by remote sensing techniques, and such factors were simply dropped. This raises critical issues. If a value had been considered important enough for inclusion in the earlier study, does its omission from the later replication weaken, or indeed invalidate the results? In this respect the paper was inconclusive, but illustrated the continuing limitations of using remotely sensed data.

Crawford replicated the method for a third time by using higher resolution satellite data, but was still not able to include such factors, although in limited respects results were better. He wrote: 'there was not a significant improvement over the earlier study.' (personal communication, October 1997)

Brabyn's paper *Landscape classification using GIS and national digital databases* was illustrated by work on an east-west transect of South Island, New Zealand. He clearly stated the underlying reasons for developing a classification and for future directions:

It is important that landscape character is classified in order to have a frame of reference for communicating research. ... A classification needs to be developed as best as possible with existing theory. Where this is deficient, assumptions should be made. As theory develops, the classification then needs to be reclassified if assumptions are proved to be incorrect. (1996: 277, 296)

In the initial stages of classification, GIS enabled extensive databases to be utilised.

'Vegetation' contained 47 different classes, 'naturalness' 22, 'water' 16 and 'landforms' 22. The subtleties resulting from combination of all these classes were too complex to consider, so a degree of generalisation was adopted. Brabyn highlighted the differences between physiographic units and the character of the landscape:

Landscape cannot simply be classified by dividing the land into areas that reflect boundaries between different landscape attributes, such as landform and vegetation, because it is these boundaries that are important characteristics of landscapes. The interaction of components is sometimes more than the components themselves. (1996: 280)

Specific landscape criteria were adopted, so that the classification could be used for evaluation immediately. It was at this stage that the study diverged from paths that would be applicable to the Antarctic. The importance of both vegetation and water in the 'general public's perception' are three factors covered by the specific criteria that have no parallel in a polar context. Brabyn's discussion on the criteria is interesting but not totally convincing, resulting in tenuously supported combinations of factors. Nevertheless, they were clearly stated, and thereby open to challenge.

Brabyn identified three deficiencies in the research, all relating to 'the nature of landscapes':

What are the exact landscape components that are important to landscape perception and the nature of their contribution?

What are the appropriate distance decay functions from a given point for each of the landscape components?

What are the important component combinations? (1996: 295)

Brabyn's conclusions were heavily influenced by these questions. He maintained that whilst GIS methodology had the technical ability to express complex spatial relationships of landscape components: 'the problem is that there is no agreement on what spatial relationships are important. ... it is necessary that our understanding of the important characteristic of landscapes be improved'. (1996: 296) Duffield and Coppock's (1975) identified deficiencies remain.

'The character of England: landscape, wildlife and natural features is a map of "building blocks" for landscape and nature conservation which defines our natural heritage in a single, easily understood framework.' (Countryside Commission, 1996a: no pagination). Analytical descriptions of the landscape were made, so as to understand the overall

distinctiveness of different areas. It was noted: 'landscape character exists everywhere in equal measure even if we value it more in some areas than others.' (1996a: no pagination) This marked one major difference in approach between the study and Brabyn's New Zealand work, which had a final map that included blank areas, thus suggesting that some places had no character that would appeal to the general public.

The English landscape study was based on 12 datasets, grouped into geological and topographical (3 variables), soil derived (2 variables), and historical, cultural and land use (7 variables). This enabled the production of a composite image entitled 'physiographic landscape units' (Chris Blandford Associates, 1997: their Figure 9). It was considered essential to supplement the digital data by field survey, so as to define those areas which shared a similar character (Shears and Stratton, personal communication, 1998). On some occasions, fieldwork showed an obvious divide which was closely linked to objective data such as geology, but in others, categorisation was *more difficult and only decided by visual assessment*. Detailed descriptions supported decisions.

8.3.2 Current work: LANDMAP

A further study came to light in the later stages of this thesis (March 1998), after fieldwork. The Countryside Commission for Wales is developing LANDMAP (name derived from 'landscape assessment and decision making process'), a GIS-based study that will ultimately cover the whole of Wales, an area of over 20,000 square km. Based on 'expert-derived data', the study includes visual and sensory issues, which may be evaluated at the time of survey by the experts (D. Eagar, Countryside Commission for Wales, conference presentation, March 1998). The ultimate size of the study is considerably larger than many others and is thus particularly interesting. No details have yet been published (October 1998) concerning the methods used to establish or assess the visual and sensory issues, so until documentation is available the merits of the study or its applicability to other areas cannot be established.

8.3.3 Conclusions about the use of GIS for Antarctic landscape assessment

Undoubtedly GIS will be extensively used in the Antarctic, but its use must be based on clearly stated and sound principles. It is a tool to be used to benefit a study, rather than a *straitjacket into which any study must be forced*.

So far it appears that GIS has not been able to cover convincingly aspects of

landscape assessment. Refinement of various processes is continuing and developments such as LANDMAP will be watched with interest. Spatial aspects of landscape were identified in 1975 as the critical issue (Duffield and Coppock 1975: 146), and their concerns have not yet been satisfactorily handled. Almost 20 years later Appleton wrote:

It is ... generally believed that aesthetic pleasure derives from the interaction of the observer with the landscape, and, if this is so, what matters must be the totality of the landscape, and not merely the number of environmental objects which are to be found within it. The spaces between them are as important as the objects themselves (1994: 114)

Spatial interpretation, which is central to an understanding of the Protocol's requirements, remains the bane in the use of GIS for Antarctic landscape assessment.

8.4 The use of photographs during landscape assessment

Two aspects required consideration; the use of photographs during survey, and their use to assess perceptual preferences. In one respect the two are linked, because the underlying issue is whether photographs can capture all dimensions of a landscape, including, for instance, such attributes as scale (chapter 9, section 9.9), enclosure and coherence.

8.4.1 Use of photographs during survey

During the late 1960s, it was suggested that photographic coverage using aerial and/or ground based material could provide all information necessary for a complete landscape survey, obviating the need for further fieldwork. A lively discussion took place at the Institute of Landscape Architects Conference at Lancaster University in September 1969, when the approach was advocated by a leading practitioner, specifically in relation to areas with restricted access such as Mecca. It was generally considered extreme, even in such exceptional circumstances, but the debate at least encouraged a closer examination of the use of available photographic material.

Aerial photography in the Antarctic has had variable results. In the mid-1930s *Polar Record* reporting the return of the British Graham Land Expedition commented:

An even more striking instance of the difficulty in recognising differences of ground-level from the air is shown by the discovery of an almost unique feature by one of Rymill's sledge parties. This is a deep channel at least 250 miles long and rarely more than 25 miles wide, with mountains on either side rising to 8000 ft.

This extraordinary land form [later named George VI Sound] was flown over by Mr Lincoln Ellsworth in his wonderful transcontinental flight a year earlier without being noticed. His track, as plotted from his records, appears to pass along the southern portion of this rift, and possibly a re-examination of his aerial photographs in the light of the ground party's discovery may show the feature, hitherto unrecognised. ... As a method of topographic discovery, however, it is clear that much less can be expected from aerial exploration than was supposed (*Polar Record*, 1937a: 92).

Aerial mapping techniques developed greatly since then, as may be seen from Dodds' summary (1997: 53-55), but difficulties of identification continued. Porter, an American photographer visited the Antarctic with the National Science Foundation and produced an outstanding book on his return, but he recognised: 'the vagaries of the most unpredictable weather on earth' and the difficulties of seeing features when flying (Porter, 1978: 105).

During tourist flights over the continent in the later 1970s, Eric Webb, the last surviving member of Mawson's 1911-12 Australasian Antarctic Expedition was taken as a guest. He said that the trip presented a view: 'which left me a newcomer to the scene - a contrast to hauling over the terrain; the wide magnificent panorama was overpowering' (quoted in Stallman, 1978: 108-09):

Use of satellite and aerial photography has been advantageous, providing a credible methodology had been developed. Young outlined work using an airphoto based land systems mapping approach (1994). Having identified epitome views of distinct landscapes, stereo pairs of aerial photographs were used to search for potential boundary lines. An English study based on this method, mapping landscape character, was considered by users to have 'performed acceptably in the field.' (Young, 1994: 144) The suitability of such an approach for Antarctic use is possible, but it would only be feasible to consider it after there is an understanding of basic issues, such as identification of Landscape Character Areas and Landscape Types (section 8.7).

Many of these comments suggest that viewing the Antarctic from above gives a different appreciation of the continent from that experienced on the ground. It serves a purpose in giving the true 'overview', and is also very enjoyable, but is very different from ground-level experiences. A straightforward understanding of 'landscape' is the environment as

it is usually seen and perceived and this 'view from the ground' should remain as the standard position for assessment.

8.4.2 Use of photographs to assess landscape perceptual preferences

Photographs have been extensively used in behavioural studies dealing with perception of the physical environment. Recent laboratory-based work in America has reinforced understanding about brain functions and human responses of the importance of spatial comprehension to navigation. Epstein and Kanwisher summarised their findings by writing: 'the shape of the local environment ... is critical to determine where we are' (1998: 601). Such specialist work on a small number of participants may seem far from the Antarctic, but it is one further facet that may contribute to a greater understanding of how we see and respond to our environment.

For many years work has been carried out in which volunteers have been shown 'typical' views before being asked to comment or state preferences about the illustrated landscape, with their opinions being analysed using recognised statistical methods. Concern about the appropriateness of a two-dimensional image for a multi-dimensional environment have been debated, but serious challenges to the use of photographs have been largely unsupported by experimental work until the study by Kroh and Gimblett (1992).

Initially they had concerns about the limitations of a split-second image to convey a landscape, so they developed a test centred on a walk through an area of southern Indiana. A sample of students followed the trail, rating their preferences and articulating their emotions at specific test sites. Two weeks later the same group were asked to participate in a laboratory test with the same sites represented by slides. The combined results of these procedures led Kroh and Gimblett to conclude that people did not respond similarly to an on-site landscape experience and a simulation in the form of photographs. 'The discrepancies between the two sets of data indicate that people's ability to rate a scene for preference and to reach a higher level of agreement is increased when multi-sensory stimuli are available.' (1992: 67) They concluded: 'If the goal of research is an accurate understanding of landscape preference the impact of multi-sensory dynamics must be accounted for.' (1992: 68) This 'move out of the laboratory' has been welcomed, as, for instance, by Burgess in an analytical review of methodological developments in varying aspects of landscape research (1996: 10).

Following a wide literature search, I have not been convinced of the feasibility of survey or establishment of preferences by the sole use of photographic material, so the position adopted for this study is that photographic material is extremely valuable, but cannot substitute for presence on the ground. This approach is supported by others in the Antarctic community. In a draft Resolution to the XX ATCM in The Netherlands, Chile called for the 'Promotion of educational and aesthetic values of Antarctica', by recommending members: 'to facilitate journeys of writers and artists to the polar continent ... so that they will be in direct contact with the aesthetic values of Antarctica.' (Instituto Antartico Chileno, 1995) Thus recognition is given to presence on the ground rather than a secondary experience through the lens of a camera, however skillfully used.

8.5 Identification of boundaries

Boundaries range from accurately defined linear marks on either the ground or a map (as with fences surrounding a field), to far broader and less precise concepts, such as the Antarctic convergence, which will vary over time in both width and position. Swithinbank imagined a mariner approaching the Antarctic and having to grapple with at least five different definitions of 'coastline', due to the varying junctions of ice, rock and sea (1988: B4-B5). Drawing a boundary in relation to a physical object, such as an ice shelf also presents problems. The tidal rise and fall of an ice shelf may cause very small cracks at the grounding point, thus allowing the general position of the edge to be established, sometimes within metres, but elsewhere, such as in parts of the Ross Ice Shelf, it is difficult to define an edge within 15 km (Swithinbank, personal communication, May 1998).

These difficulties are compounded if the reason for the line is linked to landscape factors. The physical dimensions of a feature are different from its visual influence. Taking again the example of an ice shelf, if one is standing near land (which is probably also ice covered), there may be no visual differences between 'land' and 'ice', even if a grounding zone can be established on closer examination. The conclusion is that boundaries in the Antarctic, whether for physiographic or landscape purposes are not always straightforward. Despite these difficulties, they are required, both at a casual level to assist location, and of necessity, to delineate areas for specific reasons.

8.5.1 Boundaries for designated areas in the Antarctic

The need for precise boundaries and the advisability of unambiguous designations was illustrated in several papers presented at an SCAR/IUCN workshop - *Developing the*

Antarctic Protected Area System (Lewis Smith and others, 1994) Dingwall (1994) suggested that boundaries be selected to reflect stated objectives of designation. He advocated use of natural features together with consideration of buffer reserves. This was taken further by Holdgate (1994). He cited with approval the Biosphere Reserve concept with its model based on zonation. It proposed a core area surrounded by zones of natural habitat, in turn surrounded by a buffer zone.

Clarkson stated the requirements of Annex V of the Protocol, before giving guidelines for the maps required to enable designated areas to be readily identified. The example showed a hypothetical ASPA comprising off-shore islands and a section of ice cliffs backed by a ridge (Clarkson, 1994: 55). The map was drawn to scale with a linear, rather than a numerical scale. The boundary of the protected area was clearly shown to include five islands but exclude one, and including a pillar but excluding a ridge.

Even if not adopted for the Antarctic, the World Heritage Convention offers helpful guidance related to boundaries, based on lengthy international experience. Their conditions of integrity require that sites should: 'include areas that are essential for maintaining the beauty of the site; for example, a site whose scenic values depend on a waterfall, should include adjacent catchment and downstream areas that are integrally linked to the maintenance of the aesthetic qualities of the site.' (UNESCO, 1994: 13) If Clarkson's hypothetical site was being designated because of landscape, both the excluded island and the ridge would probably be seen as part of the spatial structure of the area, and should therefore be included.

8.5.2 Boundaries for designated areas: an alternative approach

If an area is to be designated for any planning purpose, this usually entails delineation on a map. Whilst this is the norm, it is not mandatory. The UK Government asked UNESCO to consider the Hadrian's Wall Military Zone for inclusion in the list of World Heritage Cultural Properties. When designated in 1987, the site had no mapped boundaries but was covered by a verbal description which included the entire length of the Wall with its ditch, turrets and milecastles; the forts on or near the Wall; the vallum and the Roman military way (Johnson, 1994).

This approach is of interest because planning practice has usually been based on maps and plans, with the accuracy these imply. In Britain, it was not until the structure plans of the 1970s that diagrams were widely used, often with warnings against detailed or

measured interpretation. Whilst English Heritage recognised the difficulties in not delineating an area covered by specific planning policies, their underlying concern was for any line to be drawn so as to include a sufficient degree of protective setting for the Wall and its remains (Johnson, English Heritage: personal communication, July 1994). Since inclusion on the World Heritage list, a Management Plan has been prepared, and agreement sought with each adjacent local authority to provide: 'a Setting for the main linear elements of the Site' (Young, 1996: 2).

A verbally-described zone was adequate for the designation of Hadrian's Wall, and on occasions it may be necessary to use this approach. It would enable immediate recognition to be given to an area, even if further and perhaps protracted work was still required. Nevertheless, there are inevitable difficulties of interpretation with open-ended designations, and it is concluded that even if defining a boundary is fraught with difficulties, a certain degree of precision will probably be ultimately advantageous.

8.5.3 Boundary delineation: desk-study of Antarctic features

The IUCN *A strategy for Antarctic conservation* had suggested that: 'the Beardmore Glacier and adjacent ranges' would be likely to qualify for consideration as a World Heritage Site (1991:101). This was supported by Holdgate (1994), and may be taken as an example to illustrate some of the particular problems of polar regions (Figure 13).

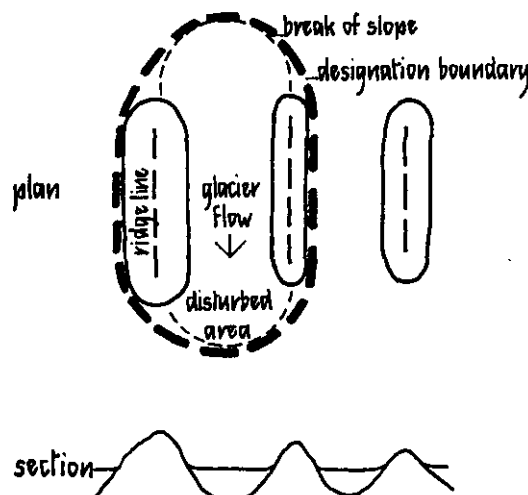


Figure 13 Identification of boundaries: diagram for glacier designation

The glacier drains an area of 121,000 square km (Swithinbank, 1988: B22) and can be seen as a frozen parallel to the UNESCO 'waterfall'. How much of this ice sheet lying above the Glacier and how much of the downstream Ross Ice Shelf should be included in any designation? The suggestion is made that the upper limit should be the break of slope that marks the beginning of the glacier, and the lower should be the disturbed area of the ice shelf to the point where no further specific disturbances from that one source may be seen.

The Beardmore Glacier is contained by mountains of the Hughes Range, Dominion Range and Queen Alexandra Range. They clearly contribute to the whole, but a line drawn, for instance, on the ridge or joining the peaks, gives insufficient weight to their mass. Yet a line drawn on the far side of the flanking mountains would probably be the edge of the next glacier. When the landscape is so closely interlocking, with facets being delineated by neighbouring features, there are problems. The call for unambiguity leads to acceptance of the more extensive boundary. In this case, if the boundary is taken to be the edge of the adjacent glacier, a modest buffer zone would be built in by the extended area. In addition, the ice/rock boundary would also be a precise edge.

There is also an argument for a far greater area to be considered, if this enabled a more coherent envelope of land to be established. This would inevitably include other glaciers. It is probable that a factor has come into deliberations that is not related to the straightforward consideration of one glacier as opposed to another. It is likely that historic links were behind the suggestion for the Beardmore Glacier to be designated, as it was the route used by both Shackleton and Scott to gain access to the polar plateau. This is an example of criteria being used to evaluate one feature against another (section 8.8). It is essential for such considerations to be clearly stated, so that their merits may be debated.

Holdgate also supported the suggestion for considering the Vinson Massif for designation. This is similarly difficult because of its location within the Sentinel Range. As may be seen from both maps and aerial photographs, the Range rises abruptly from the polar plateau to the south, with the escarpment slope dropping down to the Rutford Ice Stream on the north. The oblique photograph taken by the US Navy for the US Geological Survey (reference 263 TMA 570 F33, Figure 91 in Swithinbank, 1988: B123) and a satellite photograph (Figure 90 in Swithinbank, 1988: B122) show this clearly (Figure 14, on following page). If the whole Sentinel Range were designated, boundary

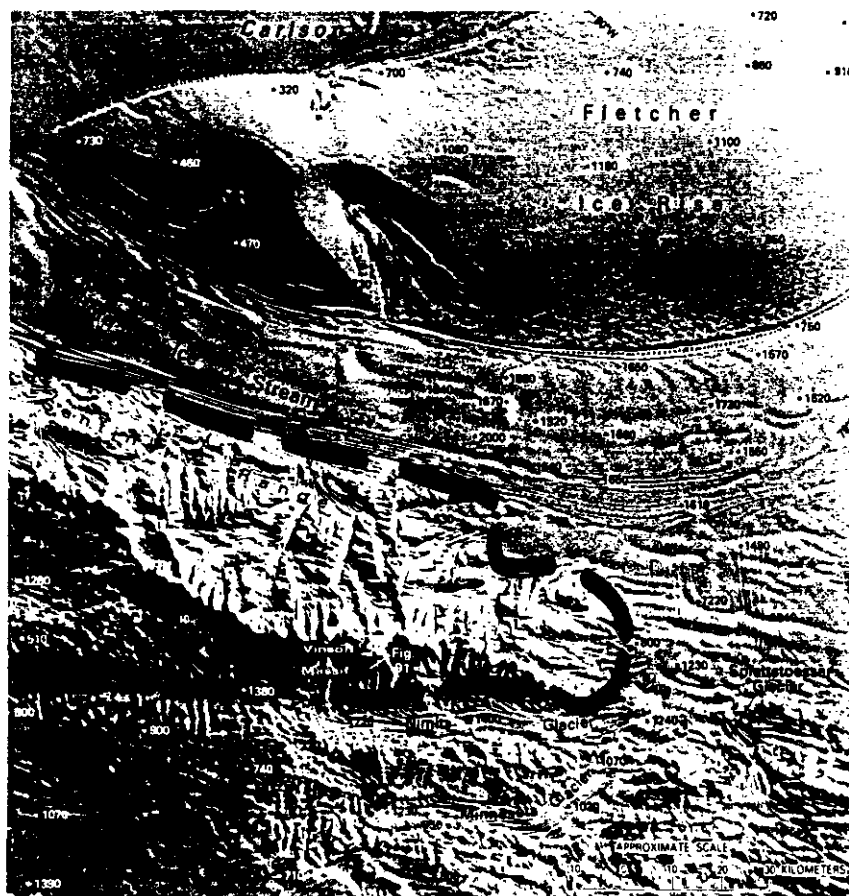
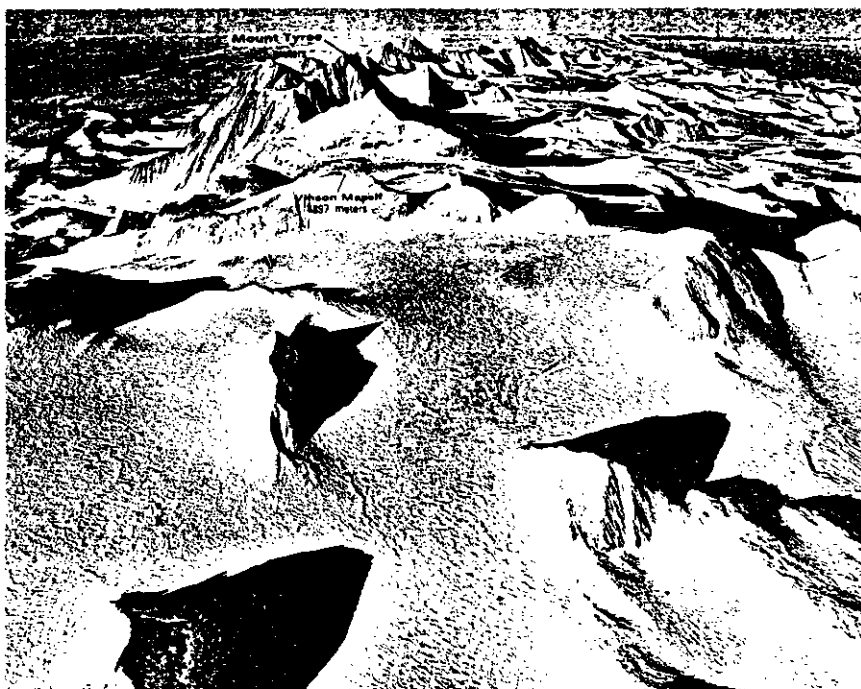


Figure 14 Identification of boundaries: Vinson Massif, Sentinel Range
Suggested designation boundary shown by superimposed broken line.
(Photographs from Swithinbank, 1988: B122 and B123)

drawing would be relatively straightforward. The near side of the Ice Stream could mark the northern extremity of the area, with the need for an arbitrary line only on the south. Isolating the single peak for designation would not only be complex, but would be against the principles of integrity.

8.6 SCAR matrices

In setting out to meet the Protocol's requirement to identify sites within a systematic environmental-geographical framework, it was initially attractive to see if landscape studies could be based on existing documents, or developed from concepts already recognised by others in the Antarctic community. In discussions, the SCAR matrices were frequently mentioned and it was therefore necessary to consider their potential.

Three SCAR matrices were developed to assess how well existing protected areas reflected the diversity of habitats and communities in the Antarctic (SCAR, 1994).

Terrestrial, inland waters and marine ecosystems were covered, but although all ecosystems contribute to the widest concept of landscape, the terrestrial matrix is most immediately relevant and has been taken as the example (Figure 15).

Environmental features Biotic (locally abundant)	Seasonally ice-free substrata and associated late snow beds							Permanent ice			
	Coastal (<10km from seasonally open sea)			Inland (>10 km from seasonally open sea)				Coastal (<10 km from seasonally open sea)		Inland (>10 km from seasonally open sea)	
	<1000 m alt.	>1000	Geo- thermal	<1000 m alt.	>1000	Geo- thermal	Adjacent to ice shelf	<500 m alt.	>500	<500 m alt.	>500
Vascular plants	3	X	-	X	X	-	X	X	X	X	X
	6	X	-	X	X	-	X	X	X	X	X
Bryophytes	7	X	-	-	-	-	-	X	X	X	X
	16	X	1	2	-	-	1	X	X	X	X
Lichens	14	-	-	-	-	-	-	X	X	X	X
	20	-	-	1	1	-	1	X	X	X	X
Macronalgae/ cyanobacteria	13	X	-	-	X	-	-	X	X	X	X
	17	X	-	1	X	-	-	X	X	X	X
Snow algae	3	X	X	X	X	X	X	1	1	X	X
	31	X	X	X	X	X	X	-	-	X	X
Microorganisms	? All	-	-	-	1	1	-	X	X	X	X
	? All	-	1	3	5	2	1	X	X	X	X
Invertebrates	10	X	-	-	-	-	-	X	X	X	X
	11	X	-	-	-	-	-	X	X	X	X
Bird/seals	16	-	-	-	-	X	-	2	X	X	X
	16	-	-	-	1	X	1	1	X	X	X
Terrestrial	-	-	-	1	2	1	-	1	1	-	-
	-	-	-	2	4	2	1	-	-	1	1

Figure 15 SCAR Antarctic terrestrial ecosystems classification matrix (SCAR, 1994: no pagination)

The vertical axis was 'biota', the horizontal axis 'environmental features', relating mainly to ice conditions, proximity to the coast and altitude. Of the 90 cells, 45 cannot support certain categories of biota, so were crossed through on the matrix. The resultant diagram gave an easily assimilated presentation of the coverage of the protected sites. Thought was given to adopting this structure as part of the landscape survey, but it was concluded that two of the three 'environmental features' - proximity to the coast and altitude - were not as influential to landscape as they were to ecosystems. However, the third relating to ice conditions - 'seasonally ice-free substrata and associated snow beds' and 'permanent ice' is important within the landscape, and had already been reflected in the development of Figure 2: Factors and features influencing the landscapes of the Antarctic (chapter 2, section 2.3).

The SCAR matrix is a convenient summary serving its intended purpose, and although ecosystems are a major contributory factor to landscape, adoption or adaptation of the established matrix would serve no positive purpose in this study.

8.7 Comparing 'like with like': Landscape Types

Landscape assessment practices emphasise the importance of only evaluating 'like with like' (chapter 7, section 7.5.3). In simple terms this would mean, for example, glacier with glacier, dry valley with dry valley, but a more comprehensive and systematic approach is required.

8.7.1 Draft classification for Landscape Types

Within landscape assessment methodology, Landscape Types (the generic grouping of landscapes with a consistent character) may be identified once a sufficient number of Landscape Character Areas (geographically specific areas with a distinct and recognisable identity) have been established. Over an area as vast as the Antarctic, this process has to be tentatively drafted as part of the desk-study, understanding that it is open to modification following fieldwork. The suggested classification (Table 6, on following page) is a development from Figure 2, the diagram that showed factors and features influencing the landscapes of the Antarctic (chapter 2, section 2.3).

The purpose of the exercise is to determine the strongest cohesive factors. Rock and ice are again used to arrange the two main divisions, with the terms 'inland and coastal' also used to help the structure, but precise definition is not always either possible or helpful. An ice shelf is floating ice, and therefore 'coastal', but may be many hundreds of

ROCK		ICE	
'Inland'	Mountains/hills/nunataks	'Inland'	Plateau ice/inland ice sheet
	'Dry valleys'/ice free areas		Glaciers
	Volcanic areas		Ice streams
'Coastal'	Mountains/hills	'Coastal'	Glaciers
	Volcanic areas		Ice streams
			Ice shelves
			Ice rises

Table 6 Draft classification for Landscape Types

kilometres from open sea. Fieldwork should be seen as the essential way to establish clear and appropriate categories.

8.7.2 An illustration of 'like with like'

Holdgate supported the suggestion contained in the IUCN *A strategy for Antarctic conservation* (1991) that the McMurdo Dry Valleys in southern Victoria Land should be considered for some form of designation (1994: 101), but no further explanation was given as to why that particular area had been singled out. Whilst they are the largest area of that particular Landscape Type, and so might be thought by some to be the 'best', a more critical approach is required.

Dry valleys occur in several areas of the continent (chapter 2, section 2.3) and if it was considered appropriate to designate an example, the ideal would be to carry out survey work over all areas in order to produce landscape inventories that could lead to classifications. Evaluation against agreed criteria should then take place to establish relative values, so that areas which are judged to have special importance could be designated so as to afford them special protection to maintain their essential character and quality.

8.8 Criteria for evaluation

8.8.1 Model to be considered

The international nature of the ATS brings together people with widely differing cultural backgrounds and consideration of the 'values' raised by the Protocol will inevitably raise many issues. The 'Summary of criteria for evaluation' (Table 7, on following page) given by CCS (1991: 23) was taken as a starting point from which a pattern appropriate to the Antarctic could be developed. The CCS summary might best be considered as overall

A Landscape as a resource	
1	Rarity
2	Representativeness/Typicality
B Scenic quality	
3	Combination of landscape elements
4	Aesthetic qualities
5	Intangible qualities -
	Sense of Place 'Habitat' theory
C Preferences	
6	Public preference
7	Informed consensus
D Special values	
8	Wild land qualities
9	Cultural associations
10	Special heritage interests -
	Wildlife Archaeology/History Geology/Geomorphology

Table 7 **Summary of criteria for evaluation**
 (Countryside Commissions for Scotland, 1991: 23)

headings under which evaluation might take place, rather than 'criteria', which are taken as the more specific details or standards used in judging. Certain items in the table were examined in greater detail, so as to identify more closely the approach needed for Antarctic use.

8.8.2 Combinations of landscape elements (Section B3 of CCS, 1994: 23)

Many studies have been developed to establish preferences in regard to combinations of landscape elements and the majority of those based in temperate regions of the world have had generally similar findings. CCS listed 12 elements which appeared consistently to make a positive effect on quality judgements: 'sea; undeveloped coast; rivers and watercourses; lakes; upland; steep slopes; bare rock; grassland/pasture; roughland/heath /bracken/ gorse; parkland; deciduous/coniferous woodland; attractive man-made features.' (1991: 24) These were funnelled down even further by the statement: 'perceived quality was dependent mainly on three physical dimensions i.e. landform/relief, naturalness/ vegetation cover and presence of water.' (1991:24)

Support for this may be found in other studies, sometimes in text unconnected to landscape assessment. Whittow, writing about the Sligo landscape in his *Geology and*

scenery in Ireland simply noted the: 'aesthetically pleasing combination of rock, wood and water' (1974: 146). Specific landscape studies also back these preferences. An Australian review, quoting work of the late 1970s, supported many aspects mentioned in the Scottish report, although with slight differences in relation to human influences:

contemporary research into statistical surveys of user perceptions ... suggested that scenic quality increases as topographical ruggedness and relative relief increase, presence of water forms, water edge and water areas increase, patterns of grasslands and forests become more diverse, natural landscapes increase and man-made landscapes decrease (Crawford, 1994:71).

The American studies also expressed similar findings (FS, 1974: 3, BLM, 1980a: 13; chapter 7, section 7.6.6). This commonality of preference for a wide range of factors was one reason for the inclusion of 'Diversity' in checklist 3 (Table 9, chapter 9, section 9.8).

Some of the specific preferences cannot immediately be applied to the Antarctic, as grasslands, roughlands, forests and vegetation cover (on the implied scale) do not exist. The broad-scale preferences in regard to combinations of landscape elements in the Antarctic may be reduced to topographical ruggedness and relative relief, and the presence of water.

Even though these preferences stand as the general norm, they will probably not be appropriate for all Landscape Types in the Antarctic. This reasoning is best explained by quoting Appleton (1994). Although he accepted that trees, woods and forests are much appreciated in temperate landscapes, he argued it would be dangerous to assume that 'more trees make more beautiful landscapes'. He wrote:

the vigorously defended landscape of the Halvergate Marshes in East Norfolk is virtually treeless - so why should we not further 'improve' it by covering it with trees? In fact one of the features which make these marshes unusual if not unique in the English landscape is their capacity to afford an uninterrupted field of vision ... perhaps not a place many would choose to live, but one to be savoured, at least for a short time. (1994: 114)

This links to the approach that character exists everywhere, but values may differ and minority views should be recognised and respected.

In Antarctic terms, this means recognition that the polar plateau or the large ice shelves have a value which is probably not shared, or perhaps even understood, by the majority. For these landscapes, the 'view' is probably 360° of uninterrupted ice, yet it

was seen by one American as: '... beautiful, quite beautiful. People just don't understand the beauty of it all' (BBC Radio 4 programme *The Big White*, 10 and 25 August 1996, quoted more extensively in chapter 3, section 3.5.2) Similarly, in one of the Personal Construct Theory interviews (chapter 9, section 9.10), a British worker living on an ice shelf for many weeks spoke of great enjoyment in the play of light on the uninterrupted surface.

Consideration of these qualities illustrates the importance of comparing 'like with like'. If the aim is to: 'identify ... areas of outstanding aesthetic ... value' (Protocol, Annex V, Article 3.2(g)), then areas of plateau and ice shelf should ultimately be designated as outstanding examples of those Landscape Types.

8.8.3 Preferences (Section C of CCS, 1994: 23)

The topic of 'Preferences' has generated much literature, frequently based around the question: 'Who establishes landscape preferences?' In populated areas, the answer may be 'the public' or 'informed professional consensus' or a combination of both.

Consideration of Antarctic landscapes brings problems, due to low numbers of either 'public' or 'professionals'. Even definition of 'the public' has problems. Are Antarctic workers on the same basis as tourists? Are either group typical of 'the public'? On one cruise, the average age was probably over 60 (Codling, 1982: 4) and cruise costs implied predominantly higher income groups. The Antarctic also attracts interest from many who will never have the opportunity to visit. Their visual experience may be limited to television or computer, but they are still concerned. Some argue that in an extended sense, they too are 'the public'.

This study cannot present the views of 'informed professional consensus' as no consensus has yet been expressed. It is known that work on wilderness values is underway in Australia, but although detailed work on aesthetic values is planned, it has not commenced (Riddle, personal communication, 1997 and 1998; Summerson, personal communication, 1997). This study is therefore a starting point, and should be seen as a beginning for debate.

'Preference' implies choice from a range of known options, and if the location of a study was in a populated area, many of 'the public' would have direct experience of at least some of the landscapes, so preferences could be based on varying degrees of

familiarity. In the case of the Antarctic, very few individuals have experience, let alone thorough familiarity, of the whole continent. Workers may be in one place for several weeks or months, but might only see a relatively limited geographical area. Most tourists are cruise based and possibly see a larger coastal area, but for a considerably shorter time, sometimes spending only five days in Antarctic waters.

During the literature search for material on landscape preferences, efforts were made to identify studies that attempted to consider opinions of people from differing cultural backgrounds. A case study in Bali was found, in which scenic evaluations made by people from different cultures were compared. It identified three concerns: the participant's purpose for evaluating a landscape; the participant's familiarity with a landscape; and a concern for the appropriateness of criteria to all participants (Hull and Revell, 1995). These three factors are clearly valid to an overview of landscape assessment, but were not immediately helpful to this study because of the difficulties in meeting the concerns.

Historically, the ATS did not recognise the need for, or the value of, landscape assessment until CRAMRA (1988) and the Protocol (1991), and even then were uncertain of the meaning and implication of identifying 'aesthetic values' (chapter 4, sections 4.6 and 4.8). Even today, most individuals visiting the continent would be unaware of the phraseology in the Protocol, although they might have a general awareness about its objectives and principles. Being clear about the purpose for evaluating a landscape would not therefore be straightforward. Hull and Revell's second concern about familiarity with a landscape has already been discussed earlier in this section. At this stage, their final concern about the appropriateness of criteria to all participants suggests a 'cart before the horse' situation. The first step has to be an understanding and acceptance by the Antarctic community of the principle of using a form of landscape assessment based on a descriptive approach. Responses to the basic methodology may suggest refinement of the outline criteria to make them appropriate to all the different nations in the ATS.

The conclusion has to be that visitors to the Antarctic will be small in number, and atypical of any form of categorisation used in more populated areas. The geographical extent of their experience in the Antarctic is also likely to be limited. This study proceeds on a pragmatic basis, appraising the comments and experiences from any visitor to the continent, whether 'public' or 'informed professionals'.

8.9 Antarctic evaluation groupings (Table 8)

A 'parallel strands' approach (chapter 7, section 7.5.4) has been adopted, thus respecting and complementing established criteria (Special values) by placing alongside them three factors arising from landscape assessment (Resource values). All of the groupings listed in the Protocol's Annex V, Article 3 (1991) have been included, with the exception of the 'catch all' sub-section (article 3.2(i)) covering 'such other areas as may be appropriate', and 'wilderness' (article 3.2(g)). The reason for the latter omission was that in chapter 8 it was proposed that the vast majority of the continent should be considered 'wilderness', and therefore further listing would be superfluous.

1 Inviolable areas	[Article 3.2 (a)]
2 Special values	
2.1 Ecosystems (both terrestrial and marine)	[Article 3.2 (b) and (d)]
2.2 Wildlife	[Article 3.2 (c) and (d)]
2.3 Geology	[Article 3.2 (f)]
2.4 Glaciology	[Article 3.2 (f)]
2.5 Geomorphology	[Article 3.2 (f)]
2.6 History	[Article 3.2 (h)]
2.7 Scientific research	[Article 3.2 (e)]
3 Resource values	
3.1 Rarity	
3.2 Representativeness/Typicality	
3.3 Scenic quality	

Table 8 Summary of Antarctic evaluation groupings

'Inviolable areas' head the list of groupings. If such an area is identified, the single value of 'no human interference' is quite clearly dominant and totally sufficient for designation. 'Special values' covers the other factors included in the Protocol's Annex V, Article 3. 'Resource values' covers those factors linked to landscape assessment. The actual term 'aesthetic values' was specifically avoided, so as to remove the possibility of isolating one part of a total process. If it were present, there may be the temptation to short-cut procedures, by omitting all the descriptive survey work and classification that precede and underpin the final products of landscape assessment.

8.9.1 Criteria for Special values

Each of the sub-sections shown in Table 8 would require detailed criteria to assist in their identification. As an example, 'Special values: ecosystems' would be covered by the

accompanying material to the SCAR matrix (Figure 15, section 8.6) which gave criteria for selecting sites for the protection of Antarctic biota, habitats and ecosystems (Lewis Smith, 1994: 31-32). Five headings were given: species distribution, biodiversity, ecosystems/ communities, habitat, and physical characteristics. Under each were further guidelines covering potentially influential factors. Similar lists of criteria from other disciplines such as geology, glaciology and geomorphology are required. There would probably be overlap, but this echoes the concept of 'landscape' itself, showing the interaction of one factor on another.

8.9.2 Criteria for Resource values: Rarity

Considerable significance is given to the statement: 'Landscape character exists everywhere in equal measure, even if we value it more in some areas than others.' (Countryside Commission and English Nature, [1996a], no pagination, quoted in chapter 7, section 7.5.5). There can be no doubt that all areas of the Antarctic exhibit very strong landscape character, but some areas are likely to be more valued than others. Criteria are therefore required to assess those values and meet the Protocol's requirements: 'to identify ... areas of outstanding aesthetic ...value' (1991, Annex V, Article 3).

Recognition should be given to an example of those landscapes which for whatever reason are 'rare'. The ice-free areas may be taken as an example, as they form a Landscape Type that in total covers a very small area of the continent. Desk-bound studies would probably locate appropriate areas for consideration, which should then be subject to landscape-orientated fieldwork, prior to evaluation.

Human nature also seems to enjoy 'the highest' or 'the biggest', or other sorts of record breaking positions. Dimensions are relatively easy to quantify - the Vinson Massif is the highest mountain in the Antarctic and the Byrd Glacier has been calculated to drain an area covering 1 017 000 square km, greater than any other glacier in the world. Whether size is as important as other factors is open to debate. The historical connotations of the Beardmore Glacier, used by both Shackleton and Scott to gain access to the polar plateau, may be seen by some to outweigh mere glacial mass. This is an example of where one Resource value may be set against another. The strength of each position has to be stated in a clearly documented form. Both will find supporters and acceptance of an assessment may rest on the persuasiveness of the decision-making debate.

There are also landscapes which may be smaller areas within larger categories. As

examples, dolines and ice rumples are both features found on ice shelves. Dolines are oval shaped depressions, which may be 1 km across and therefore an obvious 'feature' in an otherwise flat or gently undulating surface (Swithinbank, 1988: B10-11). Ice rumples are locally grounded areas of ice shelf which have been overridden by an ice sheet and are distinguished by crevassing together with a rise in the surface.

Swithinbank offered a graphic description of Kershaw Ice Rumples on the Ronne Ice Shelf: 'a scene of unremitting chaos ... Never since landing on the Byrd Glacier in 1960, had I seen so many crevasses crammed together so tightly. Even the boldest of mountaineers would have cringed at the sight.' (1998: 115) Such features are small when seen against the scale of the continent, but still notable in the total picture of the landscapes and might ultimately deserve recognition.

No comprehensive listing covering all possible eventualities can be drawn up. 'Rarity' takes many forms, but providing it is adequately described, should be incorporated within the suggested framework.

8.9.3 Criteria for Resource values: Representativeness/ Typicality

Quick assessments may be made on site (Checklist 3), but in-depth judgements can only be made during the process of analysis and classification that follows fieldwork. Recommendation 3 of the 1992 SCAR/IUCN Workshop called for 'an adequate geographical distribution and comprehensive environmental representation' of 'distinctive or special landscapes' (1994: 4) although no structure or methodology was given for the subject. Coverage of a reasonable proportion of the continent would be required so as to confirm, and almost certainly augment, the draft listing of categories named in Landscape Types (section 8.7). It would then be possible to designate areas that are typical of each category, so as to present a complete palette of Antarctic landscapes. This goes further than Recommendation 3 of the 1992 SCAR/IUCN Workshop which although calling for 'an adequate geographical distribution and comprehensive environmental representation', only suggested identifying 'distinctive or special landscapes' (1994: 4). Comprehensive coverage is the ideal to be aimed for, although it is recognised that this will be a long-term programme.

8.9.4 Criteria for Resource values: Scenic quality

Considerable thought was given to developing a greater understanding of the criteria required for Scenic quality. It proved to be one of the most difficult parts of the whole study. As fieldwork was limited to the coastal areas of the Peninsula, judgements were

based on the experience of limited Landscape Types, and had to be supplemented by further reading and seeking to understand the experience of others. One conclusion was that only after the use of all sieves and structuring should there be debate or discussion about aspects of Scenic quality. This is not because it deserves less attention, but because the aim has been to follow an objective path for as long as possible whilst recognising that ultimately subjectivity cannot be avoided.

Preferences relating to combinations of landscape elements should be the first consideration under the heading of Scenic quality. Until there is evidence pointing in any other direction, preferences in regard to combinations of landscape elements in the Antarctic are likely to be topographical ruggedness and relative relief, and the presence of water (section 8.8.2). The three most named sites in the PCT interviews - Lemaire Channel, Paradise Harbour, and Deception Island - all display these preferences. Deception Island may not be as 'rugged' as other areas of the Peninsula, but the variable relief of the volcanic landscape is clearly fascinating.

Intangible qualities should be recognised, such as historical events, or the 'sense of place' which might be present. Ultimately, comments such as 'We think Area A has more scenic value than Area B' will then be valid, but only if the statement comes towards the very end of the total assessment and evaluation procedure, and is supported by adequate documentation.

8.10. Procedure

Having described the landscape by identifying LDUs and Landscape Character Areas, it would then be possible to classify areas into appropriate Landscape Types. If there were more than one area in a single Landscape Type category, and it was considered appropriate to compare one against another, only then would Criteria for evaluation need to be introduced, to establish preferences on a 'like with like' basis. Parts of two previous Tables have been combined (Figure 16, on following page) to show this: Landscape Types (Table 6, section 8.7.1), and Antarctic evaluation groupings (Table 8, section 8.9).

Assessment under any of the headings in the Antarctic evaluation groupings (central panel) would be valid. A relentless pursuit of objectivity might suggest a higher case for designation is due to a site demonstrating 'the more, the better'. Thus a coastal area of mountains and hills with geological, geomorphological and historical interest (ie three

Special values) would be preferred over a coastal area of mountains and hills with a wildlife Special value. This approach may be acceptable in some instances, but it has limitations. If the coastal area of mountains and hills was the only area with that particular wildlife interest, it would seem appropriate that this should be reflected in any evaluation. Straight numerical totals are unlikely to be helpful.

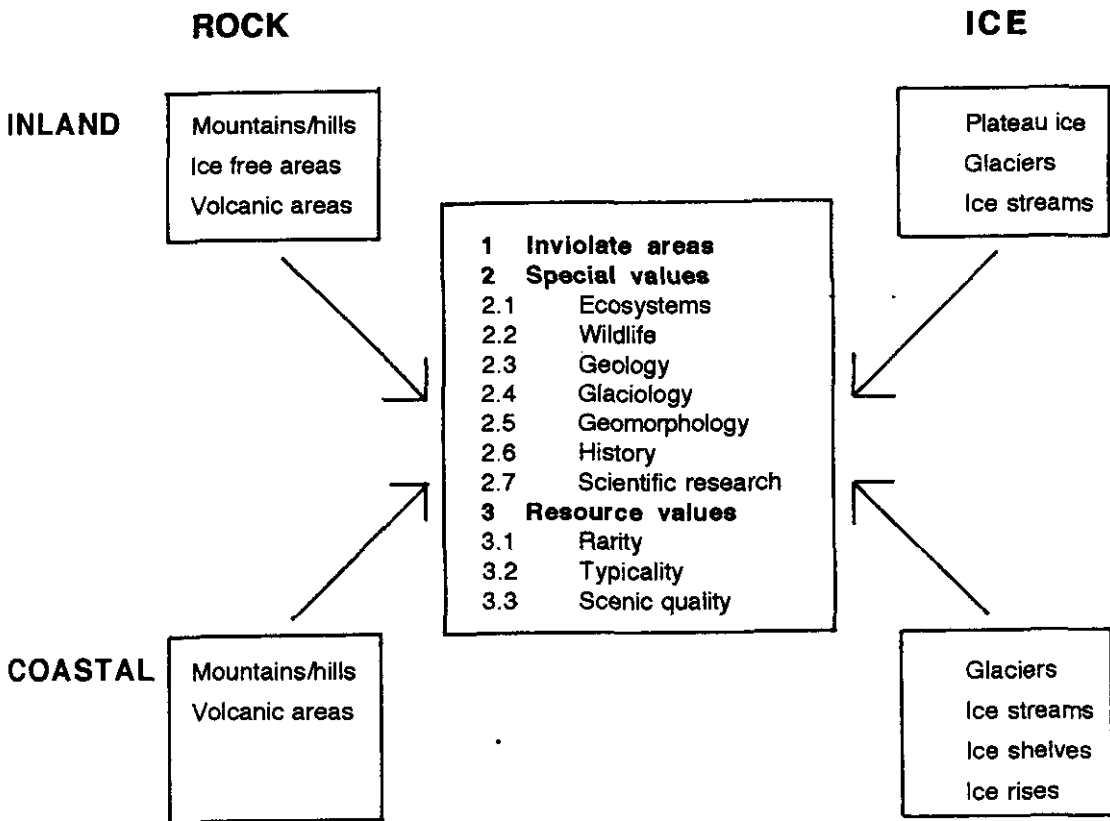


Figure 16 Landscape Types combined with Antarctic evaluation groupings

8.11 Summary

Having established the suitability of a form of landscape assessment based on a descriptive approach, it was necessary to explore various linked topics so as to develop the methodology for the polar environment. Work on various strands was carried out in parallel, with frequent cross-referencing. Sometimes the range of issues appeared to be a disparate collection, but all parts required consideration so as to strengthen the whole.

9 DEVELOPMENT OF A SYSTEMATIC ENVIRONMENTAL-GEOGRAPHIC FRAMEWORK TO IDENTIFY AREAS OF OUTSTANDING AESTHETIC VALUE: FIELDWORK

9.1 Scope of the chapter

This chapter begins by summarising the research and collation of material relating to fieldwork on the Peninsula. This fell into two general categories; first, geographic information, and second, response to, and perceptions of, the Peninsula. An account of the fieldwork follows, including a section covering interviews based on Personal Construct Theory (PCT).

9.2 Pre-fieldwork desk-study

To established Antarctic workers, it may seem surprising that there are sometimes difficulties in gaining an impression of the landscape. As scientific work has become more specialised, it appears to have become more detailed and general overviews have decreased. Pre-fieldwork reading covered, in general terms, the whole Peninsula including both objective and subjective information. Topics included consideration of geology; climate; landform; snow and ice cover; ecology (for specific sites), and historical aspects. A wide range of material, ranging from books and technical reports to expedition reports, photographs, paintings, films and postcards were reviewed, in order to appreciate the way the area was perceived. References are given when mention is made of particular material.

Texts from the period of exploration often gave the most vivid descriptions of the landscapes. For the Peninsula, notable accounts are Charcot (1912 and 1978) and Rymill (1938). Some more recent specialists have also been able to convey impressions. A booklet by Clapperton and Sugden (1975) *Scenery of the South* gave brief notes about the Falkland Islands, South Georgia and the Peninsula. Linton's paper (1963) concentrated on the landscapes of the Trinity Peninsula at the northern end of the Antarctic Peninsula and it would be both fascinating and helpful if others could follow his approach in looking at further areas. Swithinbank's *Satellite Image Atlas of Glaciers of the World: Antarctica* (1988) is outstanding in its clarity, both in text and illustrations. Impressions may also be gained from some of the more recently produced EIA documents, where sections such as 'Description of the existing environment' give a brief picture of the nature of the surroundings (BAS, 1989, 1995b and 1996).

The divide between objective and subjective was often blurred. For example, writers would present their factual information, whether descriptions of newly discovered features from explorers, or information about ecosystems from scientists, but would also include brief, but telling comments about their response to the environment. Efforts were made to determine whether perceptions and values have changed over time or remained consistent, but no clear pattern emerged.

9.3 Desk-study: objective material

The following notes are intended as an outline, with further site-specific material included in Appendix 5. The areas to which visits were planned were studied in greater detail, so that noted information could be taken into the field.

9.3.1 The Antarctic Peninsula

The Antarctic Peninsula is a clearly identifiable part of the whole continent, extending for over 1000 km, gradually building up southwards towards the plateau ice cap of West Antarctica. The Peninsula has a snow covered plateau rising to over 2000 m with two distinct margins. On the west, islands fringe the Southern Ocean, whilst the east is edged by extensive ice shelves.

9.3.2 Geology and geomorphology

The Antarctic Peninsula once formed part of the now fragmented western margin of the supercontinent Gondwana that extended originally from South America through the Antarctic Peninsula to Marie Byrd Land and New Zealand. The geology has been shaped mainly by the process of subduction - the drawing down of the Pacific Ocean floor under the crust of the continent. The Peninsula consists of the eroded remnants of a volcanic arc that was active from about 200 until 10 million years ago (Leat, 1995; Moyes and others, 1994).

The northern part of the Peninsula has been described in detail by Linton (1963). He suggested that the narrow and mountainous peninsula of Graham Land could be seen as an axial zone:

where almost continuous plateau remnants represent the high-level parts of a pre-glacial land surface incredibly little modified by glacial erosion, paralleled on either side by two zones in which glacial erosion has been just as incredibly effective.
(1963: 282)

This has resulted in jagged exposed rock ridges, with hanging glaciers especially on the

western side.

In the central part of the Peninsula (southern Graham Land) the maximum width is less than 200 km. The presence of pre-Mesozoic basement to the arc may be indicated by localised outcrops of metamorphic rocks along the east coast of Graham Land. The bulk of the rocks currently exposed on the mainland of southern Graham Land belong to the Andean Intrusive Suite and the Antarctic Peninsula Volcanic Group. The volcanic rocks range in composition from predominantly basaltic on the west coast to andesites, dacites and rhyolites on the east coast. Palmer Land has a broader plateau, at about 2000m, and is far enough south for both east and west coasts to be ice-locked throughout the year (Leat, 1995; Moyes and others, 1994).

Large sedimentary basins formed both sides of the arc and sedimentary rocks at the edges of the basin have been locally lifted above sea level on the Peninsula. Rich fossil fauna and floras have been found in these outcrops.

In the area of the Peninsula, there are also small areas of volcanic landscapes that have not been modified by glaciers, a distinctive characteristic but one which covers well-under 0.01% of the continent. Deception Island in the south of the South Shetland Islands group is the largest and most dramatic example. Also within this category are Penguin Island and Bridgeman Island, both lying east of King George Island. Bridgeman Island is seen as a stack rising from the sea, but bathymetry studies show it to be a remnant of a much larger volcano (Leat, 1995; Moyes and others, 1994).

9.3.3 Climate

... the continent is surrounded by a relatively simple pattern of circumpolar westerlies that serve as a coupling between the circulation of lower latitudes and the polar heat sink. The peninsula is the only land mass that cuts across this sub-Antarctic zone ... It separates the maritime climate of the Bellingshausen Sea from the continental climate to the east. The Weddell Sea contains the most persistent areas of pack ice in the Southern Hemisphere (Swithinbank, 1974: 86-87).

The mean annual isotherm of the peninsula shows that the east coast of the Peninsula is 5-6°C colder than the west. This results in more snow clinging to exposed slopes on the Weddell Sea coasts.

For Rothera, mean summer temperatures are in the region of -2° to $+1^{\circ}\text{C}$ while the mean monthly winter temperatures range between -5° and -20°C . Winds are gusty and strongest from the north-east and north-north-west. There is snow or sleet on about 225 days per year and rain or drizzle on about 30 days. Gales are recorded on more than 70 days per year, and there are around 1100 hours of sunshine each year, which is 27% of the possible maximum. (BAS, 1995a: 41) Rothera: 'represents a transition from that typical of the more oceanically-influenced "maritime" Antarctic to the north and the more extreme climate of "continental" Antarctica to the south.' (BAS, 1989: 22)

9.4 Desk-study: perceptions of the Peninsula

Responses to the wider Antarctic landscape have been examined in chapter 2 so consideration is now given to specific references to the Peninsula. Early visitors have been termed explorers, whilst those following have been listed as scientists and support workers; professional artists; professional photographers, and tourists. Some groups are particularly difficult to categorise, as several scientific and support workers have been proficient artists and photographers.

It is necessary to remember the total scarcity of information about the Antarctic, even as recently as 65 years ago. *Southern lights*, the official account of the British Graham Land Expedition of 1934-1937 included a map showing the coastline as it was known in 1934, before the beginning of the expedition, together with the routes of previous expeditions south of 65°S (Rymill and others, 1938: 25). The map showed the crudity of the then-available maps as well as the infrequency and limited nature of visits. This isolation was given added emphasis in a letter to *The Times* (6 March 1995) from Bertram, one of the surviving members of the expedition, who recorded that when they finally left the continent in March 1936 it was 'totally empty'.

9.4.1 Responses from explorers

A brief examination of the logs and diaries of some of the early explorers provides examples of differing approaches. Bellingshausen wrote his account of his journeyings with a naval officer's care. Details abound of the dangers that faced them such as ice, fog and snow: 'the travelling companions of the navigator in the Antarctic' (quoted in Neider, 1973: 101). On many occasions he spoke of seeing icebergs, but only as hazards to be avoided. Whilst off another section of Antarctic coast, he noted on the 17 January 1820 the 'beautiful blue colour' of the sea but further comment was restricted to strict navigational descriptions.

The French explorer Charcot visited the Peninsula twice in the early years of this century. He was widely read, quoting from the diaries and logs of other explorers such as Biscoe and de Gerlache. Malaurie observed that: 'no polar writer has written more entertainingly, yet accurately and intelligently, for the general public.' (1989: 193) Charcot's accounts of the expeditions were published immediately and an English translation *The voyage of the 'Why Not?'* was available in 1911, only a year after his return to France.

Perhaps more than others, Charcot noted colours. In translation they come in a straightforward and direct way, as rose, dazzling silvery white, 'grey, red, or black, sometimes even green' (8 February 1909; 1978: 147). He also described the sights he saw with appreciation and a freedom not often found in explorers logs:

The scenery is magnificent. The wild and lofty coast, with its rocks standing out black against the white of the snow and the blue of the glaciers, is magnificently lighted up, and we see outlined against the sky the two rounded domes of Le Matin Mountain (12 January 1909; 1978: 82).

A little before 3 o'clock the sun rises, and the light effects become wonderful. Some of the icebergs are purple in hue, others violet, others look like masses of molten iron, while some are blue or a dazzling silvery white. The whole pack is tinted pink, and it is difficult to imagine anything at once more beautiful and more fantastic. (31 January - 1 February 1909; 1978: 134)

More than any other explorer of the heroic age, Charcot seemed to be 'at home' in the Antarctic. He was under no illusion as to the dangers, but he saw the magnificence of the continent, writing in an easy style to describe both the areas charted and his responses.

The British Graham Land Expedition of 1934-37 explored and mapped areas of the Peninsula that had previously only been seen from afar. Their official account was written mainly by their leader Rymill with assistance from the chief surveyor and meteorologist, Stephenson. The two chapters by Stephenson are particularly descriptive and are quoted in the fieldwork details (Appendix 5, especially A5.3.4 and A5.3.5).

The overwhelming response from the explorers was of wonder and delight as they

travelled the area. They were aware of the dangers they faced, but were still able to have a wider vision.

9.4.2 Responses from scientific and support workers

Scott's first expedition boat *Discovery* visited the Antarctic again in 1926-1927, working off the Peninsula as part of the Discovery Committee Research Expeditions. Marshall, the surgeon, wrote of a passage to Port Lockroy:

We steamed down this fairyland channel with its various turns disclosing more beautiful scenery. I doubt if there is a more beautiful spot in the whole world than this in fine weather. (quoted in Savours, 1992: 212)

In linking landscape appreciation to weather, he moves into realms beyond present techniques (chapter 3, section 3.3), but his appreciation has been echoed by many. A few days later on the same voyage, the zoologist Hardy, who was also a keen amateur artist, verbally recorded colours in a manner similar to Charcot:

In the sun the snow on the steep ranges high above us was a vivid rose pink with the rocks warmed to a rich apricot shade; the sky behind was violet-blue merging lower down to that rich translucent turquoise now so familiar to us, and the shadows in the snow were of the same pure violet-blue so that high up it almost appeared as if you were looking right through the mountain side to the sky above. (Hardy, 1967: 404-405)

Duncan Carse, one of the members of the British Graham Land Expedition, narrated the script of a film compiled from footage taken by Lancelot Fleming during the Expedition. Although it took place in the mid-1930s, the film was not edited and issued until 1987. Carse, speaking about the Neumayer Channel, said it was: 'the finest scenery in all Antarctica'. Whilst not querying the beauty of the Channel, which has drawn comment from many, the question still has to be asked how this accolade could be awarded.

Whilst Director of BAS, Laws, also an accomplished painter, wrote that the area covered by BAS: 'contains some of the most beautiful landscapes and natural forms there are, in terms both of colour and structure.' (quoted in Hedley-Lewis, 1977: 17)

9.4.3 Responses from professional artists

At least three professional artists visited the Peninsula during the early years of exploration. William Burn-Murdoch travelled with the Dundee Antarctic Expedition in 1892-93; F. W. Stokes was with Nordenskjöld during January and February 1902, and

George Marston was with Shackleton during his 1914-17 *Endurance* expedition.

Burn-Murdoch wrote his own account of the Dundee Antarctic Expedition, called *From Edinburgh to the Antarctic*. It was subsequently described as: 'often flippant and too frequently subordinates facts beyond the limits of poetic license' (Southwell, quoted in Walton in his introduction to the facsimile edition of Burn-Murdoch's book, 1984: xiii). The early reviewer had kinder words to say about the illustrations: 'the artistic way in which the scenery of this wonderful region is depicted is really of value.' The book contains both line drawings and black and white reproductions of more finished paintings, thought to be watercolours. Dates can be seen on some showing that they were executed during the expedition. Perhaps it is because of the nature of the expedition - to explore the area for potential sealing grounds - that many of the works show people working in the Antarctic. Unfortunately for this study, they are of a very generalised nature, showing little that could be definitely identified as appertaining to the Peninsula. This clearly worked to the advantage of Burn-Murdoch as he later illustrated another polar volume, although he was not a member of the expedition. This time it was Bull's *The cruise of the 'Antarctic' to the South Polar regions* (originally published 1896). The title does not indicate that this later expedition was to the Ross Sea area, well over 4000 km away. In this second volume there is nothing in any of the illustrations that is specific to a defined part of the Antarctic - the tabular bergs show it is more likely to be in the southern polar area rather than the north, but otherwise the pictures are remarkably vague. Perhaps it was sufficient to show just snow and ice as the background to seals and penguins.

An American artist, F. W. Stokes, was with Nordenskjöld during January and February 1902, but he was apparently disappointed that the expedition's base at Snow Hill Island in the Weddell Sea was too far north to enable him to see and paint the aurora australis, so he left the party (Nordenskjöld, 1977: 96). The Antarctic pictures he did complete appear to be carefully composed studio work, often containing dramatic skies, but unconvincing in their portrayal of ice (see illustrations in Stokes, 1904). They appear to be near to a 'chocolate box' approach to polar art, containing all the right ingredients - dramatic sunsets, storms, icebergs, penguins, seals and whales - but perhaps this is a stern judgement to make solely from reproductions. Stokes continued to pursue his polar interests when he accompanied Peary to the Arctic.

Marston's surviving work is far more detailed and precise, although sadly limited, as most

of his sketches and paintings went down with the *Endurance* when she was crushed in the ice in 1915. His oil paints: 'were ultimately commandeered to paint the seams of one of the boats (now our only hope) ... we doubtless owe some small degree of our safety to those tubes of colour' (Marston, 1922: no pagination). He was left with a few sheets of paper and some watercolours, so when marooned on Elephant Island he used his limited resources to record his surroundings. He noted that he had to colour them by the light of a blubber lamp, presumably because low temperatures prevented the use of watercolours in the open. The archives at SPRI contain 13 works, mainly dating from the Elephant Island period. They are carefully drawn with strong colouring, and stand both as a record of the amazing survival of the group, and also of their setting.

Several amateur artists, such as Hardy with the Discovery Committee Research Expeditions (section 9.4.2), visited the Peninsula in the years after 1917, but the next visit by a professional artist appears to have been by Edward Seago in the 1956-57 Antarctic summer (Codling, 1997a). He went to the continent with a proven skill in using oils to capture the essence of a landscape, and despite being on or near the Peninsula for only three days, produced about 18 oil paintings, predominantly of landscapes and icescapes. His response to the Antarctic conveyed his excitement at what he saw:

I had always expected something that was very very flat and instead of that it was mountainous with tremendous peaks and black rock. I thought there was going to be wide expanses of nothingness and now and again queer upright icebergs and of course I thought it would be colourless; a mixture of greys and blacks and whites, but instead of that the colour was tremendous. It was full of rich blues and greens and the cavities, particularly in the icebergs which one would expect to be very very dark, weren't dark. They glowed with the most rich luminous blues and greens which were tremendously exciting to paint. (quoted in Goodman, 1978: 221)

Because of the fluidity of his technique, and ability to capture his subject so quickly, Seago's total portfolio of work painted in the Antarctic may be seen as a large scale sketch book using oils rather than the more typical pencil. He had never seen polar areas before, and managed to convey not only the overall topography but also the rich textures of rock, ice and water. He was true to his desire to paint the landscapes he observed with vigour and delight.

Keith Shackleton first visited the Antarctic in 1969 and expressed his interest in the

continent thus:

Much has to do with the appeal of a wilderness, in terms of challenge and nourishment for the soul. For a painter, though, there is an extra and very obvious reason, and one that applies equally to photographers. The landscape here is pure and intrinsic. Every shape, every line, every colour is elemental. It was moulded by natural forces alone over millions of years. (Snyder and Shackleton, 1986: 28)

Shackleton later expands on his colour descriptions and makes his own assessment of landscape values. Considering his travels have covered the whole world, many would give weight to his comments:

Ice is the ultimate sounding board for colour. Its purity is so perfect and so eager to reflect, it will receive and transmit the colours that fall on it in a way that makes them seem amplified and exaggerated. ... Ice certainly prepares one for the Antarctic Peninsula, or seeks to do so - yet the land is still to come. Many would say that the most spectacular scenery in all the continent, and in my view this would mean in all the world, is here. Imagine the entire upper echelons of the Annapurna Himal rising from the sea, and the picture comes close. It is certainly no exaggeration: the Lemaire Channel with Mount Scott, Mount Shackleton and Mount Peary behind; ... the white summit of 9,000 feet Mount Français, with lesser peaks of the Trojan Range soaring out of the cloud blanket covering Anvers Island. Their counterparts could perhaps be found in the Andes, the Himalayas, the high ground of Alaska - but not the solitude. One of the stronger emotions this landscape has to offer is the sense of privilege that goes with the seeing of it. (Snyder and Shackleton, 1986: 59-60)

More recently, the painter David Smith went to the Antarctic on two occasions with BAS (1981a and 1981b). He also said the Peninsula contained: 'some of the most magnificent mountain scenery this planet can show.' (1981b: 884), his comments echoing Seago:

Many people would presume that in Antarctica the painter would be faced with a perpetual vista of whiteness. The reverse is the truth. The refraction of light from the multitude of differently coloured angled ice planes, presents to the eyes endless tints of subtle colour which would have entranced the great impressionist painters such as Monet, Renoir, Pissarro and Sisley. Nevertheless, this gentler side of the Antarctic scene can suddenly and dramatically change. The wind and driving snow present more violent themes for the expressionist painter. Turner ...

would have revelled in the flying spume from the waves in the force ten gales and the slabs of two metre thick pack ice, tossed about as if they were playing cards. (1981b: 889)

9.4.4 Responses from professional photographers

Johnson, a photographer, recalled that before leaving England to work at Rothera base he had read: 'everything I could lay my hands on which related to Antarctica, with the hope of giving myself an idea of the dramatic grandeur I was told I would experience.' (1990: 95) He flew the last leg of the journey and wrote:

I felt very insignificant indeed against the size and power of such a vast, raw wilderness. Images of the early explorers such as Charcot in his ship the *Pourquoi Pas* and John Rymill in the *Penola*, who mapped this coastline, came to mind. From my lofty viewpoint, the majestic beauty was beyond my wildest imagination. Torrents of ice cascaded down from the mountains and from the polar plateau itself, ending in tottering seracs and ice-cliffs which resembled rows of pure white skyscrapers sliding silently towards the sea. (1990: 95)

It is interesting that he saw the historical context of his surroundings, not just the magnificence of the view. Having already been to South Georgia, he would have experienced dramatic snow-covered mountains, as his photographs in *Land of the ice king* bear witness, yet he admits being stirred beyond any expectations.

Further insights from a photographer may be found in Rowell's *Poles apart: parallel visions of the Arctic and Antarctic* (1995). Apart from magnificent pictures, part three of the book is entitled 'Essays about the photographs'. Not only are technical details given, but also the circumstances leading to the shot and decisions concerning composition.

9.4.5 Responses from tourists

It has to be recorded that many accounts resulting from tourist visits are little more than sparsely annotated timetables of events, with few attempts to give detailed insights. Goodall was one of the earlier cruise passengers, travelling in the *Navarino* in 1968. Describing Neumayer Channel she said: 'the scenery is probably the finest in the world and the mountains rise straight out of the sea on either side of the ship.' (1969: 55) She made few other descriptive comments. Similarly, Adams and Lockley (1982) offered little, although the book contained some good colour photographs.

The most lucid book resulting from tourist visits comes from Snyder and Shackleton. *Ship in the wilderness* documents the travels of the *Lindblad Explorer* and is subtitled 'voyages ... through the last wild places on Earth' (1986). As the most telling comments come from Shackleton, an artist, they have been already been included in section 9.4.3.

9.5 Safety

Before fieldwork I was concerned about the extent to which safety considerations might influence patterns of survey. My previous visit to the Peninsula in 1970, although following the different format of a tourist cruise, gave an introduction to safety requirements. It was obvious the Antarctic presents difficulties, especially during survey. In Britain, general familiarisation might entail travelling over and around an area, usually by car, bicycle or on foot, often in a randomly structured way - a wander with few restraints. Such freedom is virtually impossible in the Antarctic. Stringent safety precautions inevitably limit freedom of movement. With the possible exception of skilled mountaineers, limited access is the norm for the majority of visitors. The usual pattern of extensive ground based surveys was severely restricted in scope, and supplemented by other opportunities, such as ship based observation.

A further aspect of safety became apparent - was perception or appreciation linked to safety? Could the Antarctic landscape only be enjoyed if the visitor was feeling safe or content? Throughout Antarctic literature references were found that implied responses to the landscape had been affected by immediately personal conditions.

When at latitude 61° 18', longitude 40° 32' 15" on 19 January 1823 Weddell wrote: 'Ice islands were our constant companions, and indeed they had become so familiar that they they were little dreaded.' (1970: 27) Another sea captain, Charcot, had similar thoughts:

The icebergs are becoming more and more numerous. There are some superb ones, and as, inspite of the great quantity we have been permitted to see since our arrival in the Antarctic, we are not altogether *blasé* by their marvellous architecture, I pass quite close a few to enable us to photograph them. The mighty sea and the monstrous icebergs are playing their giant's games under the grey and lowering sky, caressing or fighting, and in the midst of these marvellous manifestations of nature, which are not made for man, we feel that we are merely tolerated, although a kind of intimacy may be created between us and our magnificent hosts. (14 January 1910, 1978: 289)

Adverse conditions caused despondency. Comments written by Bernacchi in 1899, have already been quoted (chapter 3, section 3.5.2): '... sinister coast ... gloomy day ... the rigging encased in ice... a feeling preciously akin to fear ... truly a land of unsurpassed desolation.' (quoted in Readers Digest Services, 1985: 135) Nordenskjöld, during his thwarted attempt to penetrate the Weddell Sea in January 1902, was overwhelmed by the sense of failure to the point of indifference to his surroundings:

It would be difficult to discover a scene more magnificent than that presented by this mighty wall of ice, with its simple lines and its uniform blue-white tint, a scene broken but by sky, sea and drift-ice. It is only in Antarctica that the opportunity is given for seeing pictures on so vast a scale ... The scene was, therefore, a new object of great interest; but at the time the impression of the moment became too powerful, and all scientific interests were left unnoticed, all feelings of beauty of the scenery were stifled. For it grew clear to me that the chief aims of the expedition ... were utterly annihilated by powers of nature against which it would be fruitless to combat. (1977: 60)

Modern writers such as Rowell saw safety as an integral part of appreciation - in this case the simple action of stopping to look at wildlife: 'Perhaps the seal felt as comfortable as I did before stopping, reasonably secure about retracing a route to safety if things did not go well.' (1995: 147)

Comments such as these give some indication of the linkage between appreciation of surroundings and feelings of personal well-being. At least two of the participants in the Personal Construct Theory interviews (9.10 and appendix 3) repeatedly linked safety with places. During fieldwork this concern came to the fore (notes written after visit to Fossil Bluff (appendix 5, section A5.3.9), and following the three day field trip on Adelaide Island (appendix 5, section A5.4.3)). In summary, I concluded I could look, absorb and appreciate my surroundings only because I had confidence about my personal safety. This was partly due to equipment and training, but mainly to the presence and leadership of an experienced general assistant (GA). I had no opportunity or desire to test the corollary - if I had had no confidence in my equipment and/or my companion, could I have appreciated the landscape? This is another outcome of the severity of the climate - attitudes such as relative security which are taken as commonplace in temperate areas have to be reassessed in the Antarctic.

9.6 Extent of fieldwork

Fieldwork was centred at BAS Rothera base (67° 34'S, 68° 07'W) on Adelaide Island, off the western coast of the Peninsula. There was no opportunity for choice. This was advantageous because the process was tested in a random sample area, with no preconceived ideas of 'value' or 'merit' of the landscape. The visit was initially to be from late February to early April 1996. Problems with the de Havilland Dash-7 air link between the Falkland Islands and Rothera intervened and it was rescheduled for the same period of 1997.

Prior to fieldwork, consultations with BAS indicated that from Rothera visits could be made with certainty to both Fossil Bluff and Sky Hi Nunataks on the West Antarctic plateau. There were also '? possible' visits to the southern end of Orville Coast and Korff Ice Rise, where seismic work would be in progress, and '?? possible' to Haag Nunataks. It would not be possible to visit the Ellsworth Mountains because it would be too late in the season.

Preparations were made accordingly, but in the event, Fossil Bluff was the only site visited, so all work was carried out in the area of the Peninsula. Actual dates in 1997 were:

- 26 February Flight by Dash-7 from Falkland Islands to Rothera*
- 3-5 March Visit to Fossil Bluff, Alexander Island*
- 12-14 March Skidoo and sledge trip to Stokes Peaks, Wright Peninsula, Adelaide Island
- 24 March Departure from Rothera in the RRS *Bransfield*: Sea passage to Horseshoe Island and Bourgeois Fjord*
- 25 March RRS *Bransfield* off Orford Cliff*, Lallemand Fjord
- 26 March Visit to Detaille Island*, Lallemand Fjord. Sea passage to Argentine Islands
- 27 March Visit to Argentine Islands*, before passage through Lemaire Channel*
- 28 March RRS *Bransfield* off King George Island*, South Shetland Islands
- 1 April Arrival at Falkland Islands

* Fieldwork sheets were completed for each of these locations. Together with other notes, they are included in Appendix 5 Site data.

Most fieldwork took place within 10 km of the Peninsula coast. The only exception was the visit to Fossil Bluff, although its rock/ice shelf boundary position gave a distinct 'coastal' feel, despite the fact that the open sea was over 100 km away.

9.7 Fieldwork

Fieldwork gave the opportunity to obtain information impossible to gain from other sources, as well as providing the all-important ground-level view which shows how the landscape is actually perceived. As such, it complemented and extended the desk-study. Ideally, it combined two approaches; the first stage of general familiarisation, followed by structured survey carrying out formal observations. Procedures such as map annotation, checklists, written descriptions, annotated sketches (pencil and watercolours) and photographs (slide, print and Polaroid) were used. Appendix 5 contains site data for specific areas, together with illustrations, covering all the media used; photographs, sketches, watercolours etc.

9.7.1 Available opportunities

Because the BAS base is situated on Rothera Point there was a greater opportunity to collect material from site, including photographs, sketches and watercolours. The site was therefore atypical, but the longer time gave opportunities to find out what really was practical. Darwin's wry comment: 'It is the fate of every voyager, when he has just discovered what object in any place is more particularly worthy of his attention, to be hurried from it' (1995: 29) could not apply to my stay at Rothera.

Apart from Rothera, observations were made for nine other sites. In the event, familiarisation took place 'on the move' as structured surveys were used and developed. During the voyage from Rothera Point to the Falkland Islands, surveys took place from the bridge of the RRS *Bransfield*, much as Smith was able to paint:

From these vantage points, [the port and starboard wings of the bridge] with the ship travelling at a moderate-average speed of eight knots, the coastline does not appear to pass too rapidly. It is therefore possible to work at a steady, comfortable pace, recording the varying scenes with a good deal of topographical accuracy. (Fogg and Smith, 1990: 78)

It was accepted that if accurate records were kept of methods and location, a ship-borne survey could be seen as an interim stage capable of augmentation and refinement, should later land-based work be possible.

It is preferable that fieldwork should be undertaken by at least two people working together, to act as 'sounding boards' for responses, but during my visit this was not possible. I was the only environmental planner present, so before joint project work there would need to have been familiarisation sessions to introduce adopted approaches

and discuss procedural techniques. Personnel at Rothera were continually changing, partly due to the approaching end of summer. None of the three with me at Fossil Bluff were on the RRS *Bransfield*, and the GA who took me on the field trip to Stokes Peaks was also supporting two other projects, which resulted in him being away from base for many days. There was therefore no one with whom I could consistently work, but because techniques were at a very early stage of testing, I do not think this was a tremendous drawback on this occasion. It would be helpful during future work.

9.7.2 Survey equipment

The only item requiring comment was a Polaroid 'Vision' camera. As expected, temperature was critical in the processing of its photographs, but two methods were found to give reasonable colour. If an exposed print was immediately held over the ventilation louvres of a running skidoo engine, the results were good. They were also acceptable, but much slower, if the camera containing the exposed print was kept almost next to the skin, under at least two layers of thermal fleece and a windproof covering. The lens of the Vision was the least successful aspect, as details of more distant features were not picked up. This would be a limitation anywhere, but the weakness was probably exacerbated in the Antarctic because the range of variations in colour and texture was generally less than elsewhere. Other Polaroid lenses might have been more suitable, but size was a critical factor, and the 'Vision' was the only model compact enough to be carried comfortably within clothing.

9.7.3 Ephemeral changes

To illustrate one aspect of ephemeral changes (chapter 3, section 3.3), daily photographs of the same view at Rothera were taken at 9am (local time) during March 1997. Photographs covering one week are included as Appendix 4. In that period, visibility ranged from about 350m to more than 21 km.

During the 1997 winter, photographs of the same view were taken at weekly intervals by Nigel Milius, one of the 'winterers', so as to show seasonal as well as climatic change. A selection is included in Appendix 4. He continued the routine during the 1997-98 summer. The time of the photograph was amended to noon (local time), so as to make the most of available light during the winter months.

9.8 Fieldwork checklists

All material relating to checklists is included at this point, even though some of the

preliminary work took place relatively early on in the desk-study period.

Initially, checklists were seen as tools to encourage careful and rigorous observation. As the study progressed, they became more than simple aide-memoires, because they exposed or highlighted certain critical issues, such as safety (section 9.5). Three lists were finally drawn up and are included as Appendix 1. Checklists 2 and 3 are also shown in the lower section of Table 9 (on following page).

9.8.1 Checklist 1: geographical terms

Hattersley-Smith's definition of geographical terms (1991: 52-55) formed the basis of the first checklist 'Contribution made by landscape elements', with additional items from Armstrong and others (1966). Geographical terms covering permanent or semi-permanent features were included, but sea features (such as anchorage or roads) and terms relating to floating ice, snow cover and the atmosphere (such as bummocks, barchans and freezing drizzle) were omitted. A summary of Hattersley-Smith's definitions was taken into the field, and is included as Appendix 2.

9.8.2 British and American versions of checklists 2 and 3

The development of lists to cover landscape characteristics and perceptions/impressions illustrated some objective/ subjective difficulties. Table 9 (on following page) shows three versions: Countryside Commission for Scotland, 1991:9; Palmer, (1996: 39), and Codling, 1997. The first version was used in the developments of both the other two variations.

The second version results from a study carried out by an American landscape architect in The Netherlands. The two British reports (Countryside Commission for Scotland's *Landscape assessment: principles and practice*, 1991, and the Countryside Commission's *Landscape assessment guidance: CCP 423*, 1993) were available to Palmer prior to preparation of *Modelling landscape spaciousness: a Dutch example* (1996). He 'borrowed heavily from them' for his study (personal communication, September 1996).

A comparison between the first two versions shows the most immediate difference between CCS and Palmer is their relative uses of 'aesthetic'. CCS said of their first list, headed Aesthetic qualities: 'These are qualities which can be judged in a rational, if not wholly objective way, and should therefore be less personal to the surveyor concerned.'

TYPE OF CHECKLIST WHICH CAN BE USED TO RECORD AESTHETIC AND PERCEPTUAL QUALITIES OF LANDSCAPE

This checklist includes a selection of words commonly used to describe reactions to landscape. Tick the word which most applies, or the approximate position on the scale if no single word applies. Insert new words as appropriate. The idea is to do this quickly to record first impressions.

AESTHETIC QUALITIES

(These are qualities which can be judged in a rational, if not wholly objective way, and should therefore be less personal to the surveyor concerned).

Scale	Intimate	Small	Large	Vast
Enclosure	Tight	Enclosed	Open	Exposed
Diversity	Uniform	Simple	Diverse	Complex
Texture	Smooth	Textured	Rough	Very rough
Form	Vertical	Sloping	Rolling	Flat/horizontal
Line	Straight	Angular	Curved	Sinuous
Colour	Monochrome	Muted	Colourful	Very colourful
Balance	Harmonious	Balanced	Discordant	Chaotic
Movement	Dead	Still	Calm	Busy
Pattern	Random	Organised	Regular	Formal

PERCEPTIONS/IMPRESSIONS

(These are subjective factors and responses and* are likely to vary between surveyors)

Rarity	Ordinary	Unusual	Rare	Unique
Security	Comfortable	Safe	Unsettling	Threatening
Wildness	Man-dominated	Man-influenced	Natural	Wild
Beauty	Boring	Interesting	Attractive	Inspiring
Familiarity	Ordinary	Familiar	Unusual	Striking
Management	Derelict	Disturbed	Tended	Manicured
Productivity	Barren	Sparse	Productive	Lush

* 'and' does not occur in the text, but this omission is assumed to be an error

Countryside Commission for Scotland. *Landscape assessment: principles and practice*. (1991: 9)

LANDSCAPE SPACIOUSNESS FIELD SHEET

DOMINANT LANDSCAPE VIEW ATTRIBUTES

Scale	Intimate	Small	Medium	Large
Enclosure	Confined	Enclosed	Open	Exposed
Near texture	Smooth	Textured	Rough	Very rough
Colour variety	Monochrome	Muted	Colorful	Garish
Rarity	Predominant	Common	Unusual	Unique
Relief	Vertical	Sloping	Undulating	Flat/horizontal
Dominant line	Straight	Angular/irregular	Curved	Organic/irregular
View position	Inferior	Normal	Superior	Aerial
Thickness	Even (1:1)	Oblong (1:3)	Elongated (1:10)	Corridor
Back edge	Immediate <30m	Near 100m	Middle 1 km	Far >2 km
Layout/plan	Perpendicular	Angular	Curved	Irregular/organic

AESTHETIC JUDGMENTS

<i>Scenic beauty</i>	Unightly	Ordinary	Scenic	Spectacular
<i>Contrasts</i>	Harmonious	Balanced	Discordant	Chaotic
<i>Involvement</i>	Obvious	Aware	Interested	Absorbed
<i>Mystery</i>	Obvious	Apparent	Promising	Mysterious
<i>Diversity</i>	Uniform	Simple	Diverse	Complex
<i>Coherence</i>	Unified	Interrupted	Fragmented	Chaotic
<i>Land use</i>	Natural	Agricultural	Country/Village	Urban

Palmer, J. F. *Modelling landscape spaciousness: a Dutch example*. (1996: 39)

Left hand column headings unique to Palmer printed in bold italics.

Checklist 2

LANDSCAPE ATTRIBUTES

Scale	Intimate	Small	Large	Vast
Enclosure	Confined	Enclosed	Open	Exposed
Texture	Smooth	Textured	Rough	Very rough
Form/relief	Vertical	Sloping	Rolling	Flat/horizontal
Line	Straight	Angular	Curved	Sinuous
Colour	Monochrome	Muted	Colourful	Highly coloured

Checklist 3

PERCEPTIONS/IMPRESSIONS

Diversity	Uniform	Simple	Diverse	Complex
Coherence	Unified	Interrupted	Fragmented	Chaotic
Familiarity	Ordinary	Familiar	Unusual	Striking
Rarity	Predominant	Common	Unusual	Unique
Beauty	Unightly	Unexceptional	Attractive	Spectacular
Security	Comfortable	Safe	Unsettling	Threatening
Wildness	Man-dominated	Man-influenced	Natural	Wild
Management	Obvious			Not obvious

Checklists as used in the Antarctic by RJC, March 1997.

Table 9 Development of checklists 2 and 3

(1991: 9) Palmer adopted many of the listed factors for his first list, but called them 'Dominant landscape view attributes' then using the phrase 'Aesthetic judgments' for his second list. When these changes were queried he accepted the objective/subjective division, but made his separation on the basis of: 'the ones I thought had a strong physical presence (i.e. they could be physically measured), from those that seemed to be only based on the presence of a human mind.' He used aesthetic: 'in the context of landscape perception research and particularly the Kaplans' work. This may be a significant difference, but perhaps it is more due to my academic than national background.' (personal communication, November 1996) The matter was not taken further, but it illustrates the difficulties of using certain words. Without qualification, there is danger that meanings will be confused.

9.8.3 Checklists 2 and 3 for Antarctic use

Modifications for Antarctic use were made for a number of reasons. The two British reports and the American/Dutch study were all based in areas greatly influenced by human activity. Some of the listed factors were appropriate to these landscapes but could be omitted for a study based in the Antarctic. Examples were CCS's 'Productivity' and Palmer's 'Land use'. This immediately simplified the lists, but further modifications were made.

The initial objective/ subjective divide was accepted, but the titles 'Landscape attributes' and 'Perceptions/Impressions' were preferred. The CCS's subjective factors were accepted (with the omission of Productivity), but Diversity was moved from objective to subjective, because it was seen as a response rather than a rational judgement. All three lists were used in the field, and this testing suggested further modifications.

9.8.4 Use in the field: fieldwork sheet 1

The fieldwork sheets were initially intended as aide-memoires to ensure adequate descriptions of the landscapes. The three pages were used for most observations to ensure consistency in recording, but it became clear that minor improvements could be made.

The first fieldwork sheet was reasonable, apart from a query about section 7 which covered 'Seen area: view lines, dead ground, edges, boundaries'. The scale of landscape was so vast that attempts to make a detailed recording of the 'Seen area' had little meaning, as there were usually few 'view lines', and 'boundaries' could be tens of

kilometres away. A verbal description based on visible features would probably be satisfactory.

9.8.5 Use in the field: checklist 1

The vastness of scale also caused difficulties in using checklist 1: 'Contribution of landscape elements'. Even avoiding use of elevated viewpoints, it was frequently possible to see a 360° panorama, containing so many of the elements listed as to make the exercise meaningless. Use of this list also raised questions about man-made features. In a note completed immediately after using the fieldwork sheets for the first time at Rothera, I wrote:

In a 'normal' landscape assessment, the man-made features [the Rothera base buildings and structures] would probably be considered 'evident' but marked '-', suggesting a negative contribution to the overall landscape. Visually, that would be fair, but because of the extreme climatic conditions in the Antarctic, other factors emerge. The buildings are 'home', albeit temporary, and at least some of the masts and aerials are links to a variety of satellites and communications systems. All contribute to the physical safety and support needed for a degree of security. These are not just comfortable background feelings, but reality. In the Antarctic life needs coordinated support and the base provides it.

These comments are linked to the earlier concerns about safety (section 9.5) and are also related to observations made following the field trip (Appendix 5, section A5.4.3).

9.8.6 Use in the field: checklist 2

Checklist 2 (lower portion of Table 9) was relatively straightforward and performed reasonably well. When it was used for the first time at Rothera, the following comment was made:

... it was immediately realised that the comparisons were being made on an Antarctic scale. Thus the colours were assessed as 'muted/ colourful' whereas if compared to a British coastal scene, they would probably have to be categorised as 'monochrome'. On the argument of only comparing 'like with like', should polar landscapes only be compared with themselves?

As further sites were visited it became clear that judgements were being made on an Antarctic scale. On reflection, this was the correct procedure to adopt, and linked with Litton's caution about transfer of values associated with one area to others (chapter 7, section 7.6.4).

So as far as 'colour' was concerned, again the assessment was being made in Antarctic terms. South Shetland Islands were 'monochrome' in comparison to Rothera Point's 'muted to colourful.' No site was described as being 'highly coloured'. Weather must have played a part in that assessment. On a bright day, the landscape seen from Rothera Point would almost certainly, in Antarctic terms, be described as 'highly coloured'. Apart from the rich and varied colours of the sea and ice, there were the rocks colours of the immediate Point, contrasting with the different hues of both Killingbeck Island and Piñero Island, which in turn were seen against the backdrop of the mainland.

9.8.7 Use in the field: checklist 3

Parts of checklist 3 raised queries in the early days of fieldwork. Initially 'Familiarity' and 'Rarity' were difficult to assess, but later, quick judgements could be made on the growing but still limited experience of the Antarctic Peninsula. There were times when it was not known if a landscape was 'Predominant' or 'Common'. Some of the other questions raised after the visit to Fossil Bluff (Appendix 5, section A5.3.9) were answered by subsequent use of the fieldsheets. If the checklists were to be used by others in the field, it would be necessary to ensure that all work was being carried out in an Antarctic context - judgements were to be made 'within the continent' rather than with reference to other landscapes.

Use of checklist 3 generated a comment on 'Security' that was apposite to the whole issue of safety, already mentioned in 9.5:

... safety has been so ground in as to become a way of life. Because of the feeling of vulnerability, all landscapes in the Antarctic will surely be classified as 'threatening', but then modified to viewpoint 'safe' but viewed area 'threatening'.
(Appendix 5, section A5.3.9)

The field trip on Adelaide Island highlighted other aspects. During the time away from base in the company of a GA, sometimes over ground presumed to be crevassed, I became convinced that the opportunities to observe and also enjoy, were possible only because of confidence in my safety.

9.9 The scale of the landscape

One incident brought home the difficulties of handling 'scale' in the Antarctic, and Figure 17 (on following page) is included to illustrate the predicament. A group of five were on a hill



The Rothera runway runs across the foreground, with the wind-sock on the far side. The walkers are just right of centre, on the crest of the hill (8 March 1997).

Figure 17 Scale: the landscape/human dichotomy

walk from the base to Reptile Ridge, just above and to the west of the Point (Appendix 5, Figure A13). If checklist 2 had been used for this particular view, 'Scale' would have probably been judged as 'small', and 'Enclosure' as 'enclosed to open', judgements made in relation to other Antarctic landscapes that had been seen and experienced. From the viewpoint of the base, the walkers were photographed as they went up the slope towards the southern end of the Ridge. From a distance of under 1 km, they appeared no more than black dots moving slowly across the landscape.

The difficulty is simply stated - in this landscape categorised as 'small scale' and 'enclosed/open', human beings were almost lost. Many of the other landscapes seen were categorised as 'large' or 'vast' and the human/landscape relationship, or lack of it, can only be imagined.

9.10 Personal Construct Theory (PCT) (Appendix 3)

During the earlier period of the study it became apparent that it would be both helpful and interesting to talk to individuals about their experience and perception of the Antarctic. Immediately after the initial thought there was concern about the way to structure a conversation so that it was not biased. Personal Construct Theory (PCT) was suggested as an approach.

PCT offered a pattern that enabled individuals to talk freely of their reaction to places, without being asked leading questions. This difficulty had been faced by others, though it might not have been recognised. In an earlier project, Stonehouse devised a 15-point plan for assessing the qualities of sites visited by shipborne tourists. One question was: *'Is the site scenically attractive? Are there interesting geological features or rock formations?'* (1992: 217) No indication was given about the understanding or values given to 'attractive' or 'interesting', or of assessment methods to be used. PCT avoided such issues, as the questions were sufficiently abstract to put the onus for choice of sites, language or direction of conversation entirely on the individual.

9.10.1 The interview

Individuals were asked if they were prepared to talk for about an hour about the Antarctic. Confidentiality was assured. Initially, no further explanation was offered, and if questions were asked about the methodology, it was suggested that it was better to try the process, rather than talk about it beforehand. All individuals who were approached agreed to the request.

The seven individuals interviewed in the UK prior to the visit to the Peninsula were mixed in both age and experience of the continent. Some had visited the continent on many occasions, sometimes for lengthy periods. Others had been on a single tourist cruise. Of the four who were interviewed at Rothera Base, one had visited the continent before and another was coming to the end of a two and a half year stay.

Interviews were carried out in relatively quiet conditions on a one-to-one basis. An introduction was given:

Personal Construct Theory was developed by George Kelly, an American psychologist and psychotherapist in the mid-50s, with the emphasis on individuals as agents of their own actions. It is the participant's understanding that is valued. In the form I am using it, it is: 'the way in which an individual views

his environment' (Stringer, 1976: 184).

The following questions were asked:

Question 1 'Can you name about a dozen places on the Peninsula which have had an impact or an effect on you?'

Names were listed and numbered, as spoken, with no comment or request for further information. Several were unknown to me, but further details or clarification about location or spelling were only requested at the end of the interview.

Question 2 'Lets look at them in threes. In what way are two of the three similar to each other and different from the third?' (Alternative form of question, used if there seemed to be any hesitation or a lengthy pause: 'Tell me one way in which two are similar and one different.')

The triads were randomly selected, using an OU list of numbers. When there had been a response to this general question, the more specific but linked third question was asked:

Question 3 'From the triplets, can you identify pairs of contrasts or opposites?'

This generally elicited straightforward statements, sometimes of abstract concepts, but often of simple objective facts, such as 'mountains - coastal' or 'penguins - no penguins'. It always became clear when there was no further use in continuing to suggest triads, as the same differences or opposites were being offered.

Question 4 On a scale of 5, score every place for each pair of opposites.
Rating of 1 is 'very like the pair' and a rating of 5 is 'very like the single'.

This was generally the most rapid part of the exercise, as 'giving marks' was seen to be unambiguous.

At the end of each interview, I usually quoted Dallos: 'the meaning of a term such as friendly, Kelly argued, can *only* be found by knowing its opposite - its contrast.' (1995: 23) or Stevens: 'Kelly's approach makes it possible to chart the nature of each person's world as she or he experiences it: but it makes it possible to elicit this from each person individually, rather than by imposing pre-set categories upon their experience.' (1995: 23)

One individual seemed perplexed by the pattern of discussion, but the results from that

interview appear no different from others. One interview was curtailed because of lack of time, but the places named have been included in the list of chosen locations. After interviews were finished, data was entered onto an existing OU form. An example of a completed form is shown as Figure 18.

Triad			Construct Pole Names		Element Ratings																
No	1	2	3	Pole 1	Pole 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	5	0		BELKAN	DURTY																
2	0	1		SAYMAN HABITATION	NO HUMAN PRESENCE	1	5	1	5	5	1	5	5	1	5	5	1	5	5	1	5
3	2	2		ON ROUTE	DESTINATION	4	1	5	5	5	5	1	5	5	1	5	5	1	5	5	1
4	6	2		CHALLENGING	RELAXING	3	2	5	1	5	1	5	1	5	1	5	1	5	1	5	1
5	3	0		NON HISTORIC	NON HISTORIC	1	2	1	5	2	1	5	2	1	5	2	1	5	2	1	5
6	10	0		SMALL, COPEABLE	LARGE, SHARPING	4	4	2	5	2	5	2	5	2	5	2	5	2	5	2	5
7																					
8																					
9	5	0		<i>8. Useability (as in 1 above)</i>																	
10	2	5		<i>6. All desirable, all unattractive, all desirable, no no consistent</i>																	
11	10	0		<i>9. Uninteresting, habitid (as in 2 above) - ALL RATED</i>																	
12	15	0		"	"																
13	10	0		"	"																
14	1	0		<i>8. Belination, passage (as in 3 above)</i>																	
15																					

Figure 18 Example of a completed PCT form

9.10.2 Chosen locations (listed in Appendix 3)

Given the invitation to 'name about a dozen places', the seven people in the UK gave 70 choices, covering 45 different places. One location was named by all seven (Lemaire Channel), two were named by five people (Deception Island and Paradise Harbour) and one was named by three (Stonington Island). Thus there were only four places in 45 that attracted any form of group consensus.

When the invitation was made to four individuals at Rothera, their choice was far wider. Thirty seven different places were chosen, with little overlap with the UK choices, or with others at Rothera. Their choices were mainly drawn from their immediate experience, and reflected the locations they had had to visit as part of their own work.

The question asked for 'places that have had an impact or an effect on you', with no indication as to whether 'effect' signified 'good' or 'bad'. At least some of the choices were because of adverse factors. Construct names such as 'safe - unsafe' were used, as well as reference to 'personal depression'. It became clear that selection of location could not be taken as a simple preference, leading to utilisation for any form of ranking.

9.10.3 Value of the survey

The survey was not designed on any form of statistical basis, and has not been subject to computer or detailed 'eye-ball' analysis. It has been of value in an informal way, showing trends in choice of locations and in hearing how participants chose to talk about the continent. All who were questioned knew that I was carrying out Antarctic research and probably most knew that my study had 'something to do with landscape', but their chosen directions for comment had little obvious acknowledgement of landscape issues. Thus one person predominantly named bases as chosen locations, finally explaining that their interest was in people on the continent. At the end of another interview, the participant said they realised their response had been mainly governed by their own discipline, but also coloured by their knowledge of the historical exploration of the area. For others, factors of personal safety, politics, or 'homeliness' were dominant.

One response was unexpected and surprising. During one interview, the individual named a location on the Peninsula, and spoke of it in similar terms to other chosen places. Only later did it emerge that the participant had never visited or seen the place, even from the air. Because of their work, it was as real to them as somewhere they had visited - they 'knew' it as a place - and thus felt able to talk about it, and compare it with other locations.

Participants had little difficulty in 'seeing the opposites', and generally commented that the interview had been interesting/stimulating/enjoyable. Several identified that the methodology enabled them to talk about the Antarctic without leading questions, and they welcomed this approach.

Although time-consuming and therefore unlikely to be suitable for surveys covering large numbers of people, the use of PCT demonstrated the value of a probing technique that is not based on leading or directional questions. Its structured use, together with detailed analysis might lead to a greater understanding of landscape perception, whether in the

Antarctic or other parts of the world.

9.11 Post-fieldwork considerations

Writing up of fieldwork gave opportunity for thought, and development of ideas, whether towards modifications of reasonably successful techniques or realisation of difficulties.

At the simplest level, the fieldwork sheets required minor modifications, and if they were to be used by others, further notes were needed to ensure consistency.

9.11.1 Intangible qualities

In chapter 8 (section 8.9) aspects of the Summary of criteria for evaluation (CCS, 1991: 23) were discussed. Included in that Summary was the heading 'Intangible qualities', but it was not until fieldwork that these became apparent. The obvious 'intangible quality' (if that is not a contradiction in terms) was the sense of history that was apparent within the BAS workers, and at least in some of the other visitors to the Antarctic met on the earlier tourist cruise. Perhaps the names of many features linked geographical places to people, and therefore acted as reminders - James Ross Island, Debenham Islands, Fuchs Ice Piedmont, Arrowsmith Peninsula etc.

BAS workers also remembered other events, often stemming from sledging or base logs read at Rothera or Fossil Bluff. The visit to Detaille Island also revealed preferences. Even though Base W remains empty of activity, it was full of reminders of earlier Antarctic workers and their dogs. During the available time ashore, the base and its immediate surrounds, with remains such as dog lines and the puppy kennel, were a 'honey-pot' claiming all the attention of visitors. Clearly the visit was of great interest, from the frequency and lengths of subsequent conversations which often compared and contrasted conditions with other bases such as Rothera or Fossil Bluff.

Other aspects of 'Intangible qualities', as described by CCS (1991: 24-25), relate to concerns already stated, about safety (section 9.5) and possibly also ephemeral effects (chapter 3, section 3.3; chapter 9, section 9.7.3 and Appendix 4). Although early in the development of methodology, intangible qualities such as historic links could be stated as elements in the criteria for evaluation. They are subjective, but may be considered provided they have been clearly itemised.

9.11.2 Criteria for Resource values - Rarity, Representativeness/Typicality

In the Antarctic evaluation groupings (Table 8, chapter 8, section 8.9), Resource values

included Rarity, Representativeness/Typicality and Scenic quality. Aspects relating to Familiarity and Rarity have already been raised in the discussion on the performance of the fieldwork sheets (section 9.8.7). Quick assessments may be made on site, but in-depth judgements about Rarity, or Representativeness/Typicality can only be made during the process of analysis and classification that follows fieldwork. Grouping of Landscape Description Units result in Landscape Character Areas - geographically specific areas with a distinct and recognisable identity, and it is only after a number of these areas are established that any comprehensive assessment can be made about relative rarity or typicality.

This period of fieldwork, although augmented by the short visit in late 1980 to the northern end of the Peninsula, did not give sufficient data on which to draw up more than one Landscape Character Area, and this is clearly not sufficient material on which to base reasonable judgements about Rarity, or Representativeness/Typicality. Landscape Types (draft classification given in Table 6, chapter 8, section 8.7) will need to be taken with mapped Landscape Character Areas and consideration given to degrees of rarity or otherwise.

9.12 Summary

The experiences of the five-week visit to the Peninsula supported Appleton's observation: 'It is ... generally believed that aesthetic pleasure derives from the interaction of the observer with the landscape, and, if this is so, what matters must be the totality of the landscape' (1994: 114). The period highlighted some difficulties in survey, but overall it was concluded that a form of landscape assessment based on a descriptive approach would be both appropriate and feasible.

Having in mind that comparisons should be on a 'like with like' basis, the experience gained from this period of fieldwork limited detailed consideration of Landscape Types. Neither plateau, nor 'typical' ice shelves were visited, although perhaps glimpses of those landscapes were seen when looking at the Fuchs Ice Piedmont in the distance from McCallum Pass on Adelaide Island (inland ice sheet), and George VI Sound (ice shelves).

'Combinations of landscape elements' might well become an important factor in Antarctic landscape assessment. The desk-study suggested that landscape preferences could be taken as variety of topographical ruggedness and relative relief, together with the

presence of water. This particular combination of factors has the advantage of being easily understood, and capable of description. All factors are frequent in the Peninsula, so there it might not be particularly efficient as a sieve, but its wider use elsewhere on the continent should be tested. It extends objectivity a little further, which many will see as advantageous in further use of the methodology.

10 A SYSTEMATIC ENVIRONMENTAL-GEOGRAPHIC FRAMEWORK TO IDENTIFY AREAS OF OUTSTANDING AESTHETIC VALUE

10.1 Scope of the chapter

Having established the form of landscape assessment to be used, it was necessary to develop aspects of the approach for use in the Antarctic (chapter 8). Fieldwork then tested parts of the methodology, showing what was feasible in polar conditions (chapter 9). It became clear that widescale use of photographic material (satellite and all scales of aerial photography) is necessary, but at the current point of research this information cannot supply all necessary information from which to establish aesthetic values. The central part of the chapter begins the landscape study of the Peninsula. Desk-study enabled the establishment of draft Landscape Sub-regions, and fieldwork enabled one such Sub-region to be described as a Landscape Character Area.

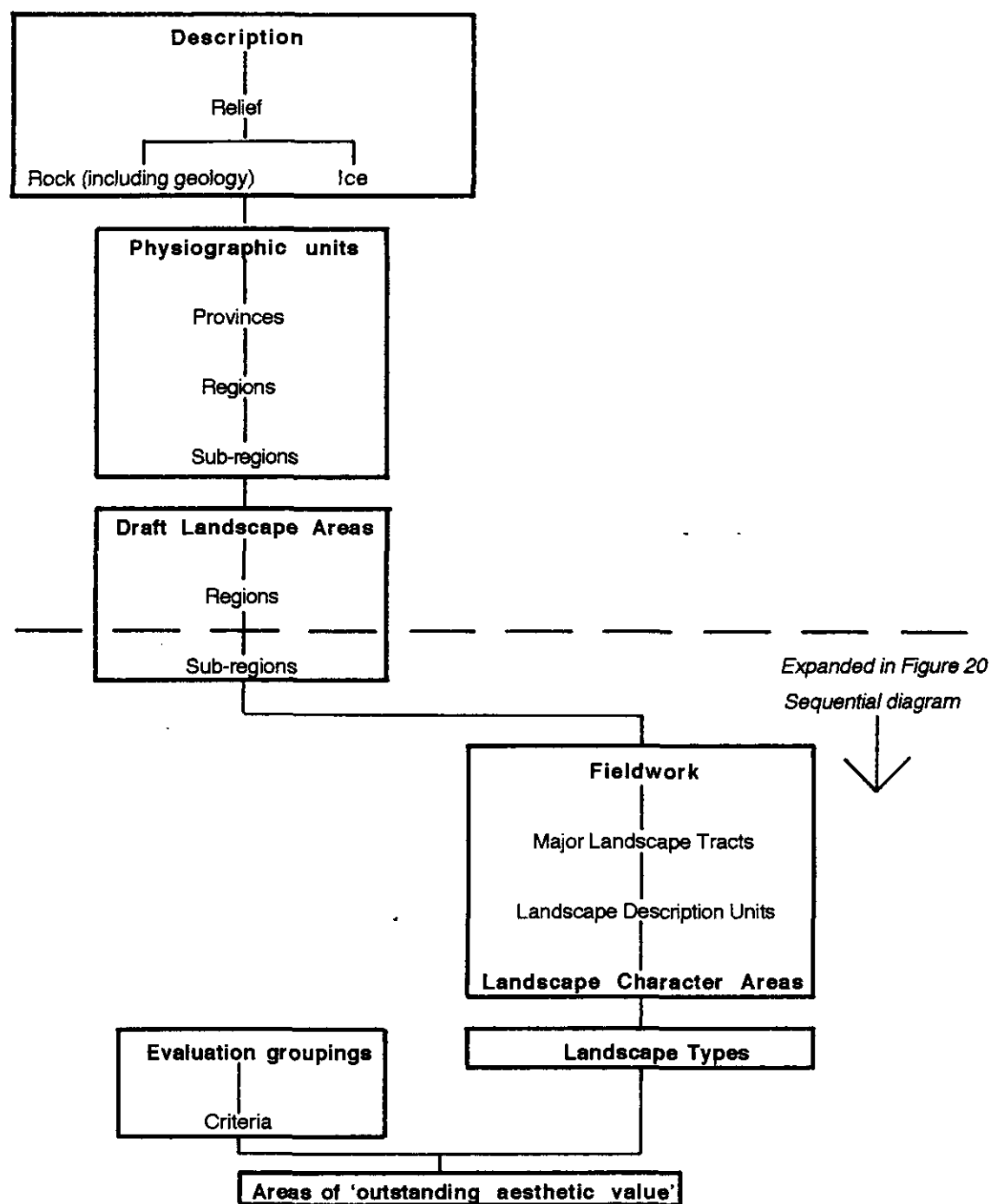
One challenge was to identify the point at which it becomes essential to have responses from people on the ground who were specifically looking at the landscape. The Shackleton Range was taken as a separate study area to see how far the assessment process could be taken without landscape-orientated fieldwork. It was chosen as a discrete area of manageable size, with good data coverage in the form of maps and photographs.

The format of documentation is considered, as well as the most appropriate form of designation. Finally, a summary is given of the complete systematic environmental-geographical framework to identify areas of outstanding aesthetic value.

10.2 The approach

The flow chart in Figure 19 (on following page) outlines the adopted procedure, which has been developed from the various Countryside Commission reports (see chapter 5 - Scotland, 1991; England 1993; Wales 1993). Further refinements were made after Antarctic fieldwork. Work was carried out in two different directions; the desk-study began with the continent and worked 'down' to differing levels of detail, whilst fieldwork gave the opportunity to concentrate on identification of Landscape Description Units (LDUs), the 'building blocks' from which landscape could be built 'up' by description. Feedback between stages was continuous.

For convenience, a summary of the main landscape classification terms used in the



Landscape Tract: an intermediate stage used when detailed fieldwork was not possible, covering areas that almost certainly contained several LDUs.

Landscape Description Unit: the smallest unit, a visually self-contained area, outlined by distinctive visual boundaries. Essentially a spatial zone, with boundaries that respond to landscape factors.

Landscape Character Area: a geographically specific area with a distinct and recognisable identity, formed by grouping similar LDUs.

Landscape Type: the generic grouping, on a continental scale, of landscapes with a consistent character.

Figure 19 Flowchart of Antarctic landscape assessment

process is given as a footnote to the flowchart. The application of these terms is illustrated in section 10.5.

10.2.1 Presentation of information

It was essential to convey information in a form that could be easily absorbed and understood. Frequently this was a balancing act between over-simplification and death by a thousand lines. Material is submitted to scale, with the detailed work covering the Sub-region on the western edge of the Peninsula mainland (from Camp Point in the south to Cape Rey in the north, with offshore islands) being shown on a larger sheet (appended as Plan 2 at 1:500 000) as well as being reduced to an A3 drawing in the text (Figure 25 at 1:1 000 000). So as to give an indication of distance, a linear scale is included on plans.

The detailed work took place primarily using geological maps at 1:500 000. The summary notes included with these maps were also helpful (BAS, 1979 and 1981).

This scale was also used for the Landscape desk-study of the Shackleton Range. The base map was originally at 1:250 000, a standard scale for many Antarctic maps, but it was reduced to 1:500 000 so that the work in both Landscape studies could be directly comparable.

10.2.2 Appended plans

Two plans are appended in a folder:

Plan 1 Antarctica - ADD topographic database at 1:10 000 000

Plan 2 Landscape Sub-region (W edge of mainland - Camp Point to Cape Rey - with offshore islands) at 1:500 000. A reduced (1:1 000 000) version of this is included as Figure 25.

10.3 Detailed approach for Landscape studies

Landscape boundaries are even more problematical than physiographic boundaries, because they refer to visual and spatial units. The draft boundaries that have been suggested during the desk-study should be open to verification by fieldwork.

The Physiographic Regions and Sub-regions were studied, together with other data. The aim was to consider how the landscape would be seen on the ground, so as to lead to the Draft Landscape Regions. Some physiographic units retained the same

boundaries, but on other occasions regrouping was necessary, illustrating the transition between landform and landscape (Chapter 2, section 2.6.1). In one case an area from the adjacent Province was added to the Landscape Regions of the Peninsula.

Physiographically, the New Bedford Inlet is part of the Ronne Ice Shelf, but is so enclosed by the Dodson and Bowman Peninsula that it should be seen as part of the Landscape Region.

10.3.1 Sequential diagrams for the latter part of the process

The adopted methodology of landscape assessment has been shown as a flowchart (Figure 19, section 10.2), but a series of sequential diagrams has been prepared showing the latter part of the process, from the establishment of Landscape Sub-regions to the designation of an area of outstanding aesthetic value (Figure 20, on following page). The diagrams are intended to:

- 1 Indicate the relationship between desk-study processes and fieldwork.
- 2 Show the grouping of areas for different purposes.

10.3.2 Level of application for criteria

The diagrams also raise a further issue. Once Criteria for evaluation (chapter 8, sections 8.8 and 8.9) have been established, at what level in the hierarchy should they be applied? Theoretically, a single LDU may be evaluated as outstanding, but it would perhaps be more appropriate for a Landscape Character Area to be considered. It would have been categorised under an appropriate Landscape Type, thus enabling 'like with like' assessment.

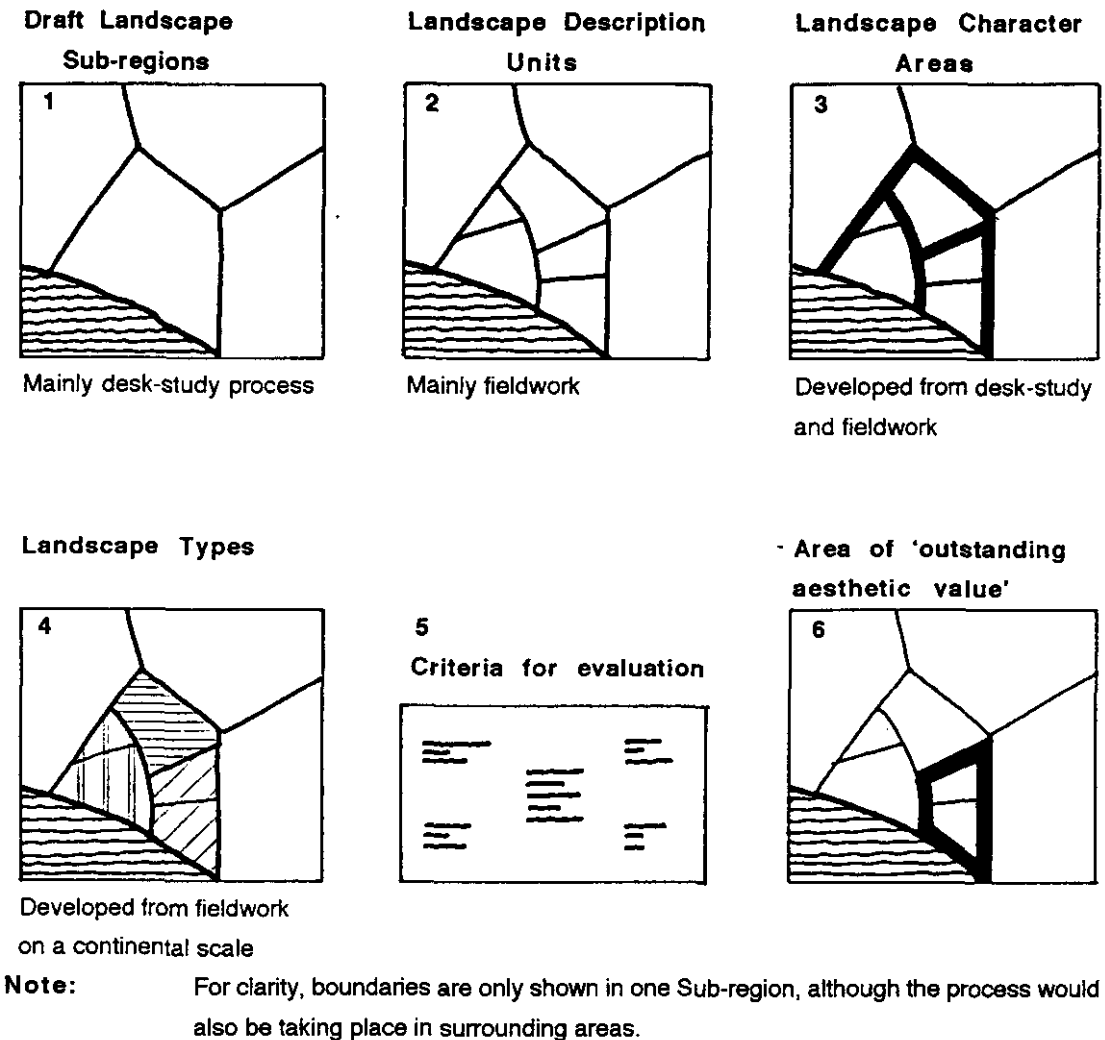


Figure 20 Sequential diagram for latter part of Antarctic landscape assessment

10.4 Landscape study of P12 Antarctic Peninsula

The pre-fieldwork desk-study (chapter 9, sections 9.3-9.4) formed the initial stages of this Landscape study. The Physiographic Regions (Figure 21) and Sub-regions (Figure 22) precede the suggestions for the Landscape Regions (Figure 23), Landscape Sub-regions (Figure 24) and detailed study area (Figure 25).

10.4.1 Physiographic Regions of the Antarctic Peninsula

ICE

- R1 George VI Ice Shelf
- R2 Larsen Ice Shelf

LAND EITHER COMPLETELY COVERED, OR DOMINATED, BY ICE

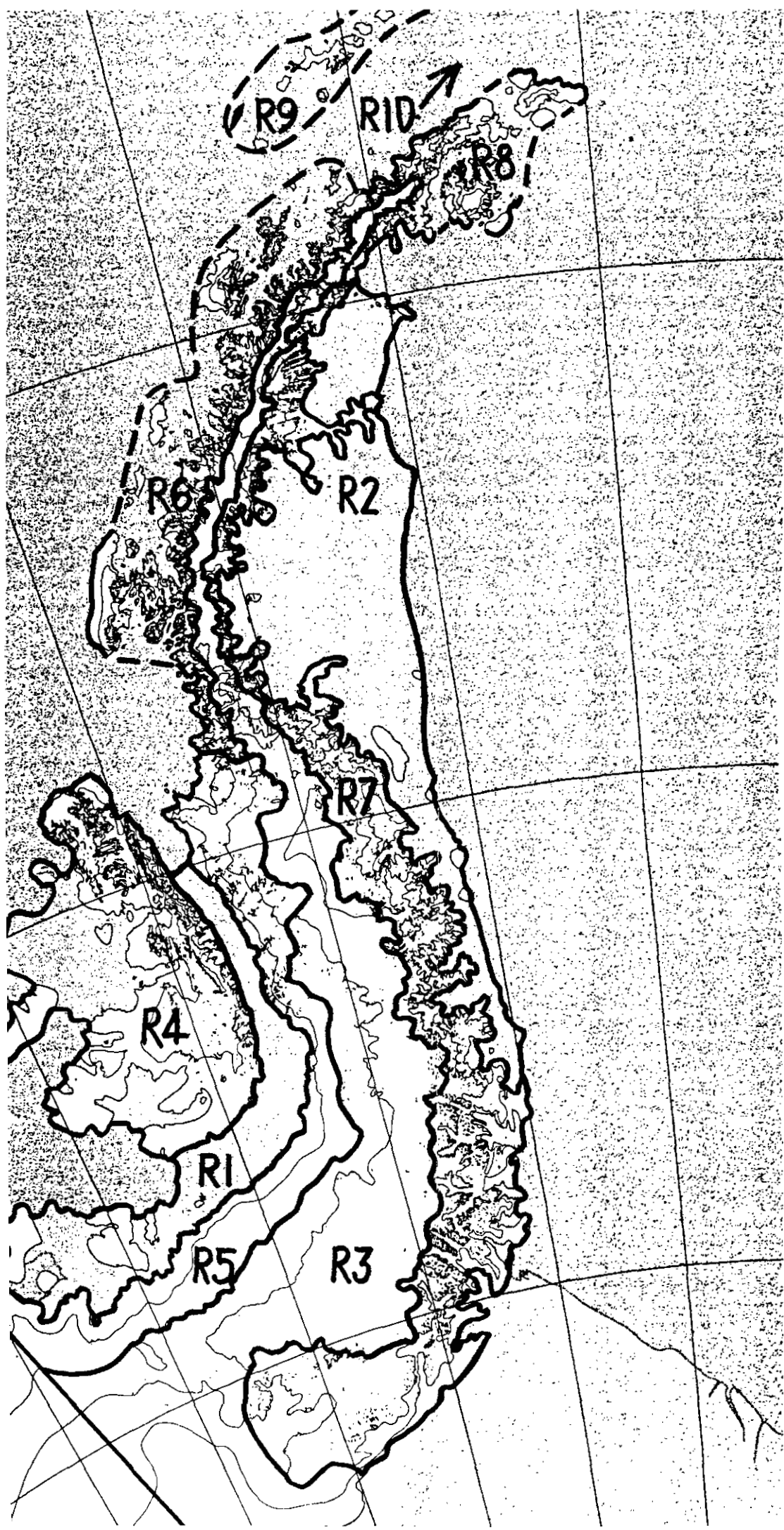
- R3 Peninsula plateau

LAND AND ICE

- R4 Alexander Island
- R5 Western Peninsula edge S of Wordie Ice Shelf
- R6 Western Peninsula edge between northern extremity of Wordie Ice Shelf and 65°30'S
- R7 Eastern Peninsula edge S of 65°30'S
- R8 Northern section (Trinity Peninsula and adjacent coasts and islands)
- R9 South Shetland Islands
- R10 South Orkney Islands

0 1000 km

Figure 21 Physiographic Regions of P12 Antarctic Peninsula (1:6 000 000)



10.4.2 Physiographic Sub-regions of the Antarctic Peninsula

ICE

- 1 a Strange Sound and the ice rises of Case I, Smyley I, Spaatz I, and DeAtley I
- 1 b George VI Ice Shelf from the Ronne Entrance to a line joining Saturn Glacier (Alexander I) to Goodenough Glacier (mainland)
- 1 c *George VI Ice Shelf from a line joining Saturn Glacier (Alexander I) to Goodenough Glacier (mainland) to its northern extremity*
- 2 a Larsen Ice Shelf from Cape Mackintosh to a line joining Eielson Peninsula and Dolleman I
- 2 b Larsen Ice Shelf from north of a line joining Eielson Peninsula and Dolleman I to Jason Peninsula
- 2 c Larsen Ice Shelf from the Jason Peninsula to N extremity of the Shelf near Robertson I and Seal Nunataks

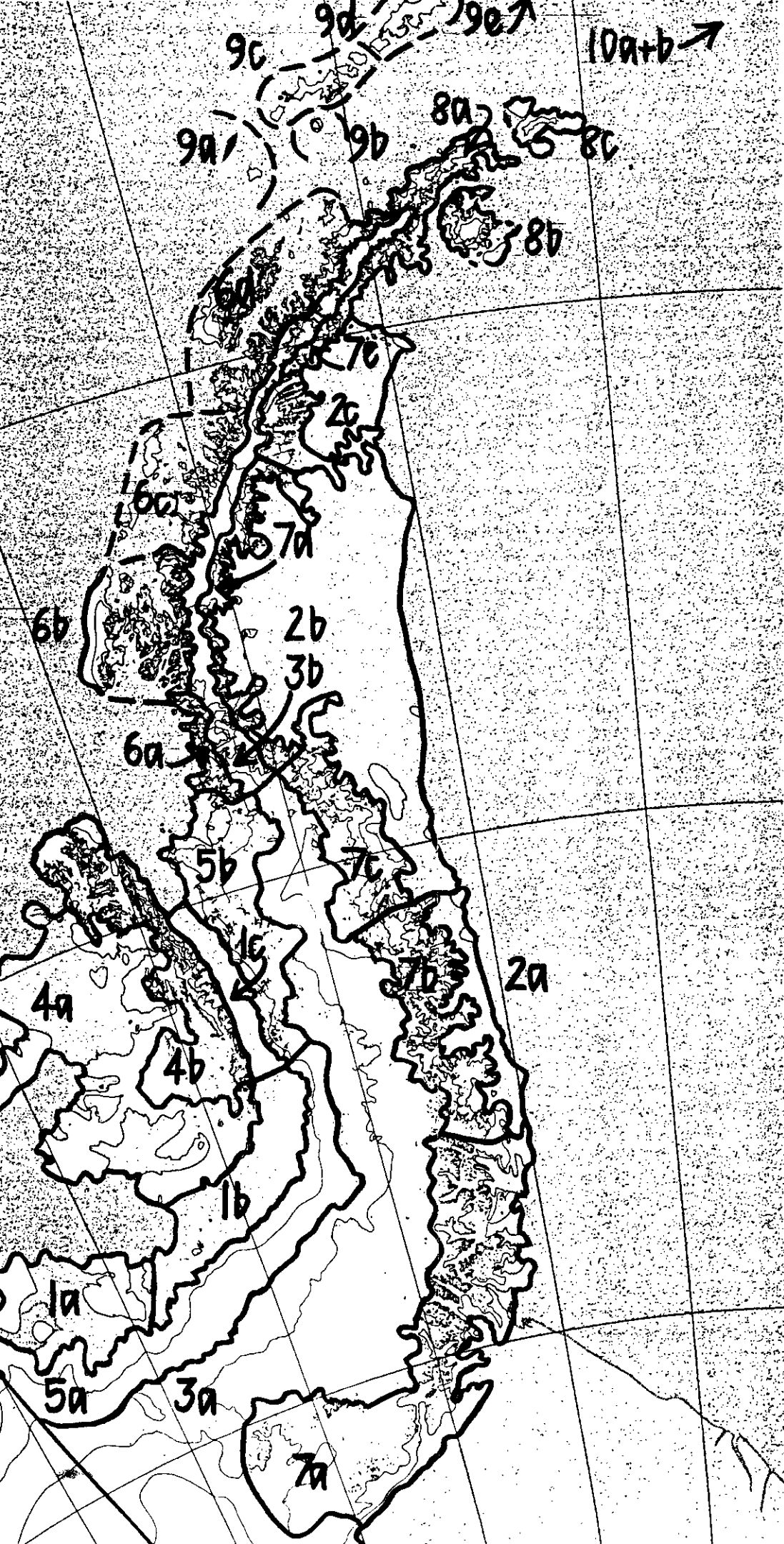
LAND EITHER COMPLETELY COVERED, OR DOMINATED, BY ICE

- 3 a Plateau south of 69°S, including ice slopes down to Evans Ice Stream
- 3 b Plateau between 65°S and 69°S

LAND AND ICE

- 4 a Western area of Alexander Island, including Wilkins and Bach Ice Shelves, Latady I, Charcot I and Rothschild I
- 4 b Eastern area of Alexander Island
- 5 a English Coast and western edge of mainland to Goodenough Glacier
- 5 b Rymill Coast and W edge of mainland from Goodenough Glacier to N extremity of Wordie Ice Shelf
- 6 a Western edge of mainland from northern extremity of Wordie Ice Shelf to Camp Point
- 6 b Western edge of mainland from Camp Point to Cape Rey, with offshore islands - Adelaide I, Pourquoi Pas I, Horseshoe I, Liard I etc
- 6 c Western edge of mainland from Cape Rey to Beascochea Bay, with offshore Biscoe Islands
- 6 d Western edge of mainland from Beascochea Bay to northern extremity of Wright Ice Piedmont, with offshore islands - Anvers I, Brabant I, Trinity I etc
- 7 a Orville and Lassiter Coasts, and eastern edge of mainland from Behrendt and Hauberg Mountains to E-W line just N of Carey Range
- 7 b Black Coast, and eastern edge of mainland from Carey Range to E-W line just N of Welch Mtns
- 7 c Wilkins Coast and eastern edge of mainland from Welch Mountains to E-W line from E end of Wakefield Highlands to southern end of Mobiloil Inlet
- 7 d Bowman, Foyn and southern part of Oscar II Coasts and eastern edge of mainland from southern end of Mobiloil Inlet to the N edge of Churchill Peninsula
- 7 e Northern part of Oscar II Coast and Nordenskjold Coast, and eastern edge of mainland from the N edge of Churchill Peninsula to Cape Longing
- 8 a Both edges of the Trinity Peninsula
- 8 b James Ross Island group
- 8 c Joinville Island group
- 9 a Smith and Low Islands
- 9 b Deception Island
- 9 c Livingston Island group
- 9 d King George Island group
- 9 e Elephant Island group 0 1000 km
- 10 a Coronation Island group
- 10 b Laurie Island

Figure 22 Physiographic Sub-regions of Antarctic Peninsula (1:6 000 000)



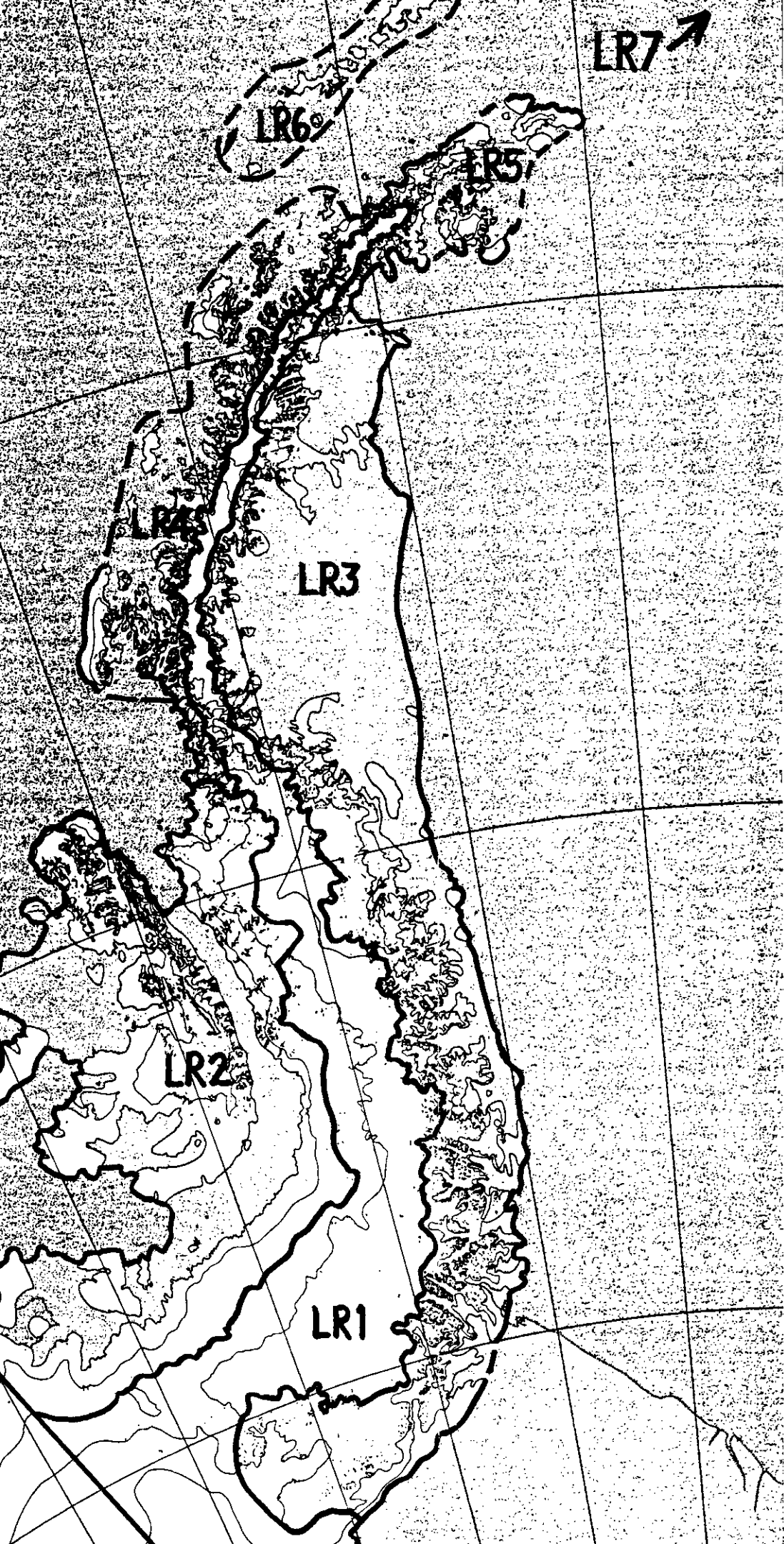
10.4.3 Landscape Regions of the Antarctic Peninsula

- LR1 Mainland plateau** (Physiographic Region R3): A linear snow-covered band, over 1600 km long, rising to over 2 000 m. For over half its length it averages about 100 km wide, but then narrows sharply to about 10-15 km and continues northwards as the spine of the Peninsula .
- LR2 Alexander Island, George VI Ice Shelf and the Western Peninsula edge to the northern extremity of Wordie Ice Shelf** (Physiographic Regions R1, R4 and R5): The centre of Alexander island is characterised by a series of parallel mountain ranges, running north-south, some with summit levels of about 3 000 m. George VI Sound is a 500 km long trench filled by an ice shelf. It is seen as a horizontal, strongly patterned and textured surface, contained by the higher ground. The Western Peninsula edge is a series of mountain ranges breaking through the snow, with glaciers running down to the ice covered Sound. There is a coastal feeling, but where there should be sea, there is ice.
- LR3 Eastern Peninsula edge S of 65°30'S, and the Larsen Ice Shelf** (Physiographic Regions R2 and R7): A heavily indented coast, backed by mountain ranges that rise to the plateau. Valley glaciers run between the peaks. The east coast of the Peninsula is just within the climatic limit for ice shelves, and coast is fringed by the Larsen Ice Shelf, which varies in width from about 20 km to 240 km.
- LR4 Western Peninsula edge N of the Wordie Ice Shelf, with the offshore islands** (Physiographic Region R6): Swithinbank was writing specifically about the Marguerite Bay area, but his description may be taken for much of the area: 'Much of the terrain consists of precipitous mountain glaciers plunging from alpine peaks or plateaus into an ice-choked sea, of calving ice cliffs and hanging glaciers, of steep ice-piedmonts furrowed by crevasses, of rugged massifs fringed by icefalls, and of an archipelago of ice-capped islands.' (Swithinbank, 1988:B107)
- LR5 Northern section of the Peninsula (Trinity Peninsula, Detroit Plateau, adjacent coasts and islands)** (Physiographic Region R8): The plateau in the northern part of the Peninsula represent the high-level parts of a pre-glacial land surface incredibly little modified by glacial erosion, paralleled on either side by two zones in which glacial erosion has been just as incredibly effective. This has resulted in jagged exposed rock ridges, with hanging glaciers especially on the western side. (Linton, 1963)
- LR6 South Shetland Islands** (Physiographic Region R9): The most southerly group of the Scotia Arc, remarkably varied in character, ranging from Deception Island, the caldera of a still-active volcano, to the rounded snow-covered hills of King George Island.
- LR7 South Orkney Islands** (Physiographic Region R10): A rugged mountainous group, consisting of two major islands, Coronation and Laurie Islands, together with various smaller islands. The larger islands rise steeply from the sea to form irregular ridges with sharp peaks.

0

1000 km

Figure 23 Landscape Regions of Antarctic Peninsula (1:6 000 000)



10.4.4 Landscape Sub-regions of the Antarctic Peninsula

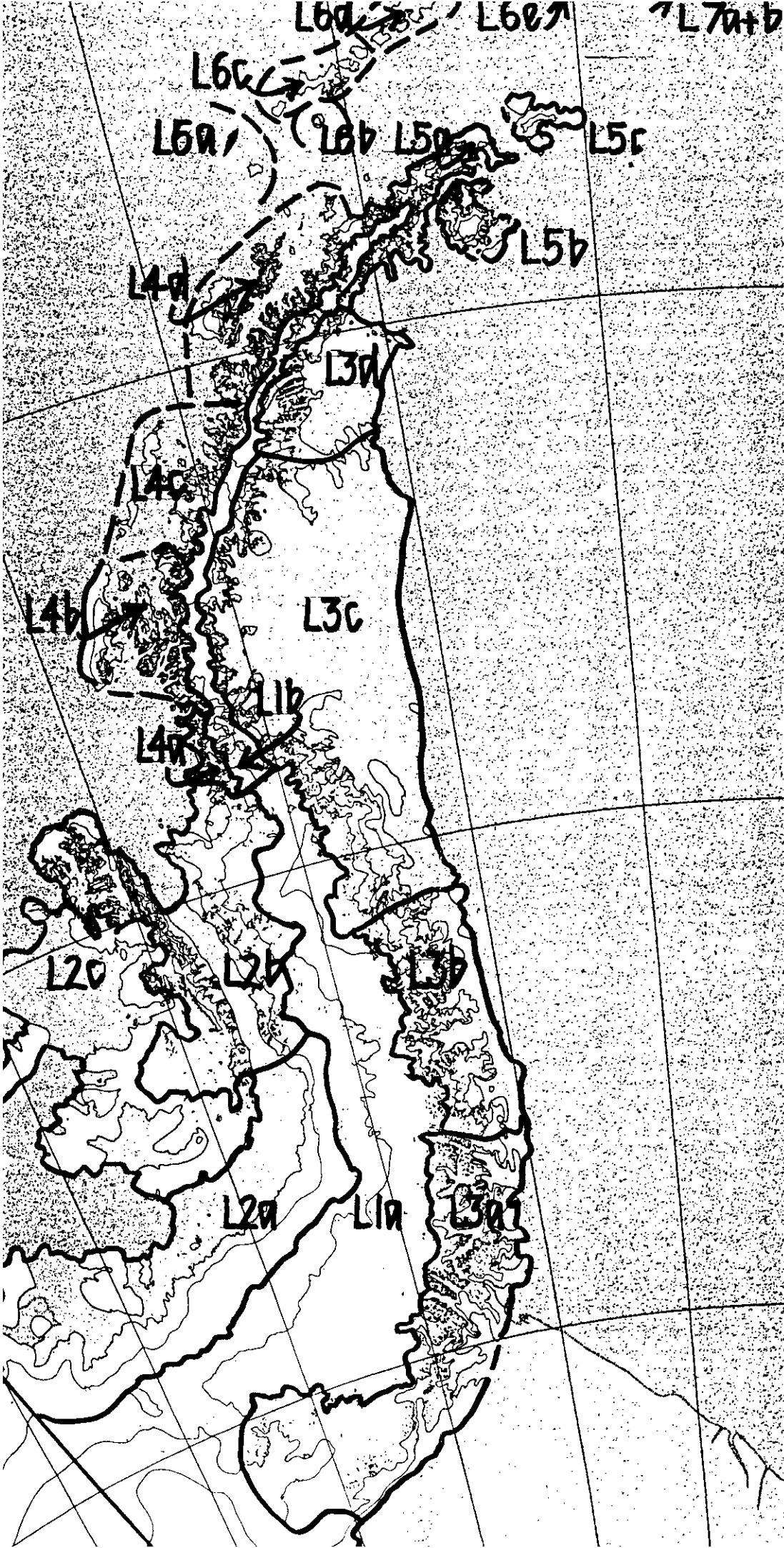
Physiographic units relating to ice shelves have been combined with adjacent coastal areas. The plateau has been divided into two, at the point where it narrows.

- L 1 a** Plateau south of 69°S (Physiographic Sub-region 3a)
- L 1 b** Plateau between 65°S and 69°S (Physiographic Sub-region 3b)
- L 2 a** The southern and wider section of George VI Ice Shelf, flanked by the western edge of the Peninsula and Monteverdi Peninsula of Alexander Island (Physiographic Sub-regions 1a, 1b, 5a)
- L 2 b** The northern third of George VI Ice Shelf, flanked by the western edge of the Peninsula and the eastern mountains of Alexander Island (Physiographic Sub-regions 1c, 4b and 5b)
- L 2 c** The western slopes of Alexander Island including the Beethoven Peninsula, the offshore islands, and the linking Wilkins and Bach Ice Shelves (Physiographic Sub-region 4a)
- L 3 a** Orville and Lassiter Coasts, and eastern edge of mainland from to E-W line just S of Carey Range, together with the ice shelf of the New Bedford Inlet and the Wright Inlet (Physiographic Sub-region 7a and part of P1.R1 Ronne Ice Shelf)
- L 3 b** Black Coast, and eastern edge of mainland from Carey Range to E-W line just N of Welch Mountains, together with the Larsen Ice Shelf from its southern-extremity at Cape Mackintosh to Dolleman Island (Physiographic Sub-regions 2a and 7b)
- L 3 c** The eastern edges of the mainland from Welch Mountains to Jason Peninsula and the Larsen Ice Shelf from Dolleman Island in the south to the Jason Peninsula in the north (Physiographic Sub-regions 2b, 7c and 7d)
- L 3 d** The eastern edges of the mainland and the Larsen Ice Shelf from the Jason Peninsula to N extremity of the Shelf near Robertson I (Physiographic Sub-regions 2c and 7e)
- L 4 a** Western edge of mainland from northern extremity of Wordie Ice Shelf to Camp Point (Physiographic Sub-region 6a)
- L 4 b** Western edge of mainland from Camp Point to Cape Rey, with offshore islands - Adelaide I, Pourquoi Pas I, Horseshoe I, Liard I etc. (Physiographic Sub-region 6b)
- L 4 c** Western edge of mainland from Cape Rey to Beascochea Bay, with offshore Biscoe Islands (Physiographic Sub-region 6c)
- L 4 d** Western edge of mainland from Beascochea Bay to Cape Herschel, with offshore islands - Anvers I, Brabant I, Trinity I etc. (Physiographic Sub-region 6d)
- L 5 a** Both edges of the Trinity Peninsula (Physiographic Sub-region 8a)
- L 5 b** James Ross Island group (Physiographic Sub-region 8b)
- L 5 c** Joinville Island group (Physiographic Sub-region 8c)
- L 6 a** Smith and Low Islands (Physiographic Sub-region 9a)
- L 6 b** Deception Island (Physiographic Sub-region 9b)
- L 6 c** Livingston Island group (Physiographic Sub-region 9c)
- L 6 d** King George Island group (Physiographic Sub-region 9d)
- L 6 e** Elephant Island group (Physiographic Sub-region 9e)
- L 7 a** Coronation Island group (Physiographic Sub-region 10a)
- L 7 b** Laurie Island group (Physiographic Sub-region 910b)

0

1000 km

Figure 24 Landscape Sub-regions of Antarctic Peninsula (1:6 000 000)



10.5 Fieldwork in a Landscape Sub-region of the Peninsula:

L4b Western edge of mainland from Camp Point to Cape Rey, with offshore islands - Adelaide I, Pourquoi Pas I, Horseshoe I, Liard I etc. (Figure 25 on following page at 1:500 000, Plan 2 at 1:1 000 000)

To give a size comparison, this Sub-region is roughly the same area as the usual understanding of East Anglia - from the Lincolnshire Wolds in the N to the Thames in the S, and from the Fens near Peterborough in the W to the Suffolk coast in the E. This is slightly larger than the area covered by the Shackleton Range desk-study (section 10.6).

In this instance, the Physiographic sub-region correlates to the draft Landscape Sub-region. The presence of a series of fjords influenced decision-making when Physiographic boundaries were being considered during the desk-study, and this pattern continued to be appropriate for the Landscape Sub-region.

10.5.1 Landscape Description Units

The term Landscape Description Unit (LDU) is used to describe a visually self-contained area, outlined by distinctive visual boundaries. It is not smaller-scale physiographic units, but spatial zones, seen in their context, with boundaries that respond to landscape factors. This is the 'bottom-up' fieldwork that supplies information which leads to Landscape Character Areas. On Adelaide Island, fieldwork enabled the identification of seven LDUs in the area south of Shambles Glacier (approximately 67° 19'S).

10.5.2 Major Landscape Tracts (LTs)

The ideal would have been for LDUs to be identified over a wider area, but fieldwork was limited by logistic constraints and the remainder of the Landscape Sub-region has only been taken to an intermediate level, by designation of Major Landscape Tracts. These are similar to the approach taken by the CCS (1971: 101 and 'visual envelopes' in CCS, 1991: 34), but the qualification of 'major' has been added, due to the magnitude of the areas under consideration, each of which would probably break down into several LDUs. Boundaries of the Major Landscape Tracts should be seen as diagrammatic, rather than with the precision indicated by LDUs.

10.5.3 Landscape Character Areas and Landscape Types

Landscape assessment methodology indicates that analysis and grouping of LDUs will enable Landscape Character Areas to be established - geographically specific areas

LANDSCAPE DESCRIPTION UNITS

- LDU1 Jenny Island:** The steep cliffs of the island rise from the sea. Peaks stand above the ice and snow, giving the impression of a crown.
- LDU2 Léonie Islands,** including Limpet Island, Mikkelsen Island, Anchorage Island, Léonie Island and Lagoon Island: A collection of islands, some no more than rocks washed by the sea. The triangular NE face of Léonie Island is so distinctive that it acts as a marker for this part of Adelaide Island and Laubeuf Fjord.
- LDU3 Stork and Reptile Ridges:** Two distinct ridges that mark the edge of Ryder Bay and visually contain part of the southern edge of the snowfields that cover the Wright Peninsula. Reptile Ridge grows in height from its southern end to over 400m at the NW, where it visually links with the E-W aligned Stork Ridge.
- LDU4 The snowfields of the Wright Peninsula:** Contained by Stokes Peaks to the north, Mount Mangin to the north-west, and edged by Stork and Reptile Ridges to the south. The undulating surface of the snowfield is seemingly gentle because of its smoothness. Nevertheless, crevasses occur as the ice moves westwards and southwestwards towards Ryder Bay (becoming the Sheldon Glacier) and eastwards as the Wormald Ice Piedmont, before reaching Laubeuf Fjord.
- LDU5 Eastern Stokes Peaks including Sighing Peak and**
- LDU6 Western Stokes Peaks:**
The more-exposed southern faces of both groups are snow-covered, with rock breaking through at about 500m. The 'Sunnyside Glacier' separates the two groups as it falls from the snowfield to the waters of Stonehouse Bay.
- LDU7 Shambles Glacier:** When seen from McCallum Pass it links the Fuchs Ice Piedmont to the Laubeuf Fjord. Heavily crevassed, it dips dramatically as its gradient increases.

MAJOR LANDSCAPE TRACTS

- LT1** Fuchs Ice Piedmont, which covers the western side of the island (a length of about 140 km).
- LT2** Mount Mangin and Mount Liotard with their surrounding peaks, lying south of Shambles Glacier.
- LT3** Mount Bouvier with its surrounding peaks, lying to the north of Shambles Glacier.
- LT4** Mount Machatschek
- LT5** Mount Vélain
- LT6** North of Camp Point, Square Bay with Horseshoe Island, Lagotellerie Island, Bourgeois Fjord, with Ridge Island, to a northern boundary running NE-SW dividing Pourquoi Pas I and Blaiklock I. The eastern boundary is the edge of the central plateau of the Peninsula, running approximately along the 1000m formline.
- LT7** Bigourdan Fjord, to the ridge line running to Cape Sáenz.
- LT8** The west-facing coast of the Arrowsmith Peninsula, backed by the ridge of the Tyndall Mountains, and Laubeuf Fjord with its islands - Piñero I, Wyatt I and Day I - as far N as The Gullet.
- LT9** Hanusse Bay, with its islands - Liard I, Hansen I etc.
- LT10** Lallemand Fjord, bounded by the eastern edge of the Avery Plateau and the northern part of the Arrowsmith Peninsula. The eastern boundary is the edge of the central plateau of the Peninsula, running approximately along the 1000m formline.

0

1000 km

Figure 25 Landscape Sub-region (W edge of mainland - Camp Point to Cape Rey - with offshore islands)
(Figure 25 at 1: 1 000 000, Plan 2 at 1:500 000)



with a distinct and recognisable identity. From this specific identification, the generic grouping of landscapes with a consistent character - Landscape Types - may be developed at a continental level.

Fieldwork in this Landscape Sub-region confirmed that the area drafted during the desk-study held together as a single Sub-region, having a consistent, recognisable identity which merits the term Landscape Character Area. The northern and southern boundaries of the drafted area were not visited, so it is possible that the Landscape Character Area could extend in either, or both, directions. The summary description of this Landscape Character Area is:

A coastal area of the western side of the Peninsula, dominated by deeply indented fjords, backed by mountains rising to over 2000m. Offshore islands vary in size from collections of semi-submerged rocks to the extensive Adelaide Island. Visually, islands and mainland form complex spatial relationships, often making it difficult to define precise boundaries. The sea is the most unifying factor.

Further fieldwork in other coastal areas of the continent is required to ascertain if the fjord/mountains/islands relationship is repeated sufficiently to become a distinct Landscape Type.

10.6 Landscape desk-study of P4.R5 Shackleton Range

Map reference: United States Geological Survey. 1983. *Shackleton Range, Antarctica: sheet SU 26-30/1 (20°W - 31°W)*. (scale 1: 250 000).

10.6.1 Physiographic Regions of P4 East Antarctic ice sheet slopes from 45°W-5°E

Figure 26 (on following page) shows the Regions for the whole Province. The Shackleton Range is a relatively small Region on the western edge of the massive East Antarctic ice sheet slope.

10.6.2 Discovery

Until about 45 years ago, the Shackleton Range (latitude 80°07' - 80°50' S, longitude 19° - 31°W) was unknown. It was possibly seen from the air by an Argentine aerial expedition in 1955, but the first definite sighting, again from the air, was by the Trans-Antarctic Expedition (TAE) in February 1956. That expedition later carried out surveys in October 1957, with further BAS studies during 1967-1970 (Hattersley-Smith, 1991: 513).

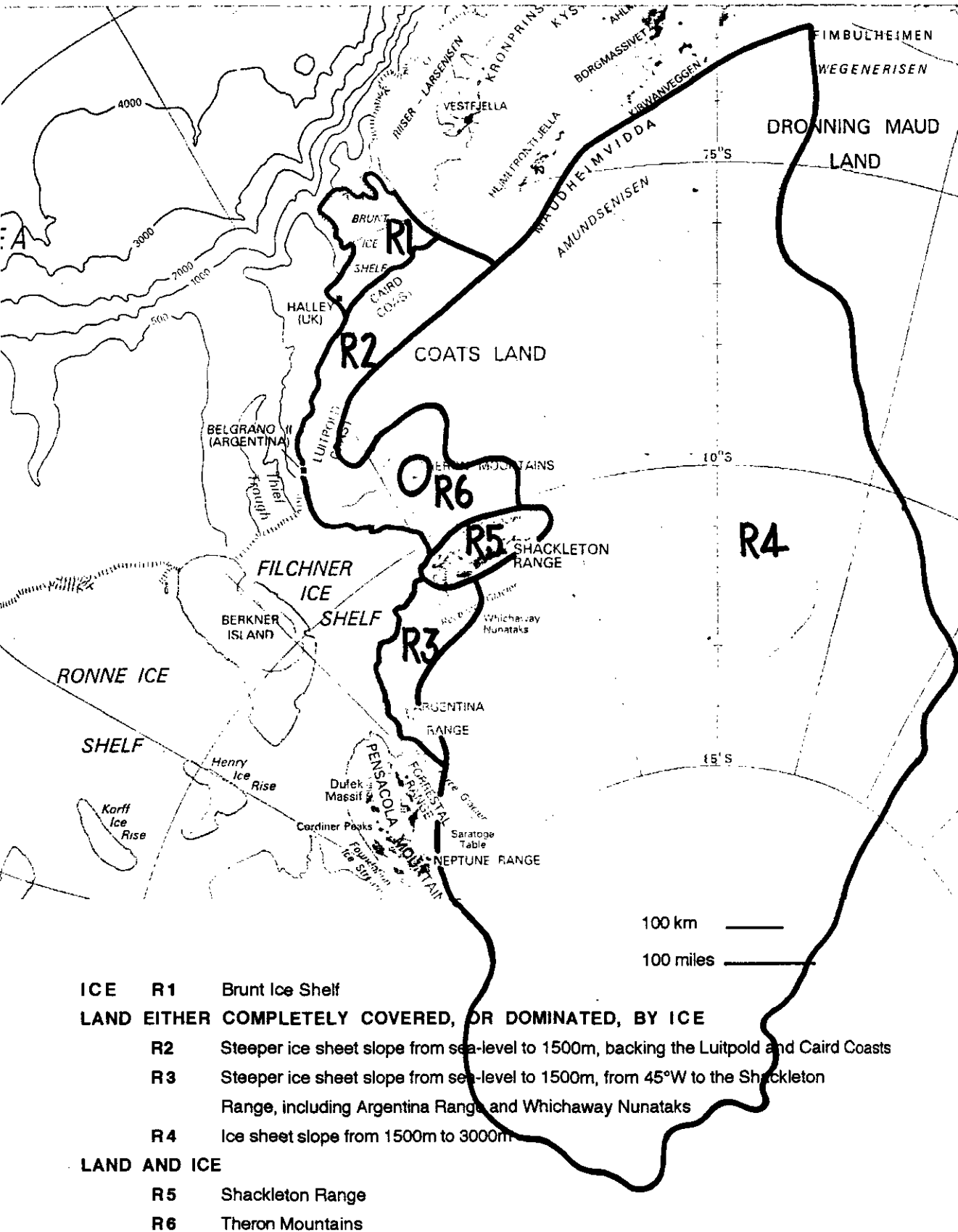


Figure 26 Physiographic Regions of P4 East Antarctica ice sheet slopes from 45°W-5°E (1:10 000 000)

Many of the features are named after those who first explored and mapped the area, especially members of the TAE. Evidence of geographical precision is also apparent as features have been descriptively named, such as Watts Needle, Beche Blade, Strachey Stump, Maclaren Monolith and Charpentier Pyramid.

10.6.3 Physiographic description and Physiographic Sub-regions

Two photographic panoramas are included as Figure 27 (on following page).

Greater detail may be found in Skidmore and Clarkson (1972) but in summary, the Range is an elevated mountain area, covering about 200 km (east-west) by 65 km (north-south), about the same as the combined areas of Norfolk, Suffolk and Cambridgeshire and therefore slightly smaller than the Physiographic and Landscape Sub-region of the Peninsula examined in section 10.5 'Its surface relief is greatest in the west and south and decreases eastwards to longitude 19°W, where it is covered by the Antarctic ice sheet. The dominant feature in the range is a central snow plateau flanked by ice scarps with rock windows. Local drainage glaciers dissect this plateau' (Clarkson, 1972: 1). The mountains reach about 1800m, with the snowfield between the two ranges rising from about 1400m to the Fuchs Dome at 1800m. A pre-glacial peneplain is preserved as summit plateaux, mainly in the southern and western parts of the range (Skidmore and Clarkson, 1972: 74). Both Recovery Glacier to the south and Slessor Glacier to the north flow westwards towards the Filchner Ice Shelf, containing the Range by extensive crevassed areas. Even by Antarctic standards, both glaciers are extremely large. Swithinbank described the Slessor Glacier as 'one of the longest coherent ice streams known' (1988: B97), 30 km wide at its narrowest point, with satellite imagery showing visible flow features extending over 850 km. Figure 28 (on the page following the photographic panoramas) suggests Physiographic Sub-regions.

10.6.4 Other descriptions

Fuchs and Hillary's account of the TAE, *The crossing of Antarctica*, has both good descriptions of landscapes as well as many (for the 1950s) colour photographs. A note by Fuchs in the introductory pages of the book is interesting:

The reader may justifiably feel that the colour illustrations in this book are a somewhat romantic interpretation of the colouring in Antarctica. I would like to emphasize, therefore, that the colours seen may be both varied and vivid according to the season and the time of day. These pictures ... give an excellent idea of the the colours as they really are. (1958: x)

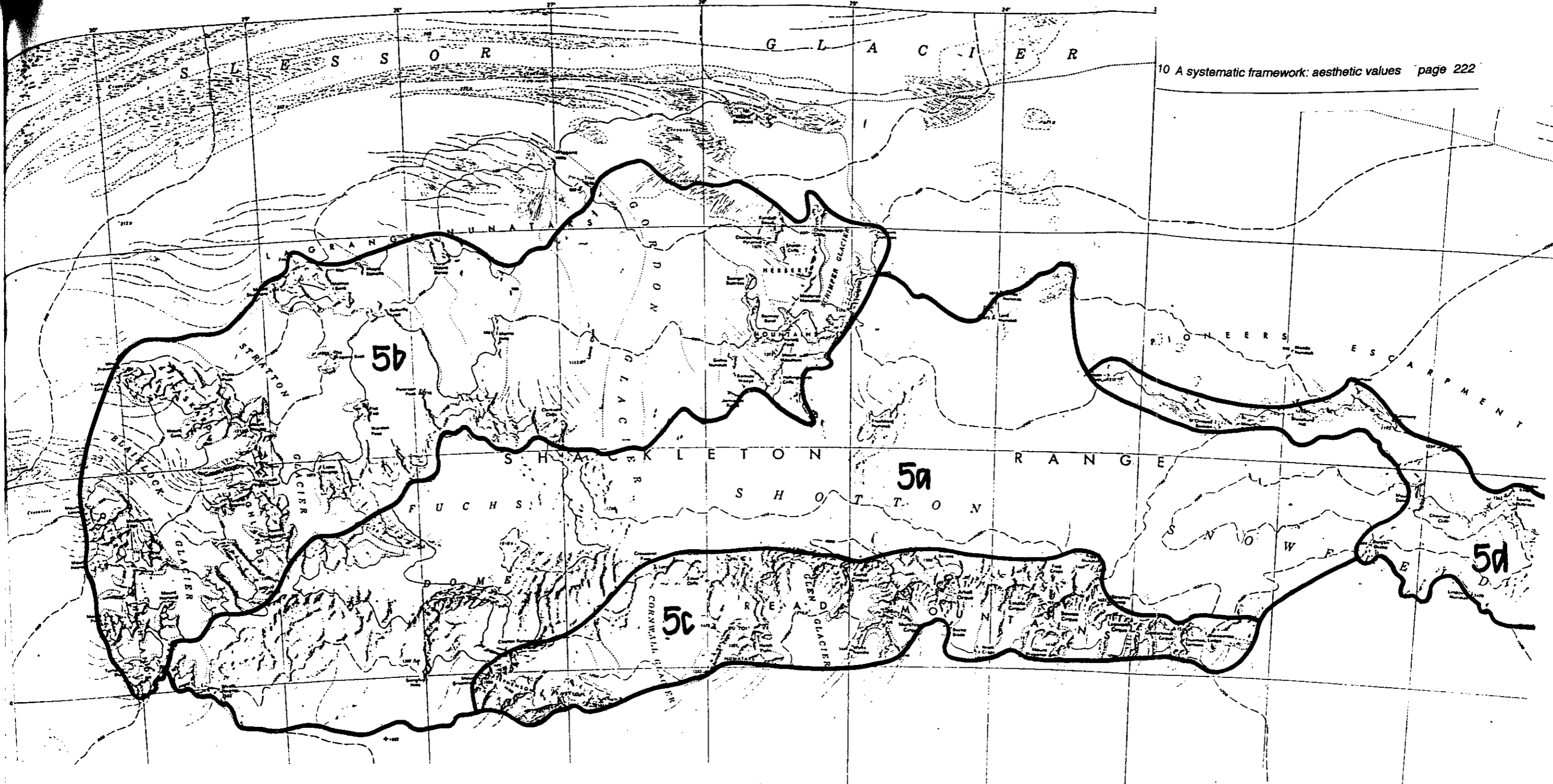


Panorama 1 in the Herbert Mountains of approximately 155° from NW to ESE
Looking over Bonney Bowl, towards Charpentier Pyramid with Venetz Peak on the right



Panorama 2 in the Haskard Highlands of approximately 95° from WNW to NNE
Mount Rogers to the left, with the Stratton Glacier on the far right flowing northwards
(foreground to horizon)

Figure 27 Shackleton Range photographic panoramas



ICE

5a Fuchs Dome and Shotton Snowfield

LAND AND ICE

5b Western and northern areas: Otter Highlands, Blaiklock Glacier, Haskard Highlands, Stratton Glacier, La Grange Nunataks, Gordon Glacier and Herbert Mountains

5c Southern areas: Stephenson Bastion, Cornwall Glacier, Read Mountains and Glen Glacier

5d Pioneer Escarpment, extending to the east-most nunataks in the vicinity of Skiltvakta and Vindberget, Dronning Maud Land

R E C O V E R Y
G L A C I E R

Figure 28 Physiographic Sub-regions of P4.R5 Shackleton Range (1:500 000)

0

100 km



It was yet another attempt to dispel the 'all-white' image of the continent, as Charcot, Seago and many others tried to do (chapter 9, section 9.4.3).

Fuchs wrote about the visit of the survey party sent to the Shackletons in the early austral summer of 1957:

On all sides the wonderful alpine scene was almost overwhelming after so many months of the flat, featureless ice shelf [Filchner Ice Shelf] at Shackleton. The sun, still less than 30° above the horizon, picked out veins and crags of brighter colours in the otherwise dark walls and buttresses of rock far below, while between them the swells and troughs of the glacier were thrown into relief by the long shadows. To the north-east, a new glacier lay open to view, its centre a broad, white, uncreased ribbon of snow, but its edges puckered and crinkled by crevasses where the ribbon had been deflected and held back by the restraining walls of rock. (Fuchs, 1958: 161)

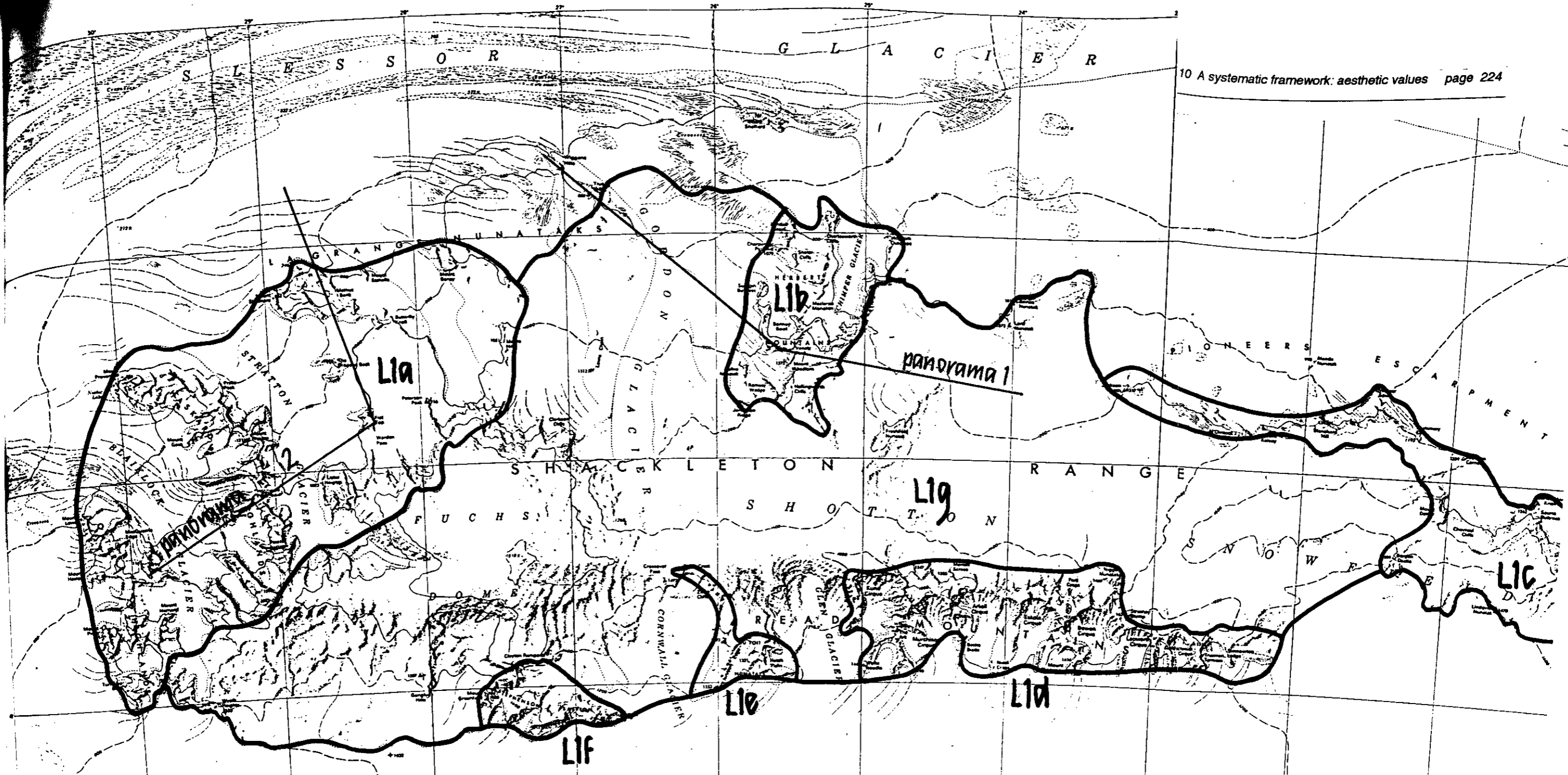
The description continued, but the landscape is not being appreciated through rose-tinted landscape spectacles, but rather travel-and-tractor-tinted-spectacles. Comments such as: 'boded ill for the vehicle party ... yet another problem for tractors' (1958: 161) show the overriding influence of the expedition's aim to cross the continent. This was Fuchs primary concern (1958: 156), and much as earlier European map makers had charted Alpine passes rather than peaks, he saw the landscape in terms of help or hindrance to travel.

10.6.5 Landscape Region

The whole of the Shackleton Range has a coherence that suggests it should be seen on a continental scale as a single Landscape Region. The Range appears as an irregular necklace of exposed rocks surrounding a central ice plateau, but in a more subtle and less dramatic way than, for instance, many areas of the Antarctic Peninsula. The mountains and hills rise from the ice and snowfields with gentler gradients, with occasional areas of moraine patterning the ground.

10.6.6 Draft Landscape Sub-regions

Because of the discrete nature and smaller area, landscape considerations of the Range may move to a 'finer grained' level and be subdivided into smaller units. The suggested Draft Landscape Sub-regions of the Range are shown in Figure 29 (on following page).



- L1a** Western and northern areas: Otter Highlands, Blaiklock Glacier, Haskard Highlands, Stratton Glacier, and La Grange Nunataks
- L1b** Herbert Mountains including the Schimper Glacier
- L1c** Pioneer Escarpment, extending to the east-most nunataks in the vicinity of Skiltvakta and Vindberget, Dronning Maud Land
- L1d** Read Mountains excluding Du Toit Nunataks
- L1e** Du Toit Nunataks
- L1f** Stephenson Bastion
- L1g** The snowfields and glaciers of the Range, including Fuchs Dome, Shotton Snowfield, Gordon Glacier, Glen Glacier and Cornwall Glacier

R E C O V E R Y
G L A C I E R

Figure 29 Draft Landscape Sub-regions of the Shackleton Range (1:500 000)

0

100 km



During this exercise the limitations of desk-based work became apparent. I found I was giving greatest weight to exposed rock, seeing areas of mountains, hills and nunataks as paramount. Against this approach, Clarkson, a geologist with extensive field experience of the Range, saw the 'dominant feature' as the central snow plateau (1972: 1). It is reminiscent of the children's story about the confused panda who did not know whether he was a black bear with white patches or a white bear with black patches. Whilst the panda was ultimately reassured that the issue was not important, in the Shackletons it illustrates the difficulties of desk-based study. In landscape terms, does the land visually enclose the ice, or the ice dominate the land? The questions are part of the total picture of spatial interactions, and are influential in the wider process of landscape assessment. They would be answered during the development of LDUs, which is essentially a fieldwork exercise.

Thus the suggested Landscape Sub-Regions must be seen as open to debate. Are Otter Highlands visually linked by the Blaiklock Glacier to Haskard Highlands? Similarly, is the eastern side of Haskard Highlands visually integrated with Stratton Glacier? Are there divides between the Shotton Snowfield, the Fuchs Dome and the various glaciers that descend from the plateau? Decisions have been made, primarily on the size and assessment of scale of features. Where glacier edges are delineated on the map, they have been used, although this raises difficulties already outlined in chapter 8, section 8.5.3.

10.6.7 Outcome of Landscape desk-study

This study was carried out after fieldwork on the Peninsula, as memories of the earlier visit in 1980 were not sufficient to recall adequately spatial qualities of the polar landscape. Recourse to extensive numbers of photographic slides from that visit was helpful, but impressions seemed limited to 'views' rather than the whole landscape. The more recent fieldwork acted as a measure or control for the Shackleton study, and was undoubtedly helpful, but still insufficient. The attempt to carry out a desk-based study to assess landscape factors was interesting but frustrating and ultimately unsatisfactory. Although there was good photographic coverage and papers such as Skidmore and Clarkson (1972) gave clear descriptions of many features, there came a point at which there were too many unanswerable questions relating to the inter-relationship of features, which influences the spatial qualities of the landscape.

It was hoped that boundaries could be drawn at desk-study level for Draft Landscape

Sub-regions, but the completed attempt should be seen as a very tentative suggestion. The conclusion is that a desk-study cannot be a substitute for fieldwork. Spatial qualities have to be seen to be assessed, and the initial descriptive statement, the foundation of landscape assessment, could not be satisfactorily achieved by desk-study alone.

10.7 Format of documentation

Consideration has been given to the level and format for presentation of information. For specialists, studies require adequate and probably detailed documentation, but information also has to be communicated to a wider community in a form that is both comprehensive and compact.

Three sets of information are required covering:

- 1 Descriptive assessment of the whole continent, probably best achieved at the level of Landscape Character Areas.
- 2 Landscape Types, showing the range found on the continent.
- 3 Designated areas of 'outstanding aesthetic value'.

Two sides of A4 should be considered the maximum for any area in any of the three categories, and if developed in a loose-leaf format, further studies could be added, or revisions made, should additional material become available. Figure 30 (on following page) offers a format for the summary of a Landscape Character Area.

10.8 Form of designation

In the information paper submitted to the XXII Antarctic Treaty Consultative Meeting held at Tromsø, Norway, in May 1998 I wrote:

Annex V of the Protocol provides for designation of Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs). Designation under either rubric requires the preparation of management plans. Such plans are flexible in terms of values to be protected and mechanisms by which protection is to be accorded. Given, however, that the purpose of ASMAs is to protect values associated with activities, it would probably be inconsistent to seek designation of an area as an ASMA if wilderness value was amongst the reason for designation. Beyond that, however, there is no reason why aesthetic value could not, in principle, be protected under either rubric.

Designation under the precise terms of the World Heritage Convention would not be feasible, due to legal difficulties regarding territorial sovereignty (Article IV of the Antarctic

Province

Landscape C Area

Landscape Type

Survey details Location and extent of observations, including dates

Index map
showing continental
location

Regional map
showing Landscape Character
Area in context

Photograph of typical part
of Landscape Character Area

Sketch of typical character or features

Geology and geomorphology

Brief description

Climate

Brief description of present patterns

Glaciology

" " " "

Biology

Covering all aspects of flora, fauna, habitats etc.

Historical associations

Links with earlier expeditions or activities

Historical descriptions

Summary from earlier sources

Description of landscape character

Summary of landscape assessment, including estimated extent of areas of similar landscape character

Present Protocol status

Whether any part of the area is an ASPA or an ASMA, or if still an SPA or SSSI awaiting redesignation under the Protocol

Suggested Protocol status

Whether further designation is desirable and reasons for this suggestion, together with management plan.

Figure 30 **Format for summary of a Landscape Character Area**

Treaty). It has been suggested that if Antarctic designations followed procedures that were termed 'analogous' to the Convention, this problem could be circumvented (Lewis Smith and others, 1994). If this were so, and their procedures were adopted, the ATCPs would be seen to be in step with existing and respected guidelines, but as Annex V plans may include prohibitions which need to be given legal force against individuals, it is considered preferable to proceed initially via the Protocol and Annex V route. Progression in this way would not, subject to Article IV of the Antarctic Treaty, prevent subsequent listing of designated areas as World Heritage Sites.

10.9 Summary of the systematic environmental-geographical framework to identify areas of outstanding aesthetic value

It is recognised that successfully completed studies are probably the best demonstration of the capabilities of landscape assessment. Any structured and well-documented descriptive work carried out on the continent would contribute to an overall mosaic, which in turn would strengthen and balance assessments of character and type.

In summary, the process to meet the Protocol's requirement for a systematic environmental-geographical framework is:

- 1 Acceptance of landscape assessment as an integral part of the continental planning process.
- 2 By desk-study and field survey, the drawing together of material to form a descriptive inventory of the landscape, prior to classification into Landscape Character Areas and Landscape Types.
- 3 On the basis of 'like with like', the use of Antarctic evaluation groupings and linked criteria, to compare area with area to identify those which are 'outstanding'.
- 4 The designation of areas, using the procedures laid down in Annex V, Article 6 of the 1991 Protocol.

11 CONCLUSIONS

11.1 Summation of this study

The ATCPs are to be commended for their concern in the 1991 Protocol for 'the protection of the Antarctic environment' (Article 3). Benninghoff's tentative speculation: 'that we are ready to raise esthetic qualities of landscape into our valuation lists' (1974, p 97; chapter 7, section 7.6.3) may have taken many years to be recognised, but this issue, together with wilderness, have now been brought into the formal structure of the ATS and thereby demand consideration and action.

By using the phrase 'wilderness and aesthetic values' the Protocol linked two disparate concepts, best handled by separation. *Wilderness in the Antarctic was examined first.* By all commonly accepted definitions, the continent is a wilderness, but the implications of this for the southern continent required examination and development. 'Wilderness' was seen as an all-exclusive designation, and it was not therefore considered necessary to develop methodology that ascribed 'higher values' to particular areas so as to raise them to 'outstanding' status on wilderness grounds alone.

In using the phrase 'aesthetic values' the Protocol unwittingly isolated part of a wider process - landscape assessment - a procedure which is at present unknown to most in the Antarctic community. It was necessary to begin by examining the philosophical and theoretical aspects of landscape assessment, so as to be confident of the basis on which the methodology has been developed. Issues such as subjective preferences will always benefit from more extensive research, possibly using techniques such as PCT, but this does not hinder the establishment of descriptive landscape character as the basis of future work. Fieldwork showed that in principle the technique works in the Antarctic, despite difficulties of survey in the inhospitable climate and terrain.

It is essential that basic concepts of landscape assessment are examined and understood by ATCPs, as the methodology developed from these foundations forms the 'systematic environmental-geographical framework' required by the Protocol. Only after acceptance of the principles of description and classification prior to development of criteria for evaluation, can areas of 'outstanding aesthetic value' be established. The move from objective to subjective is introduced at a relatively late stage in the procedure, an advantage when considering the wide range of the ATCPs.

Care needs to be taken that techniques are introduced only when they can genuinely contribute to accepted procedures. GIS techniques are developing rapidly, and such approaches will almost certainly have a part to play in future work, but at the present there remain too many issues, such as spatial interpretation, that have not been satisfactorily handled using GIS. Fieldwork is therefore indispensable.

11.2 Design in the Antarctic

One disquieting issue came to the fore on several occasions during this study. Mention has been made of the apparent conviction that all human construction activity will inevitably be aesthetically degrading (chapter 4, section 4.4.2), even to the extent of deserving the description 'polluted' (chapter 6, section 6.3.1).

These comments suggest either very little experience of, or confidence in, good design. Ideally, any design-based approach to structures in the Antarctic should understand all demands placed upon them, whether human needs (meeting both functional and aesthetic criteria) or environmental concerns. There are precedents to examine. In the 1960s and 1970s, the Scandinavian architect Ralph Erskine carried out extensive studies for new communities and buildings in Swedish Lapland (Erskine, 1960) and the Canadian north (Erskine, 1973). He also argued for improvements in standards of architecture and town planning in northern regions (Erskine, 1969, see also *Architectural Design*, 1977). Southern polar areas urgently need both thought and action.

11.3 Other Antarctic landscapes

Fieldwork for this study took place in the Peninsula. Even though it contains all possible combinations of the ice/rock classification, this does not mean that all the landscapes of the Antarctic are covered in that single Province. Figure 34 (on following page) is included to illustrate other Antarctic landscapes that widen the range identified in this study, thus showing the need for a structured description and classification system covering the whole continent.

The phraseology of the Protocol has required clarification. This study has attempted to 'unpack' underlying thoughts, develop best practices for the Antarctic and offer approaches that meet the specified requirements for systematic environmental-geographical frameworks. It is hoped it may also be a starting point for discussion that will lead to further refinements of techniques, as well as continuing the task of understanding and describing the landscapes of the wilderness that is the Antarctic.



Ross Ice Shelf, near McMurdo Base
(Broady, cover of *Antarctic* (12): 2/3)



Trollslottet, Dronning Maud Land
(Wiltzie, 1998: 53)



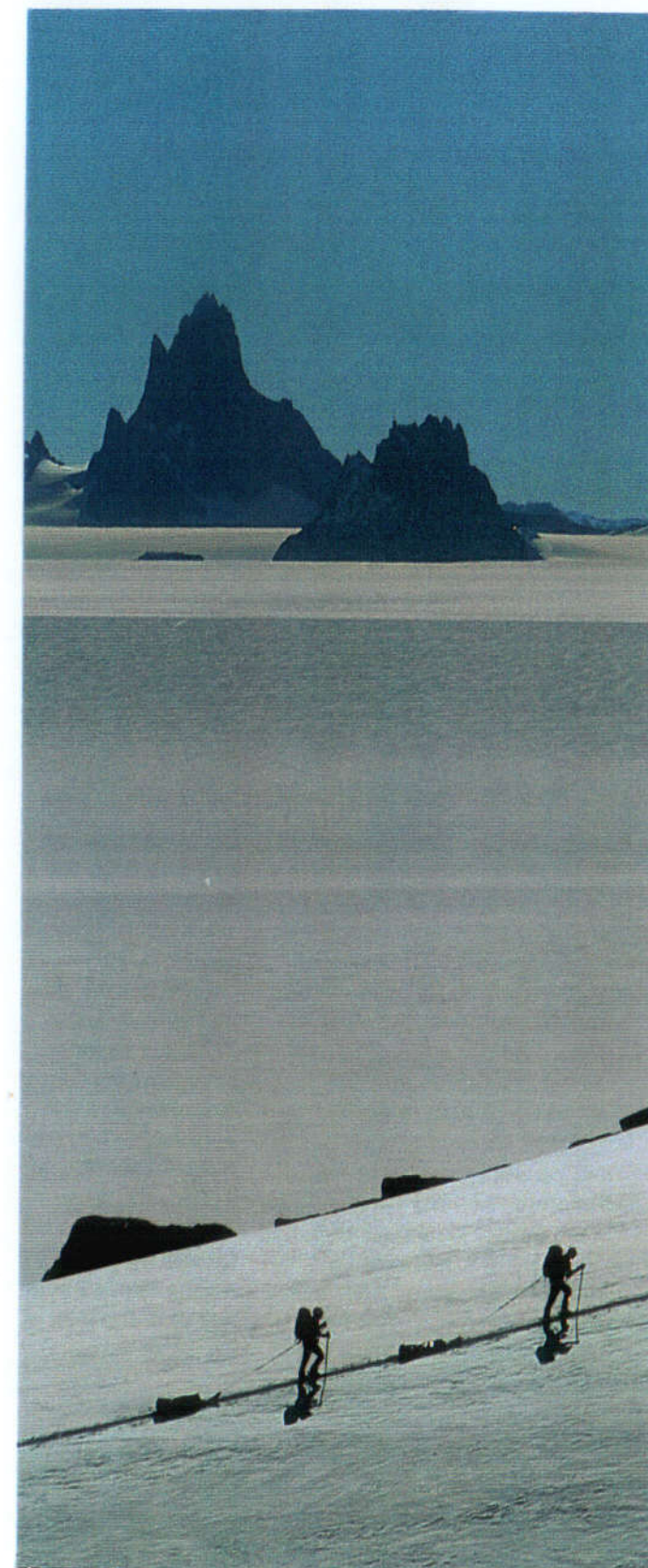
Wright Valley, one of the Victoria Land dry valleys
(Higham, cover of *Antarctic* (13): 8)



Fumeroles on Mount Melbourne, Victoria Land
(Broady, cover of *Antarctic* (12): 4)



Sastrugi on the polar plateau
(Steger, 1990: 82)



Fenriskjeften, Dronning Maud Land
(Wiltzie, 1998:65)

Figure 31 Other Antarctic landscapes



APPENDICES and REFERENCES

to the thesis **WILDERNESS AND AESTHETIC VALUES IN THE ANTARCTIC**

submitted by **Rosamunde Jill Codling**

Diploma in Landscape Architecture, Diploma in Polar Studies

to the Department of Geography, Faculty of Social Sciences

The Open University for the degree of Doctor of Philosophy

December 1998.

APPENDIX 1 FIELDWORK SHEETS TESTED IN THE ANTARCTIC

Fieldwork sheet 1

Site number

1	Location	
2	Date	
3	Time	Start Finish
4	Assistant	
5	Weather and light	
6	Multiple view	Directions of observation
7	Seen area	View lines Dead ground Edges Boundaries
8	Checklist 1	L elements
	" 2	L characteristics
	" 3	Perceptions/impressions
9	Descriptions	Key elements Contribution made Colours Snow/ice
10	Outstanding	Ecosystems Wildlife Geo/glacial/geomorph Historic
11	Sketches	
12	Photographs	Slides Prints B and w Polaroid

Fieldwork sheet 2

Direction of observation

Site number

Checklist 1 CONTRIBUTION OF LANDSCAPE ELEMENTS

* present but inconspicuous, ** evident, ***very conspicuous or dominant.

+/- contribution

SEA AND COASTAL FEATURES	LANDFORM	Pass	VEGETATION/ ORIGINATING FROM VEGETATION
Sea	Isthmus	Col	
Channel	Peninsula	Valley	
Strait		Gully	
Sound	Range		Moss (peat bog)
Entrance	Chain	Cirque	Vegetation
Port	Massif		
	Highlands	Moraine	
Offshore land	Foothills	Scree	
Archipelago	Mountains	Volcano	MANMADE FEATURES
Island	Peak	Plug	Buildings
Reef	Hill		Airfields
	Crag		Masts/poles
	Nunatak	WATER	Tracks
Needle	Outcrop	Lake	Paths
Pinnacle		Pond	
Stack	Cone	Lagoon	VIEWS
	Horn		Distant
Coastal form	Needle		Framed
Coast	Pinnacle		Intermittent
Gulf	Pyramid	SNOW AND PERMANENT ICE	Panoramic
Bay	Spire		Corridor
Firth	Stump		
Fjord	Tooth	Uplands	
Cove	Tower	Snowfield	FLOATING ICE
Inlet		Dome	
Lagoon	Cliff	Ice sheet	
	Buttress	Ice cap	
Coastal edge	Edge	Glacier	
Cliff	Summit	Ice piedmont	
Promontory	Ridge	Ice fringe	
Headland	Corner	Ice shelf	
Corner	Ledge	Glacier tongue	
Cape	Terrace	Ice front	OTHER FACTORS
Point		Ice foot	
	Escarpment	Crevasse	
Beach	Scarp	Ice fall	
Beach		Ice rumples	
Flats	Plateau	Ice rise	
Spit	Plain	Strandcrack	

Fieldwork sheet 3

Direction of observation

Site number

Checklist 2 LANDSCAPE ATTRIBUTES

Scale	Intimate	Small	Large	Vast
Enclosure	Confined	Enclosed	Open	Exposed
Texture	Smooth	Textured	Rough	Very rough
Form/relief	Vertical	Sloping	Rolling	Flat/horizontal
Line	Straight	Angular	Curved	Sinuous
Colour	Monochrome	Muted	Colourful	Highly coloured

Checklist 3 PERCEPTIONS/IMPRESSIONS

Diversity	Uniform	Simple	Diverse	Complex
Coherence	Unified	Interrupted	Fragmented	Chaotic
Familiarity	Ordinary	Familiar	Unusual	Striking
Rarity	Predominant	Common	Unusual	Unique
Beauty	Unsightly	Unexceptional	Attractive	Spectacular
Security	Comfortable	Safe	Unsettling	Threatening
Wildness	Man-dominated	Man-influenced	Natural	Wild
Management	Obvious			Not obvious

APPENDIX 2 DEFINITIONS OF GEOGRAPHICAL TERMS

Modified from:

Armstrong, T., Roberts, B. and Swithinbank, C. 1966. *Illustrated glossary of snow and ice*. Cambridge, Scott Polar Research Institute.

Armstrong, T., Roberts, B. and Swithinbank, C. 1977. Proposed new terms and definitions for snow and ice features. *Polar Record* 18 (116): 501-502.

Hattersley-Smith, G. 1991. *The history of place names in the British Antarctic Territory*. Cambridge, British Antarctic Survey Special Report 113: 52-55.

- Archipelago* A large group of *islands*.
- Basin* Synonymous on land with *cirque*, or an almost landlocked body of water off an *inlet* or *sound*.
- Bastion* Upstanding rock feature, often with *cliffs* on at least one side and usually outlying a larger feature, cf. *buttress*.
- Bay* Properly a comparatively gradual indentation of the coastline, the seaward opening of which is usually wider than the penetration into the land, but often applied more loosely, cf. *bight*, *firth*, *fjord*, *gulf*, *inlet*.
- Beach* Ice-free length of shore, gently sloping and free of rock outcrops or material above cobble size.
- Beacon* Conspicuous *hill*.
- Bench* Similar to *terrace* but usually applied to a high-level rock feature.
- Bight* Crescent-shaped indentation in the coastline, of relatively large extent, cf. *bay*.
- Block* Similar to *massif* but usually applied to a smaller feature.
- Bluff* A *headland* or short stretch of *cliff* with a broad vertical or nearly vertical face, or a similar feature at the margin of a *glacier* or *ice piedmont*.
- Buttress* Similar to *bastion* but usually forming part of a larger feature.
- Cape* Piece of land facing seaward and projecting beyond the line of the adjacent coast into the sea or into an *ice-shelf* cf. *point*, *promontory*.
- Chain* Row of *hills*, *mountains* or *nunataks* of lesser extent than a *range*.
- Channel* A comparatively deep, navigable waterway between an *island* and the mainland, or between *islands*.
- Chasm* Synonymous with large *crevasse*
- Cirque* Rounded recess on a mountain side formed by glacial action and usually occupied by a *glacier*.

<i>Cliff</i>	Relatively high land projecting nearly vertically from the sea or, inland, <i>mountains</i> or <i>nunataks</i> with vertical faces.
<i>Coast</i>	Boundary between land and sea, cf. <i>land</i> .
<i>Col</i>	Depression in a range of <i>hills</i> or <i>mountains</i> generally forming a pass.
<i>Cone</i>	Cone-shaped hill or <i>nunatak</i> .
<i>Corner</i>	Turning point of a rock <i>ridge</i> or a <i>point</i> on a bay.
<i>Corridor</i>	Linked mountain <i>passes</i> .
<i>Corrie</i>	Synonymous with <i>cirque</i> .
<i>Cove</i>	Small coastal indentation, often circular or semi-circular in shape with a restricted entrance, or a small <i>bay</i> .
<i>Crag</i>	Steep, rugged <i>rock</i> , <i>hill</i> , <i>mountain</i> or <i>nunatak</i> .
<i>Creek</i>	A comparatively narrow, fresh or salt water <i>inlet</i> , tidal throughout its length.
<i>Crest</i>	Top or summit applied to a <i>hill</i> , <i>mountain</i> or <i>nunatak</i> .
<i>Crevasse</i>	Fissure formed in a glacier, cf. <i>chasm</i> .
<i>Defile</i>	Narrow mountain <i>pass</i> .
<i>Dome</i>	Dome-shaped <i>ice cap</i> or <i>snowfield</i> or dome-shaped snow <i>summit</i> .
<i>Doline</i>	Large oval-shaped depressions in ice shelves.
<i>Escarpment</i>	Elongated and steep, or cliffed, rock feature marking a break in geological structure, cf. <i>scarp</i> .
<i>Edge</i>	Steep or cliffed rock feature.
<i>Entrance</i>	Seaward end of a harbour, <i>channel</i> , <i>strait</i> or <i>sound</i> .
<i>Firth</i>	Partly land-locked arm of the sea.
<i>Fjord</i> or <i>Fiord</i>	Long narrow arm of the sea between high <i>cliffs</i> .
<i>Flats</i>	Extensive level or nearly level area, usually of mud, sand or gravel.
<i>Foothills</i>	Relatively low elevations in a mountainous area.
<i>Foreland</i>	Synonymous with <i>headland</i> .
<i>Gap</i>	Synonymous with <i>pass</i> .
<i>Glacier</i>	Mass of snow and ice moving continuously from higher to lower ground or, if afloat, continuously spreading. In the broad sense, glaciers include <i>ice caps</i> , <i>ice piedmonts</i> , <i>ice rises</i> , <i>ice shelves</i> , <i>ice streams</i> and <i>snowfields</i> .
<i>Glacier tongue</i>	An extension of a <i>glacier</i> or ice stream projecting seaward, usually afloat.
<i>Gulch</i>	A ravine.
<i>Gulf</i>	Sea area partially enclosed by land, and usually of larger extent and relatively greater penetration than a <i>bay</i> .
<i>Gully</i>	Glacier-worn or water-worn ravine in a <i>hill</i> or <i>mountain</i> side.

<i>Head</i>	Comparatively high, steep-faced land jutting into the sea or into an ice shelf; similar to <i>promontory</i> but applied to a feature of lesser extent, cf. <i>cape</i> , <i>point</i> . An unnamed <i>head</i> is usually described as a <i>headland</i> .
<i>Heights</i>	Relatively high <i>hills</i> or <i>mountains</i> .
<i>Highland</i>	Group of <i>hills</i> or <i>mountains</i> with glaciers or an undulating <i>plateau</i> .
<i>Hill</i>	Natural elevation usually below 300m, but the term may be applied to much higher (although relatively low) features in mountainous areas, cf. <i>knoll</i> , <i>mountain</i> .
<i>Holm</i>	Small <i>island</i> near the mainland or near a larger <i>island</i> .
<i>Horn</i>	Horn-shaped <i>mountain</i> or <i>nunatak</i> .
<i>Ice barrier</i>	Obsolete term for <i>ice shelf</i> or <i>ice front</i> .
<i>Ice cap</i>	Dome-shaped <i>glacier</i> or small <i>ice sheet</i> usually covering a highland area.
<i>Icefall</i>	Heavily crevassed area on a <i>glacier</i> where the descent is steep.
<i>Ice foot</i>	A narrow strip of ice attached to the coast, unmoved by tides and remaining after the fast ice has broken free.
<i>Ice fringe</i>	Very narrow <i>ice piedmont</i> , extending less than about 1 km inland from the sea.
<i>Ice front</i>	Vertical cliff forming the seaward face of an <i>ice shelf</i> or other floating <i>glacier</i> and, because of its variable position, dated on maps and charts.
<i>Ice piedmont</i>	A <i>glacier</i> covering a coastal strip of low-lying land backed by <i>mountains</i> , and sloping gently seaward over a distance up to 30 km or more terminating in ice cliffs or to merge with an <i>ice shelf</i> , cf. <i>ice fringe</i> .
<i>Ice rise.</i>	Mass of ice, often dome-shaped, resting on rock and surrounded either by an <i>ice shelf</i> , or partly by an <i>ice shelf</i> and partly by <i>sea</i> ; no rock is exposed and there may be none above sea-level.
<i>Ice rumples</i>	Locally grounded area of <i>ice shelf</i> which is overridden by an <i>ice sheet</i> and distinguished by crevassing together with a rise in the surface, cf. <i>ice rise</i> .
<i>Ice sheet</i>	Mass of ice and snow of considerable thickness, and often large area, either resting on rock or floating as an <i>ice shelf</i> , cf. <i>ice cap</i> .
<i>Ice shelf</i>	Floating <i>ice sheet</i> of a considerable thickness attached to a coast, and nourished by the accumulation of snow and often by the seaward extension of land <i>glaciers</i> . Limited areas may be aground as <i>ice rises</i> . The seaward edge is termed an <i>ice front</i> .
<i>Ice stream</i>	Part of an <i>ice sheet</i> in which the ice flows more rapidly and not necessarily in the same direction as the surrounding ice. The margins are sometimes clearly marked by a change in direction of the surface slope

but may be indistinct.

- Inlet* Small indentation in the coastline usually tapering towards its head, but also applied to an arm of a *bay* or to a coastal embayment on the landward side of an *ice shelf*.
- Island* Piece of land of less than continental size completely surrounded by water at least at mean high-water spring tide, or by water and *ice shelf*, or by *ice shelf*, cf. *ice rise*. Cases are known of *islands* becoming completely overrun or joined to the mainland by *glacier* advance, but names have been retained against the eventuality of glacier recession. A very small island may be termed a *rock* or a *skerry*.
- Isthmus* Neck of land connecting two broader land masses.
- Knoll* Small *hill* or relatively low *mountain* or *nunatak*.
- Lagoon* Enclosed area of salt or brackish water separated at times from the sea by a more or less effective obstacle such as a beach bar, or partially impounded against the land by an *ice shelf*, cf. *lake*.
- Lake* Body of water entirely surrounded by land.
- Land* Large continental area defined by natural boundaries, or partly by natural boundaries and partly by boundaries of political convenience. The term was formerly used by explorers for newly discovered lengths of coastline, cf. *coast*.
- Ledge* Flat-topped *ridge*.
- Massif* Compact group of *mountain* heights, which may be partly or almost entirely ice-covered.
- Monolith* Pillar-like rock *peak* or *nunatak*.
- Moss* Peat bog.
- Moraine* Ridges or deposits of rock debris transported by a *glacier*.
- Mountain* Natural elevation rising to a relatively great height. *Mountain*, *hill* and *knoll* are terms indicating various degrees of height in descending order, varying with the general configuration of the vicinity. The term *mountains* may be used for a grouping within a *range*.
- Narrows* Contracted part of a *channel* or *strait*.
- Needle* Needle-like *peak* or off-shore *rock*.
- Nunatak* Small *mountain*, rocky *crag*, or *outcrop* projecting from a *glacier*, *ice-shelf* or *snowfield*.
- Outcrop* Area of exposed rock surrounded by a *glacier* or *snowfield*.
- Pass* Relatively low area that provides easy passage through *hills* or

mountains.

- Passage* Navigable *channel* between two seas or oceans, or between *reefs* or *islands*.
- Peak* A *hill* or a *mountain* with a comparatively sharp *summit*.
- Peninsula* Piece of land almost surrounded by water or projecting far into the sea, cf. *island*.
- Pillar* Synonymous with *pinnacle* for an off-shore *rock*.
- Pinnacle* A *rock* rising sheer from the sea bottom, or slender *peak* or *rock* on land.
- Plain* Level, mainly ice-free area which may be at low or high elevation, cf. *plateau*.
- Plateau* More or less extensive ice-covered area of relatively high and uniformed elevation, cf. *plain*, *snowfield*.
- Plug* Volcanic neck.
- Point* Sharp and often comparatively low piece of land jutting out from the *coast* or forming a turning point in the coastline, but usually applied to a less prominent feature than a *cape*.
- Pond* Small *lake*.
- Pool* Small body of fresh or brackish water, or *lagoon*, impounded between an *ice shelf* and the land.
- Port* A harbour on which an occupied or unoccupied station is situated, or where an expedition ship has wintered.
- Promontory* Similar to a *headline*, but of larger extent, that may be above open sea, above an *ice piedmont* or above an *ice shelf*.
- Pyramid* Pyramid-shaped *peak*.
- Range* Row of *mountains* broken by *glaciers*, extending over a considerable distance.
- Reef* Area of *rocks*, attached or unattached to shore, where the depth of water constitutes a danger to navigation.
- Ridge* Long narrow *hill* or *mountain* top or *spur* leading to a *summit*.
- Rock* Hard, solid mass of the Earth's surface rising from the sea bottom, either completely submerged or projecting permanently, or at times above water. A very large rock may be termed an *island*. The term *rock* may also be applied to a small *nunatak*.
- Scarp* Steep or cliffed rock feature, usually of less extent than an *escarpment*, which may be inland or on the coast.
- Scree* Rock debris on the side or at the foot of a *hill* or *mountain*, forming a steep

	stony slope.
<i>Skerry</i>	Small rocky <i>island</i> .
<i>Snowfield</i>	Large expanse of permanent ice and snow which may extend down to sea-level or may be intermontane, cf. <i>plateau</i> .
<i>Sound</i>	A <i>strait</i> between two sea areas or an extensive, partly enclosed sea area, including an area that may be covered by <i>ice shelf</i> .
<i>Spire</i>	Spire-like <i>peak</i> .
<i>Spit</i>	Long narrow shoal (where submerged) or a tongue of land (where above water) extending from the shore.
<i>Spur</i>	Projection from a <i>mountain</i> or <i>range</i> .
<i>Stack</i>	High and precipitous detached rock near the shore.
<i>Strait</i>	Comparatively narrow waterway, connecting two seas or two large bodies of water cf. <i>channel</i> , <i>passage</i> .
<i>Strand crack</i>	Fissure at the junction between an inland <i>ice sheet</i> , <i>ice piedmont</i> or <i>ice rise</i> and an <i>ice shelf</i> , the latter being subject to the rise and fall of the tide.
<i>Stump</i>	Flat-topped <i>hill</i> or <i>mountain</i> .
<i>Summit</i>	Highest point of a <i>hill</i> or <i>mountain</i> , or the feature itself.
<i>Table</i>	Synonymous with <i>plateau</i> .
<i>Terrace</i>	Relatively flat horizontal or gently inclined surface, sometimes long and narrow, bounded by a steeper ascending slope on one side and by a steeper descending slope on the opposite side.
<i>Tooth</i>	Tooth-shaped <i>rock</i> or <i>nunatak</i> .
<i>Tower</i>	Tower-like <i>hill</i> , <i>mountain</i> or <i>nunatak</i> .
<i>Uplands</i>	High ice-covered area with or without <i>nunataks</i> .
<i>Valley</i>	Long depression running from a higher level to a lower level (or to the coast), with a <i>glacier</i> completely filling the feature, partly filling it or terminating within it; rarely a valley may be ice-free with a seasonal stream running through it.
<i>Volcano</i>	More or less conical <i>hill</i> or <i>mountain</i> which may erupt or has in the past erupted.
<i>Wall</i>	Nearly vertical

APPENDIX 3 PERSONAL CONSTRUCT THEORY

A3.1 Chosen locations ('Element names' on the OU form)

Seven people were questioned in the UK, prior to fieldwork, and their responses are shown by number. Four were questioned at Rothera Base, and their responses are shown by letter.

In limited cases, groupings have been made. For instance, the Argentine base Almirante Brown is situated on Paradise Harbour, so the two are placed next to each other.

Similarly, various locations around Rothera Point and Rothera Base are grouped. Many of these locations are shown on the *BAS Antarctica - a topographic database* (appended as Plan 1), but some are imprecise ('approach to Deception Island') as they are linked to the individual's memory.

Antarctic Sound	1
Deception Island	1,2,3,5,7
Approach to Deception Island	1
Lemaire Channel	1,2,3,4,5,6,7,b
'Kodak Crack'	5 (Unofficial name for southern entrance to Lemaire Channel)
Palmer Base	1
Paradise Harbour	1,2,4,5,6
Almirante Brown Base	7
Arctowski Base	1,7
Anvers Island	1
O'Higgins Base	1
Port Lockroy Base	2,4,a
Wiencke Island	3
Stonington Island	2,3,5'
Crystal Sound	2
Duse Bay	2
Admiralty Bay	2,5
Hope Bay	2,5
The Gullet	2
Green Island	2
Byers Peninsula	3
Smith Island	3
Fildes Peninsula	3
Huntress Glacier	3
Brabant Island	3,5
Faraday Base	3,5,7
Petermann Island	4,5
Couville	4
Hannah Point	4
Rongé Island	4
Paulet Island	5,7
Neumayer Channel	5
Lagotellerie Island	5
Rothera Base	5,a,b,d
Rothera skiway	a
Reptile Ridge	c
North Bay, Rothera Point	c
S Alexander Island	6
Danco Coast	5
Fossil Bluff	6,a,c,d

Eland Mountains	6
Windy Valley	6
Prince Gustav Channel	6
N Larsen Iceshelf	6,a,c
Elephant Island	7
Livingston Island	7
King George Island	7
Torgersen Island	7
Gerlache Channel	a
Ryder Bay	a,d
Avery Plateau	a
Butler Island	a
Mount Jackson	b
Ronne Ice Shelf	b
Ellsworth Mountains	b
Adelaide Island	b,d
Dufek Mountains	b
Berkner Island	b
S Orkneys	b
S Georgia	b
Trinity Peninsula	c
Mars Oasis	c
Hauberg Mountains	c
Mount Suggs	c
Sky Hi	c,d
Fleming Glacier	c
Bourgeoise Fjord	c
Stonington Ice Shelf	c
Hag Pike, Fallières Coast	c
James Ross Island	d
Seymour Island	d
Snow Hill Island	d
Horseshoe Island	d
Blaiklock Island	d
Colbert Mountains, W Alexander I	d
Ellsworth Land	d
Shackleton Mountains	d

A3.2 Summary

UK volunteers	7 people gave 70 choices covering 45 places.
Rothera volunteers	4 people gave 41 choices covering 37 places.
Combined	11 people gave 111 choices covering 78 places.

APPENDIX 4 EPHEMERAL CONDITIONS AND FIELD PHOTOGRAPHY

A4.1 Weather conditions

Soon after I arrived at Rothera, it became apparent that weather conditions were so variable as to affect what could, or could not, be seen. Litton's 'ephemeral' aspects of landscape were obvious, and still as difficult to handle 20 years after his comments (chapter 3, section 3.3). I took a slide photograph every morning as near to 9 am local time as possible, from the same point (the service ducts outside the main Rothera building), looking at the same view, over the runway to the most easterly ice cliff bordering Ryder Bay. For four weeks this was my 'view from the office window'.

The periods spent at Fossil Bluff and on the field trip interrupted the series, but a week-long series was obtained for Tuesday 18 March to Monday 24 March 1997. Over the week, visibility ranged from about 350m to more than 21 km. The north edge of the Bay could usually be seen, and on clearer days the Sheldon Glacier. Mount Mangin, at a distance of about 21 km was a sign of a 'good' day. The speed of visibility change may be seen from the photographs for Saturday 22 March. The first (with passing tractor) was taken at the usual time. About 30 minutes later the view was taken again, because the visual change had been so great.

The photographs do not convey all aspects of weather conditions. On some mornings not covered by this series, the wind was so severe that it was difficult to stand upright, and several exposures were taken in the hope that at least one would be acceptable. An exposure taken on the 9 September 1997 showed the most restricted conditions. Nothing can be seen except a dull blue-grey haze. The photographer recorded that he could not see an adjacent building, a distance of under 50m.

A4.2 Seasonal change

A series of photographs is available showing the seasonal change. Nigel Milius, the wintering cook, continued the series on a weekly basis over the 1997 winter and the 1997/98 summer, although during winter the timing was changed to about noon because of the shorter days. Four of his slide photographs are reproduced, all being at two or three weekly intervals. The photograph taken on the 24 June 1997 is nearest to 'Midwinter's Day', when the sun is at its lowest elevation. Only the tips of the highest peaks catch the light.



Fig A1 Tuesday 18 March 1997

Fig A2 Wednesday 19 March 1997



Fig A3 Thursday 20 March 1997

Fig A4 Friday 21 March 1997

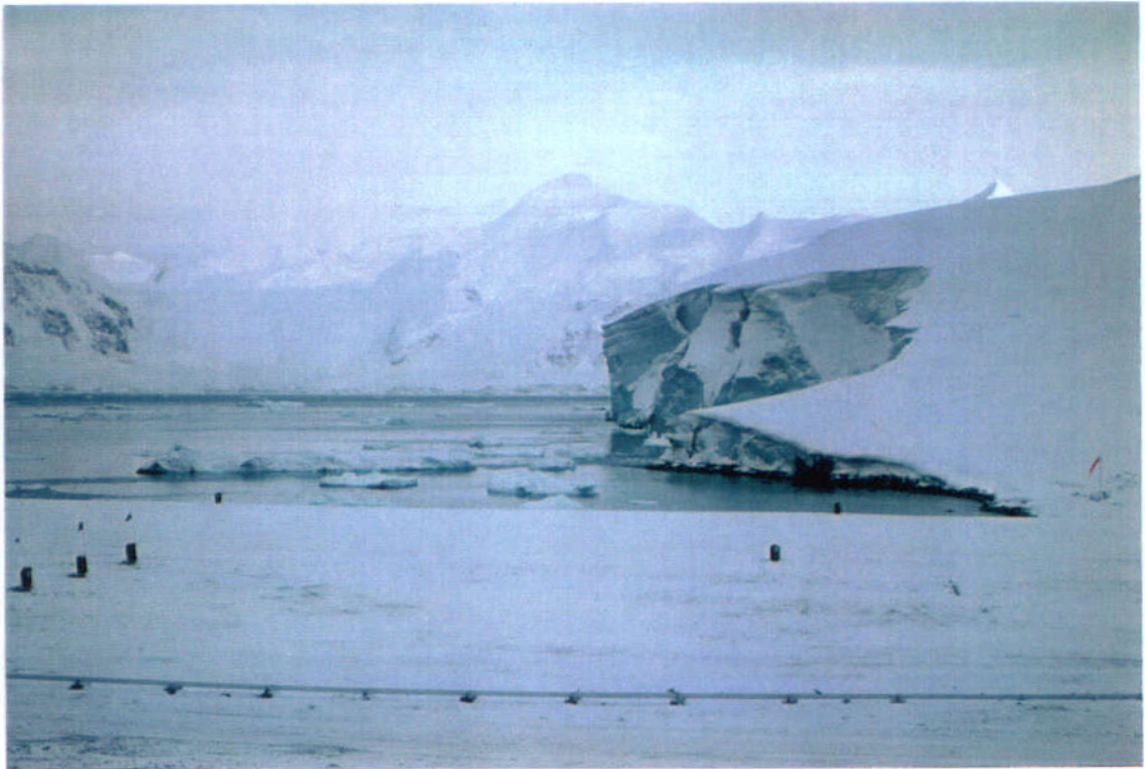


Fig A5 Saturday 22 March 1997, about 9am local time

Fig A6 Saturday 22 March 1997, about 9.30am local time

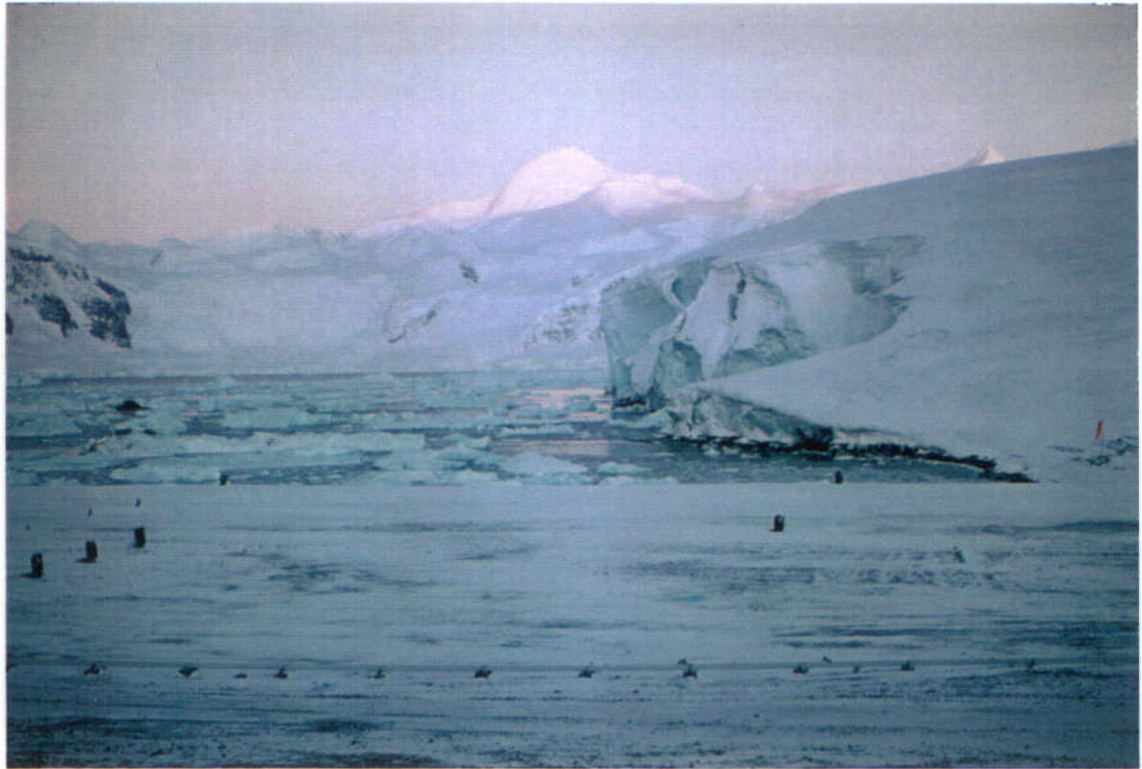


Fig A7 Sunday 23 March 1997, about 10am local time

Fig A8 Monday 24 March 1997

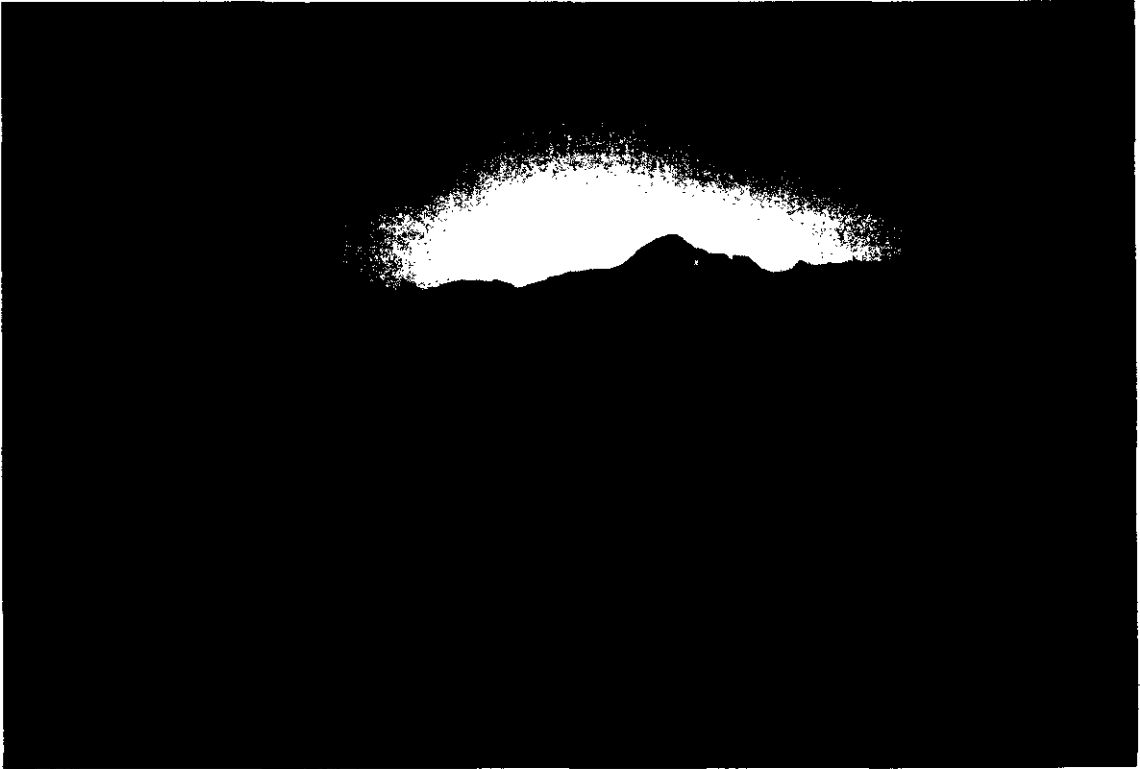
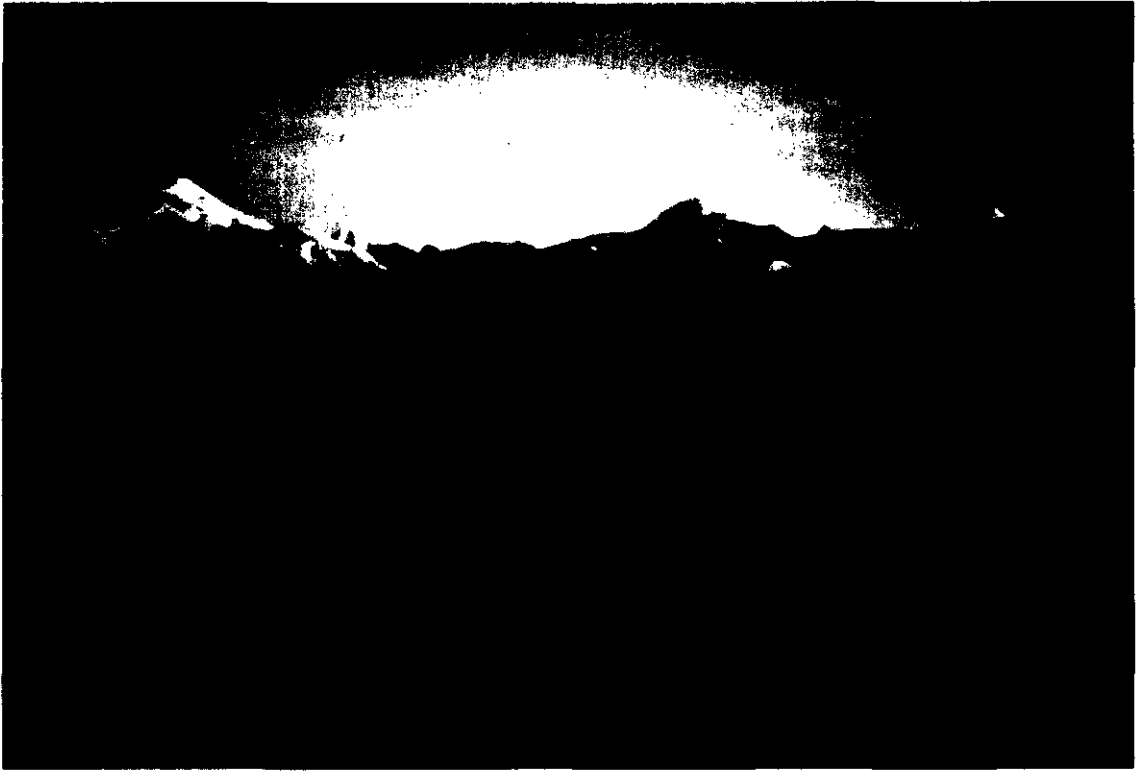


Fig A9 Seasonal variations Tuesday 20 May 1997, about noon local time

Fig A10 Seasonal variations Tuesday 10 June 1997, about noon local time



Fig A11 Seasonal variations Tuesday 24 June 1997, about noon local time

Fig A12 Seasonal variations Tuesday 8 July 1997, about noon local time

APPENDIX 5 FIELDWORK DETAILS

A5.1 Notes

1 Locations in chronological order with appendix reference number:

A5.2 Rothera Point, Adelaide Island

A5.3 Fossil Bluff, Alexander Island

A5.4 Three day field trip to Stokes Peaks, Adelaide Island

A5.5 Sea passage to Horseshoe Island and Bourgeois Fjord, Fallières Coast

A5.6 Orford Cliff, Loubet Coast

A5.7 Detaille Island, Loubet Coast

A5.8 Sea passage from Detaille Island to the Argentine Islands

A5.9 Argentine Islands, Graham Coast

A5.10 Lemaire Channel, Graham Coast

A5.11 South Shetland Islands, particularly King George Island

2 When site-specific text has been found, summaries or extracts are included. The general descriptions given in chapters 2 (sections 2.6 and 2.7), and chapter 7 (sections 7.3 to 7.5) are also applicable.

3 Sites A5.2-4, 7 and 9 were visited on the ground, and sites A5.5, 6, 8, 10 and 11 observed from the bridge of RRS *Bransfield*.

4 References to available maps have been included, but *Bransfield's* Admiralty Charts were also consulted. The BAS geological maps, Series BAS 500 G, were much used.

5 Notes reproduced as written on site are slightly indented.

6 When used, copies of marked-up checklists 2 and 3 are reproduced at the end of each site summary. Comments noted on original survey sheets are reproduced in italics.

7 Photographs were taken, using slide, print and Polaroid film, and pencil sketches were made. One watercolour was painted out of doors (on a very mild afternoon), but other watercolours were painted indoors, looking through convenient windows or portholes. This obviously limited choice of subject, but when in the Antarctic was preferred to using photographs. Further watercolours have been painted after the visit, either worked up from pencil sketches and notes made on site, or from photographs. Examples of all are included.

A5.2 Rothera Point, Adelaide Island

A5.2.1 Available maps

BAS. 1981. *Geological map of Southern Graham Land. BAS 500G: Sheet 3, Edition 1.* (scale 1:500 000). Cambridge, British Antarctic Survey.

BAS. 1995c. *Rothera Point - Wright Peninsula, Adelaide Island. BAS SCISTAMAP Series, Sheet 1A and 1B.* (scales 1:2000 and 1:50 000).

Moyes, A. B., Willan, C. F. H., Thomson, J. W. and others. 1994. *Geological map of Adelaide Island to Foyt Coast. BAS GEOMAP Series: Sheet 3.* (scale 1:250 000).

A5.2.2 Documentation

Various BAS reports, especially Initial Environmental Evaluations and a Final Comprehensive Environmental Evaluation, were helpful in giving an overview of the base (BAS, 1989, 1995b and 1996).

A5.2.3 Climate

Rothera figures give a general indication of conditions on the western coastline of the Peninsula. Further details have been given in chapter 9, section 9.3.3.

A5.2.4 Earlier descriptions

Earlier descriptions were found for parts of Adelaide Island. The explorer John Biscoe sailed to the west of the Island, and his journal for the 15 February 1832 reads:

It has a most imposing and beautiful appearance, having one very high peak running up into the clouds, and occasionally appears both above and below them; about one-third of the mountains, which are about four miles in extent from north to south, have only a thin scattering of snow over their summits. Towards the base the other two-thirds are buried in a field of snow and ice of the most dazzling brightness. This bed of snow and ice is about four miles in extent, sloping gradually down to its termination, a cliff, ten or twelve feet high, which is split in every direction for at least two or three hundred yards from its edge inwards, and which appears to form icebergs, only waiting for some severe gales or other cause to break them adrift and put them in motion. (Quoted by Savours, 1984: 488)

One of the BGLE's winter sea-ice journeys took the team of Rymill and Bertram to the south end of Laubeuf Fjord, where Hansen, Day and Wyatt Islands lie between the Arrowsmith Peninsula to the east and Adelaide Island to the west. On the 28 July 1936 Rymill wrote:

Above the cliffs on the west side the steep island [assumed to be Wyatt Island] rises to about 1500 feet, while on the east side magnificent pinnacle-like mountain-peaks rise to 6000 feet. These peaks [on the west side of the Arrowsmith Peninsula] are divided by great ice-filled valleys coming down to the coast; the ice in many places spills over precipitous cliffs in chaotic ice-falls, while the mountain-sides themselves are covered with hanging glaciers. These, in the pale winter sunlight, glow with wonderful shades of blue and green in striking contrast with the dark massive rock-faces between them. (1938: 140)

A5.2.5 Description

Adelaide Island has a rugged topography. The highest peak is Mount Gaudry at 2560m and the deepest valley revealed by radio-echo sounding lies at -300m. The island has two distinct topographic areas: Fuchs Ice Piedmont to the west, and to the east a mountainous ridge extending southwards from Mount Vélain to Mount Ditte.

A5.2.6 Fieldwork sheets

Fieldwork sheets were completed for Rothera Point in the mid-afternoon on 2 March 1997. The weather was bright, but cloudy (8 oktas). The following notes were completed immediately following the fieldwork and are reproduced as originally written, ending with two paragraphs that raised procedural questions.

Summary A panoramic coastal view with distant land acting as backdrop to the calm sea. Icebergs catch the lowering sun and this play of light on such dramatic form attracts attention.

Description Rothera Point is a rocky promontory, approximately 1 km long by about 400m wide, on the east side of Adelaide Island, with Laubeuf Fjord to the east and south and Ryder Bay to the west. The Point rises to a height of 38m and is predominantly ice-free in summer except for an area of permanent ice on south facing slopes. It was joined to the main body of Adelaide Island by a narrow isthmus, but this landform was modified when the 900m landing strip was constructed in 1993/1994. The Wormald Ice Piedmont to the west of the Point rises to join the Fuchs Ice Piedmont which covers the majority of Adelaide Island.

Fieldwork sheets were completed from near the Memorial Cross on the southern end of the Point, at a height of about 35m above sea level. From this point there is 360° visibility, with the nearest limitations being Reptile Ridge and the crevassed lower slopes of the Wormald Ice Piedmont, about 1 km to the northwest. The dominant element is the sea, visually contained to the north by the Wormald Ice

Piedmont which forms the edge of the Wright Peninsula; to the east by distant views of the Arrowsmith Peninsula (21 km) and Pourquoi Pas Island (19 km), and to the west by the glaciers and mountains of the southern part of Adelaide Island (13 km). Against this land backdrop lie groups of island, especially to the south. The pyramidal northwest face of Léonie Island, rising to a height of 504m, and seen against the Turner Glacier, is a dominant feature. The other islands to the south are lower, with Lagoon Island reaching 15m, Anchorage Island 57m, Mikkelson Islands 170m and Killingbeck Island 28m. Distances have all been measured from available maps, as on site there are no visual clues.

Rothera Station is visually dominant to the north. The form of the buildings is straightforward - one or two storeys with pitched roofs, mainly painted a medium green. The boxed service conduits often form desire line paths.* Equipment is also stored externally, which does not always help visually coherence.** In addition, masts and aerials of varying shapes and sizes occur in many areas of the Point. Artificially levelled areas cover about 25 ha of the Point (estimated from Rothera Point Map).

Vegetation is limited to lichens on the immediate rocks and occasional small patches of moss. The colouring of some of the outlying islands suggests a similar pattern.

There is an SSSI covering the northern quarter of the Point. It has been designated as a control to assist assessment of human impact.

Procedural questions

1 In a 'normal' landscape assessment, the man-made features would probably be considered 'evident' but marked '-' suggesting a negative contribution to the overall landscape. Visually, that would be fair, but because of the extreme climatic conditions in the Antarctic, other factors emerge. The buildings are 'home', albeit temporary, and at least some of the masts and aerials are links to a variety of satellites and communications systems. All contribute to the physical safety and support needed for a degree of security. These are not just comfortable background feelings, but reality. In the Antarctic life needs coordinated support and the base provides it.

2 This was the first time the checklists had been used and it was immediately realised that the comparisons were being made on an Antarctic scale. Thus the colours were assessed as 'muted/ colourful' whereas if compared to a British coastal scene, they would probably have to be categorised as 'monochrome'. On the argument of only comparing 'like with like', should polar landscapes only be compared

with themselves?

* 'Desire line paths' are direct routes made by users, often ignoring planned provisions.

** This point was later clarified. Much of the externally stored 'equipment' was material waiting to be returned by sea to the Falklands or the United Kingdom. Following the final visits for the season by the RRS *James Clark Ross* and RRS *Bransfield*, the base had a much 'simplified' look. Such storage is inevitable, especially because of the stringent environmental controls required by the Protocol (Annex III: Waste disposal and waste management), which were closely followed by BAS.

A5.2.7 Rothera checklists, 2 March 1997

Checklist 2 LANDSCAPE ATTRIBUTES

Scale	Intimate	Small	Large	<u>Vast</u>
Enclosure	Confined	Enclosed	Open	<u>Exposed</u>
Texture	<u>Smooth</u> (sea)	Textured	<u>Rough</u> (land)	Very rough
Form/relief	Vertical	Sloping	Rolling	<u>Flat/horizontal</u>
Line	Straight	<u>Angular</u>	Curved	Sinuous
Colour	Monochrome	<u>Muted</u> to	<u>Colourful</u>	Highly coloured

Checklist 3 PERCEPTIONS/IMPRESSIONS

Diversity	Uniform	Simple	Diverse	<u>Complex</u>
Coherence	Unified	<u>Interrupted</u>	Fragmented	Chaotic
Familiarity	Ordinary	<u>Familiar</u>	Unusual	Striking
Rarity	Predominant	<u>Common</u>	Unusual	Unique
Beauty	Unightly	Unexceptional	Attractive	<u>Spectacular</u>
Security	Comfortable	<u>Safe</u>	Unsettling	Threatening
Wildness	<u>Man-dominated</u>	Man-influenced	Natural	<u>Wild</u>
Management	<u>Obvious</u> (to N)			<u>Not obvious</u> (to S)

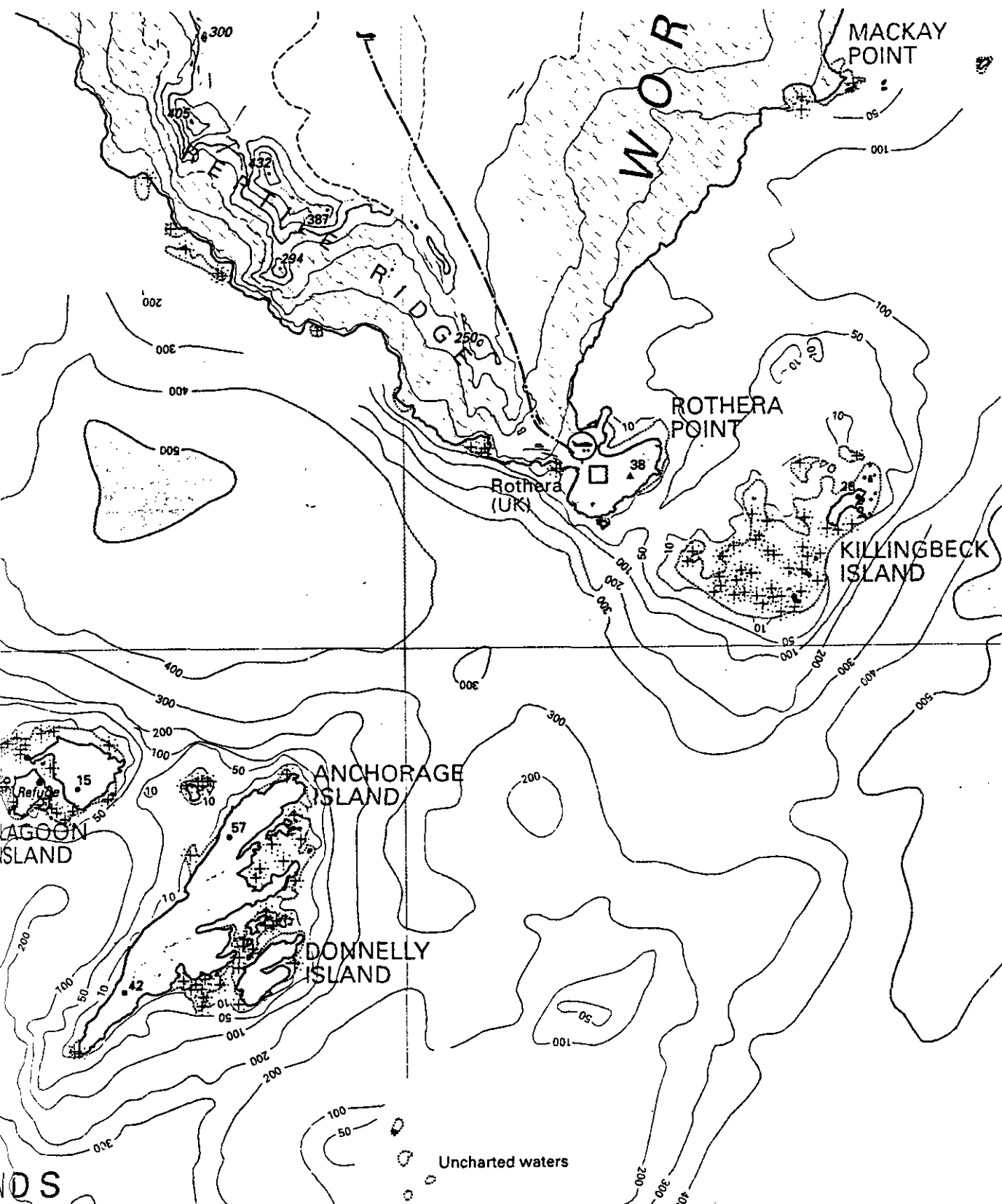


Fig A13 Extract from BAS map, 1995c. *Rothera Point - Wright Peninsula, Adelaide Island, Sheet 1B.* Scale 1:50 000.



Fig A14 **BAS postcard D 20** 'Rothera Research Station and the crushed rock airstrip, Adelaide Island'. The runway runs approximately NNE (left) to SSW (right). Killingbeck Island is in the middle distance, on the right.

Fig A15 **North Bay.** Stokes Peaks are on the left skyline and the Arrowsmith Peninsula in the distance to the right.



Fig A16 Eastern edge of Rothera Point looking east over Laubeuf Fjord. Piñero Island is the dark spine against the sky on the right.

Fig A17 Watercolour painted out of doors, from eastern edge of Rothera Point with the low Killingbeck Island lying in front of Piñero Island.

A5.3 Fossil Bluff, Alexander Island, 3-5 March 1997

A5.3.1 Available maps

The sledge journey made by the BGLE down George VI Sound resulted in the mapping of an area never before visited by man: 'We were the first people ever to land on this island' (Stephenson, 1938: 193). BAS is currently producing a map covering the Fossil Bluff area at a scale of 1:50 000 in their BAS SCISTAMAP Series, as the former FIDS base (71° 20'S, 68° 17'W) is used during the summer as a fuel depot and weather station. A draft copy was available on site. Other maps used included:

United States Geological Survey. 1979. *Antarctica sketch map, Palmer Land (north part)*. (scale 1:500 000).

BAS. 1984a. *British Antarctic Territory, George VI Sound. BAS 5250P: Sheet SIR 19-20/14, Edition 2-DOS*. (scale 1:250 000).

A5.3.2 Climate

Whilst the north-eastern corner of Alexander Island is affected by moisture coming in from Marguerite Bay, the south-eastern side lies in a precipitation shadow from the Pacific, thus reducing snow cover. (Swithinbank, personal communication.)

A5.3.3 Geology

Elliott summarised the geology of the area:

Sedimentary rocks on the western flank of the Antarctic Peninsula are Late Jurassic to Early Cretaceous in age ... the Alexander Island sequence, the Fossil Bluff Formation, consists of interbedded volcanic and sedimentary rocks in the lower part overlain by a thick sequence of shallow marine classic sediments with a significant volcanic content and containing an abundant invertebrate fauna; the uppermost part is non-marine and plant bearing.' (1985: 50-51)

A5.3.4 Earlier descriptions

Commenting on an earlier expedition, Charcot wrote:

It seems interesting to quote the precise passages of Arctowski's description (*Rapports scientifiques de la 'Belgica'. Geology, p 42*): "Alexander Land, which lies to the south has some very high peaks rising majestically above a mountainous mass stretching in the direction north to south and fading away dimly on the horizon" (Charcot, 1978: 120).

The BGLE visited Alexander Island in both 1936 and 1937, by sledge and by overflying

in their De Havilland Fox Moth. Stephenson gave a descriptive summary of a flight made with Hampton over the northern part of the Island, but their outstanding discoveries related to the massive ice covered sound that separates the Island from the Peninsula.

Stephenson wrote:

The country on the east side of the sound was similar to that further north, in that it consisted of glaciers and promontories stretching inland as far as one could see. The coast on the other side of the sound, however, was very different. As far as we could see to the north and south a solid wall of mountains confronted us, rising to some 8000 feet. It was not a broad range with summits some distance inland, but a steep-faced ridge running parallel with the shore, from which it rose abruptly. There were a few foothills and bays of ice, but behind there was just a straight wall of bare rock or a slightly less precipitous ice-covered wall. (1938: 184)

George VI Sound is a 500-km-long trench that separates Alexander Island from Palmer Land. It is filled almost throughout its length by George VI Ice Shelf. Unlike most ice shelves, this one flows in two directions from an ice divide. the ice is moving not along the sound but across it. (Swithinbank, 1988, p B113)

Central Alexander Island is characterised by a series of parallel north-south-trending mountain ranges. Summit levels reach about 3,000 m above sea level in the Douglas Range Glacier-filled trenches between the main ridges extend to depths of 500 to 800 m below sea level. Although there are a great many meltwater lakes on low-lying tracts of ice piedmont and on the adjacent ice shelf, there are only two places [on George VI Ice Shelf] where the sea shows through. The 2-by-2-km lake at the northeast end of Dorset Island is one of them; the other can be seen 25 km west of Dorset Island. Sea lakes at the inland boundary of an ice shelf are uncommon, but sea lakes surrounded by ice shelf are very rare. This is a reminder that here, too, we are at the climatic limit of ice shelves. (Swithinbank, 1988, p B117)

A5.3.5 Earlier perceptions

Throughout the book *Southern lights* there are many passages that show the sensitivity of expedition members to their surroundings. One example is quoted. Those making the southern journey down George VI Sound in 1936 were aware of the growing political disturbances at home. Stephenson was preparing to receive a radio time signal, and

happened to hear five minutes of a political speech from Europe. He recorded:

Slowly, however, I became conscious of the things in front of me, and then suddenly I looked up, and the full beauty of my surroundings came upon me as if I had suddenly been transported here. To the east, the silvery mountains cut clearly into a dark blue sky, whilst to the west the ice-covered mountains and glaciers were floodlit by the long rays of the setting sun. ... It made one feel extremely insignificant to see and think of such vast areas untouched by man, and in which man has had no influence whatsoever. (1938: 196-197)

A5.3.6 Fieldwork sheets

Fieldwork sheets were completed for Fossil Bluff in the late-afternoon on 3 March 1997. The weather was cloudy (8 oktas), with especially low cloud on the west side of the Sound. The following statement was made immediately, and is reproduced as originally written:

Fieldwork sheets were completed from the BAS base at Fossil Bluff. It is situated on the eastern edge of Alexander island, overlooking the ice shelf that covers George VI Sound. At this point the edge of Alexander island runs north-south and is formed by peaks reaching 300-600m in height.

To the north, Eros Glacier can be seen descending to the Sound. It is contained by Georgian Cliffs (3 km from the base). To the east lies the Sound, with the Batterbee Mountains (rising to 440m) on the far side, about 25 km away, backed by the plateau (at about 200m distance). To the north of the Batterbee Mountains is the 15 km wide Ryder Glacier.

To the south over a 250m wide strip of moraine is Scarab Bluff, with scree slopes of about 35° which cut off any further view south. To the west, a small side glacier peters out into the moraine.

The magnitude of the Sound is lost due to the relatively low elevation of the base (68.8m), but the western side of the Peninsula provides a seemingly continuous elevational view, always changing under differing light. Falling stones over the scree slopes provide an element of sound in the landscape.

A5.3.7 The buildings

No comment was made on site about the base itself, sometimes known as Bluebell Cottage. It stands just above the permanent ice, a small hut that suggests many of the ideas and ideals about 'true' Antarctic exploration - a compact wooden structure with Aga-type stove, and bunks beside the dining table. Two other timber buildings lie a short

distance away - the food store (referred to as 'Tesco's') and a caboose, used as a further bunk space. The ski-way is on the ice, just over 2 km away along a discernible path, with occasional crevasse markers by the side. Tie-downs for the aeroplanes may be seen against the sky, but look very insignificant in their setting. Even the notorious rubbish dump, dating from an earlier, less enlightened environmental age, was only seen at a distance. Thus man-made features are visible, but would probably rate as 'present but inconspicuous'.

A5.3.8 Fossil Bluff checklists, 3 March 1997

Checklist 2 LANDSCAPE ATTRIBUTES

Scale	Intimate	Small	Large	<u>Vast</u>
Enclosure	Confined	Enclosed	Open	<u>Exposed (to E)</u>
Texture	Smooth	<u>Textured (foreground)</u>	Rough	<u>Very rough (distance)</u>
Form/relief	Vertical	Sloping	Rolling	<u>Flat/horizontal</u>
Line	<u>Straight</u>	Angular	Curved	Sinuous
Colour	Monochrome	<u>Muted</u>	Colourful	Highly coloured

Checklist 3 PERCEPTIONS/IMPRESSIONS

Diversity	Uniform	<u>Simple</u>	Diverse	<u>Complex (distance)</u>
Coherence	<u>Unified</u>	Interrupted	Fragmented	Chaotic
Familiarity	Ordinary	Familiar	Unusual	<u>Striking</u>
Rarity	Predominant	Common	Unusual	<u>Unique (?)</u>
Beauty	Unightly	Unexceptional	Attractive	<u>Spectacular</u>
Security	Comfortable	<u>Safe</u>	Unsettling	Threatening
Wildness	Man-dominated	Man-influenced	Natural	<u>Wild (?)</u>
Management	Obvious			Not obvious

(Feeling that base is 'safe' giving security to extremes of wildness)

A5.3.9 Later responses and questions

On return to Rothera from Fossil Bluff, several queries arose and are presented as then written:

Use of checklist 2 - landscape attributes

- 1 As drafted, will 'scale' always seem to be 'vast'? Will 'enclosure' always be 'exposed'?
- 2 Scale dominates to such a degree that other attributes appear secondary.
- 3 Colour has so far been 'muted' or 'colourful' - in the middle on the range, never at either extremity.

Use of checklist 3 - perceptions/impressions

- 1 'Diversity' - will it always be 'complex'?
- 2 'Coherence' - relevance of term?
- 3 'Familiarity' and 'rarity' - always judged in Antarctic terms, with inevitable influence of background knowledge - ie King George VI Sound is unique and therefore is ranked in this way.
- 4 'Beauty' - all ratings seem to come as 'spectacular' - will it ever be different?

5 'Security' - safety has been so ground in as to become a way of life. Because of the feeling of vulnerability, all landscapes in the Antarctic will surely be classified as 'threatening', but then modified to viewpoint 'safe' but viewed area 'threatening'.

6 All areas are 'wild' except bases, which are 'man influenced' and therefore management is obvious.



Fig A18 Looking east from Fossil Bluff over George VI Ice Shelf. The Batterbee Mountains on the Peninsula are approximately 25 km away.

Fig A19 Watercolour painted on site, from the Fossil Bluff Hut. Looking north across the Eros Glacier.

A5.4 Three day field trip to Stokes Peaks, Adelaide Island, 12-14 March 1997

A5.4.1 Available maps

BAS. 1981. *Geological map of Southern Graham Land. BAS 500G: Sheet 3, Edition 1.* (scale 1:500 000). Cambridge, British Antarctic Survey.

BAS. 1995c. *Rothera Point - Wright Peninsula, Adelaide Island. BAS SCISTAMAP Series, Sheet 1A and 1B.* (scales 1:2000 and 1:50 000).

Moyes, A. B., Willan, C. F. H., Thomson, J. W. and others. 1994. *Geological map of Adelaide Island to Foyn Coast. BAS GEOMAP Series: Sheet 3.* (scale 1:250 000).

A5.4.2 Summary notes (Unofficial names shown in inverted commas)

Two skidoos and one sledge were taken for the three day trip, 12-14 March 1997, by Simon Garrod as General Assistant (GA) and RJC. The normal pattern of linked travel on possibly crevassed areas was GA skidoo - sledge - RJC skidoo.

Exceptions were when extra pulling power was needed on soft snow slopes, when both skidoos were used to tow the sledge.

The route taken was up the 'Ramp', across the 'Traverse' with Reptile Ridge to the west, then northwards across the snowfield of the Wright Peninsula to the McCallum Pass. From there the Shambles Glacier was seen running down to Stonehouse Bay. After we had travelled 6 km SE, camp was made at about 500m above sea level, on the N side of 'Trident Peak', overlooking 'Sunshine Glacier' which discharges down the southern side of Stonehouse Bay.

On the morning of Thursday, 13 March there was whiteout - very little visual contrast (2.5.3) so no travel was possible until late morning. One of the mountains ('Mouse') that makes up Stokes Peaks was climbed, using ski and foot. Long distance views were curtailed by cloud, but these were spectacular in themselves. Lenticular altocumulus lay above the Peaks, ever changing their outline in the wind.

Camp was struck Friday, 14 March and a route taken in very soft snow to the east of 'Trident'. The main snowfield [of the Wright Peninsula] was crossed in a south-westerly direction towards Stork Ridge. A brief diversion was made to the col near the northern end of Reptile Ridge, from where Jenny Island, about 21 km away, was seen framed by the edges of the Ridge. The 'Traverse' was crossed, followed by the descent of the 'Ramp' towards Rothera Base.

The total distance covered by skidoo was approximately 60 km. On the whole, the weather was good, this being the first three-day period of such conditions in over two and a half weeks.

A5.4.3 Immediate response

During the day following return to Rothera, I wrote the following notes:

Safety requirements were obvious and paramount during the trip. There had to be full confidence in the GA - 'looking' was possible because of this confidence in personal safety. The need for precision in route selection, taking of bearings etc became clear, as difficulties - some would say hostilities - were always present. There was always the possibility that weather conditions would change.

In one sense the landscape was familiar, because certain features such as Reptile Ridge were known, but the effects of light in the landscape challenged the familiarity. Throughout the three days 'aesthetic' appreciation was always possible, except perhaps during whiteout. Weather and clouds were indivisible from appreciation of the land, with the weather accentuating parts of the landscape. The GA commented that he had never really 'seen' one buttress before, although he had passed it on previous occasions. Cloud had isolated it from the rest of the peak and highlighted the feature, bringing it to his attention. The clouds were indivisible from the landscape, as they gave a continuously changing light pattern to the surface of the snow and rock.

In two and a half years on the Peninsula, the GA had only once been able to give a completely cloud-free weather observation. Arising from this was the question: Is cloud/weather as variable elsewhere on the continent? As a guide, the two diaries of Edward Wilson (1966, 1972) were scanned, which together included about 96 illustrations of Wilson's sketches and watercolours of polar landscapes in the area of the Ross Sea, Transantarctic Mountains and Victoria Land - the 'other' side of the continent. Only 14 of the 96 had an even sky, with no suggestion of cloud or variable weather, so 85% of Wilson's carefully observed work included some reference to weather. This can only be taken as an approximation, but it indicates the significance of the phenomena. A further spread of comments are in the various diaries, from which it may be concluded that weather was always of importance.

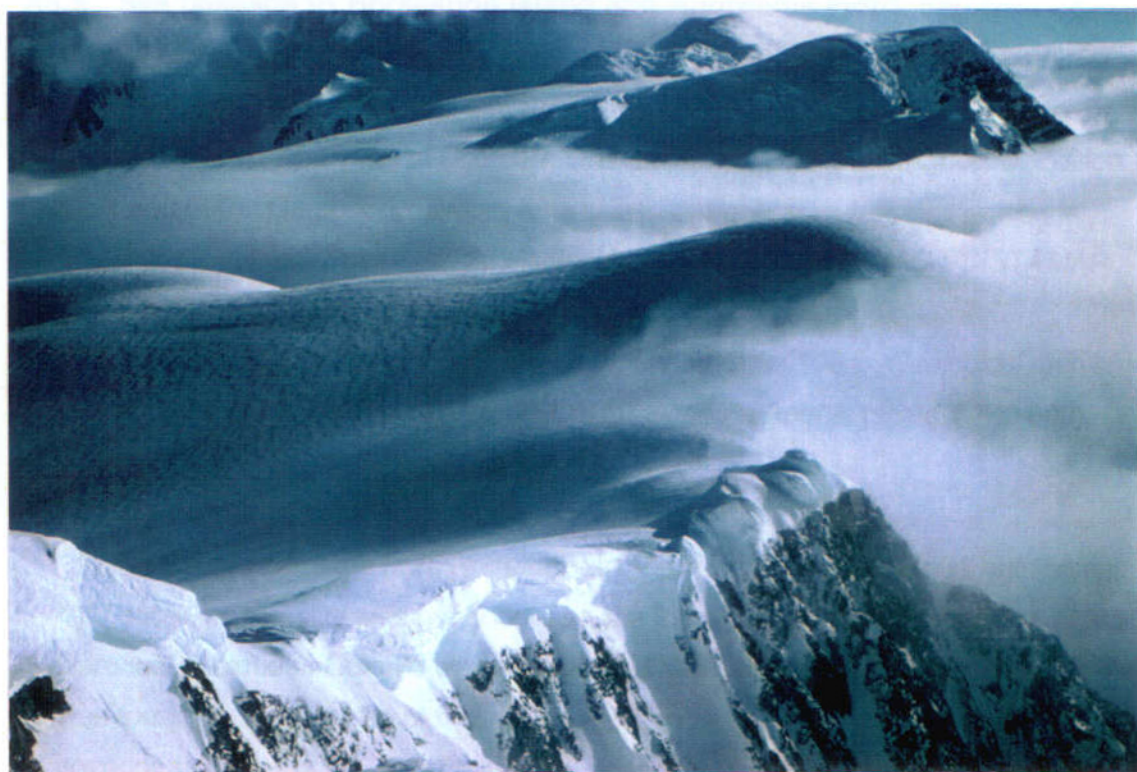


Fig A20 Looking west and north from 'Mouse', Western Stokes Peaks.

Fig A21 Travelling south-west across the Wright Peninsula. Reptile Ridge is to the far left, with Stork Ridge in the centre distance.

A5.5 Sea passage to Horseshoe Island and Bourgeois Fjord, Fallières Coast, 24 March 1997

A5.5.1 Available maps

BAS. 1981. *Geological map of Southern Graham Land. BAS 500G: Sheet 3, Edition 1.* (scale 1:500 000). Cambridge, British Antarctic Survey.

BAS. 1995c. *Rothera Point - Wright Peninsula, Adelaide Island. BAS SCISTAMAP Series, Sheet 1A and 1B.* (scales 1:2000 and 1:50 000).

Moyes, A. B., Willan, C. F. H., Thomson, J. W. and others. 1994. *Geological map of Adelaide Island to Foyn Coast. BAS GEOMAP Series: Sheet 3.* (scale 1:250 000).

A5.5.2 Description

On the sea passage from Rothera Point there was much low cloud, with some light snow, so visibility was not good, and the top of peaks on Pourquoi Pas Island were lost in clouds. Colours were very muted and subdued. In places, new sea ice was forming. Steep faces of mountains were snow free, with glaciers and snow covering gentler slopes. The immediate response was one of hostility, difficulty of access and precarious terrain.

Entrance to Bourgeois Fjord: Ridge Island (true to name) was visible, with scree at foot of slopes. Blaiklock Island was seen in the distance, but was indistinguishable from Pourquoi Pas Island, Arrowsmith Peninsula and mainland. A glacier on the northern end of Blaiklock Island was highlighted by weak sunlight. Mount Cyril, on Horseshoe Island, was seen as a triangular peak, light grey against a slightly darker grey sky. Rock exposed on protected northern faces contrasted with the snow-covered southern slopes and snow-covered ridges.

Pourquoi Pas Island, rising to over 1600m is seen as a mountainous mass on a vast scale, its southern faces snow and ice covered, with glaciers falling down to sea level between the ridges. Fringed by sea, it appears inaccessible, with the roughness of the rock relieved by the smoothness of the glaciers and the upper slopes of the ice fringe.

Ridge Island which lies at the east end of the fjord is aptly named. Its northwest facing slopes are scree fringed, whilst its SE aspect is predominantly snow and ice covered, with only the very steepest slopes remaining bare. Horseshoe Island offers an immediate contrast. The low ridge which forms the southern edge to the Cove at least offers the possibility of landing. It is backed by the higher hills of the island, which rises to 823m. Mount Cyril, visible from a distance, rises more gently with sweeping snowfields forming its lower slopes.

A5.5.3 Horseshoe Island checklists, 24 March 1997

Checklist 2	LANDSCAPE ATTRIBUTES			
Scale	Intimate	Small	Large	<u>Vast</u>
Enclosure	Confined	Enclosed	Open	<u>Exposed</u>
Texture	Smooth	Textured	<u>Rough</u>	Very rough
Form/relief	Vertical	<u>Sloping</u>	Rolling	Flat/horizontal
Line	Straight	<u>Angular</u>	Curved	Sinuous
Colour	<u>Monochrome</u>	Muted	Colourful	Highly coloured
Checklist 3	PERCEPTIONS/IMPRESSIONS			
Diversity	Uniform	<u>Simple</u>	Diverse	Complex
Coherence	Unified	<u>Interrupted</u>	Fragmented	Chaotic
Familiarity	Ordinary	<u>Familiar</u>	Unusual	Striking
Rarity	Predominant	<u>Common</u>	Unusual	Unique
Beauty	Unightly	Unexceptional	Attractive	<u>Spectacular</u>
Security	Comfortable	Safe	Unsettling	<u>Threatening</u>
Wildness	Man-dominated	Man-influenced	Natural	<u>Wild</u>
Management	Obvious			<u>Not obvious</u>



Fig A22

Polaroid photograph of the south-west corner of Pourquoi Pas Island.

Taken from the bridge of *RRS Bransfield*, with added notes.

A5.5.4 Passage to Loubet Coast

Following the visit to Horseshoe Island, *Bransfield* took the outer passage to the south and west of Adelaide Island, so as to reach the Loubet Coast. Weather conditions were worsening, and in the dusk low cloud could be seen sweeping across the rising ground of the Fuchs Ice Piedmont (Figure A23).

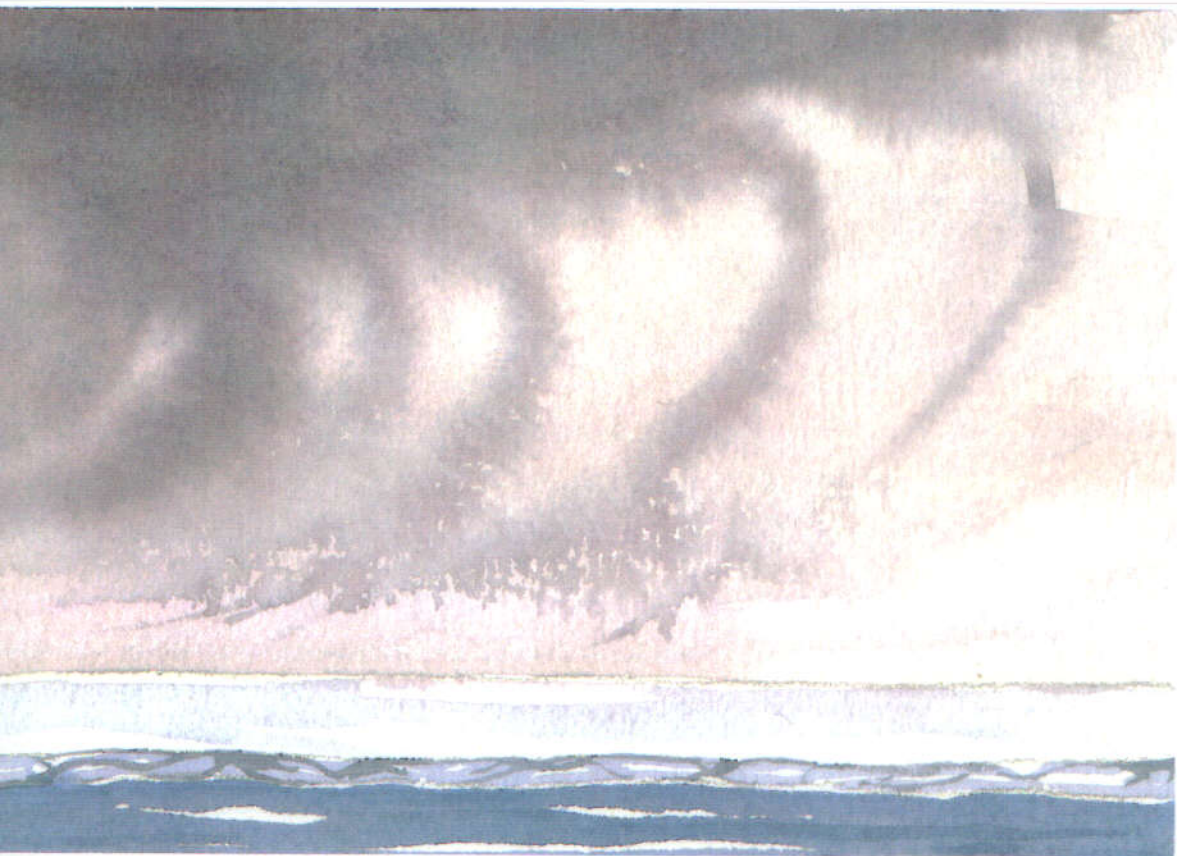


Fig A23 Watercolour of the Fuchs Ice Piedmont.

Painted from RRS *Bransfield*.

A5.6 Orford Cliff, Loubet Coast, 25 March 1997

A5.6.1 Available maps

BAS. 1981. *Geological map of Southern Graham Land. BAS 500G: Sheet 3, Edition 1.* (scale 1:500 000). Cambridge, British Antarctic Survey.

Moyes, A. B., Willan, C. F. H., Thomson, J. W. and others. 1994. *Geological map of Adelaide Island to Foyn Coast. BAS GEOMAP Series: Sheet 3.* (scale 1:250 000).

A5.6.2 Description

Weather conditions were not good, as there was low cloud with both poor visibility and contrast. Colours were muted, the strongest being the the blue of the ice, and the brownish grey of the exposed rock.

A prominent cliff of plutonic intrusion on the east side of Lallemand Fjord. The lower snow-covered slopes form a rolling edge and are backed by mountains which gradually rise over a distance of 40 km to the Avery Plateau (2000m). To the north of Orford Cliff, a much fractured glacier runs to the sea. To the south, the land rises, forming a higher edge to the Fjord. Because of the enclosure given by the bay, the scale, though large, is less than the vast spectacle presented by 360° views. The chaotic texture of the adjacent glacier contrasts with the smooth curved lines of the slopes near the Cliff. By Antarctic standards, it is both diverse and familiar - diverse because of the different features, but familiar because they are all frequent features of this part of the Antarctic.

Considerations of security become more complex; the chaos of the glacier contrasts with the shelving rocky beach. Sea conditions cannot be excluded. New ice was forming, and the wind was blowing both brash and bergs into the bay. This ice was predominantly of glacier origin, and therefore much older and harder than sea ice, and to the mariner a greater hazard. Bergs were seen to move because of the brisk wind.

As we left Orford Cliff at about 1830 hours, the dominant spectacle was ice. It was forming and at that stage was translucent rafts many metres in diameter, with areas of pancake ice. To port, Detaille Island was fog covered. Minke whales showed themselves in the failing light.

A5.6.3 Orford Cliff checklists, 25 March 1997

Checklist 2	LANDSCAPE ATTRIBUTES			
Scale	Intimate	Small	<u>Large</u>	Vast
Enclosure	Confined	Enclosed	<u>Open</u>	Exposed
Texture	<u>Smooth</u>	Textured	Rough	<u>Very rough</u>
Form/relief	Vertical	Sloping	<u>Rolling</u>	Flat/horizontal

Line	Straight	Angular	<u>Curved</u>	Sinuuous
Colour	Monochrome	<u>Muted</u>	Colourful	Highly coloured
Checklist 3	PERCEPTIONS/IMPRESSIONS			
Diversity	Uniform	Simple	<u>Diverse</u>	Complex
Coherence	Unified	<u>Interrupted</u>	Fragmented	Chaotic
Familiarity	Ordinary	<u>Familiar</u>	Unusual	Striking (<i>by A. standards</i>)
Rarity	Predominant	Common	Unusual	Unique (<i>can't assess</i>)
Beauty	Unightly	Unexceptional	<u>Attractive</u>	Spectacular
Security	Comfortable	Safe	<u>Unsettling</u>	Threatening
Wildness	Man-dominated	Man-influenced	Natural	<u>Wild</u>
Management	Obvious			<u>Not obvious</u>



Fig A24 Watercolour of Orford Cliff.

Painted from RRS *Bransfield*.

A5.7 Detaille Island, Loubet Coast, 26 March 1997

A5.7.1 Available maps

BAS. 1981. *Geological map of Southern Graham Land. BAS 500G: Sheet 3, Edition 1.* (scale 1:500 000). Cambridge, British Antarctic Survey.

Moyes, A. B., Willan, C. F. H., Thomson, J. W. and others. 1994. *Geological map of Adelaide Island to Foyn Coast. BAS GEOMAP Series: Sheet 3.* (scale 1:250 000).

A5.7.2 Description

Base W was used by FIDS in the 1950s and the buildings act as the focal point for visitors. They are situated on Detaille Island, a small, low island at the mouth of Lallemand Fjord, approximately 10 km from the Arrowsmith Peninsula and 25 km from the mainland. The larger and higher Andresson Island lies 3 km to the SSE. The scale of the immediate landscape is small - a series of snow covered slopes utilised for the Base, with many artifacts remaining to give reminders of a past era. Dog lines and a separate puppy hut remain, with the main Base and other small buildings. A small colony of penguins, possibly Adélie and/or Gentoos, could be seen in the distance.

A5.7.3 Detaille Island checklists, 26 March 1997

Checklist 2 LANDSCAPE ATTRIBUTES

Scale	Intimate	<u>Small</u>	Large	Vast
Enclosure	Confined	Enclosed	<u>Open</u>	Exposed
Texture	<u>Smooth</u>	Textured	Rough	Very rough
Form/relief	Vertical	Sloping	<u>Rolling</u>	Flat/horizontal
Line (not applicable)	Straight	Angular	Curved	Sinuuous
Colour	Monochrome	<u>Muted</u>	Colourful	Highly coloured

Checklist 3 PERCEPTIONS/IMPRESSIONS

Diversity	Uniform	<u>Simple</u>	Diverse	Complex
Coherence	Unified	<u>Interrupted</u>	Fragmented	Chaotic
Familiarity	Ordinary	Familiar	<u>Unusual</u>	Striking
Rarity	Predominant	Common	<u>Unusual</u>	Unique
Beauty	Unsightly	<u>Unexceptional</u>	Attractive	Spectacular
Security	Comfortable	<u>Safe</u>	Unsettling	Threatening
Wildness	Man-dominated	<u>Man-influenced</u>	Natural	Wild
Management	Obvious			Not obvious



Fig A25 **Base W, Detaille Island** looking towards Crystal Sound.

A5.8 Sea passage from Detaille Island to the Argentine Islands, 26 March 1997

A5.8.1 Available maps

BAS. 1981. *Geological map of Southern Graham Land. BAS 500G: Sheet 3, Edition 1.* (scale 1:500 000). Cambridge, British Antarctic Survey.

A5.8.2 Description

26 March 1997, 1735 hours, heading NW to take the outer passage to the west of the Biscoe Islands to the Argentine Islands. Various indistinguishable islands seen on the starboard. They are rounded, snow covered, with ice cliffs reaching the sea. Very occasionally the snow slope seemed to reach the sea (without an ice cliff), but at this distance detail is not clear [Figures A26 and A27, on following page]. The massive spine of the Peninsula extends, seemingly to infinity, some peaks picked out by sunlight, others in shadow or merging into the clouds. The cloud pattern changes over the islands, presumably because of temperature changes between sea and land masses covered by ice.

In a personal communication, Swithinbank commented that the ice-covered islands on the west coast of the Peninsula between Anvers Island and Adelaide Island are a flooded version of a Norwegian strandflat. The glaciated landscape has been smoothed down to under 100m and is sometimes dissected by fjords.

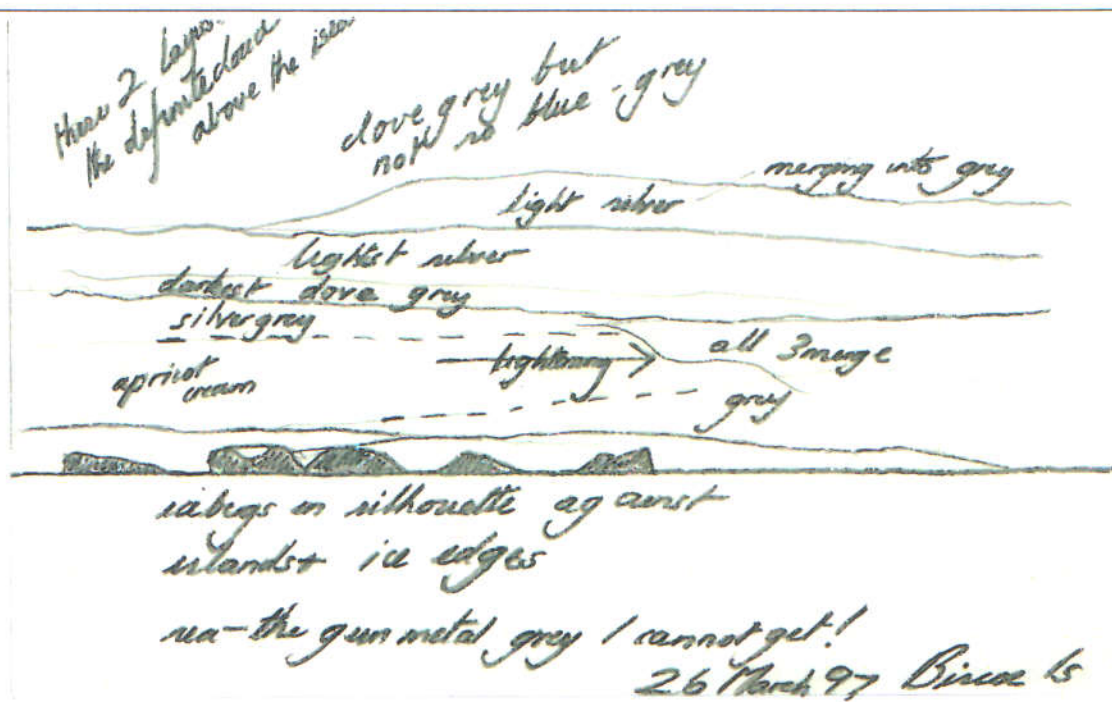


Fig A26 Pencil sketch of Biscoe Islands made from RRS *Bransfield*.

Fig A27 Watercolour of Biscoe Islands worked up in UK from sketch.

A5.9 Argentine Islands, Graham Coast, 27 March 1997

A5.9.1 Available map

BAS. 1981. *Geological map of Southern Graham Land. BAS 500G: Sheet 3, Edition 1.* (scale 1:500 000). Cambridge, British Antarctic Survey.

A5.9.2 Earlier descriptions

On February 8, 1909, the French explorer Charcot explored the islands: 'Passing close to icebergs of strange and graceful shape, we reach without difficulty the first of the Argentine Islands, and after climbing to its summit we proceed to that which lies most to the south. This very picturesque group of islands is composed of rocks of various colours, grey, red, or black, sometimes even green through the thick covering of moss upon them.' (this edition 1978, p 147)

The BGLE Gypsy Moth was flown from the Argentine Islands southwards and Rymill described the coastline of the Peninsula:

... even the promontories were fringed with narrow glaciers ending in ice-cliffs. Further into the bays these narrow glaciers gave place to broad crevassed ones or to rocky cliffs where the mountains came to the water's edge. The back of the bays terminated in steep valley glaciers which flowed down from a large glacier running parallel to and at the foot of the great plateau scarp. (1938: 57)

A5.9.3 Description

27 March, 0840 hours. Sunrise about an hour ago. Overcast above, but lighter nearer the horizon. The spine of the Peninsula runs approximately NE-SW and is seen as steep faced rocky cliffs falling towards the sea. Snow clings to the rock, especially on the south-facing elevations. The snowfield of the plateau is seen between the peaks with broken glaciers running down to the sea. The Argentine Islands rise to a maximum height of about 65m, and contrast with the steepness of the Peninsula. It appears that a geological fault lies between the mainland and the islands. Rock may be seen all over the islands, but many are now covered by snow which smooth out angularities. As always, light and floating ice contribute to the view. The aspect is always changing due to the clouds and mist, and the occasional flurry of snow. Sea ice is just beginning to form, and in still waters brash, including some blue glacier ice collects in drifts across the channel.

Possibly applicable to all parts of the Antarctic Peninsula, but being written on Argentine Islands - Wind sculpts the snow into flowing forms, not only in its initial fall, but when undercutting edges of snow banks. These forms, continuously changing,

sometimes as they are being watched, can be seen as having aesthetic value. In addition, the sky with its continuously changing colours (within a palette, but certainly not limited) back these areas.

A5.9.4 Argentine Islands checklists, 27 March 1997

Checklist 2 LANDSCAPE ATTRIBUTES

Scale	Intimate	Small	<u>Large</u>	Vast
Enclosure	Confined	<u>Enclosed (to E)</u>	<u>Open (to N)</u>	Exposed
Texture	Smooth	<u>Textured (to N)</u>	Rough	<u>Very rough (to E)</u>
Form/relief	<u>Vertical (to E)</u>	<u>Sloping</u>	Rolling	<u>Flat/horizontal</u>
Line	Straight	<u>Angular (to E)</u>	Curved	Sinuous (to N)
Colour	Monochrome	<u>Muted</u>	Colourful	Highly coloured

Checklist 3 PERCEPTIONS/IMPRESSIONS

Diversity	Uniform	Simple	<u>Diverse</u>	Complex
Coherence	Unified	<u>Interrupted</u>	Fragmented	Chaotic
Familiarity	Ordinary	<u>Familiar</u>	Unusual	Striking
Rarity	Predominant	Common	Unusual	Unique (can't assess)
Beauty	Unightly	Unexceptional	Attractive	<u>Spectacular</u>
Security	Comfortable	<u>Safe (to N)</u>	Unsettling	<u>Threatening (to E)</u>
Wildness	Man-dominated	<u>Man-influenced</u>	Natural	<u>Wild (to E)</u>
Management	Obvious			Not obvious



Fig A28

Watercolour of Stella Creek, Argentine Islands worked up in UK from photograph.

A5.10 Lemaire Channel, Graham Coast, 27 March 1997 (see also Figure 19)

A5.10.1 Available map

BAS. 1981. *Geological map of Southern Graham Land. BAS 500G: Sheet 3, Edition 1.* (scale 1:500 000). Cambridge, British Antarctic Survey.

A5.10.2 Earlier descriptions

The Lemaire Channel is to the Peninsula as Pulls Ferry is to Norwich or King's College Chapel to Cambridge - seemingly the most photographed and described location, used on Christmas cards (BAS, nd); post cards (BAS, nd); book covers (printed back-to-front, presumably to aid graphic design of cover, on Snyder and Shackleton, 1986); book illustrations (numerous, eg Rymill, 1938: 58; King, 1969: plate 9; Snyder and Shackleton, 1986: 64), paintings (Edward Seago and David Smith, chapter 2, section 2.8.11), postage stamps and first day covers (Ukraine, received 1997). This list is only a short selection - the reasons for, and manifestations of, its popularity deserves a fuller study.

'... spectacularly beautiful Lemaire Channel' (Daily programme note for 7 December 1980, MS *World Discoverer* on tourist cruise to the Peninsula)

'Scores of different places, both in the Peninsula and the Ross Sea, have been suggested as the most beautiful landscape in Antarctica. Not for nothing does the Lemaire Channel find itself high on everybody's list.' (Snyder and Shackleton, 1986: 64)

A5.10.3 Description

In the late afternoon passage was made northwards from Penola Strait, past Petermann Island to the Lemaire Channel and through to more open sea past Cape Renard. Weather and light conditions were poor - wind, driving snow, cloud, low temperatures.

The snow-covered islands to the west contrast with the steep rocky cliffs of the Graham Coast to the east. Views are channelled and confined and limited to looking down the guided vista. From the south there appear to be two 'entrances'; the first marked by the smooth snow covered islands to the left and the crag to the right, and the second by two buttresses of snow. Then the near-vertical walls of the Channel are seen with the hanging glaciers and huge buttresses of snow, all at seemingly impossible angles.

The feeling of confinement is suddenly relieved by the opening out of Deloncle Bay to the east. On the west, Wandel Peak on Booth Island drops down to a smooth, sinuous slope before rising again to Clery Peak at the northern end of the island. False

Cape Renard loomed out of the snow and cloud, shortly to be followed by the true Cape Renard (747m). Some of the drama was lost, due to the peaks being covered by cloud but the sheerness of the pillars was still obvious. After the confinement of the Channel, Flandres Bay to the east seems huge, and the openness of the sea also contrasts with the previous constrictions.

The Lemaire Channel presents contrasts not always seen so strongly in the Antarctic - smoothness and ruggedness, but especially constriction and space. This sense of enclosure is different. When passing between two icebergs, or through passages between small islands, there may be a feeling of enclosure, but it is transitory.

A5.10.4 Passage to the South Shetlands

The next port-of-call was to be the South Shetland Islands. Light conditions were so poor by the end of the Lemaire Channel, that the outer passage to the west of Anvers Island was taken, rather than the Neumayer Channel followed by the Gerlache Strait.

A5.10.5 Lemaire Channel checklists, 27 March 1997

Checklist 2 LANDSCAPE ATTRIBUTES

Scale	Intimate	Small	Large	Vast
Enclosure	<u>Confined*</u>	<u>Enclosed*</u>	<u>Open*</u>	Exposed
Texture	<u>Smooth (to W)</u>	Textured	Rough	<u>Very rough (to E)</u>
Form/relief	<u>Vertical (to W)</u>	Sloping	<u>Rolling (to E)</u>	Flat/horizontal
Line	Straight	<u>Angular (to E)</u>	<u>Curved (to W)</u>	Sinuuous
Colour	Monochrome	Muted	Colourful	Highly coloured

* At different points along the Channel

Checklist 3 PERCEPTIONS/IMPRESSIONS

Diversity	Uniform	Simple	Diverse	<u>Complex</u>
Coherence	Unified	Interrupted	<u>Fragmented</u>	Chaotic
Familiarity	Ordinary	Familiar	Unusual	<u>Striking</u>
Rarity	Predominant	Common	Unusual	<u>Unique</u>
Beauty	Unightly	Unexceptional	Attractive	<u>Spectacular</u>
Security	Comfortable	Safe	Unsettling	<u>Threatening</u>
Wildness	Man-dominated	Man-influenced	Natural	<u>Wild</u>
Management	Obvious			<u>Not obvious</u>

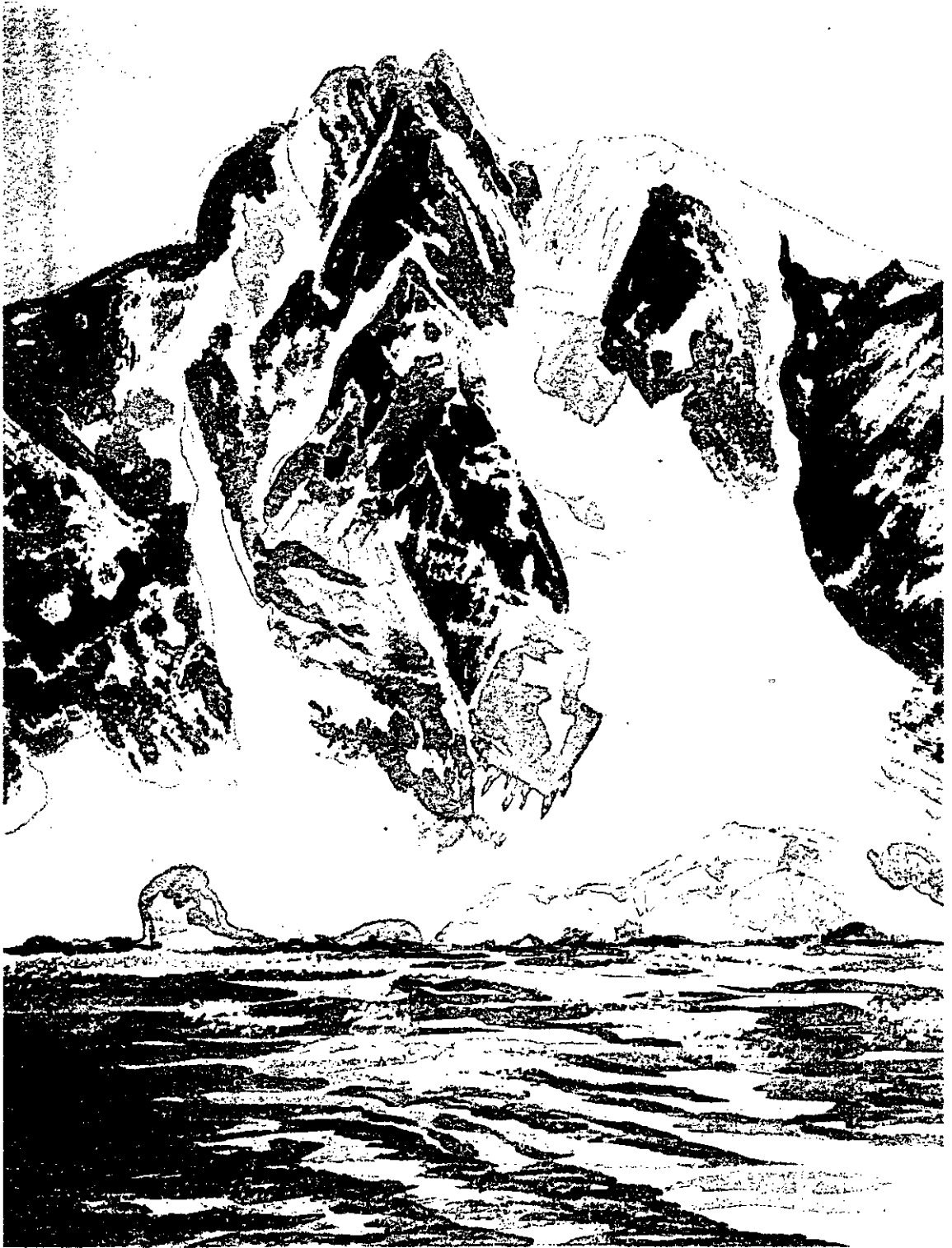


Fig A29 Watercolour of cliff face in the Lemaire Channel worked up in UK from photograph.

A5.11 South Shetland Islands, particularly King George Island, 28 March 1997

A5.11.1 Available map

BAS. 1979. *Geological map of Northern Graham Land and South Shetland Islands.*

BAS 500G: Sheet 2, Edition 1. (scale 1:500 000). Cambridge, British Antarctic Survey.

A5.11.2 Geology

The islands of the group are essentially part of the Scotia Ridge, being composed largely of Jurassic to Tertiary volcanic and sedimentary rocks associated with lines of structural weakness. Volcanic activity has continued through the Quaternary on a smaller scale, and in recent centuries Bridgeman Island and Deception Island have experienced eruptions. Areas of alpine relief are limited to parts of Livingston Island and Greenwich Island, and for the most part the landscapes are dominated by low ice domes fringed at the coastline by ice cliffs. There are a few nunataks in the interiors of the islands, but the most extensive ice-free areas are Byers Peninsula (c. 66 km square) on Livingston Island, and Fildes Peninsula (c. 60 km square) and Barton Peninsula (c. 15 km square) on King George Island. There are many other small ice-free peninsulas, headlands and islands scattered around the the coasts, while the exposed northern shores are characterized by a wide belt of skerries. Below an altitude of 120m on the major ice-free peninsulas the dominant landscape features are extensive erosion surfaces and ancient marine clifflines; the latter are often 30m high. (John, 1972, p 76)

A5.11.3 Earlier descriptions

General descriptions may be found in Nordenskjöld (originally published in English in 1905), Hardy (1967) and Campbell (1992). The last two, both biologists, appreciated the South Shetlands greatly - 'the prettiest place in the Antarctic' (Campbell, 1992, p 5) and wrote graphically about the islands. As one of the early explorers, Nordenskjöld approached the region with very different feelings. On first seeing King George Island he wrote:

The overpowering feelings cannot be described which were awakened in me when this long-wished-for land thus suddenly rose before my view. So rapid was the transition, from a vision of sea alone to this of ice-bound land, that my first impression necessarily was, that a loneliness and a wildness reigned here such as could, perhaps, be found nowhere else on earth; I experienced the same feeling of helplessness as when one stands alone and deserted amidst mighty

forces of Nature. (1905, p 24-25)

A5.11.4 Description

Seen in the late afternoon, on a dull day, the overall impression was of the lowness of the islands and the contrast between the exposed rock - a greenness not seen before on this visit to the Antarctic - and the ice and snow. The rock stacks coming from the sea are seen against the snow-covered hills, although the snow seems thin, allowing patterns to come through. Comment was made independently by two individuals that the pattern seemed to be of fields, one adding that it was like the northern moors. Closer, it is seen to be ice. The most monochrome of all sites. A comment heard in the early days of this study came to mind: 'A dirty bunch of islands'.

A5.11.5 King George Island checklists, 28 March 1997

Checklist 2 LANDSCAPE ATTRIBUTES

Scale	Intimate	<u>Small</u>	Large	Vast
Enclosure	Confined	<u>Enclosed (bay)</u>	<u>Open (hill behind)</u>	Exposed
Texture	Smooth	<u>Textured (hill)</u>	<u>Rough (rock to W)</u>	Very rough
Form/relief	Vertical	Sloping	<u>Rolling</u>	Flat/horizontal
Line	Straight	Angular	<u>Curved</u>	Sinuuous
Colour	<u>Monochrome</u>	Muted	Colourful	Highly coloured

(most monochrome of all sites, until close at hand, then olive greenness of gently faceted slopes)

Checklist 3 PERCEPTIONS/IMPRESSIONS

Diversity	Uniform	<u>Simple</u>	Diverse	Complex
Coherence	Unified	<u>Interrupted</u>	Fragmented	Chaotic
Familiarity	Ordinary	Familiar	<u>Unusual</u>	Striking
Rarity	Predominant	Common	Unusual	Unique
Beauty	Unsightly	<u>Unexceptional</u>	Attractive	Spectacular
Security	Comfortable	<u>Safe</u>	Unsettling	Threatening
Wildness	Man-dominated	Man-influenced	<u>Natural (apparently)</u>	Wild
Management	Obvious			Not obvious

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1 Referencing by acronyms has been used for:

Antarctic Treaty Consultative Parties - ATCPs

British Antarctic Survey - BAS

International Union for the Conservation of Nature and Natural Resources - IUCN

Scientific Committee on Antarctic Research - SCAR

2 Comments are made in the text about difficulties in referencing two sets of documents. British reports on landscape assessment have been referenced under Countryside Commission and Countryside Commission for Scotland rather than the consultant's name. American reports have been referenced under Bureau of Land Management, Forest Service or Soil Conservation Service and have not been prefixed with titles such as *United States Department of Agriculture*.

3 Up to 1981, my own papers are referenced under my maiden name of Reich. From 1982, they are under my married name of Codling.

4 If relevant, original date of publishing is given in brackets thus {1904}.

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**Annex V Area Protection and Management
to the 1991 Protocol on Environmental Protection to the Antarctic Treaty.**

Reproduced from *SCAR Bulletin* 110: 17-20. (July, 1993).

**ANNEX V
TO THE PROTOCOL ON ENVIRONMENTAL PROTECTION TO THE ANTARCTIC TREATY
AREA PROTECTION AND MANAGEMENT**

**ARTICLE 1
DEFINITIONS**

For the purposes of this Annex:

- (a) "appropriate authority" means any person or agency authorized by a Party to issue permits under this Annex;
- (b) "permit" means a formal permission in writing issued by an appropriate authority;
- (c) "Management Plan" means a plan to manage the activities and protect the special value or values in an Antarctic Specially Protected Area or an Antarctic Specially Managed Area.

ARTICLE 2
OBJECTIVES

For the purposes set out in this Annex, any area, including any marine area, may be designated as an Antarctic Specially Protected Area or an Antarctic Specially Managed Area. Activities in those Areas shall be prohibited, restricted or managed in accordance with Management Plans adopted under the provisions of this Annex.

ARTICLE 3

ANTARCTIC SPECIALLY PROTECTED AREAS

Any area, including any marine area, may be designated as an Antarctic Specially Protected Area to protect outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research. Parties shall seek to identify, within a systematic environmental-geographical framework, and to include in the series of Antarctic Specially Protected Areas:

- (a) areas kept inviolate from human interference so that future comparisons may be possible with localities that have been affected by human activities;
- (b) representative examples of major terrestrial, including glacial and aquatic, ecosystems and marine ecosystems;
- (c) areas with important or unusual assemblages of species, including major colonies of breeding native birds or mammals;
- (d) the type locality or only known habitat of any species;
- (e) areas of particular interest to on-going or planned scientific research;
- (f) examples of outstanding geological, glaciological or geomorphological features;
- (g) areas of outstanding aesthetic and wilderness value;
- (h) sites or monuments of recognized historic value; and
- (i) such other areas as may be appropriate to protect the values set out in paragraph 1 above.

Specially Protected Areas and Sites of Special Scientific Interest designated as such by past Antarctic Treaty Consultative Meetings are hereby designated as Antarctic Specially Protected Areas and shall be renamed and renumbered accordingly.

Entry into an Antarctic Specially Protected Area shall be prohibited except in accordance with a permit issued under Article 7.

ARTICLE 4

ANTARCTIC SPECIALLY MANAGED AREAS

Any area, including any marine area, where activities are being conducted or may in the future be conducted, may be designated as an Antarctic Specially Managed Area to assist in the planning and co-ordination of activities, avoid possible conflicts, improve co-operation between Parties or minimize environmental impacts.

2. Antarctic Specially Managed Areas may include:
 - (a) areas where activities pose risks of mutual interference or cumulative environmental impacts; and
 - (b) sites or monuments of recognized historic value.
3. Entry into an Antarctic Specially Managed Area shall not require a permit.
4. Notwithstanding paragraph 3 above, an Antarctic Specially Managed Area may contain one or more Antarctic Specially Protected Areas, entry into which shall be prohibited except in accordance with a permit issued under Article 7.

ARTICLE 5

MANAGEMENT PLANS

1. Any Party, the Committee, the Scientific Committee for Antarctic Research or the Commission for the Conservation of Antarctic Marine Living Resources may propose an area for designation as an Antarctic Specially Protected Area or an Antarctic Specially Managed Area by submitting a proposed Management Plan to the Antarctic Treaty Consultative Meeting.
2. The area proposed for designation shall be of sufficient size to protect the values for which the special protection or management is required.
3. Proposed Management Plans shall include, as appropriate:
 - (a) a description of the value or values for which special protection or management is required;
 - (b) a statement of the aims and objectives of the Management Plan for the protection or management of those values;
 - (c) management activities which are to be undertaken to protect the values for which special protection or management is required;
 - (d) a period of designation, if any;
 - (e) a description of the area, including:
 - (i) the geographical co-ordinates, boundary markers and natural features that delineate the area;
 - (ii) access to the area by land, sea or air including marine approaches and anchorages, pedestrian and vehicular routes within the area, and aircraft routes and landing areas;
 - (iii) the location of structures, including scientific stations, research or refuge facilities, both within the area and near to it; and
 - (iv) the location in or near the area of other Antarctic Specially Protected Areas or Antarctic Specially Managed Areas designated under this Annex, or other protected areas designated in accordance with measures adopted under other components of the Antarctic Treaty System;
 - (f) the identification of zones within the area, in which activities are to be prohibited, restricted or managed for the purpose of achieving the aims and objectives referred to in subparagraph (b) above;

- (g) maps and photographs that show clearly the boundary of the area in relation to surrounding features and key features within the area;
- (h) supporting documentation;
- (i) in respect of an area proposed for designation as an Antarctic Specially Protected Area, a clear description of the conditions under which permits may be granted by the appropriate authority regarding:
 - (i) access to and movement within or over the area;
 - (ii) activities which are or may be conducted within the area, including restrictions on time and place;
 - (iii) the installation, modification, or removal of structures;
 - (iv) the location of field camps;
 - (v) restrictions on materials and organisms which may be brought into the area;
 - (vi) the taking of or harmful interference with native flora and fauna;
 - (vii) the collection or removal of anything not brought into the area by the permit holder;
 - (viii) the disposal of waste;
 - (ix) measures that may be necessary to ensure that the aims and objectives of the Management Plan can continue to be met; and
 - (x) requirements for reports to be made to the appropriate authority regarding visits to the area;
- (j) in respect of an area proposed for designation as an Antarctic Specially Managed Area, a code of conduct regarding:
 - (i) access to and movement within or over the area;
 - (ii) activities which are or may be conducted within the area, including restrictions on time and place;
 - (iii) the installation, modification, or removal of structures;
 - (iv) the location of field camps;
 - (v) the taking of or harmful interference with native flora and fauna;
 - (vi) the collection or removal of anything not brought into the area by the visitor;
 - (vii) the disposal of waste; and
 - (viii) any requirements for reports to be made to the appropriate authority regarding visits to the area; and
- (k) provisions relating to the circumstances in which Parties should seek to exchange information in advance of activities which they propose to conduct.

ARTICLE 6

DESIGNATION PROCEDURES

1. Proposed Management Plans shall be forwarded to the Committee, the Scientific Committee on Antarctic Research and, as appropriate, to the Commission for

the Conservation of Antarctic Marine Living Resources. In formulating its advice to the Antarctic Treaty Consultative Meeting, the Committee shall take into account any comments provided by the Scientific Committee on Antarctic Research and, as appropriate, by the Commission for the Conservation of Antarctic Marine Living Resources. Thereafter, Management Plans may be approved by the Antarctic Treaty Consultative Parties by a measure adopted at an Antarctic Treaty Consultative Meeting in accordance with Article IX(1) of the Antarctic Treaty. Unless the measure specifies otherwise, the Plan shall be deemed to have been approved 90 days after the close of the Antarctic Treaty Consultative Meeting at which it was adopted, unless one or more of the Consultative Parties notifies the Depositary, within that time period, that it wishes an extension of that period or is unable to approve the measure.

2. Having regard to the provisions of Articles 4 and 5 of the Protocol, no marine area shall be designated as an Antarctic Specially Protected Area or an Antarctic Specially Managed Area without the prior approval of the Commission for the Conservation of Antarctic Marine Living Resources.
3. Designation of an Antarctic Specially Protected Area or an Antarctic Specially Managed Area shall be for an indefinite period unless the Management Plan provides otherwise. A review of a Management Plan shall be initiated at least every five years. The Plan shall be updated as necessary.
4. Management Plans may be amended or revoked in accordance with paragraph 1 above.
5. Upon approval Management Plans shall be circulated promptly by the Depositary to all Parties. The Depositary shall maintain a record of all currently approved Management Plans.

ARTICLE 7

PERMITS

1. Each Party shall appoint an appropriate authority to issue permits to enter and engage in activities within an Antarctic Specially Protected Area in accordance with the requirements of the Management Plan relating to that Area. The permit shall be accompanied by the relevant sections of the Management Plan and shall specify the extent and location of the Area, the authorized activities and when, where and by whom the activities are authorized and any other conditions imposed by the Management Plan.
2. In the case of a Specially Protected Area designated as such by past Antarctic Treaty Consultative Meeting which does not have a Management Plan, the appropriate authority may issue a permit for a compelling scientific purpose which cannot be served elsewhere and which will not jeopardize the natural ecological system in that Area.
3. Each Party shall require a permit-holder to carry a copy of the permit while in the Antarctic Specially Protected Area concerned.

ARTICLE 8

HISTORIC SITES AND MONUMENTS

1. Sites or monuments of recognized historic value which have been designated as Antarctic Specially Protected Areas or Antarctic Specially Managed Areas, or which are located within such Areas, shall be listed as Historic Sites and Monuments.
2. Any Party may propose a site or monument of recognized historic value which has not been designated as an Antarctic Specially Protected Area or an Antarctic Specially Managed Area, or which is not located within such an Area, for listing as a Historic Site or Monument. The proposal for listing may be approved by the Antarctic Treaty Consultative Parties by a measure adopted at an Antarctic Treaty Consultative Meeting in accordance with Article IX(1) of the Antarctic Treaty. Unless the measure specifies otherwise, the proposal shall be deemed to have been approved 90 days after the close of the Antarctic Treaty Consultative Meeting at which it was adopted, unless one or more of the Consultative Parties notifies the Depositary, within that time period, that it wishes an extension of that period or is unable to approve the measure.
3. Existing Historic Sites and Monuments which have been listed as such by previous Antarctic Treaty Consultative Meetings shall be included in the list of Historic Sites and Monuments under this Article.
4. Listed Historic Sites and Monuments shall not be damaged, removed or destroyed.
5. The list of Historic Sites and Monuments may be amended in accordance with paragraph 2 above. The Depositary shall maintain a list of current Historic Sites and Monuments.

ARTICLE 9

INFORMATION AND PUBLICITY

1. With a view to ensuring that all persons visiting or proposing to visit Antarctica understand and observe the provisions of this Annex, each Party shall make available information setting forth, in particular:
 - (a) the location of Antarctic Specially Protected Areas and Antarctic Specially Managed Areas;
 - (b) listing and maps of those Areas;
 - (c) the Management Plans, including listings of prohibitions relevant to each Area;
 - (d) the location of Historic Sites and Monuments and any relevant prohibition or restriction.
2. Each Party shall ensure that the location and, if possible, the limits of Antarctic Specially Protected Areas, Antarctic Specially Managed Areas and Historic Sites and Monuments are shown on its topographic maps, hydrographic charts and in other relevant publications.
3. Parties shall co-operate to ensure that, where appropriate, the boundaries of Antarctic Specially Protected Areas, Antarctic Specially Managed Areas and Historic Sites and Monuments are suitably marked on the site.

ARTICLE 10

EXCHANGE OF INFORMATION

1. The Parties shall make arrangements for:
 - (a) collecting and exchanging records, including

records of permits and reports of visits, including inspection visits, to Antarctic Specially Protected Areas and reports of inspection visits to Antarctic Specially Managed Areas;

- (b) obtaining and exchanging information on any significant change or damage to any Antarctic Specially Managed Area, Antarctic Specially Protected Area or Historic Site or Monument; and
 - (c) establishing common forms in which records and information shall be submitted by Parties in accordance with paragraph 2 below.
2. Each Party shall inform the other Parties and the Committee before the end of November of each year of the number and nature of permits issued under this Annex in the preceding period of 1st July to 30th June.
3. Each Party conducting, funding or authorizing research or other activities in Antarctic Specially Protected Areas or Antarctic Specially Managed Areas shall maintain a record of such activities and in the annual exchange of information in accordance with the Antarctic Treaty shall provide summary descriptions of the activities conducted by persons subject to its jurisdiction in such areas in the preceding year.
4. Each Party shall inform the other Parties and the Committee before the end of November each year of measures it has taken to implement this Annex, including any site inspections and any steps it has taken to address instances of activities in contravention of the provisions of the approved Management Plan for an Antarctic Specially Protected Area or Antarctic Specially Managed Area.

ARTICLE 11

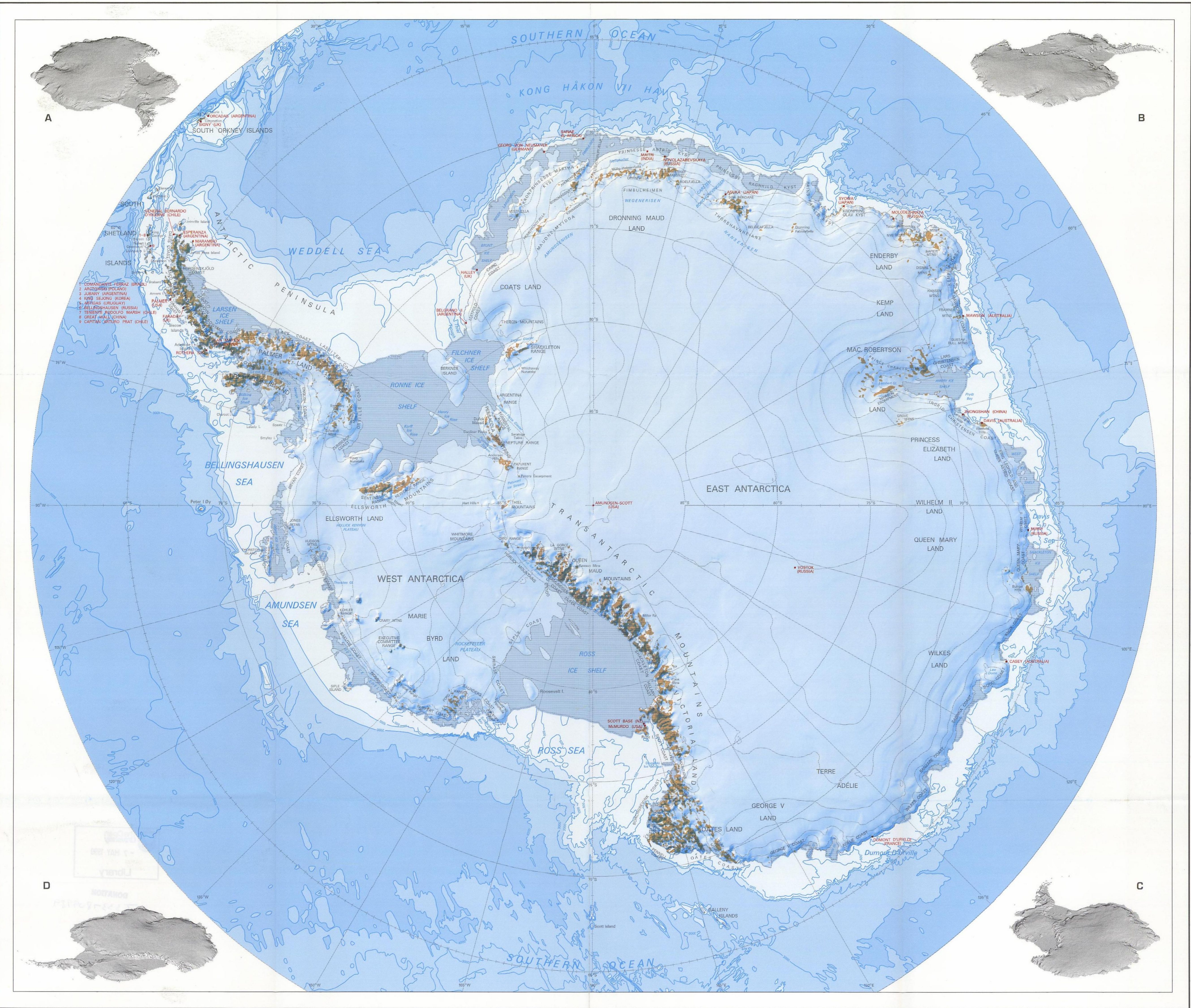
CASES OF EMERGENCY

1. The restrictions laid down and authorized by this Annex shall not apply in cases of emergency involving safety of human life or of ships, aircraft, or equipment and facilities of high value or the protection of the environment.
2. Notice of activities undertaken in cases of emergency shall be circulated immediately to all Parties and to the Committee.

ARTICLE 12

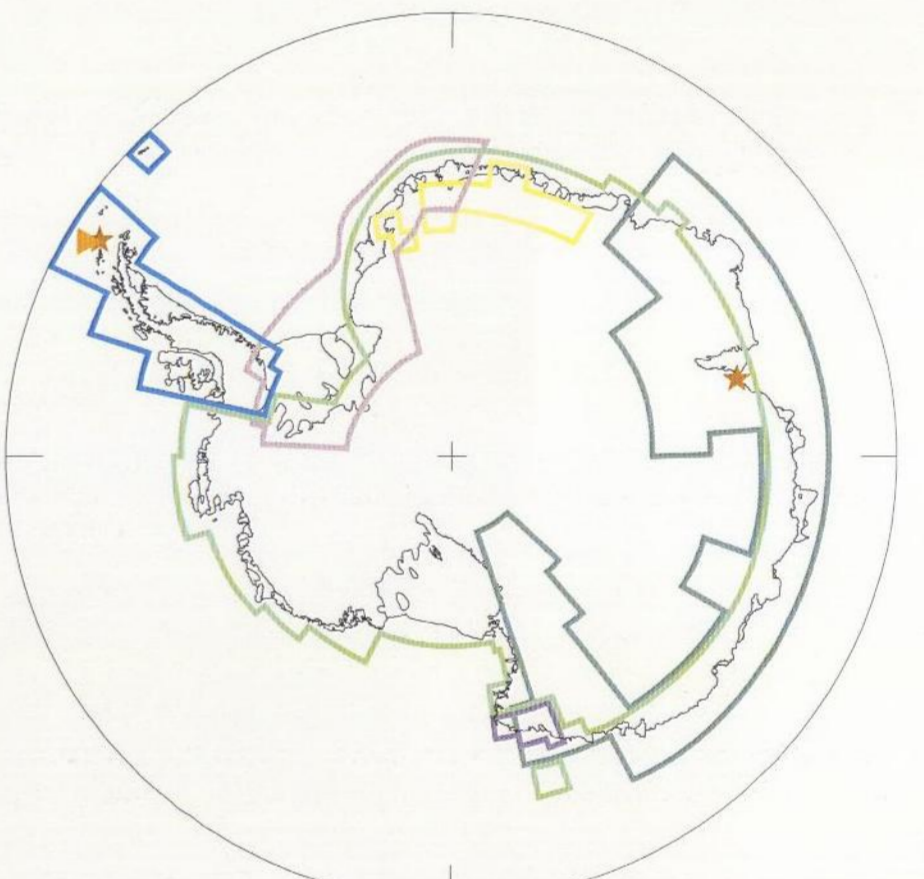
AMENDMENT OR MODIFICATION

1. This Annex may be amended or modified by a measure adopted in accordance with Article IX(1) of the Antarctic Treaty. Unless the measure specifies otherwise, the amendment or modification shall be deemed to have been approved, and shall become effective, one year after the close of the Antarctic Treaty Consultative Meeting at which it was adopted, unless one or more of the Antarctic Treaty Consultative Parties notifies the Depositary, within that time period, that it wishes an extension of that period or that it is unable to approve the measure.
2. Any amendment or modification of this Annex which becomes effective in accordance with paragraph 1 above shall thereafter become effective as to any other Party when notice of approval by it has been received by the Depositary.



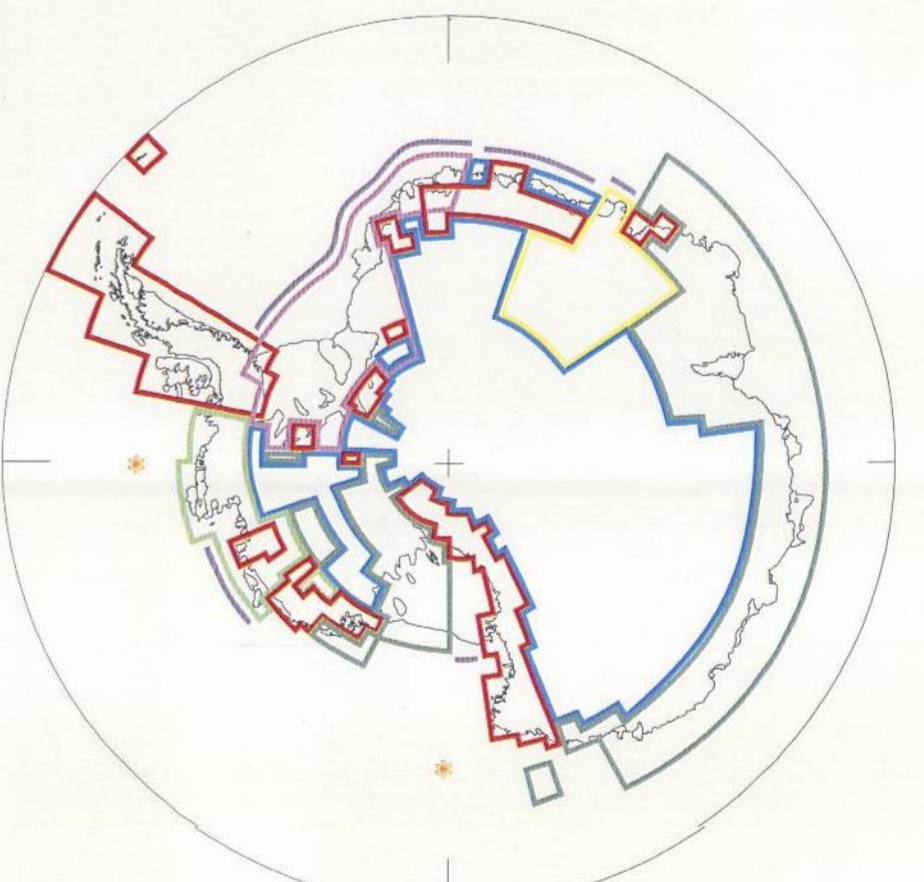
CAMBRIDGE
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Natural Environment Research Council
1993

Figure 1. Geographical location of digital data provided by different nations.



— AUSTRALIA
★ CHINA
— GERMANY
— NEW ZEALAND from USA sources
— NORWAY
— POLAND
— UK from UK sources
— UK from JAPAN, USA, Russia and UK maps

Figure 2. Types of source material used for different parts of the continent.



Topographic maps
— 1:250 000
— 1:500 000
— 1:1 000 000
— 1:2 000 000
— 1:5 000 000
— Other scales (1:150 000; 1:500 000; 1:5 000 000)

Satellite imagery
— Geocoded satellite images with interpreted topographic overlays
— Coastline interpreted entirely from imagery
— Note that most of the coastline has been updated to some extent using imagery

Digital terrain model and perspective views shown on this map were created by A. Paul R. Cooper from the SCAR Antarctic Digital Topographic Database

Map design by Janet W. Thomson
Preparation of ancillary material by Adrian J. Fox, Ann Roberts and C. F. Hanni Willan

Published by the BRITISH ANTARCTIC SURVEY, High Cross, Madingley Road, Cambridge CB3 0ET, UK
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Sales agent: Edward Stanford Ltd., 12-14 Long Acre, London WC2E 9LQ, UK

Prepared for multi-coloured reproduction by CHK Datamap, London,
from digital data supplied by the British Antarctic Survey
Printed by Cook, Hammond & Kell, London

Preferred reference for this map:
British Antarctic Survey, 1993. *Antarctica - a topographic database*, 1:10 000 000 scale map, BAS (Misc) 7, Cambridge, British Antarctic Survey.

Associated product:
BAS, SPRI and WCMC, 1993. *CD-ROM and Antarctic Digital Database User's Guide and Reference Manual*. Cambridge, Scientific Committee on Antarctic Research.

British Antarctic Survey
Scott Polar Research Institute
The British Petroleum Company p.l.c.

Scientific Committee on Antarctic Research
World Conservation Monitoring Centre
MAGIC

**ANTARCTICA
A TOPOGRAPHIC DATABASE**

This 1:10 000 000 scale map is a derivative product of the Antarctic Digital Database Project (ADDP). The preparation of the first seamless digital map of Antarctica was coordinated in the UK by the British Antarctic Survey (BAS), Scott Polar Research Institute (SPRI) and World Conservation Monitoring Centre (WCMC), under the auspices of the Scientific Committee on Antarctic Research (SCAR) and its Working Group on Geodesy and Geographic Information. The work was funded generously by the British Petroleum Company p.l.c. and to a lesser extent by BAS. The Antarctic digital topographic database (ADD) incorporates a small part of preliminary revision work by Petroconsultants (CES) Ltd for their digital map of the world.

The seamless map of Antarctica has been prepared from cartographic material published by eleven nations (Figure 1). Eight countries provided digital data to the project (Argentina, Australia, China, Germany, New Zealand, Norway, Poland and UK) and three gave permission for their maps to be digitized for the project (Japan, Russia and USA).

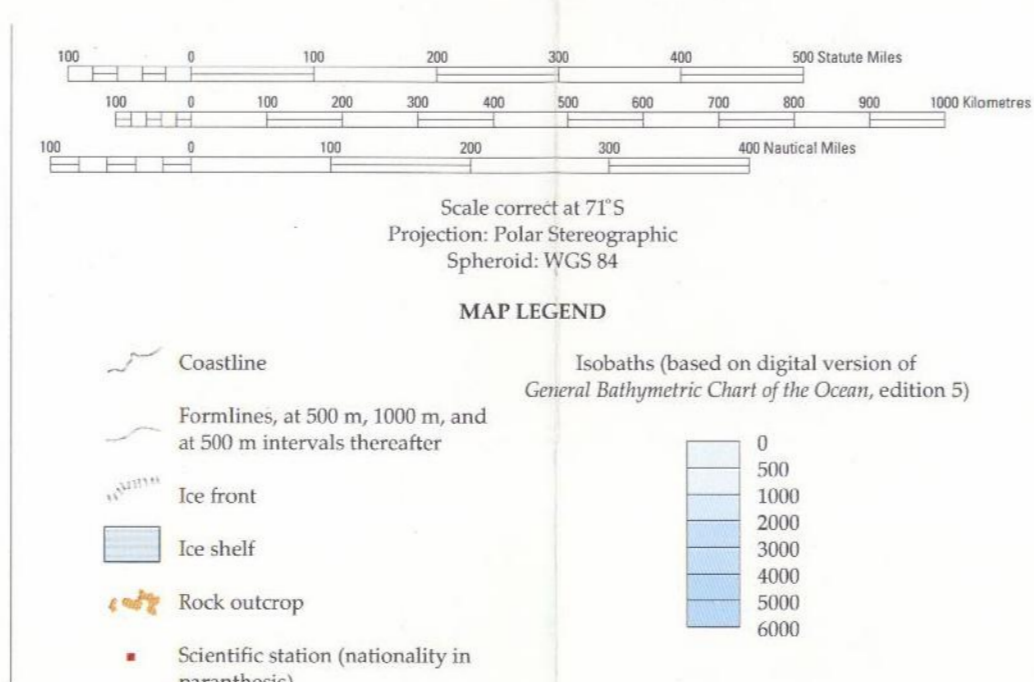
The scale of the source material used in the compilation of the map varied from 1:200 000 (1:250 000 to 1:5 000 000) (Figure 2). Coastal regions and areas of mountainous terrain with plenty of exposed rock (e.g. Antarctic Peninsula, Transantarctic Mountains, parts of Dronning Maud Land), were prepared from the larger-scale maps, the coastline being updated by reference to photographic products of Landsat MSS (and TM) imagery at 1:10 000 000 scale. The area between 5°E and 85°W, 76°S and 82°S has been based on a digital mosaic of geocoded Landsat scenes.

The primary dataset for the seamless digital map of Antarctica incorporates data from paper maps at a variety of scales (Table 1). Data have been generalized subsequently to enable meaningful display of the data at a number of different scales: 1:1 000 000, 1:3 000 000 and 1:10 000 000. An index map at 1:30 000 000 is included in the database as part of the package available on CD-ROM (Scientific Committee on Antarctic Research, 1993).

Place-names printed on the 1:10 000 000 map have been generated from a hierarchical database prepared especially for the ADD. This tree-structured database has enabled the selection of names appropriate to the scale of a given map.

Table 1. Number of map sheets incorporated in the digital map

Scale	Country of Origin	No.	Total
1:200 000	Russia	2	2
1:250 000	Japan	2	
	Norway	32	164
	UK	52	
	USA	78	
1:500 000	USA	3	3
1:1 000 000	Australia	22	
	USA	2	37
	Russia	13	
1:1 500 000	Argentina	1	1
1:2 000 000	Japan	1	1
1:3 000 000	UK	1	1
1:5 000 000	USA	1	1
Grand Total:			210



Technical details

Generalization of the primary dataset was done automatically using two techniques. For rock outcrop and coastline the vector data were used to create polygons outlining different surface types (coast, ice shelf, ice sheet or rock), followed by conversion into raster data with a pixel size appropriate to the scale of generalization (e.g. 1500 m for 1:10 000 000). Finally, the raster data were converted back into vectors. Generalized contours were created from a digital elevation model (DEM). The DEM was produced from basic-scale elevation data, filtered so that points were no closer to each other than a threshold distance (3000 m for 1:10 000 000). A 10 km grid DEM was used to generate the contours displayed on this map.

Besides its use in compiling the map, the ADD has enabled the generation of a number of statistics for Antarctica (Table 2). There are slight errors ($\pm 1\%$) in the figures calculated because the measurements were made on data in the Polar Stereographic projection, which is not an equal area projection; it preserves shapes but not areas. The errors are systematically related to latitude, with measured areas and lengths being too small south of 75°S and too large north of this latitude. Generalization has introduced slight

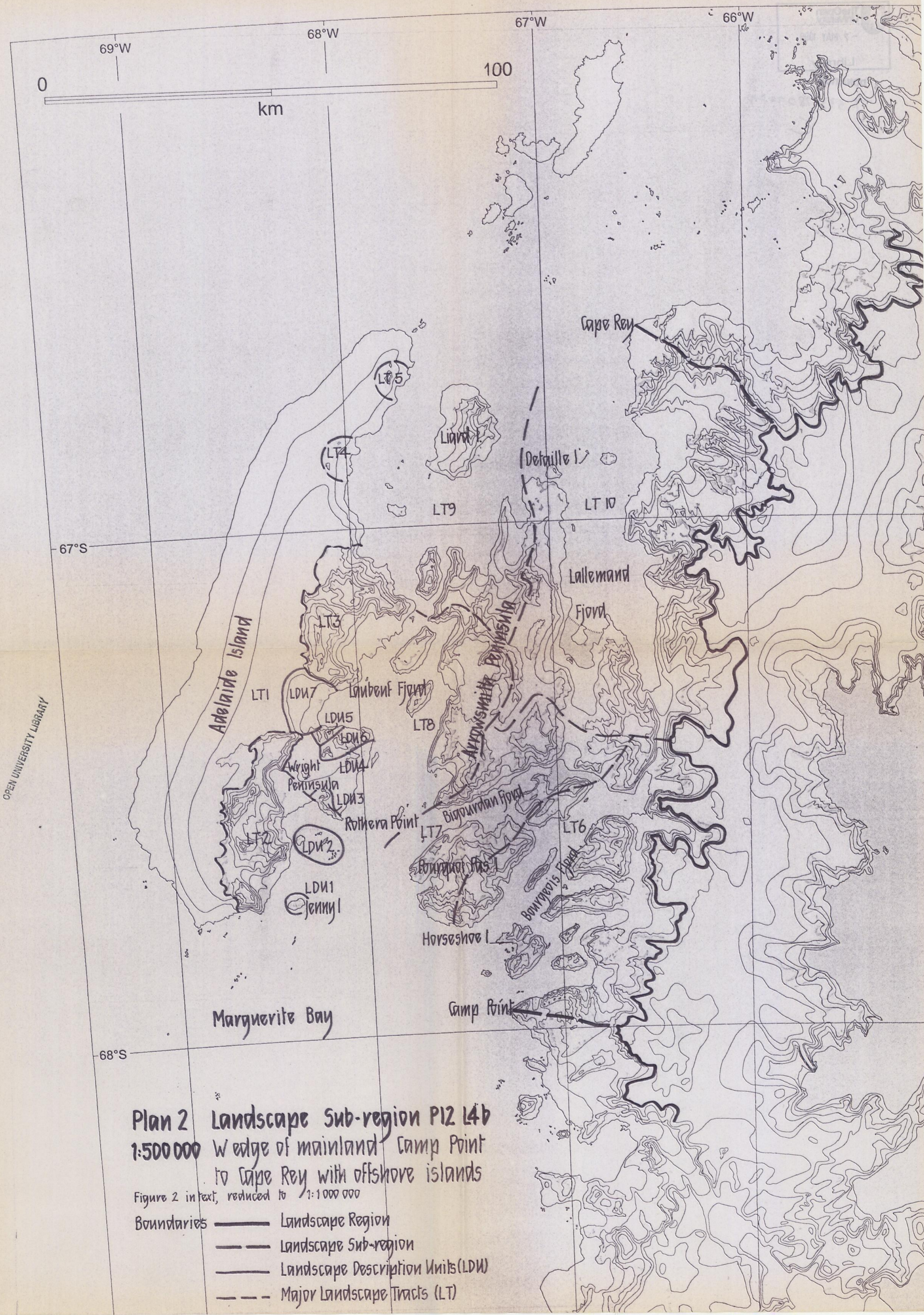
cant non-random errors and the size of small features such as rock outcrops are over-estimated. Errors in the source data for the ADD are harder to quantify. The Pole of Inaccessibility was located by manually fitting circles to the coastline, and finding the circle of maximum radius which would fit within the coast. Two definitions of coast were used, one exclusive of ice shelves and the other inclusive. A similar manual process was used to determine shortest and longest straight-line crossings of Antarctica, and the shortest distance from the coast to the South Pole.

The hill-shading, isometric views and the illustration in the cover block of the map were derived from a DEM at 5 km resolution, and the isometric views and cover-block illustration from a 20 km resolution DEM. The isometric views are oriented as if the light source is situated at the base of the map; their true viewpoints, looking southward, are: A, 85°W, 8, 45°E, C, 135°E, D, 135°W.

Table 2. Antarctic statistics derived from the SCAR Antarctic digital topographic database (values, to the nearest thousand, based on computations from 1:10 000 000 dataset unless stated otherwise)

Area of Antarctica (with all islands and ice shelves)	13 601 000 km ²
(with ice shelves and only islands within ice)	13 043 000 km ²
(with all islands but without ice shelves)	12 093 000 km ²
Areas of countries' for comparison:	
Australia	2 686 855 km ²
Canada	9 976 147 km ²
USA	9 363 132 km ²
Area of East Antarctica (with all islands and ice shelves)	10 241 000 km ²
(with all islands but without ice shelves)	9 860 000 km ²
Area of West Antarctica (with islands and ice shelves)	3 420 000 km ²
(with islands but without ice shelves)	2 233 000 km ²
Area of Ross Ice Shelf (based on 1:1 000 000 dataset)	490 000 km ²
Area of Filchner-Ronne Ice Shelf (based on 1:1 000 000 dataset)	449 000 km ²
Area of exposed rock in the Antarctic:	48 310 km ² (0.4% of continent)
Highest peak in Antarctica:	Vinson Massif (4897 m)
Maximum thickness of ice:	4776 m at 69°54'S, 135°12'E
Shortest distance across Antarctica:	3280 km, between 78°05'S, 104°28'E and 72°15'S, 153°17'W
Shortest distance to the South Pole:	5339 km, between 66°38'S, 118°06'E and 64°35'S, 61°53'W
Position of the magnetic pole (1990):	67°N, 12°E
Pole of Inaccessibility for contiguous continent:	77°15'S, 104°39'E
Pole of Inaccessibility for continent and ice shelves:	83°05'S, 65°47'E
Number of permanent scientific stations in Antarctica (maintained all year, as at winter 1992):	37

¹ Data taken from *The Times Atlas of the World*, Comprehensive Edition, 1980.



11 The Precursors of Tourism in the Antarctic

ROSAMUNDE J. CODLING

In its grandeur, its vastness and, in a way, its purity the Antarctic is the most beautiful thing in the world (Cherry-Garrard, 1937).

The idea of tourist interest in the Antarctic appears incredible to many. For example, when the Antarctic Treaty Bill was receiving its Third Reading in the Parliament of Great Britain and Northern Ireland in 1967, some members of the House of Commons found difficulty in accepting that tourist visits were already taking place. The Member who concluded the debate finally commented that 'no place, however cold or wet, or hot or high or deep is beyond the quest of man's ingenuity' (Gibson-Watt, 1967). Few probably realise that tourists visited a sub-Antarctic island in 1891 and that a suggestion was made for an Antarctic cruise as early as 1910. Nevertheless, over half a century elapsed before a commercially organised voyage took place and it was not until 1966 that regular tourist cruises were established (Reich, 1980).

The precursors of developed tourism in the Antarctic fall into two categories. There are those who planned visits which, for reasons now unknown, never took place. There were also others who successfully took tourists to destinations in the sub-Antarctic, and possibly the Antarctic, but whose primary purposes were trade or mail delivery. It is known that some intrepid travellers took the opportunities available to them, but in other cases it has not been possible to ascertain how many, if any, capitalised on the availability of berths on Antarctic-bound vessels.

This chapter outlines the main events that have contributed to the development of Antarctic tourism. Individually, their influence may not have been great, but they combined to demonstrate the growing interest in visits to the southern continent. Following a brief consideration of motives for travel, the first confirmed tourist visit to a sub-Antarctic island is examined. Thomas Cook planned a cruise but it was not until the 1920s

Appreciation beyond basic geographical description is more readily found in the writings of those in the 'heroic age' of Antarctic exploration, about the beginning of the twentieth century. Edward Wilson was with Scott on both of his expeditions, serving firstly as second surgeon and then as head of the scientific staff. He was also an exceptionally talented artist and wrote freely about his surroundings. On the *Discovery* expedition he realised the pleasure that the landscapes of the Antarctic could give others. In his diary for 23 August 1902 he wrote:

We had the whole of Erebus island spread out in front of us, and it was a very beautiful sight indeed. One of the thoughts that strikes one oftenest I think is what people at home would give to have a glimpse of such a sight. There was a true spring feeling in the air today which makes every thing infinitely more beautiful (Wilson, 1966, p. 175).

Wilson and many of his companions on Scott's first expedition wrote lengthy letters home, but at that time, none of their families had the opportunity to see the continent.

SUB-ANTARCTIC VISITS

Headland (1989) lists several New Zealand government expeditions to peri-Antarctic islands, starting in 1882, which are believed to have carried tourists, though details are difficult to confirm. Definite information is available about the visit by the *Gratitude* to Macquarie Island, one of the sub-Antarctic islands, in 1891. Cumpston (1968, Plate 21) includes an illustration of a card distributed by the ketch's owner, Joseph Hatch, following a visit to the island in February 1891. Four people whose photographs appear on the card were described as 'tourists'. It is intriguing to see that one of the male travellers is given the title of 'Mr' while the other three men are simply listed with their initials. This possibly reflects on their relative class status, but no other clues are given to the designations. Part of the text on the back of the card reads:

A large number of sensational articles, telegrams and letters have appeared in the public Press all over the Australian colonies in many of which Mr Hatch, an old representative for Invercargill in the New Zealand Legislature, was very roughly handled, but subsequent events have proved his knowledge of the position to be correct.

The contentious issue appears to be the killing of seals and penguins for their oil. On the return of the *Gratitude* to the port of Bluff, Hatch gave an address at the town's Theatre Royal including a spirited defence of trade

that visits probably took place using the mail delivery services to South Georgia. In the 1930s two efforts were made by Lt.-Com. J.R. Stenhouse to organise an Antarctic cruise, but both were abortive, although interest continued in both Argentina and Australia.

MOTIVES FOR ANTARCTIC TRAVEL

It is often asked why people wish to visit the Antarctic. To identify motives is complex, but a passenger on one of the first regular cruises in the mid-1960s gave this descriptive summary of her fellow travellers:

ranging in age from 23 to 86; jaded travellers, interested amateurs, four travel agents, one or two knowledgeable housewives, one neurotic, one psychopath, a few bona-fide and three quasi-scientists, an avid continent collector, an astronomer, a clutch of bird people ... there were as many reasons for being there as there were passengers on board (Goodwin, 1966).

The term 'avid continent collector' seems to be applicable to the botanist Joseph Banks, who accompanied Captain James Cook on his first voyage from 1768 to 1770. Initially, it was planned that he should again accompany Cook, but during preparations for his second voyage, considerable difficulties developed between Cook and Banks, who appears to have had an 'absurdly swollen head' (Beaglehole, 1961, p. xxvii). The botanist withdrew from the expedition, so he never had the opportunity he desired to stand on the South Pole and turn a full circle on his heel through 360° of longitude (Beaglehole, 1961, p. xxvii). Cook circumnavigated the continent, but did not see land.

For many, the beauty of the continent has been especially impressive, whatever other motives there might have been for their visit. The journals of some of the early explorers—Cook, Bellingshausen, Weddell and Wilkes for example, understandably concentrate on the hazards they faced in travelling through unknown regions. Accounts of uncharted seas, navigated by small sailing vessels with the ever-present difficulties caused by atrocious weather conditions, ice and adverse living and working conditions, form the core of their writings. But even amid these dangers, some recorded the magnificence of their surroundings. On 30 January 1841, James Clark Ross sailed on the sea now named after him and was confronted by the edge of the great ice shelf. He wrote: 'But this extraordinary barrier of ice, of probably more than a thousand feet in thickness, crushes the undulations of the waves, and disregards their violence: it is a mighty and wonderful object, far beyond any thing we could have thought or conceived' (quoted by Neider, 1973, p. 181).

Appreciation beyond basic geographical description is more readily found in the writings of those in the 'heroic age' of Antarctic exploration, about the beginning of the twentieth century. Edward Wilson was with Scott on both of his expeditions, serving firstly as second surgeon and then as head of the scientific staff. He was also an exceptionally talented artist and wrote freely about his surroundings. On the *Discovery* expedition he realised the pleasure that the landscapes of the Antarctic could give others. In his diary for 23 August 1902 he wrote:

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The contentious issue appears to be the killing of seals and penguins for their oil. On the return of the *Gratitude* to the port of Bluff, Hatch gave an address at the town's Theatre Royal including a spirited defence of trade in seal and penguin oil. He is reported as commenting on the 'ridiculous

nonsense of protecting the penguins' (Cumpston, 1968, p. 163). It is known that Hatch continued his trading business, but no further references have been found to tourists accompanying his voyages.

THOMAS COOK AND ANTARCTIC TRAVEL

The last years of the nineteenth century saw both Norwegian and Belgian expeditions to the Antarctic and by 1905 Great Britain, Germany, Sweden and France had also become involved in exploration and scientific work in the south. Captain Scott's first expedition took the *Discovery* to McMurdo Sound in 1901-4. Shackleton followed in 1907-9 with the *Nimrod* and travelled to within 97 nautical miles of the South Pole. Scott returned in 1910-12, finally reaching the Pole in January 1912, but dying with his companions on their return journey.

All of these expeditions were given extensive coverage in the newspapers of the day, in Great Britain as well as in Australia and New Zealand. In November 1910, *The Press*, published in Christchurch, New Zealand, carried a detailed report of preparations for Scott's second expedition, and it is in the middle of that lengthy article that reference is made to the proposals by the travel agents Thomas Cook and Sons to 'despatch a vessel to McMurdo Sound'.

The proposal must be seen against the background of social patterns of both the Victorian and Edwardian age as well as the development of the travel industry, first begun over half a century earlier by the young Thomas Cook (Brendon, 1991). During the early 1840s he had begun organising excursions but it was not until the Great Exhibition of 1851 that he also arranged accommodation for his travellers. Overseas tours followed a few years later and because of Cook's Baptist and Temperance Association background, it was considered quite respectable for ladies to travel under his guidance, giving them remarkable freedom in an age beset with strict conventions. This therefore was the background to the report in *The Press* on 4 November 1910.

Scott's second Antarctic expedition was clearly of considerable interest and had already received regular coverage. The article on that particular day concentrated on food supplies and stores. A lengthy list included '12½ dozen quarts anchovy paste ... 700 lbs marmalade ... 500 lbs beef marrow ... 29 cases brandy, whisky, and wines' (*The Press*, 4 November 1910, p. 9). After this inventory and a discussion of the problems relating to storage and transportation there is a series of miscellaneous notes about the *Terra Nova* and the social arrangements for the ship's officers and the scientific staff. Then follows one paragraph:

proposals for the despatch of a vessel to McMurdo Sound. The trip, it is estimated, will take fifty days, and it is intended that the vessel should leave some New Zealand port about the end of 1911, so as to arrive at the Antarctic in mid-summer. Already some members of the New Zealand Parliament, a number of ladies and several gentlemen interested in scientific matters, have made enquiries about the trip, which, it is likely, will include a visit to the sub-Antarctic islands of the Dominion. It is anticipated that many from different parts of the world interested in the Antarctic and desirous of an opportunity of witnessing the Aurora Australis, will probably go on the trip, in addition to many who have friends and relatives with the British Antarctic Expedition (*The Press*, 4 November 1910, p. 9).

Unfortunately, the archives of Thomas Cook in London are missing certain editions of their Cook's *Australasian Travellers Gazette*, which might have contained further information on this planned voyage and they have no other record of the proposals (Jill Lomer, Archives Development Officer, personal communication).

Twenty years later, Thomas Cook's Travel Service advertised in *The polar book*, the handbook of the 1930 British Polar Exhibition organised by Louis Bernacchi, who had been a physicist on Scott's first expedition (Anon, 1930). The single paragraph opened 'Cook's Tours to the Poles are still a thing of the future, but the Cook's and Wagon-Lits travel organisation can arrange every detail of a pleasure cruise to Spitzbergen, or Iceland, or the North Cape. They seemed happier with the Arctic, rather than the Antarctic, but were willing to organise transport of 'goods of every description ... by land, sea or air'. Both the report of *The Press* and this modest half-page advertisement must stand as reliable evidence of the intentions of a well-established and internationally known travel agency.

THE MAIL DELIVERY SERVICES

The First World War interrupted Antarctic exploration and, not surprisingly, interest in Antarctic tourism waned. Opportunities to travel south were extremely limited and it was not until the mid-1920s that a possible route became available. Even though about 1000 whalers worked on South Georgia during the whaling season (October-May), as well as a small permanent population of government officials, there was a lack of regular, direct communication with the Falkland Islands. In order to meet this deficiency the SS *Fleurus* was fitted out for service as a mail ship. She arrived in Port Stanley late in 1924 and during the next nine years carried out a regular delivery service, including visits to the South Shetlands and South Orkneys (Griffiths, 1980). Passenger fares for journeys on the *Fleurus* were established. A 'saloon' to South Georgia or Port Foster,

of the number of passengers carried on any of the voyages. There was clearly the opportunity to be a 'tourist'—one who travels for pleasure—so despite the lack of data, these trips by 'an uninspiring and far from glamorous steamer' (Griffiths, 1980, p. 1358) are part of the pattern of developing interest in the Antarctic as a tourist venue.

THE PROPOSALS OF LT.-COM. J.R. STENHOUSE

Lt.-Com. J. R. Stenhouse had considerable Antarctic experience. He joined Sir Ernest Shackleton's Antarctic expedition in 1914 before serving as a naval officer in the later years of the First World War. He went to the Antarctic for a second time in 1925–27, as Commander of the *Discovery*, then used as a whaling research vessel. It must have been shortly after his return from this work that he developed and publicised his cruise proposals.

The brochure for the Antarctic cruise planned by Stenhouse bore no travel company's name. The traveller was offered 'a unique opportunity of visiting the Antarctic continent' (Stenhouse, 1929–30). It was proposed to leave Southampton about 10 December 1930 and return in late April 1931, on what was proposed to be 'the first passenger ship to cross the Antarctic circle' (Stenhouse, 1929–30). From later correspondence it appears that Stenhouse was working with British American Tours, an international travel service, with offices in London and New York.

It was proposed to travel first to New York and Havana, before using the Panama Canal to reach the Pacific Ocean, the Galapagos Islands, Tahiti and Auckland, New Zealand. In addition to this simple listing of places, greater detail is given for the itinerary for the Ross Sea:

The ship will penetrate to the Great Ice Barrier, the limit of Southern navigation, within seven hundred miles of the South Pole, and will be the first passenger ship to cross the Antarctic circle. The destination of the cruise will be the Bay of Whales in the great Ross Barrier at which Amundsen and Byrd made their bases and from which they started on their journeys to the South Pole. During the seven days' cruise in the Ross Sea, the ship will proceed, ice conditions permitting, to McMurdo Sound, from where Scott and Shackleton started their epic journeys. Visits will also be made to the huts in which they wintered at Hut Point, Cape Evans, and Cape Royds (Stenhouse, 1929–30).

The homeward route was via Australia, Bali, Ceylon (now Sri Lanka), India, the Suez Canal, Malta, Gibraltar and Southampton. It is interesting to note that many of the places listed rank highly as areas of present tourist interest, but it is not possible from this one brochure to judge whether they were simply convenient ports of call, or whether they were chosen as

added attractions to the prospective passengers. In the few lines given to the world itinerary, places are simply listed, with no further detail. It is only 'The Southern Land of the Midnight Sun' that is described:

The Antarctic Continent, which is the only Polar Continent, has an area of over five million square miles. It is isolated from the civilised world by the seas of the Southern Ocean. Known hitherto only to explorers and whalers, this vast continent is covered in eternal ice and snow. It is a land of beauty and majesty, and presents a world of colour, brilliant and intensely pure. The scenery of its ice-clad mountain ranges, towering fifteen thousand feet, is unequalled in any other part of the world. On this great silent continent there are no trees, no flowers, no land animals and no inhabitants. It has been referred to as the greatest untapped reservoir of health left for the human race. During the Antarctic summer the sun shines throughout the twenty-four hours. A cold, dry and exhilarating climate (Stenhouse, 1929–30).

The fare was tactfully stated as being 'from £500', a sum equivalent to about £7000 in 1990 terms. Three excellent photographs by Ponting, Scott's 'camera artist' from the *Terra Nova* expedition, show the magnificent scenery and wildlife. The brochure is completed by a world map showing the cruise route and a commendable bird's-eye perspective of the Ross Sea, the ice shelf and the flanking mountains stretching towards the Pole (Figure 11.1).

The brochure has been quoted in some detail not only because of the interest that the material holds, but also because it is revealing to consider what it does not say. No details are given of the ship to be used, its size or suitability for ice work. The 'roaring forties, filthy fifties and screaming sixties' receive no attention and the severity of the weather on the continent itself is also ignored. The overall prospect seems to be a trip with the character of a pleasant Sunday afternoon boating jolly.

On 24 October 1930, the *Daily Mail* reported the planned voyage in enthusiastic terms, with emphasis on the opportunity it gave to women to set foot on the Antarctic continent. Commander Frank Worsley, who had been captain of the *Endurance* on Shackleton's Trans-Antarctic expedition was also to accompany the cruise which was to use the *Stella Polaris*. The latter part of the article also said that Lt.-Com. Stenhouse

hopes to organise an expedition of the travellers to walk 12 miles over the ice to the hut which was occupied by Commander Byrd, the American explorer, when he flew to the South Pole and back. He hopes also to take them to the hut occupied by Scott and his party. They will travel in tents just as the explorers did and pitch camp on the ice for one night (Stenhouse, 1929–30).

The whole article stressed again the magnificence of the continent and the beauty of the wildlife that could be seen. There was no indication of

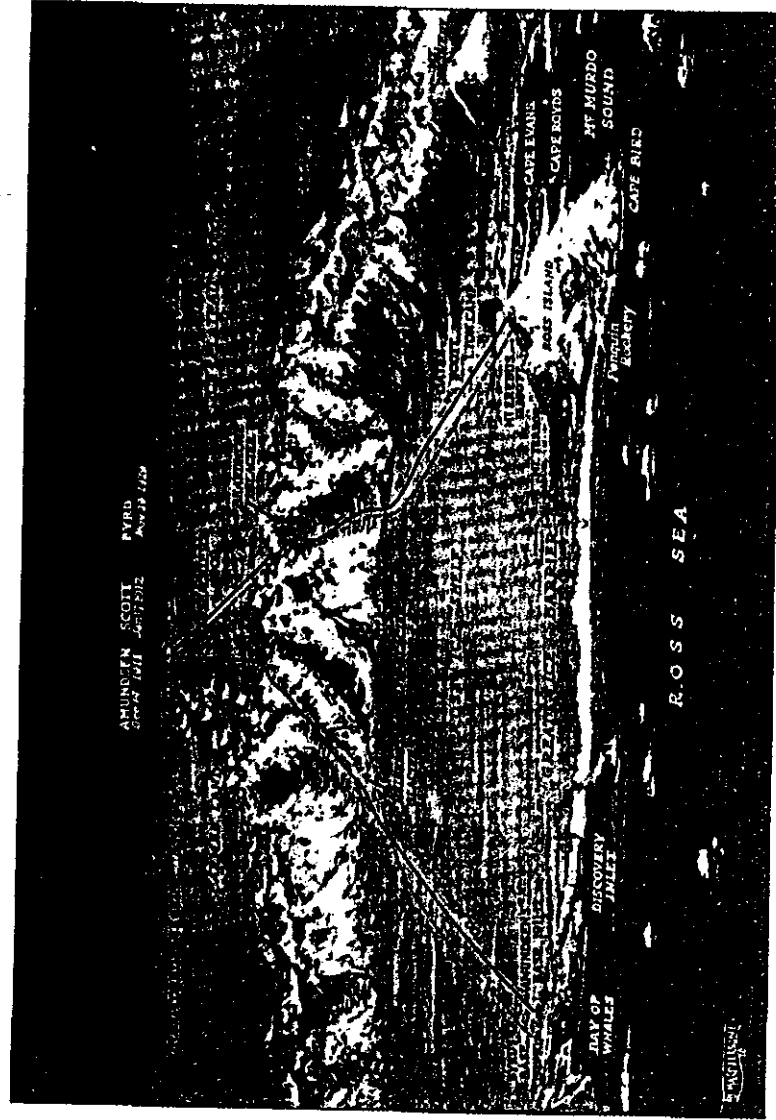


Figure 11.1.1. Panorama from the brochure of the proposed Antarctic cruise to be led by Lt.-Com. J.R. Stenhouse, 1930–31. The scale of the ship shown steaming away from Discovery Inlet has been greatly exaggerated. The distance between the Bay of Whales and Cape Bird is more than 750 km, so the ship is shown as being about 25 km long!

possible difficulties or dangers due to natural factors such as weather or ice conditions.

This Antarctic and world cruise never took place. No explanation has been found, but there must have been some interest to encourage Stenhouse, for he attempted to organise a similar tour in the 1931–32 season. Together with British American Tours Ltd, an itinerary was arranged, using the SS *Veendam* of 17 000 tons. Departing from New York on 15 December 1931, the same route was to be followed via the Panama Canal. It was scheduled to arrive in the Ross Sea on 27 January 1932 and depart six days later. The return route was again to be the north of Australia, and then via the Suez Canal to Gibraltar, where British passengers were to be landed. Mr Hankey, the Director of British American Tours Ltd, wrote in May 1931 that 'passengers will have a unique opportunity of visiting many places off the beaten track, which, in the ordinary course, they would never have a chance of doing' (manuscript in Scott Polar Research Institute). However, the stops were to be very short; arrival and departure at the Galapagos was scheduled for the same day and there was only a two-day stay scheduled in Bali. The plans for the cruise were still active in mid-June 1931, but it too never took place. It would be interesting to know how many had shown genuine interest, beyond merely writing for the brochure, but the records at the Scott Polar Research Institute give no further details. International unrest, leading to the Second World War and the subsequent austerity, again subdued European and American unrest and no further plans for Antarctic tourism emerged until the mid-1950s.

CONTINUING INTEREST

Two years later, in 1933, the Argentine transport ship the *Pampa* left Buenos Aires with relief personnel and provisions for the meteorological observatory on Laurie Island in the South Orkneys. According to Capdevila (1984), a group of tourists were on board, including the naval attaché from the United States embassy with his wife and family. However, the American guests decided to disembark at Ushuaia as they had doubts concerning the expertise of the crew in dangerous seas. The other travellers remained on board, and reached their goal.

Sir Douglas Mawson, the veteran Australian explorer, identified the future potential of tourism. In 1936 he concluded his presidential address to the Australian and New Zealand Association for the Advancement of Science by considering the 'prospects for economic development' (Mawson, 1936). In a quaintly worded way he suggested that 'as a winter-sports ground for diversion in summer, Antarctica would be a thrill to Australians' (Mawson, 1936). He recognised there could be transport problems. Nevertheless, he saw 'no reason to delay the despatch from our

ports of modern liners on summer pleasure cruises amongst the pack ice' (Mawson, 1936).

Mawson's enthusiasm for Antarctic tourism has not always been shared, especially by scientific workers, but it has to be recognised that 'this is the most remote and unknown area of the world. Its heroic explorers belong to recent history . . . it has great scenic beauty, particularly in the relatively accessible peninsula area' (Potter, 1973, pp. 301-302). Any of these attributes can generate interest and climbers, yachtspersons and other adventurers have joined the visitors who use the cruise ships. As already suggested by Codling (1982), there is a need for both quantitative and qualitative measurement of tourist activity, with systematic monitoring, to provide a basis for balanced and workable decisions concerning its impact and it is encouraging that work has begun in these directions. Tourism in the Antarctic is now firmly established. The wanderings of a few intrepid travellers on trading or mail boats, or the proposals for a single cruise—whether in 1911 or 1930—have now developed into a far wider pattern of regular visits, fulfilling the desire of many people to see the southern continent.

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POLAR RECORD

VOLUME 33 NUMBER 186 JULY 1997

CAMBRIDGE UNIVERSITY PRESS

Polar Record

Journal of the Scott Polar Research Institute, University of Cambridge.
Published by Cambridge University Press.

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Production:

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Polar Record (ISSN 0032-2474) is published four times yearly — in January, April, July, and October — the four issues making a volume. First published in January 1931, *Polar Record* appeared twice yearly until July 1954 and three times yearly until September 1987. Scholarly contributions are invited on virtually all subjects of polar interest. For information on contributions, see 'Instructions for authors,' in *Polar Record* 33 (184): 86–88, January 1997, or write The Editor, *Polar Record*, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER, UK.

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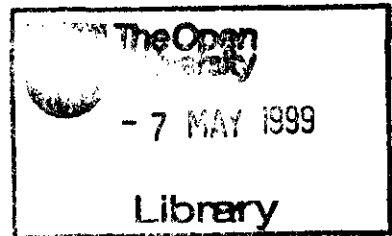
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The subscription price of vol 33, 1997, including postage (excluding VAT), is: for individuals, £47.00 (US\$82.00 in USA, Canada, and Mexico), for institutions £76.00 (US\$132.00 in USA, Canada, and Mexico). Periodicals postage paid at New York, NY, and at additional mailing offices. Separate issues cost £21.00 (US\$37.00 in USA, Canada, and Mexico) plus postage. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. Japanese prices for institutions are available from Kinokuniya Company Ltd, PO Box 55, Chitose, Tokyo 156, Japan. Prices include delivery by air. POSTMASTER: send address changes in the USA, Canada, and Mexico to *Polar Record*, Cambridge University Press, 110 Midland Avenue, Port Chester, NY 10573-4930.

Claims for missing issues can be considered only if made immediately after receipt of the subsequent issue.

Information about *Polar Record* and all other Cambridge journals can be accessed via <http://www.cup.cam.ac.uk/> and in North America via <http://www.cup.org/>.



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<i>COVER PICTURE</i>		'Near Base O, Grahamland (Antarctic black)'. Oil painting by Edward Seago. Reproduced by kind permission of His Royal Highness The Duke of Edinburgh (see article beginning page 213). A contribution to cover the cost of the colour printing was gratefully received from the Open University.

The Antarctic paintings of Edward Seago (1910–1974)

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Received June 1996

ABSTRACT. The professional artist Edward Seago (1910–1974) travelled to the Antarctic Peninsula, the Falkland Islands, and South Georgia in the 1956/57 austral summer. Although firmly rooted in the English, and in particular the East Anglian, tradition of landscape painting, Seago was able to portray polar landscapes, which he had not previously experienced, with vigour and delight. He went to Antarctica with a firmly established skill in using oils to capture the essence of a landscape, and, despite being on or near the Antarctic Peninsula for only about three days, he produced about 18 oil paintings, predominantly of landscapes and icescapes. In addition, he painted at least a further 17 works of the Falkland Islands, South Georgia, the whaling industry, and icebergs in the Southern Ocean. Seago had an excellent memory and was able to ‘reproduce’ earlier works, an ability that has caused some confusion. Examples of these counterparts are discussed. A catalogue of his known Antarctic works is given.

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Introduction

The professional artist Edward Seago (1910–1974) was invited by His Royal Highness the Duke of Edinburgh to join the Royal Yacht *Britannia* for the return voyage from the 1956 Melbourne Olympic Games, via the South Pacific, the Antarctic Peninsula (then frequently known as Graham Land), the Falkland Islands, South Georgia, the Atlantic islands, and finally to Gibraltar. Seago’s work had been greatly appreciated by the Royal Family. Prince Philip had become firm friends with him and made the invitation hoping that: ‘Ted would find something to challenge his remarkable talent for landscape painting. Neither of us was disappointed’ (Foreword in Reid 1991: 9). The Antarctic and South Georgia paintings resulting from this brief visit number about 35, and show Seago’s ability to capture the essence of a landscape, even in a part of the world previously unknown to him.

Several recent books have been written about Seago. Jean Goodman’s *Edward Seago: the other side of the canvas* (1978) was well received as a comprehensive biography and has been much used by subsequent authors, such as Ranson (1987, 1992) and Reid (1991), the latter of whom examined his methodology, style, and technique in detail (with pages 155–178 concentrating on his Antarctic paintings).

Reproductions of Seago’s paintings of the Antarctic and the Falkland Islands may be found in Bowie (1957:

one in colour, one in black and white); *The Illustrated London News* (1957: 12 in black and white); Priestley and others (1964: one in colour); Hawcroft (1965: four in black and white); Reid (1991: three in colour, two in black and white, plus a photograph of Seago working on a further Antarctic painting); Ranson (1992: six in colour); and the Royal Collection Trust (1994: two in colour).

At present, the Castle Museum in Norwich has a gallery that groups together works by three East Anglian painters — Sir John Arnesby Brown, Sir Alfred Munnings, and Seago. The opportunity to see their works in close proximity is helpful in understanding the influence of the two older men on Seago.

Seago’s life

Seago was born in Norwich in 1910. Due to a recurring heart condition, he received very little formal education and spent much of his childhood at home, sketching and painting. He did not attend art school for any length of time but enjoyed friendship and encouragement from several artists, especially Munnings and Bertram Priestman. Seago learned to work rapidly in both oils and watercolours, and is probably best remembered for his landscapes of East Anglia. Although he travelled widely, Seago always returned to Norfolk, confirming his love of the Broads and the near-by coast by the purchase of a house in the village of Ludham in 1945. This was to be his home for the remainder of his life.

After the Second World War, Seago enjoyed close ties with the Royal Family, the members of which admired and collected his work. This came at a time when ‘the Royal Academy and the critical establishment either ignored his work or regarded it with indifference’ (Reid 1991: 118). His friendship with the Duke of Edinburgh led to the invitation to join HMY *Britannia* in 1957 and to visit the Antarctic Peninsula, the Falkland Islands, and South Georgia.

Seago’s later overseas visits were to warmer climes, including the far east, Morocco, and Istanbul, and he never visited polar areas again. He died in 1974, leaving a large body of work.

A wider assessment of Seago's work

Reid's authoritative and detailed study identified three artistic movements as being particularly influential on Seago:

the Dutch seventeenth-century School; English painting, with special emphasis upon John Constable, Richard Parkes Bonington and the Norwich School in the nineteenth century, and upon Arnesby Brown, Wilson Steer and Richard Sickert in the twentieth; and, finally, French painting, especially Eugène Boudin, the French Impressionists and the American artist James McNeil Whistler. (1991: 81)

This assessment sets his work in the widest context, but more individual influences need also to be identified. When a young man, Seago was particularly encouraged by Priestman, who wrote extensively to him, teaching and encouraging through correspondence. One of Priestman's letters advised him to: 'get the tones and colour of animals carefully from Nature in relation to background' (quoted in Goodman 1978: 49), a principal that Seago adopted, thus following both the writings of Ruskin and the practice of Edward Wilson, the doctor and talented self-taught artist who went south with Robert Falcon Scott.

Further insight into Seago's work may be found in the various books he wrote himself, mainly during the period from 1933 to 1948. A book of essays entitled *A canvas to cover* appeared in 1946. It was not a teaching or technical manual, but was a verbal exploration of his approach to nature and his need to express his responses in paint: 'Nature, then, is our material....All things must be taken into account, for they are part of the whole' (Seago 1946: 133). The 11 chapters in *A canvas to cover* have titles that are clearly influenced by those in the first volume of John Ruskin's *Modern painters*, originally published in 1843. Ruskin entitled the sections of his work in a somewhat elevated manner, such as 'Of truth of vegetation' and 'Of truth of skies,' but Seago was content with more straightforward headings, such as 'Of trees and hedgerows' and 'Of the sky.' It is clear that Seago had studied Ruskin, although Reid made no mention of it. Quotations from Ruskin prefixed three of Seago's chapters, including Chapter IX, 'Of snow.' Ruskin had written: 'In the range of inorganic nature, I doubt if any object can be found more perfectly beautiful than a fresh, deep snowdrift, seen under warm light' (1843: part II, section IV, chapter II, paragraph 19). Seago responded by describing a winter walk taken near his Norfolk home:

The fields on the far side of Howe Lane looked quite blue, with streaks of violet and rose, while a patch of sunlight in the distance turned the snow pale pink. It was then that I considered the changed appearance of the landscape as a whole. How strange it all was, and how oddly full of colour. I wondered, then, why we always regard snow as being white. Not one piece of pure whiteness could I see. Pearl grey, blue, pink, yellow, violet - all these, but never white. (1946: 103)

Seago's later Antarctic work illustrated this. Even in the brightest areas, with the snow highlighted by sunlight, blues and yellows may be seen.

In his review of Seago's work from 1953 to 1964, Hawcroft suggested that from about 1960 Seago deliberately changed his method of painting landscapes:

Whereas, in earlier compositions, much of his work had been done direct from nature, that is out of doors with his subject in front of him, he saw that there was a serious danger of being completely tied to the recording techniques of a topographer unless he employed an entirely new approach....Now, on being confronted by a landscape, Seago thoroughly absorbs its colouring and atmosphere, retains these in his mind, and makes a pencil sketch in his pocket-book, from which a final scheme may be worked out in the studio. (1965: Introduction, no pagination)

This change occurred shortly after his voyage in *Britannia*, but the ability to adopt this different approach would have been founded on skills that were already firmly established. About this time Seago also began use of a camera to augment his memory (Reid 1991: 157).

The cruise of HMY *Britannia*

Seago was in *Britannia* for about two months, visiting the Antarctic Peninsula, the Falkland Islands, South Georgia, Gough Island, Tristan da Cunha, St Helena, Ascension Island, and the west coast of Africa, before arriving in Gibraltar in early February 1957. In that time he painted about 60 pictures, later giving most of them to Prince Philip.

Because *Britannia* was not ice-strengthened, the royal party was transferred to RRS *John Biscoe*. Seven Falkland Islands Dependencies Survey (FIDS) bases were visited, including those at Anvers Island, Port Lockroy, and Deception Island (*Polar Record* 1957; Fuchs 1982: 144–146). The party sighted its first iceberg on 26 December 1956, and this, together with the painting entitled 'Last iceberg seen from *Britannia*, January 14, 1957,' suggests a maximum time of about two and a half weeks in Antarctic and sub-Antarctic waters. In that time, Seago probably painted 34 or 35 pictures. Of these, 18 were directly related to the Antarctic Peninsula (catalogue numbers 6–25, excepting possibly 10b and 24b). This gives a clear indication of Seago's speed, because the time spent near or on land was limited to about three days. The Duke of Edinburgh wrote: 'We could hardly tear him away from his easel to come to meals' (Foreword in Reid 1991: 9).

The report in *Polar Record* noted that the weather was varied during the royal visit. During the first day (2 January 1957) off the Loubet Coast (Base W), low clouds hid everything except the lower slopes of the mountains. The following day was sunny, with perfect visibility. The Argentine Islands were visited (Base F), before *John Biscoe* sailed northwards through the Lemaire Channel to Anvers Island (Base N), Wiencke Island and Port Lockroy (Base A). Passing through the Neumayer Channel, they visited the Danco Coast (Base O). On 4 January the weather deteriorated, but visits were made to Deception Island (Base B) and Admiralty Bay (Base G) in the South Shetland Islands. *Britannia* then headed north to the Falkland Islands before reaching the whaling station at



Fig. 1. 'Near Base O, Grahamland (Antarctic black)': catalogue number 24a. 'This painting conveys all the bleakness of the Antarctic landscape under a lowering sky, the feeling of awe only intensified by the snow and ice' (Royal Collection Trust 1994: 30).

Leith Harbour and Grytviken on South Georgia on 12 January (*Polar Record* 1957). The catalogue attempts to list the paintings chronologically, although some titles are too general for certainty.

Seago's Antarctic paintings

Even though Seago was a skilled watercolour painter, there are no known Antarctic works by him in this medium. Two reasons may be suggested: firstly, the climate, and, secondly, Seago's feelings about the medium. At the time of the visit, Seago was predominantly painting in the open air, in front of his subject, as may be seen from a photograph in Reid (1991: 226) showing him working on 'HMY *Britannia* oiling astern from *Wave Chief*' (catalogue number 3). Despite being the height of the Antarctic summer, and said by Seago to be similar to working outside in Norfolk in winter, watercolour washes would not have been easy to handle. However, the more important reason was probably Seago's own feelings. He admitted to feeling 'taut as a bow-string' when using watercolours, and he invariably painted in oils when he was being watched (Goodman 1978: 230). The close proximity of others in *Britannia* would not have been conducive to his use of watercolours.

He used oils for the series of paintings that: 'sparkle with thinly painted areas, over which heavy white paint is laid on with either brush or palette knife' (Reid 1991: 221).

The final number of Antarctic paintings remains uncertain, because of Seago's skills of mental recollection. This was illustrated by the Duke of Edinburgh, who wrote:

When he gave me the pictures at the end of the voyage in Gibraltar, it was agreed between us that he would retain the 'reproduction' rights, and I know that he produced one copy as I happened to notice it while I was visiting an exhibition of paintings some years later. I don't know how many other paintings he reproduced but, as you know, he had a photographic memory for his pictures and could reproduce them with amazing accuracy even after many years without sight of the original. (quoted in Reid 1991: 226)

The term 'reproduction' has connotations that are often derogative, so when pairs of paintings are being discussed, reference is made to the first as the 'original,' with the second being called the 'counterpart.' At least four pairs of paintings have been identified and have been designated 'a' and 'b' in the catalogue. When the pairs of Antarctic paintings are compared, the differences are obvious. In all cases, the size of the two pictures are different and at least

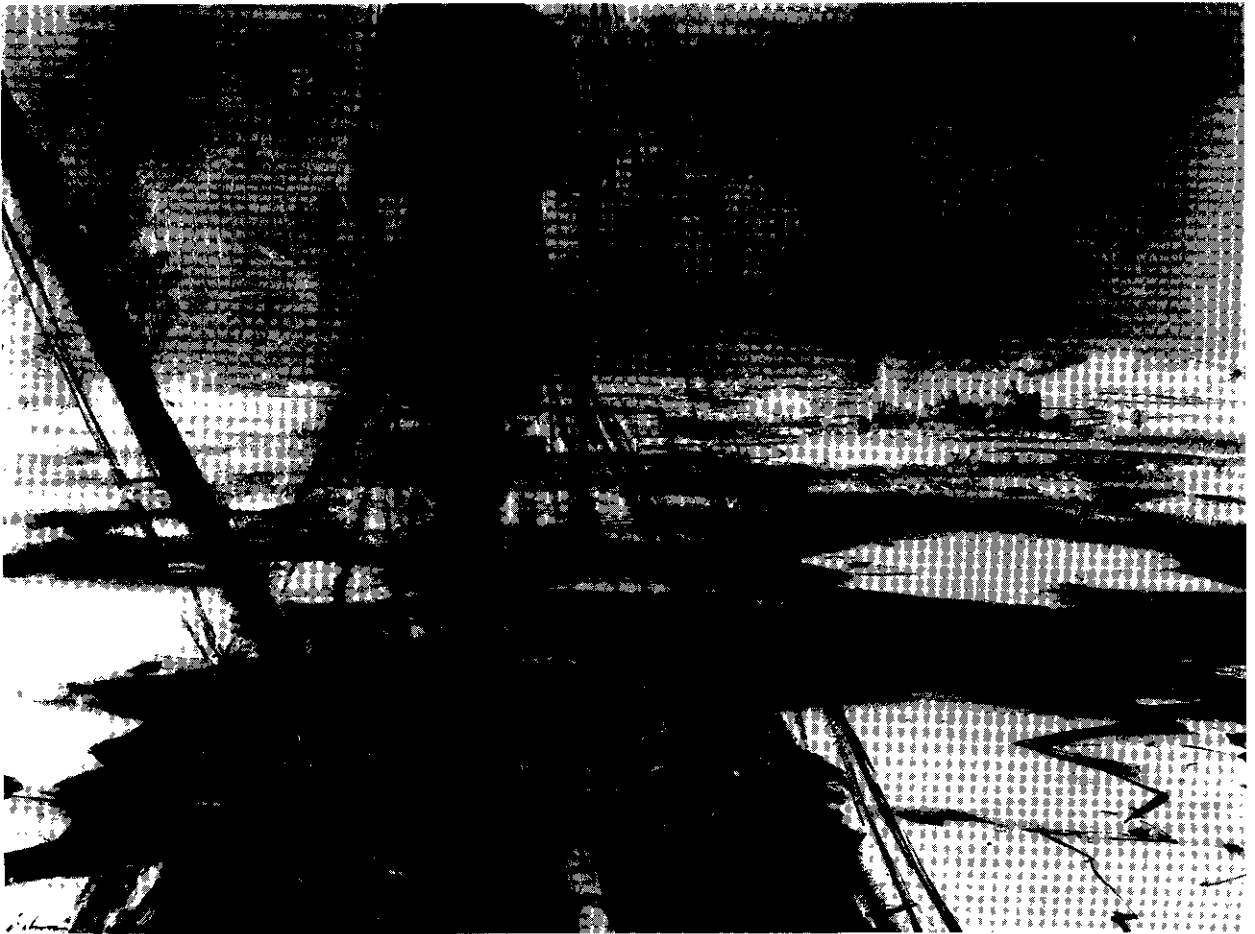


Fig. 2. 'John Biscoe in pack ice (2)': catalogue number 11. A picture dominated by the artist's interest in the ship's rigging, set in a relatively colourless background of the pack.

two of the counterparts are painted on canvas rather than board. Details in the composition of the pictures in the pairs sometimes differ; for example, in Figure 1 — 'Near Base O, Grahmland (Antarctic black)' (catalogue number 24a) — there is considerable floating ice in the foreground sea, with rock cliffs on the left horizon. The counterpart — 'Antarctic black' (catalogue number 24b) — is larger and has fewer floes, with more visually dominant ice, including a length of ice cliff, forming the left-hand side of the painting.

The only record of the background of the counterparts is that given by Goodman for the painting presented to *John Biscoe*. She recounts Prince Philip's story that Seago made the gift of a painting to the ship, but that the captain thought the picture was a personal gift and took it when he left the ship. Some years later, Seago heard of this and painted a further picture (Goodman 1978: 221–222). The Seago Antarctic painting in the ownership of the British Antarctic Survey is now in the conference room of *James Clark Ross*, the replacement ship for *John Biscoe* (Joanna Rae, deputy archivist, BAS, personal communication, March 1996), and is a pair with 'John Biscoe in pack ice' (catalogue painting number 10a).

In 'John Biscoe in pack ice (2)' (Fig. 2; catalogue

number 11), Seago used the mast and bow of the ship to give a sense of scale and perspective to the picture. In a later studio work, 'John Biscoe approaching the Lemaire Channel, Grahmland' (Fig. 3; catalogue number 12), he used a similar pattern, but lightened the density of the pack and incorporated a carefully placed iceberg. The two pictures are not paired as 'original and counterpart,' but they are clearly related.

Seago valued the support of friends, and it is clear from accounts that the time in *Britannia* was one of both pleasure and productivity. The royal party included the veteran polar scientist Sir Raymond Priestley, a notable raconteur. An article in *The National Geographic Magazine* contained a reproduction of Seago's portrait of Sir Raymond, with a whimsically placed penguin looking over his shoulder (Bowie 1957: 598). Seago later gave Priestley one of his paintings, of the Argentine Islands (Fig. 4; catalogue number 18), which was used as the frontispiece for a volume of papers published under the name *Antarctic research* (Priestley and others 1964). Unfortunately, the reproduction in *Antarctic research* is printed back to front, an error that was not noticed until the book was bound. The mountains mark the beginning of the Lemaire Channel, and the painting is a good example of



Fig. 3. 'John Biscoe approaching the Lemaire Channel, Grahamland': catalogue number 12. A carefully composed studio work, again using the ship's rigging, but incorporating more varied and dramatic ice patterns.

Seago's use of rich blues and greens.

Raymond Adie, one of the co-authors of *Antarctic research*, remembers contacting Seago to ask his permission to use the painting as the frontispiece. In giving his consent, Seago told him of the name given to Sir Raymond — 'the greater crested polar back chat' (Raymond Adie, personal communication, May 1996).

Seago's verbal response to the Antarctic

After his trip in *Britannia*, Seago said:

I had always expected something that was very, very flat and instead of that it was mountainous with tremendous peaks and black rock. I thought there was going to be wide expanses of nothingness and now and again queer upright icebergs and of course I thought it would be colourless; a mixture of greys and blacks and whites, but instead of that the colour was tremendous. It was full of rich blues and greens and the cavities, particularly in the icebergs which one would expect to be very, very dark, weren't dark. They glowed with the most rich luminous blues and greens which were tremendously exciting to paint. (quoted in Goodman 1978: 221)

In a radio interview he also commented: 'we can't help being influenced by pictures we have seen by other painters of the past of various parts of the world and it was rather fascinating to go to a part of the world where you have seen

no pictures at all because nobody had ever painted it (quoted in Goodman 1978: 221).

This latter statement is not completely true and may be an example of Seago's tendency to exaggerate (Goodman 1978: 96, 144). Trained artists had already visited Antarctica, and the Peninsula specifically had been visited by both Burn Murdoch (1892–1893, with the Dundee Antarctic Expedition) and George Marston (1914–1917, with Shackleton's *Endurance* expedition). Even though he was not a professional artist, Edward Wilson's work made a major contribution to polar exploration and science. The Scott Polar Research Institute (SPRI) has a large collection of polar art, including more than 1300 pictures by Wilson, so the resources were available for Seago to have seen, especially since Cambridge is only about 80 miles from his home at Ludham. However, the SPRI archives contains a letter that suggests that he never visited the Institute, unless in an anonymous way after 1958 (Seago 1958). One of his assistants inferred that he was very aware of his lack of education, which may have inhibited him (Goodman 1978: 202).

Seago's portrayal of the Antarctic Peninsula

It is sometimes suggested that sketchbooks, rather than worked-up pictures, convey an artist's vision more clearly. Because of the fluidity of his technique, and his ability to



Fig. 4. 'Argentine Islands': catalogue number 18. Printed correctly, this painting shows the Argentine Islands in the foreground, with the entrance to the Lemaire Channel just left of centre. It illustrates the richness of colour in the Antarctic that initially surprised Seago.

speedily capture the essence of his subject, Seago's total portfolio of work painted in the Antarctic may be seen as a large-scale sketchbook using oils rather than the more typical pencil. He is reported as painting almost continually during his brief visit, and the 18 works that appear to have been executed on or near the Peninsula are testimony to his productivity.

In one sense, Seago was introduced to the Antarctic in a gentle way. He was already a master in conveying the ever-changing moods of sky and sea, but the journey from Melbourne to north coast of Adelaide Island must have given him the freedom of seeing sky against a different ocean. He had not been to polar areas before, so icebergs were a new form. The first distant views came on Boxing Day, and were captured in a very typical way, with breaking waves and a lowering sky (catalogue numbers 1a and 1b). In March 1958, the counterpart picture (which is on canvas and therefore probably painted after the cruise) had recently arrived at SPRI. Terence Armstrong, then acting director of SPRI, in writing to Seago to acknowledge receipt, summarised the mood of the picture: 'I think you have caught most skillfully the feeling of a cold, windy day, and the first iceberg emerging from the squall heightens the rather sinister quality of that exciting moment'

(Armstrong 1958).

The nearer view of the first iceberg (catalogue number 2) is more tranquil, with a soft luminous effect in both the sky and sea. The colouring of the painting is dominated by the yellow glow of reflected sunlight on the upper surfaces of the berg. The two original paintings may be seen as encapsulating the different faces of the Antarctic seen by Seago — the bolder, harder aspects of a severe landscape dominated by overcast skies and the more gentle moments when golden light falls on snow and ice on a calm sea.

The known counterparts offer a different insight. They are carefully composed, with perhaps a greater precision of execution. This is especially seen in catalogue number 24b. The original was considered by Reid to be the most dramatic work painted on the voyage, with sea and sky merging 'in an unearthly dark indigo' (1991: 222), and the counterpart loses nothing of this intensity. The sky is used to frame the snow-capped island (wrongly called an iceberg by Reid), which is given added importance by the spur of land and ice cliff to the left, which lead the eye to the island. The calm sea has fewer ice floes than were shown in the original, with consequently less foreground distraction. Both versions of 'Antarctic black' have generated comments about the 'awesome bleakness' of the conti-



Fig. 5. 'Icebergs at Base W': catalogue number 9. This is typical of a small group of Seago's paintings that show the Antarctic Peninsula on a calm summer's day with sunlight falling on ice. Thickly applied paint, with carefully placed highlights, makes the icebergs prominent against a sky that is both sunny and ominous, suggesting impending bad weather.

nent, and both capture the dramatic fall of light on snow and ice. 'Bleakness' may be questioned because, although severe and gaunt, many would not find it oppressive or disheartening.

One painting, 'Icebergs at Base W' (catalogue number 9; Fig. 5), has raised questions that so far remain unanswered. There is no parallel in His Royal Highness the Duke of Edinburgh's collection to this picture (Mrs David Griffiths, archivist of His Royal Highness the Duke of Edinburgh's private collection, personal communication, April 1996), even though Hawcroft (1965) stated that the picture was 'reproduced by generous permission of His Royal Highness Prince Philip, Duke of Edinburgh.' It is painted on canvas laid on board, a material not thought to be used by Seago when actually in the Antarctic, so this suggests it may have been painted after the voyage. Although there are no features linking it to Base W, which was on Detaille Island, the title is very specific. *Polar Record* reported that on the single day that the royal party visited the area, the weather was overcast (1957: 457), yet the picture is of ice on a tranquil and sunny Antarctic day, bathed by rich golden light. It is similar in both general

composition and colour to 'Icebergs in the Antarctic' (catalogue number 8; colour reproduction in Ranson 1992: 15), although the foreground of the painting, light pack on a calm sea, is visually simpler than the foreground of 'Icebergs in the Antarctic.' This pattern of simplification also occurs in the two 'Antarctic black' pictures. In the original, the ice cover is greater than in the counterpart, where the composition of the painting has been carefully considered. 'Icebergs at Base W' may be an example of an Antarctic 'Seagoscope,' the term coined by Seago himself for composite imaginary pictures based on observed elements of a landscape (Goodman 1978: 226).

Summary

A total of 39 Antarctic and Falkland Island pictures by Seago have been identified, not including portraits. It is possible that others may come to light, which may either be counterparts to known pictures or 'Seagoscopes.' More than half of the known paintings are icescapes or landscapes, without obvious human presence.

Seago went to Antarctica with a firmly established technical skill in using oils, which enabled him to capture

the essence of a landscape. The Duke of Edinburgh wrote: 'The novelty of the light and landscape of these unfamiliar places fascinated him and the rest of us were fascinated by his almost miraculous technique. He had a knack of capturing a scene with a speed and dexterity that rivalled that of a conjuror' (Foreword to Reid 1991: 9).

A few years after the voyage, Hawcroft concluded his review of Seago's work by writing:

Seago's painting has a fluid, refreshing, and spontaneous quality. To this may be added a natural flair for colouring and textures, as well as a deep regard for his subject matter....in every single instance the interpretation of his subject had been inspired by enthusiasm, affection, and a high degree of sensitivity, and this is what makes him a major landscape painter of to-day. (1965: no pagination)

This assessment, made during the painter's lifetime, has stood the test of time. Ten years after his death, Reid echoed the earlier summary in writing, 'He never wavered in his dedication to, and faith in, the splendours of nature, never hesitated to marvel at the miracles of a universe epitomized by light and atmosphere' (1991: 136).

Both these commentaries are illustrated by the Antarctic paintings of Seago. Despite the briefness of his visit, it is clear that he was greatly stimulated by what he saw in the Antarctic. He was not trying to convey any underlying heroic message, but he was true to his desire to portray the landscapes he observed with vigour and delight.

Catalogue of Seago's Antarctic and sub-Antarctic paintings

The route of the royal visit was given in *Polar Record* (1957), and the pictures have been listed accordingly. Four paintings of the Falkland Islands and four of South Georgia are also listed. The majority of the paintings are in His Royal Highness the Duke of Edinburgh's private collection. Titles vary between publications, but preference has been given to information supplied by the present owners of the paintings. Unless otherwise stated, all paintings are oil on board.

Where two paintings form a pair, the original is listed first and has been designated 'a'. It has not been possible to establish exact dates for the counterpart pictures (designated 'b'), but brief comments have been made about identifiable differences between the two.

- 1a. 'Storm at sea with iceberg.' 24 x 39 cm. Listed as 'The first iceberg, December 26, 1956' by *The Illustrated London News* (1957: 500) and Reid (1991: 220), with both giving the size as 30 x 41 cm. There is some confusion regarding the naming of 1a. This picture appears to be the pair of catalogue number 1b, which Seago, in a letter to Terence Armstrong, the acting director of the SPRI in March 1958, definitely called 'The first iceberg seen from *Britannia*, Dec 26th, 1956.'
- 1b. 'The first iceberg seen from *Britannia*, Dec 26th, 1956.' 51 x 66 cm. Oil on canvas. In the ownership of Scott Polar Research Institute since March 1958.

2. 'The first iceberg, Boxing Day, 1956.' 45 x 60 cm. Colour reproduction in Royal Collection Trust (1994: 32–33). See also catalogue number 1a.
3. 'HMY *Britannia* oiling astern from *Wave Chief*.' 45 x 60 cm. Reid (1991: 226) has a photograph of Seago painting this oil. Although the photograph is small, the picture can clearly be seen.
4. 'Whale chase by whale catcher.' 43 x 59 cm. Colour reproduction in Bowie (1957: 612–613).
5. 'HMY *Britannia*, two whale catchers and a whale.' 45 x 60 cm.
6. 'Icebergs.' 29 x 39 cm. Listed as 'Icebergs near Base W, Grahamland' by *The Illustrated London News* (1957: 500).
7. 'Antarctic base camp.' 29 x 40 cm. Listed as 'Pack ice at Base W, Grahamland' by *The Illustrated London News* (1957: 500).
8. 'Icebergs in the Antarctic.' 45 x 60 cm. Colour reproduction in Ranson (1992: 15).
9. 'Icebergs at Base W.' 51 x 66cm. Canvas laid on board. Black-and-white reproductions in Hawcroft (1965: plate 60) and Goodman (1978: between 216–217). There is no parallel in His Royal Highness the Duke of Edinburgh's collection to this picture.
- 10a. 'John Biscoe in pack ice (1).' 29 x 40 cm. Listed as 'John Biscoe at Base W' by *The Illustrated London News* (1957: 501).
- 10b. 'John Biscoe.' 44 x 59 cm. In the ownership of the British Antarctic Survey, and in the conference room of *James Clark Ross*. This is a counterpart to catalogue number 10a, although there are minor differences in the positioning of the icebergs.
11. 'John Biscoe in pack ice (2).' 45 x 60 cm. Colour reproduction in Ranson (1992: 19) and black-and-white reproduction in Reid (1991: 221). The mast of *John Biscoe* is left of centre, clearly showing the complexity of the rigging; there is pack ice all around the ship, with sharp cracking of the ice due to the passage of the ship shown in the lower right corner.
12. 'John Biscoe approaching the Lemaire Channel, Grahamland.' 64 x 91 cm. Oil on canvas. Black-and-white reproduction in Hawcroft (1965: plate 58; listed as 'John Biscoe in pack ice, January 1957'). The mast of *John Biscoe* is on the far right with an iceberg on the horizon (left of centre) with light ice near ship. There is no parallel in His Royal Highness the Duke of Edinburgh's collection to this painting.
13. 'John Biscoe in the Antarctic.' 45 x 60 cm.
14. 'John Biscoe in pack ice near Base F.' 49 x 65 cm. Catalogue numbers 13 and 14 may be coupled, although both were known to have been painted in the Antarctic. The main differences are the closer proximity of the ship in 14, backed by a darker sky suggesting an impending storm. Seago's sensitiv-

- ity to weather and delight in portraying skies is well established, so it is possible that having painted one picture, he noted the deteriorating weather conditions, and took the opportunity for a second picture.
15. 'Ice floes in the Antarctic.' 50 x 65 cm. Listed as 'Near the Argentine Islands, Grahamland' (46 x 60 cm) by *The Illustrated London News* (1957: 501).
 16. 'Base F, Grahamland Peninsula.' 29 x 40 cm.
 17. 'HMY *Britannia* anchored in a bay with mountains in the background, Grahamland.' 26 x 39 cm.
 18. 'Argentine Islands.' 50 x 65 cm. Colour reproduction as the frontispiece in Priestley and others (1964), where the reproduction is printed back to front. There is no parallel in His Royal Highness the Duke of Edinburgh's collection to this picture. The painting was given by Edward Seago to Sir Raymond Priestley, who had also been on HMY *Britannia*. The mountains mark the beginning of the Lemaire Channel, and the picture is therefore related to catalogue number 20.
 19. 'Sea passage between two rocks.' 29 x 40 cm. Listed as 'Entrance to the Lemaire Channel, Grahamland' by *The Illustrated London News* (1957: 501); reference in Reid (1991: 221), using *The Illustrated London News* title.
 20. 'Mountain peaks, Grahamland, near the Lemaire Channel.' 50 x 65 cm. Listed as 'Grahamland coast near the Lemaire Channel' by *The Illustrated London News* (1957: 501) and Reid (1991: 67 (plate 73), 221).
 21. 'Grahamland coast.' 29 x 39 cm.
 22. 'Grahamland coastline.' 50 x 65 cm.
 23. 'HMY *Britannia* passing through the Neumayer Channel.' 26 x 39 cm.
 - 24a. 'Near Base O, Grahamland (Antarctic black).' 45 x 60 cm. Colour reproductions in Reid (1991: 66 (plate 72)), Ranson (1992: 12), and Royal Collection Trust (1994: 30–31).
 - 24b. 'Antarctic black.' 66 x 91 cm. Black-and-white reproduction in Hawcroft (1965: plate 59). This counterpart has an ice cliff on the centre left horizon, rather than exposed rock as in the original. There are fewer floes than in the original. It is not known if the painting is on board or canvas.
 25. 'HMS *Protector* off the ice cap.' 44 x 59 cm. Listed as 'The *Protector* in Admiralty Bay, South Shetlands' by *The Illustrated London News* (1957: 500).
 26. 'Port Stanley, Falkland Islands.' 44 x 59 cm. Listed as 'The wreck of the *Fenia*' by both *The Illustrated London News* (1957: 501) and Reid (1991: 66 (plate 71)), where there is a colour reproduction. See note for catalogue number 28.
 27. 'Stanley Harbour, Falkland Islands.' 45 x 60 cm. Colour reproduction in Ranson (1992: 21). Catalogue numbers 26 and 27 may be coupled (as were 13 and 14), as they appear to be another example of Seago taking the same scene, but painting it under different weather conditions. The composition of 27 is similar to 26, but the colouring is much brighter, with sunlight falling on the town in the left middle distance and on the hills in the centre middle distance. The cloud pattern is strong in both pictures, but in 27 there is a dominant patch of blue sky left of centre. Another distinguishing factor is the sea, which is more broken, with white caps to the waves.
 28. 'Rocky promontory, Falkland Islands.' 24 x 39 cm.
 29. 'Headland, Falkland Islands.' 50 x 65 cm. Colour reproduction in Ranson (1992: 18).
 30. 'Entrance to the Cook Straits.' 24 x 39 cm.
 31. 'Rocky coastline, South Georgia.' 24 x 39 cm.
 32. 'Shackleton's Cross, South Georgia.' 50 x 65 cm. Listed as 'Grytviken Bay, South Georgia, from the Shackleton Memorial' by *The Illustrated London News* (1957: 501). Black-and-white reproduction in Reid (1991: 223).
 - 33a. 'Grytviken Harbour, South Georgia.' 50 x 65 cm. Listed as 'The whaling station, Leith Harbour, South Georgia' by *The Illustrated London News* (1957: 500). Colour reproduction in Ranson (1992: 13).
 - 33b. 'The whaling station, Leith Harbour, South Georgia.' 64 x 91 cm. Oil on canvas. Black-and-white photographs of this counterpart, listed as 'Grytviken, South Georgia,' in Goodman (1978: between 216–217) and Hawcroft (1965: plate 57). The left middle distance shows clear differences in the patterns of exposed rock on the mountains behind the settlement. The ships' masts are also less distinct on the larger counterpart painting. Reid (1991: 222) said 'several paintings' were done at factory buildings at Grytviken. If that is so, they are not in the collection of His Royal Highness the Duke of Edinburgh, and no reproductions or other references have been found.
 34. 'Antarctic seascape with distant icebergs.' 45 x 60 cm. Listed as 'Last icebergs, January 14, 1957' (46 x 60 cm.) by *The Illustrated London News* (1957: 501). It appears that Reid (1991: 222) was commenting about 'Antarctic seascape with distant icebergs,' although he referred to it under *The Illustrated London News* title.
 35. 'Last iceberg seen from *Britannia* — 14/1/57.' 49 x 74 cm.

Acknowledgements

The author wishes to convey her thanks to many individuals who patiently answered questions or gave permission for their paintings to be reproduced. Invaluable help came from personal communications with: R.J. Adie, Cambridge; K. Bromley, King's Somborne; Mrs David Griffiths, archivist of His Royal Highness the Duke of Edinburgh's private collection; R.K. Headland, archivist of the Scott Polar Research Institute; the family of the late Sir Raymond

Priestley, especially G.F. Hubert, Tewkesbury; Jane E. Noakes, corporate archivist of Scotiabank, the Bank of Nova Scotia; and Joanna Rae, deputy archivist of the British Antarctic Survey.

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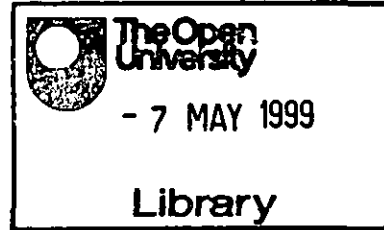
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The accuracy of references in the text and in this list is the responsibility of the author, to whom queries should be addressed.

HMS *Challenger* in the Antarctic: pictures and photographs from 1874

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ABSTRACT *HMS Challenger* was probably the first official expedition to carry a photographer as well as an artist. A survey has been made of the illustrations and photographs made during their 3-week voyage in polar waters during February–March 1874. Documents from this period reveal the interest and excitement generated by ice. The eight existing photographs are the earliest known images of southern icebergs and some appear to have been used as the basis for later illustrations. The work of the official artist was supplemented by drawings and watercolours by several of the ship's officers and scientists, as well as a unique lower-deck collection by a cooper. The fascination with ice is evident in all work, but both professional and amateur artists portrayed ice in a straightforward and realistic manner. A different approach has been identified in later work, produced at a distance. Although based on *Challenger* material, images were reworked so as to increase the dramatic effect and romanticize the illustration.

KEY WORDS: Antarctic, exploration, *HMS Challenger*, art, photography

Introduction

In December 1872 *HMS Challenger* set sail from Portsmouth to begin ocean surveys that were to last almost three and a half years, and cover 127,634 kilometres (68,890 nautical miles). About 240 men—officers, crew, scientists and technicians—took part in a voyage which covered the Atlantic, Southern Ocean and Pacific, contributing greatly to the developing science of oceanography. Apart from the extensive scientific studies, the voyage was notable in at least three further ways: it was probably the first major expedition to carry an official photographer as well as an official artist; *HMS Challenger* became the first steamship to cross the Antarctic circle; and eight photographs, dating from February 1874, are the earliest known images of southern icebergs (Headland, 1989, p. 191).

This study is focused on the 3 weeks *Challenger* spent in sub-Antarctic and Antarctic waters and examines, firstly, the artistic work executed in this period by both the official artist and also by other members of the expedition, and, secondly, the photographs of icebergs. Consideration is then given to the way these works were subsequently used in published material.

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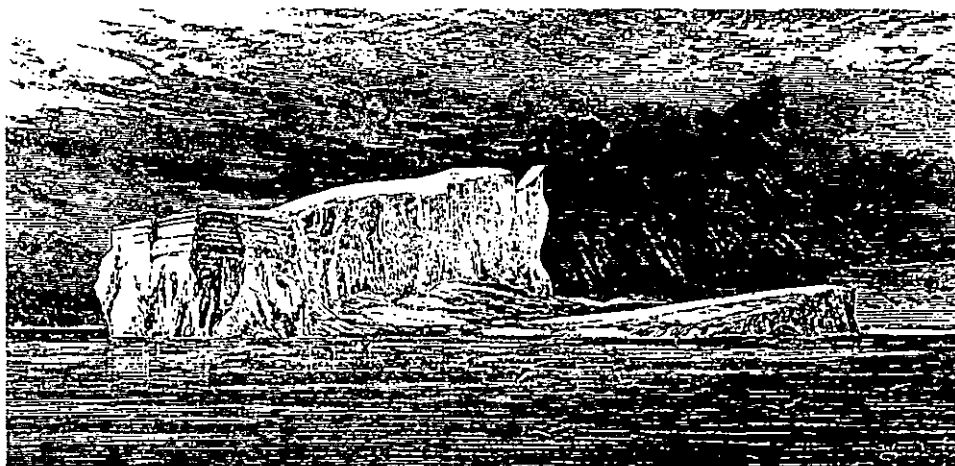


Figure 1. 'Iceberg seen 21st February' from Thomson and Murray's *Narrative*, p. 402. Two shots were fired at this iceberg.

Sources

The artist was one John James Wild. Little has been found about his life and the only originals of his work are located in the archives related to the publishing of the *Challenger* reports at the University of Edinburgh. They hold a collection of about 80 works, but none for the Antarctic stage of the voyage. Assessment of his work for that period has therefore been by means of illustrations in two books—the official report of the voyage and Wild's own account (1878) *At Anchor: a narrative of experience afloat and ashore during the voyages of HMS 'Challenger' from 1872–1876*. In making this initial search, it became apparent that several other members of the expedition were amateur artists, producing work that deserved study.

After the return of the expedition in 1876 it took many years to edit all the 50 volumes of the scientific report. The *Report Narrative of the Voyage: Volume 1, parts 1 and 2* (1885) was mainly used in this study but for ease it will be referred to as the *Narrative*, with Thomson and Murray (this edition 1965) as editors. It has a total of 19 titled reproductions of icebergs and pack ice, presumed to be based on drawings by Wild, plus one from a naval officer (Figure 1).

Immediately following the return of the *Challenger*, several members of the expedition published books recounting their experiences. For example, Moseley, later to be Professor of Zoology at Oxford, produced *Notes by a naturalist on the 'Challenger', being an account of various observations made during the voyage of H.M.S. 'Challenger' round the world in the years 1872–1876* (1879) which provided a detailed but lively account, often illustrated by engravings based on his own drawings. At least two lower-deck records have also survived and these provide interesting material from a very different perspective. A sketchbook found in an American antique shop gave a visual record from Shephard, one of the ship's coopers (Stewart & Henderson, 1972), whilst the letters sent home by Joseph Matkin, a steward's assistant, provided written insights into life on board (1992).

The centenary of the expedition resulted in the publication of several volumes, one of which, Linklater's *The Voyage of the Challenger* (1972), gives an

enjoyable narrative account as well as being well illustrated. Further reproductions of paintings, sketches and other illustrations, seemingly by different hands, as well as contemporary photographs (although none of icebergs), may be found in Reader's Digest (1985, pp. 120–125).

The Artist

Wild was a member of the civilian staff and also had to serve as private secretary to the Director of the Scientific Staff, Dr Charles Wyville Thomson, who was also a civilian. The dual role was typical of the lot of expedition artists (see, for instance, Jacobs, 1995), but at least he was financially rewarded for his efforts, as his annual pay was £400, twice that of other members of the civilian staff (Thomson & Murray, 1965, p. 19).

In 1872 he wrote from Belfast to Dr Thomson, Professor of Natural History at Edinburgh University, who had persuaded the Royal Society to fund the expedition. The letter shows that Wild had already made zoological illustrations for Dr Thomson and that there was a respectful friendship between the two men and their wives. Wild also expressed his excitement: 'the proposal of going with you on this expedition appears to me in reality so brilliant that I am almost afraid to realise the idea, lest in case of failure the disappointment would be too great' (MS Letter, 9 January 1872). In one of the expedition's group photographs Wild is seen seated on deck with other civilian staff. He wore an open-necked shirt with a casually-knotted scarf, showing distinct sartorial differences between him and his more formally-dressed companions (Reader's Digest, 1985, p. 120).

At the end of the voyage Dr Thomson was appointed editor of the scientific reports. After his death in 1882, the work was carried on by John Murray, one of the 'Naturalists', but the *Narrative* was not published until 1885. In the opening editorial note Murray wrote:

Nearly all the woodcuts of scenery, and many of those of animals, are from the sketches and drawings of Dr J. J. Wild, who accompanied the Expedition as Artist and Private Secretary to the Director of the Civilian Scientific Staff; in 1884 Dr Wild forwarded from Australia a large number of sketches taken during the cruise, from which a selection was made. (1965, p. vii)

However, a further note on the title-page of the *Narrative Volume 1, part 2*: 'Partly illustrated by Dr J.J. Wild, Artist to the Expedition', suggests it is unwise to assume that all the illustrations were by Wild. Some are clearly headed 'from a photograph', a process which would not have required Wild's attention.

No indication is given as to how Wild received a doctorate, or where he was resident in Australia. A note in the front of *At Anchor* (1878) confirms the title, so it must have been conferred on him in the 2 years immediately following the return of the expedition. During that period he also published *Thalassa: an essay on the Depth, Temperature, and Currents of the Ocean* (1877).

More to the point of this paper, the note in *At Anchor* stated that the 'typographic etchings' are by Dr Wild, and they bear his monogram. The seven illustrations in the chapter entitled 'The regions of the South Pole' (1878, pp. 70–78) convey clearly the form of the ice, with its weathered and irregular surfaces. Wild was obviously competent in production of etchings, and his



Figure 2. Coloured plate from Wild's *At Anchor*, opposite p. 74. It appears to be a composite picture based on sketches made in the Antarctic.

uncoloured works in *At Anchor* have a simplicity that contrasts with the more detailed images in the *Narrative* (Figures 2 and 3). The only coloured plate in his own book that showed a polar scene was entitled 'HMS *Challenger* among the icebergs of the Antarctic Ocean'. By modern standards the colour is crude with flat areas of bottle green for the sea, but the underlying drawing of the ice and the ship is convincing.

The University of Edinburgh holds several of Wild's sketches of the peri-Antarctic islands visited by the *Challenger*—Prince Edward Islands, Iles Crozet, Iles Kerguelen and Heard Island, as well as a view of a glacier on the north shore of the Magellan Strait off South America. They are carefully-drawn water-colours, fulfilling Wild's own description of his work: 'simple topographical ... sketches, representing as accurately as the circumstances of their production would permit, the natural scenery' (1878, p. 4). However, it is frustrating to read Matkin's comment: 'The Artist made sketches of most of the large icebergs,' (1992, p. 141). Presumably there must have been many drawings, but despite enquiries these have not been traced.

Other Artists on the Expedition

Although he was the official artist, Wild was not the only individual who drew and painted. During the 19th century it was considered a necessary accomplishment for many, including both naturalists and naval officers. The book jacket for Linklater's account (1972) is a reproduction from the first volume of the Chief Paymaster R.R.A. Richard's journal, whilst the back of the jacket shows the first page of Lieutenant Pelham Aldrich's journal where the handwritten text frames two ink and water-colour sketches. Further examples in Linklater's text show his facility in the use of water-colour.

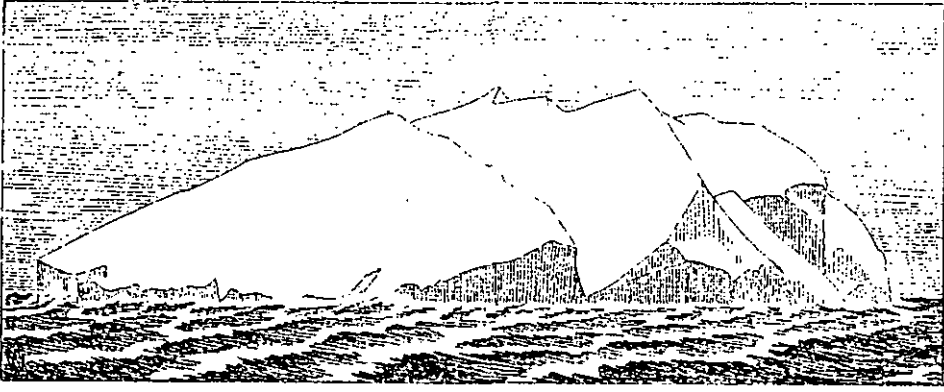


Figure 3. 'The Challenger's antagonist' from Wild's *At Anchor*, p. 76. The iceberg damaged the rigging of the ship in the collision on 24 February 1874.

The archive at Oxford contains some of the water-colours used as the basis for engravings in Moseley's own book (1879). It is almost certain they were painted after the event, rather than as on-the-spot coloured sketches. This is indicated by the way the washes have been laid, and also by the technical difficulties of using the medium outside in Antarctic temperatures. A later artist, Edward Wilson, who was with Scott on both the *Discovery* and *Terra Nova* expeditions wrote: 'One is very limited as to methods. Pencil and chalk are the only things possible out of doors' (1911, no pagination). Wilson's own method was to annotate his sketches with detailed notes about colour, so that he could do later work on a painting indoors.

The record made by one Benjamin Shephard, a cooper on board *Challenger*, consists of a single sketchbook containing 34 watercolours, of which six relate to the Antarctic (Stewart & Henderson, 1972). Every painting follows the same oval pattern, showing the *Challenger* against a scenic background, usually her various ports of call. The style is naive and the paintings are framed by an ornamented belt on which the painting's title is written.

Few examples exist of work by members of the lower deck from any polar expedition, so this collection is of particular interest. The editors of Shephard's work pointed out that the: 'renditions of the ship itself, are extremely accurate with the single exception that—as a true man of sail—he frequently refuses to show in his paintings that the *Challenger* had a stack' (Stewart & Henderson, 1972, Introduction, no pagination). The offending item is conveniently hidden by the fore sail in four of the Antarctic paintings and can only be clearly distinguished in one. The sixth, *HMS 'Challenger' firing at ice burgh Feby 1874*, is ambiguous—is it disturbed water behind the ship or smoke from the stack (Figure 4)?

The Photographs

Several albums of *Challenger* photographs exist and Brunton (1994) painstakingly collated all known images with earlier lists, as well as giving further background information. Dr Thomson is known to have been a competent photographer but the text of the *Narrative* was remarkably silent about the photographers—no

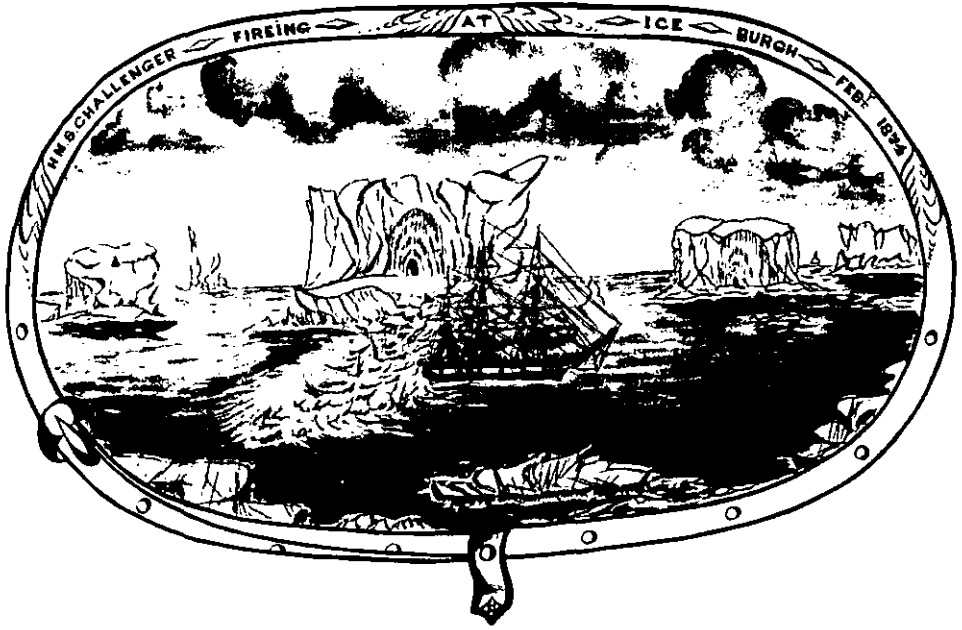


Figure 4. 'HMS Challenger firing at ice burgh Feby 1874'. Watercolour by Shephard from the *Challenger Sketchbook*, J. Welles Henderson Collection, by courtesy of Independence Seaport Museum, Philadelphia, USA

names were given and no equipment listed. The reason for this reticence may be because at least two deserted during the voyage, including Caleb Newbold, listed in Ship's Ledgers as a Corporal in the Royal Engineers (Brunton, 1994, p. 17). Since 1855, a training programme in photography had been established by the Royal Engineers, enabling skilled men to be sent on expeditions, such as the one to survey the United States-Canadian border on the Forty-ninth Parallel (Haworth-Booth, 1984, p. 114). It may therefore be presumed that the early photographic work on the *Challenger* was in skilled hands, but as Newbold absconded in South Africa, prior to the voyage south, another photographer had to be appointed.

No details have been found of the cameras used on the *Challenger* and the only records that exist refer to various chemicals, albuminized paper and glass plates. Consequently, it is not possible to assess how much tolerance of movement there was when taking photographs on board ship. Brunton's total collection numbers over 820 images and it is clear that the vast majority (over 97%) were taken on land. At the most, 12 other photographs, apart from the iceberg series, were taken from the ship, and all show a calm sea so it is assumed that this was a prerequisite for use of the equipment.

Even today, the extreme climatic conditions found in polar areas affect both camera and film but in the 1870s the problems would have been exacerbated by the limitations of available equipment and techniques. It is also assumed that limitations were imposed on the photographer by the very nature of the expedition. *Challenger's* scientific work included the taking of soundings and the establishment of stations to enable deep-sea dredging to take place. During these activities, the decks were taken up by trawls and other equipment, demanding conc

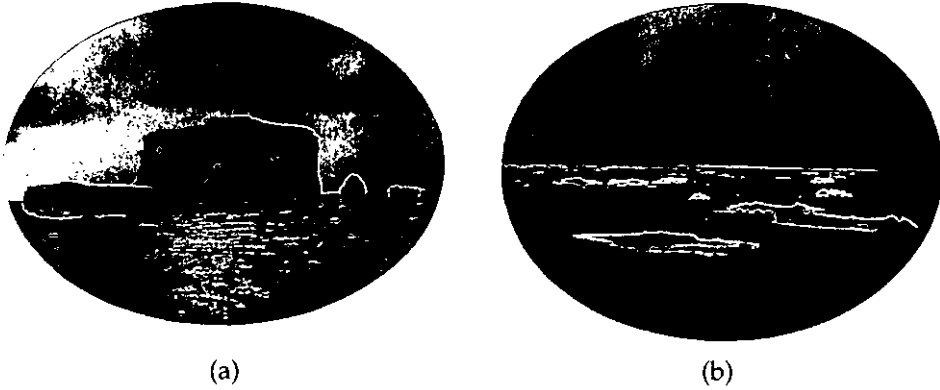


Figure 5. Photographs taken during February 1874 from Thomson and Murray's *Narrative*. (Reproduced by courtesy of the Natural History Museum London.)

5a. The target iceberg (*Narrative*, plate XIIa, Brunton photograph 280).

5b. The most successful Antarctic photograph, possibly due to the floes giving perspective to the image (*Narrative*, plate Xb, Brunton photograph 280).

graphs, there would have been few options in the choice of viewpoint or distance to the object.

A total of eight photographs of icebergs exist and all are included in the *Narrative* as pairs on plates X–XIII (see figure 5 for an example). Reference will be made to the left-hand photograph as 'a' and the right-hand as 'b'. The photographs have been masked, resulting in oval images simply entitled 'Antarctic ice', but by cross-referencing to various texts and other illustrations it has been possible to date two of them to the 21 and 25 February 1874 (plate XIIa, Brunton photograph 280; plate Xb, Brunton photograph 281 respectively).

The photographs taken on board *Challenger* were available to members of the crew. The price was one shilling, chargeable to personal accounts, and from Matkin's letters it is clear that many took the opportunity to purchase prints. He promised his family he would send them 'some photographs of these bergs' (1992, p. 142). Ten years after the end of the voyage the price was still the same (Brunton, 1994, p. 15), showing commendable economic restraint.

Polar Phenomena: ice and light

It is not known how many members of the expedition had been in polar waters before, but it is clear that most on the ship were fascinated by ice. Matkin wrote: 'We passed one on the night of the 14th, which looked something like Windsor Castle ... nearly all hands were on deck to see it' (1992, p. 141). These were early days in polar waters for the *Challenger*. By the time they had had a collision with a berg and periods of stormy weather, Matkin recorded: 'Altho' we were all eager to see an iceberg, we are just as anxious to lose them now, it is so dangerous sailing these foggy nights with such masses of destruction all round us' (1992, p. 146).

Many of the verbal descriptions emphasized colour, possibly for two reasons: firstly, to refute the general notion that icebergs were white, and

secondly, because it was realised that published accounts would be predominantly in black and white. The *Narrative* quoted Moseley:

The colouring of the southern bergs is magnificent. The general mass has an appearance like loaf sugar, with a slight bluish tint, except where fresh snow resting on the tops and ledges is absolutely white. On this ground colour there are parallel streaks of cobalt blue, of various intensities ... The colouring of the crevasses, caves, and hollows is of the deepest and purest azure blue. None of the artists on board was able to approach a representation of its intensity. (Thomson & Murray, 1965, p. 433)

Throughout the history of polar exploration there have been examples of confusion caused by the light and atmosphere of polar regions. The *Narrative* illustrated some of the difficulties in interpreting what exactly was being seen:

... some distant bergs were seen to assume a most intense black colour. This was due to their being thrown in shade by clouds passing between them and the sun, and the heightening of this effect by the contrast with brilliantly lighted up bergs all around them. They looked like rocks of basalt. (Thomson & Murray, 1965, p. 434)

Another example of 'visual confusion' was Termination Land, confidently charted by the American Charles Wilkes in 1840. *Challenger* searched in vain for the plotted coastline and Matkin wrote:

... we were on the exact spot ... & no sign of land was to be seen ... so may conclude that Termination Land has no existence, & the Yankees were deceived by a large iceberg, or well defined cloud.... had it not been for our having steam, we might have marked new lands down on the Southern Charts; but, altho' we could all have sworn, that we saw land on one occasion, on steaming towards it, it proved to be a peculiar, & remarkably defined vapour cloud. (1992, p. 144)

These difficulties faced, and continue to face, all polar visitors including artists and photographers trying to capture the images they saw. Distance is particularly difficult to comprehend and consequently it is not easy to convey scale. The French explorer Charcot summarized the problem clearly:

nothing is so productive of error as the eyesight in polar regions. The least change in the weather alters one's estimates in truly fantastic manner, and all distinction between different levels vanishes. (1911 translation, this edition 1978, p. 89)

The Recording of the Icebergs of the Southern Ocean

The first iceberg was seen on 11 February 1874. Daily sightings occurred until 4 March by which time *Challenger* was en route for Australia. During these 3 weeks five stations took place. Weather and sea conditions influenced procedures, but a typical station took about 8 or 9 hours. Sails were furled, steam got up so that soundings and dredgings could be carried out. These stationary conditions, and also 3 days of calm weather from 20–22 February, were clearly conducive to both artists and photographers. Perhaps the very title of Wild's

book—*At Anchor*—gives an indication of the conditions he desired for his work.

Three events stand out during the 3-week period—the shooting at an iceberg, the blizzard resulting in a collision with a berg, and the lowering of a boat to investigate the pack. On 21 February the weather was calm and during the afternoon the ship closed in on an iceberg. It was photographed and appears to be Plate XIIa in the *Narrative* (Brunton photograph no. 280, shown as Figure 5a). The *Narrative* also had a woodcut of this berg seen from a different angle (Thomson & Murray, 1965, figure 152, p. 402, shown as Figure 1) together with a description of the event:

The first shot was directed at a low part of the berg about 100 feet from the ship, and striking against pure ice split off a great mass from the ice-cliff, which, tumbling into the water between the berg and the ship, created quite a commotion. The second shot was directed at the upper part of the berg about a third of the distance below the summit, which was 180 feet high, and striking against the softer part merely buried itself in the snow-cliff. (Thomson & Murray, 1965, p. 402).

Shephard painted the event, suggesting much disturbance as the ice cascaded down after the first shot (Stewart & Henderson, 1972, plate 29, shown as Figure 4). He showed the cave in the ice which may also be seen in Wild's drawing in the *Narrative* (Thomson & Murray, 1965, plate D2, opposite p. 432). His painting also contains pinnacles of ice, similar to one shown by Wild in his coloured illustration (1878, opposite p. 74, shown as Figure 2). Although it has not been possible to cross-reference these with photographs or other illustrations, it suggests that Shephard attempted accurately to convey what he saw. The archive at Oxford also contains an unnamed drawing of the same incident, possibly by Moseley, but although detailed it lacks the action of Shephard's work.

The second incident occurred 3 days later on 21 February. The weather worsened and a gale blew up, so the ship took refuge under the lee of an iceberg, with engines steaming slowly to keep head to wind. A sudden lull in the wind 'caused the ship to gather headway, and before the engines could be stopped the vessel ran into the berg and carried away the jib-boom, martingale, and one of the whiskers' (Thomson & Murray, 1965, p. 404). Wild's drawing of 'The Challenger's antagonist' (1878, p. 76, shown as Figure 3) is the simplest of his Antarctic sketches, probably because of the speed of events after the collision and the need to stay out of the way of sailors under emergency orders. A lively rendering of the occasion is the pencil and wash drawing, presumed to be by Moseley (Reader's Digest, 1985, p. 125). The form of the iceberg is similar to that shown by Wild, but the view is that of an onlooker, seeing the incident from a convenient but imaginary viewpoint.

The following day, 25 February, the weather was calmer and the *Narrative* has three illustrations for this day. There is also a link with one of the photographs. Plate Xb (Thomson & Murray, 1985, opposite p. 398, shown as Figure 5b) is of the same ice floes and berg shown in figure 155 (1985, p. 406) and is similar to an illustration in Wild's book (1878, p. 77 bottom), although there are some variations in the positioning of the floes.

A boat was lowered to investigate the nature of the pack ice. Matkin recorded this event and wrote that whilst the *Challenger* 'was forcing her way

through a large field of floating ice, the Artist sketched her from a Boat' (1992, p. 146). Perhaps this was the occasion when Wild gathered some of the material that he ultimately used to produce the coloured plate in *At Anchor* (1878, opposite p. 74, shown as Figure 2). This is a composite work. The massive iceberg to the left of the ship is that seen on 19 February and shown as plate C5 of the *Narrative* (1965, opposite p. 430) and the foreground grouping of floes is found in Figure 155 of the same volume (1965, p. 406). It has not been possible to identify the other ice groupings of the picture.

Reports in *The Illustrated London News*

The *Challenger* voyage was one of the first major expeditions to be regularly reported in the home press. Information was supplied to *The Illustrated London News* (ILN), a weekly journal then illustrated by engravings, presumably prepared by the journal's own staff. There was an inevitable time-lag, as may be seen from the incident of the collision with an iceberg. This occurred on 24 February, but it was not until 17 March that the *Challenger* arrived in Melbourne, enabling material to be sent to London. The written report appeared in *The Illustrated London News* on 6 June 1874, with acknowledgement to Lieutenant Aldrich: 'for two sketches of the ship encountering ice-drifts and snowstorms, in the middle of February last' (LXIV: 1815, p. 538). There is no mention of the actual collision—simply that 'icebergs on the lee beam were closely approached' (p. 538). Whether the censorship took place on the *Challenger* before sending the report, or at an editorial desk in London cannot now be ascertained. Aldrich's diary included two sketches, one of the actual collision and the second of the *Challenger* in the subsequent snowstorm (see black and white illustration in Linklater, 1972, p. 89), both seen from the position of an onlooker. A similar scene also appeared in the *Narrative* (Thomson & Murray, 1965, Figure 154, p. 404) where it was credited to Aldrich. There are thus three extant versions of the same event—the original in Aldrich's diary, a woodcut in the *Narrative* and an engraving in the ILN.

Aldrich's diary and the *Narrative* illustrations are similar, though perhaps the snow is denser in the diary sketch, but differences appear when these two are compared with the ILN illustration. In the weekly journal the angle of the ship is steeper, the seas are higher, the smoke from the stack is being blown harder by the wind and the main topsail appears torn, rather than with the weather clue set aback as reported by the *Narrative* (Thomson & Murray, 1965, p. 405). There was no doubting the seriousness of the situation that faced the *Challenger*, but it appears to have been the journal's engraver who took on the role of picture editor, presumably for increased dramatic effect.

A further polar illustration appeared in the ILN later in the year from 'a correspondent on board the ship' (28 November 1874, LXV: 1840, p. 505). The *Challenger* is shown within heavy floes, flanked by large icebergs (Figure 6). Brunton's photograph 326, listed as 'Wild's drawing', is the obvious basis for the ILN illustration. In his album Moseley wrote below his print: 'Combining various Ice Phenomena. The ship was never in such a position. Moreover Royal Yards were never crossed down South, & flying Jibboom was stowed'. The print appears to be a copy of a water-colour, but it is difficult to be certain. The largest of the icebergs is similar to illustrations by Wild in the *Narrative* (Thomson & Murray, 1965, opposite p. 429) and in his own book (1878, p. 73). The profile of



Figure 6. 'Among the icebergs of the Antarctic' from the *Illustrated London News*, 28 Nov. 1874, p. 505. (Reproduced by courtesy of the *Illustrated London News* Picture Library, London.)

the ship is remarkably similar to Brunton's photograph 93, showing the *Challenger* at St Thomas in the West Indies and the implication is that Wild used this photograph in this composite picture.

Comparison of the photograph with the ILN illustration indicates that the picture had been redrawn. One unfortunate result of this is that edges have been rounded, and the angularity of the southern bergs has been lost. Much of the ice in the Antarctic comes from fragments breaking off the ice sheet, so flat tops are more typical than in the glacier-derived ice of the north. These differences have been lost in the ILN drawing, and the general impression is of a more crowded, ill-defined scene.

After the passage of over 120 years, it is not easy to make judgements as to motives, but one interpretation is that the ILN, more used to Arctic illustrations, reworked the image for their readers, romanticizing the scene so as to portray the danger and excitement of a hazardous voyage in previously-reported 'perilous regions' (ILN, 6 June 1874, LXIV: 1815, p. 538). A more innocent assessment would see the difficulties of an engraver sitting in London and receiving sketches or photographs on which to base a final work. He might not be aware of the importance of the density of ice cover, or subtleties concerning angularity. Nevertheless, as the first polar engraving clearly exaggerated aspects of *Challenger* in the gale, it must be concluded that the first supposition is more likely. The *Illustrated London News* did not simply use engraving as the means of communicating an image to its readers, but was willing to take artistic licence in order to dramatize and romanticize events.

The Colophons of the Narrative Account

Throughout the *Narrative* sections or chapters were concluded with a colophon offering vignettes of the life of the expedition, such as examining the contents of the trawl, or obtaining plant specimens. One of the ship's dogs, a black labrador-type, was frequently shown, often portrayed as showing a keen interest in the scientific work (Thomson & Murray, 1965, Vol. 1, part 1, p. 191) One of the colophons is fanciful, with two mermaids assisting in the collection of fishes for a sample net (p. xxix), whilst another is patriotic, showing Mr Punch in sailor's uniform, cheering the departing *Challenger* (p. 20, taken from *Punch* 63: iv, 28 December 1872). Some would now be considered 'politically and environmentally incorrect'. A scientist kicks out at pecking penguins, seeking to protect their eggs (Thomson & Murray, 1965, Vol. 1, part 1, p. 288) whilst two sailors use a pulley to haul up an obviously live shark, with two worrying dogs under it (Thomson & Murray, 1965, Vol. 1, part 2, p. 560). Many are signed by Elizabeth Gulland, a lady who did not go on the expedition, but was involved in the production of the *Narrative*. In some cases she clearly worked from photographs, but in others it appears she based her drawing on sketches that have since disappeared.

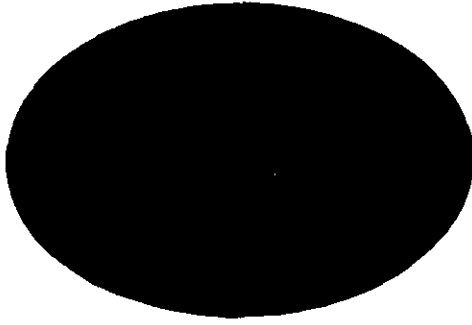
The Edinburgh University Library holds one unsigned and untitled work showing the *Challenger* under sail, keeling over under the wind with a surging bow wave, passing in front of an iceberg (Figure 7b). The work was used to end the chapter relating to the voyage from Heard Island to the Antarctic Circle and Australia (Thomson & Murray, 1965, p. 404, shown as Figure 7c).

The painting of the iceberg is taken directly from one of the 'Antarctic ice' photographs that appear in the *Narrative* (Thomson & Murray, 1965, Plate XIIIb, shown as Figure 7a). Both Brunton's and the ship's referencing systems make this the first of the Antarctic series (Brunton photograph 279, 1994, p. 37). It is therefore reasonable to suppose that it predates photograph 280, which was taken on 21 February 1874. As can be seen from the dated illustrations, particularly in the *Narrative*, many large icebergs were seen especially between 14–21 February. Two stations were also made in that period, offering relatively motionless conditions for photography.

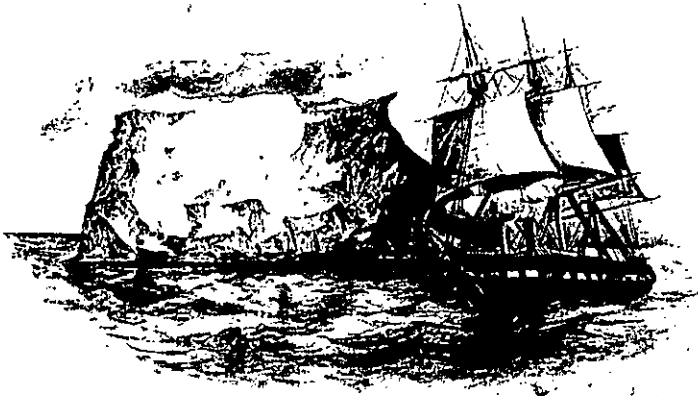
It is not likely that the spectacle depicted by the colophon occurred in the Antarctic. If the photograph dates from the first week amongst the ice, a skilled naval captain would hardly have sailed in such a dashing manner in uncharted polar waters. It suggests that the illustration is a later composite work, based on the photograph and a skilled representation of the *Challenger*. It is not unreasonable to conclude that it was produced specifically to provide a triumphant ending to the chapter which chronicled a successful voyage in dangerous waters. The editors of the *Narrative*, all scientists of high standing, appear to have allowed themselves the pleasure of visually embellishing the end of this part of their work with an imaginary artistic flourish.

Discussion

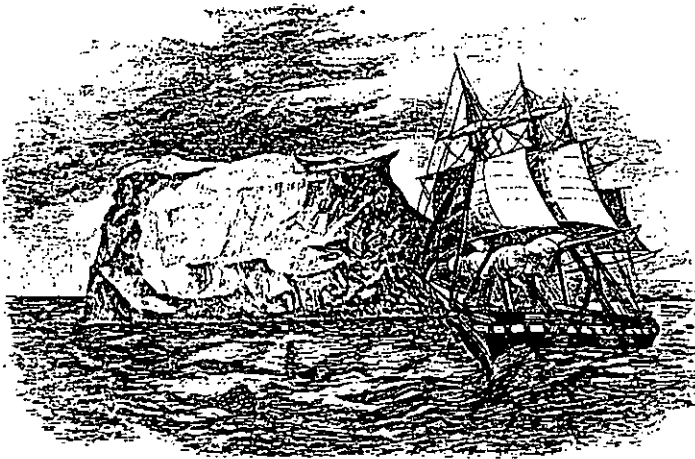
Any assessment of pictorial and photographic work resulting from the *Challenger's* voyage should be seen in the context of the 'polar views' then prevalent in Britain. During the latter half of the 19th century, popular interest had focused on the Arctic mainly because of the mystery of the last Franklin expedition to



(a)



(b)



(c)

Figure 7. The colophon from Thomson and Murray's *Narrative*.

7a. The photograph (*Narrative*, plate XIIIb, Brunton photograph 279, reproduced by courtesy of the Natural History Museum, London).

7b. The watercolour (reproduced by courtesy of the Edinburgh University Library).

7c. The printed colophon (*Narrative*, p. 414).

northern waters. In 1845 Sir John Franklin had left to search for a Northwest Passage, but his expedition disappeared and their fate remained an enigma. Repeated search expeditions were sent but it was not until 1859 that messages were found in Northern Canada. Franklin had died in the summer of 1847, the ships had been abandoned and the survivors were attempting to reach Hudson Bay Company Posts. None succeeded. The tragedy received wide publicity, inspiring both painters and writers. As an example, Wilkie Collins and Charles Dickens collaborated in the development and writing of a play *The Frozen Deep*, set in the Arctic. In the summer of 1857 a Command Performance was given in front of Queen Victoria, with Dickens and Collins taking the leading roles. It was revived in 1866 and again in 1874, showing the continued interest in polar matters (Codling, 1986).

Franklin's expeditions and the many search parties sent after him greatly extended knowledge of the Canadian North. In contrast, the Antarctic was largely unknown. The only activity was sealing, centred on the Antarctic Peninsula. In other parts of the continent, only occasional sightings of the extensive coastal ice and land had been made. The discovery of Victoria Land by Sir James Clark Ross in 1841, together with the Ross Sea and the Ross Ice Shelf, was the last major discovery to be made until the beginnings in about 1895 of the so-called heroic age of exploration. The *Challenger's* visit to southern polar waters would therefore have been seen as venturing into the unknown, a visit to seas traversed by Coleridge's *Ancient Mariner* (although it should be noted that Doré's engravings for that work were not to be published until 1875, the year after the *Challenger's* visit).

Jacobs' recent study *The Painted Voyage: art, travel and exploration 1564–1875* (1995) only briefly considers polar areas, and even then concentrates on the Arctic, dismissing the Antarctic in a few lines. Yet the subject of the painting used by Jacobs to conclude his book—an 1861 oil painting of a northern scene by the American artist Frederick Church, entitled *The icebergs*—appears to be in common with the subject matter of all of the works considered in this essay. Against the background of towering icebergs lay the pathetically small and broken wreckage of part of a ship's mast. Jacobs maintained that this picture 'attained what had now become the ultimate goal of the intrepid travelling artist—to portray nature at her most strikingly unusual, and to do so with an overlay of metaphor, poetry and adventure' (1995, p. 153). Is his view supported by the Antarctic work resulting from the *Challenger* voyage?

Jacobs' evidence to support his theory may well be valid for 'the intrepid travelling artist', but it is suggested that those on the *Challenger*, including Wild, should be seen as individuals with varying levels of artistic skills who had the opportunity to travel, rather than artists who specifically chose to travel. All had been selected to go on the voyage because of their abilities, whether maritime, scientific or craft based. They were part of a scientific mission and their work reflected this, as they portrayed natural phenomena in a straightforward and realistic manner. Their fascination was with ice, which probably most would describe as 'nature at her most striking' (in more ways than one), but whilst they recognized the adventure in their work, they had no need of overlays of metaphor or poetry. Even Wild, as a professional artist, did not conform to Jacobs' theory. Assuming the illustrations in the *Narrative* and *At Anchor* follow his original work closely, he was generally true to his intentions of 'representing ... accurately ... the natural scenery' (1878, p. 4). The main exception is the

composite work that ultimately appeared in the ILN. There he condensed images, and added the *Challenger* to the scene.

The frequency of representations of the *Challenger* from a distance is one major difference between the works of the professional and amateur artists. Only one reference has been found to the lowering of a boat, enabling the *Challenger* to be seen in this way, yet many of the amateur artists repeatedly produced works showing their ship surrounded by spectacular bergs and floes. There would definitely have been no opportunity for 'views from afar' during the collision with the iceberg, yet it was illustrated by at least three different amateur hands, all showing the iceberg as well as the ship. Wild, as the professional artist, limited his illustration of this incident to a view that he could observe, rather than imagine.

One exception to Wild's pattern of illustration has been identified, dating from the period immediately before the polar period of the expedition. His painting that was used as figure 133 in the *Narrative*, 'Cape Challenger, Kerguelen Island with Mount Ross in the distance', shows the rugged coastline of the peri-Antarctic island with *Challenger* passing from left to right. The near-identical scene was also painted by Shephard but he showed *Challenger* moving in the opposite direction, from right to left. Henderson and Stewart (1972, plate 4) examined the two works, together with the chart of the voyage, and concluded that the cooper was more accurate than the artist. They suggested that a photograph may have been used by both men, but even though coverage of Kerguelen is particularly good (Brunton photographs 291–324), all surviving prints were from land based positions, and Cape Challenger was only seen as the expedition was actually leaving the islands. As the two works are so close, it can only be presumed that either Wild or Shephard sketched the scene and allowed the other to work from that drawing. The reasons for Wild's apparent inaccuracy in portraying the direction of the *Challenger* cannot now be established.

To a 20th-century eye, the series of photographs which appear in the *Narrative* may appear to be flat, lacking contrast in either tone or scale, but these limitations are partly due to reproduction techniques used in the book publication. Examination of the sepia prints in one of the *Challenger* albums enables far greater detail to be seen, although even then the difficulty in conveying scale when there was nothing to indicate the size of the mass is apparent. Perhaps the most successful is Brunton's photograph 281 which was able to use the pack to give a sense of perspective, with icebergs in the distance (Figure 5b).

Although the *Challenger* photographs could be purchased, initially from Her Majesty's Stationery Office and later from an established photographer entrusted with the collection, it is unfortunate that available printing techniques in the United Kingdom appeared to have limited their circulation. Whilst the expedition was in progress and for the period immediately after, engravings were the usual form of visual presentation for periodicals, as may be seen from the reports and engravings in the ILN. The craftsman preparing the final engraving was therefore the ultimate arbiter of the image to be published. These weekly journals did not begin to use photographs until the last decade of the 19th century, the same time as newspapers started to use half-tones. Daily use of photographs did not take place until about 1903.

The main period of exploration of the Antarctic continent, was to begin about 20 years after the *Challenger's* voyage. By then, photographic techniques

had been greatly refined and graphic printing techniques were being improved and extended. The *Challenger's* photographs of ice would be surpassed, especially by the studies made by Ponting, the 'camera artist' of the *Terra Nova* (1910–12), but the achievement of both taking and developing these early images in extreme conditions should not be forgotten.

As far as the *Challenger* expedition is concerned, no clear conclusions can be drawn about the relationship between art and photography. Whilst there are photographs and illustrations of the same scene, with similar geographic features in both, it cannot be categorically stated that the professional artist Wild regularly used prints to produce sketches. Only two of Shephard's sketches bears any relationship to photographs, those of leaving Madeira, and Royal Sound, Kerguelen, (Shephard's illustrations 3 and 25 with Brunton's photographs 71 and 313) and these could easily have been achieved by both the amateur artist and the photographer using the same viewpoint.

However, there is no doubt that a photograph was used in the production of the colophon. Onto an accurate reproduction of the iceberg was added an image to suggest daring adventure, the romance of exploration. Jacob's view may therefore be supported by this image and the illustrations in the ILN, but they were the works of interpreters, almost certainly divorced from any southern ice by many thousands of miles and probably intent on the romantification of their subject.

All the artists who went south before the 1950s were members of expeditions with distinct aims such as exploration, resource evaluation or scientific study and the artistic results reflected their context. The *Challenger* was no exception. The range of work executed on board was commendable: the detailed studies by Wild, as the trained artist, should be seen with the proficient paintings and drawings by a number of gentlemen amateurs, as well as the naive water-colours of the cooper. All were clearly fascinated by ice and attempted to portray this dominating, yet perpetually moving and disintegrating element of the Southern Ocean.

Postscript on Arctic Photographers

During the later stages of this study's preparation, a detailed examination of early photographers of the Arctic was published (Wamsley & Barr, 1996), which provided an interesting comparison to the *Challenger* photographs. The earliest northern works date from Belcher's expedition (1852–54) to search for Franklin, but by the 1870s, photography had been extensively used in the Arctic. There had even been one private 'art expedition' by William Bradford, an American artist with seemingly considerable financial resources. In the summer of 1869 he engaged two professional photographers and, together with an experienced Arctic traveller, went to Greenland, exposing between 300 and 400 glass plates. The account of the voyage which appeared in 1873 was: 'the first published work to include photographs of the Arctic' (Wamsley & Barr, 1996, p. 307) and Bradford later used some of the images for oil paintings.

Acknowledgement

The author wishes to convey her thanks to many individuals who patiently answered questions. Personal communications and assistance were received from:

Eileen V. Brunton, formerly with Library and Information Services, Natural History Museum, London; Mary Eaves, Librarian of the Department of Zoology, Oxford University; Dr Margaret Deacon, Southampton Oceanography Centre, University of Southampton; R. K. Headland, Archivist of the Scott Polar Research Institute, University of Cambridge; Independence Seaport Museum, Philadelphia, USA Anne Savours, formally of the National Maritime Museum; Dr Murray Simpson, Sub-Librarian of the Special Collections, Edinburgh University.

Postscript—a request for information

Wild was clearly a capable artist and it would be of interest to discover more about him as well as identifying further works by him.

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INTERNATIONAL PERSPECTIVES

CONCEPTS OF WILDERNESS IN THE ANTARCTIC

BY ROSAMUNDE CODLING

ANTARCTICA IS OFTEN REFERRED TO AS A WILDERNESS. But what does this term actually mean in the Antarctic context, and how does it relate to the use of the term elsewhere?

Some of the countries that have signed the 1991 Protocol on Environmental Protection to the Antarctic Treaty have no areas that could be accurately described as "wilderness." Thus, transferral of ideas directly to the Antarctic community, without taking into consideration both national differences and the geographical uniqueness of the Antarctic, can cause confusion. An attempt is made to clarify the issue by looking at comments of some of the early Antarctic explorers, before examining what the Antarctic Treaty System (ATS) has said about wilderness. These interpretations are then examined in the context of wider wilderness thinking, and possible directions for future conservation planning are developed.

The Views of Early Explorers

In their writings, early Antarctic explorers, especially in the "heroic age" at the beginning of this century, give a fascinating account of the physical environment and of their personal responses to the polar landscape. In 1903 famous British Antarctic explorer Robert Falcon Scott wrote that the interior of Victoria Land "must be considered the most desolate region in the world. There is none other that is at once so barren, so deserted, so piercingly cold, so windswept, or so fearsomely monotonous." (Scott 1929: 607).

Yet, Scott also wrote of the continent in more favorable terms. Even when sledging on the arduous three-month Southern Journey in 1902, he recorded the beauty of snow crystals falling on a calm night:

As one plods along towards the midnight sun, one's eyes naturally fall on the plain ahead, and one realizes that the simile of a gem-strewn carpet could never be more aptly employed than in describing the radiant path of the sun on the snowy surface. It sparkles with a myriad points of brilliant light, comprehensive of every color the rainbow can show, and is so realistic and near that it often seems one has but to stoop to pick up some glistening jewel. (Scott 1929: 441).

For those exploring the coast, such as the French naval captain Charcot in 1910, the ever-present ice brought both danger and beauty:

The mighty sea and the monstrous icebergs are playing their giant's games under the grey and lowering sky, caressing or fighting, and in the midst of these marvelous manifestations of nature, which are not made for man, we feel that we are merely tolerated, although a kind of intimacy may be created between us and our magnificent hosts (Charcot 1978: 289).

While many of the early visitors to the Antarctic graphically described their surroundings in great detail, they rarely used the word "wilderness." This term has appeared regularly only during the last 30 years or so, and is now frequently used in descriptions of the continent, especially in environmental and popular writings.

The Antarctic Treaty System

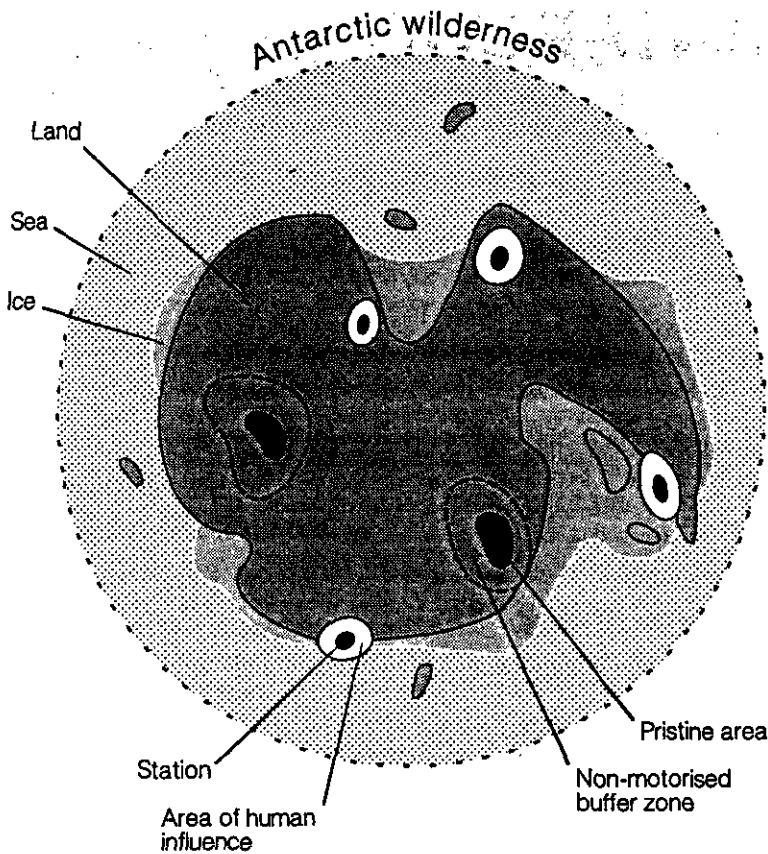
In the more than 35 years since the Antarctic Treaty entered into force, a vast collection of documents has amassed including those from the Treaty's Scientific Committee on Antarctic Research (SCAR). From these we can find that the concept of wilderness in the Antarctic has only gradually emerged.

Initially, the treaty nations focused on the development of scientific research. As other activities such as tourism began to develop (Reich 1980) concerns widened. In 1980 SCAR produced "A Visitor's Introduction to the Antarctic and Its Environment," a 28-page booklet that included recognition of "a general awareness of the value of unspoiled nature or wilderness. The last



The icy grandeur of Mt. Erebus, the active volcano on Ross Island, Antarctica. Photo by Antarctica NZ.

Figure 1—Antarctic Wilderness Areas



remaining extensive wilderness is the Antarctic." (SCAR 1980: 26). Reference was also made to the uniqueness of the continent's scenery and wildlife, but the statements were very general.

Shortly after, SCAR and the International Union for the Conservation of Nature and Natural Resources (IUCN) jointly produced *Conservation in the Antarctic* (IUCN/SCAR 1986), a report that recognized the need to explore protected area concepts such as wilderness or park designation, but the subject generally was still being treated in a broad-brush manner. One of the most expansive ATS comments concerning wilderness came from the SCAR document *Objectives of Conservation in the Antarctic*. It was considered necessary "to minimize disturbance by human activity so that ... unique features, localities or complexes of features and sites of scientific importance are undisturbed ... cultural values, such as scenic beauty, inspirational quality, wilderness status and recreational

potential can be maintained." (1989: 182). However, no attempt was made to define methodology to assess such values, or suggest appropriate management plans to protect them.

These generalizations continued in the late 1980s, including a Recommendation from the XV Antarctic Treaty Consultative Meeting in Paris in October 1989 calling for comprehensive measures for the protection of the Antarctic environment and dependent and associated ecosystems. In turn, this led to development of the Protocol on Environmental Protection to the Antarctic Treaty, which was adopted in 1991.

At the heart of the Protocol is Article 3, which covers a range of principles applying to all Antarctic activities. The opening section of the Article refers to the intention to protect "the Antarctic environment ... and the intrinsic value of Antarctica, including its wilderness and aesthetic values." Similar phraseology occurs three more times in the Protocol or its Annexes,

but no closer definition is offered for these terms (Article 3, section 2[b]vi; Annex V, Article 3.1 and Article 3.2[g]).

These examples illustrate the pattern that has emerged from examination of the more formal Antarctic documents. While it is commendable that there has been a growing recognition of wider environmental concerns, there is as yet no firm understanding as to how they are to be considered. Moreover, although the term "wilderness value" is now well-established in the ATS, there have been no attempts to define what it means, or to identify specific wilderness areas or develop comprehensive management safeguards.

Explaining the Concept of Wilderness

Three writers have endeavored to expound on the concept of polar wilderness. Mosley (1986) defined the "value of the Antarctic wilderness" as maintenance of natural benefits, political cooperation, and long-term environmental stability, although he did not identify potential conflicts, such as permanent structures and the issue of motorized transport.

Roots took an approach that was historically wider, giving an analysis that separated the European fascination with polar wilderness from the indigenous view. He suggested that northern peoples had been able to prosper within the Arctic environment because they had become part of the ecosystem. He concluded:

What do polar wildernesses contribute? They have provided essential elements of history, culture, knowledge, psyche, and spirit, for better or for worse, for at least the past 2300 years. Today, particularly, they are important to our self-awareness, our environment, and to what actions we can take towards a sustainable future. To whom do they contribute? To each of us, no matter where we live (1995:127).

The most analytical examination came from Watts:

Any human activity in Antarctica will have some environmental impact, and the only form of com-

plete protection for the Antarctic environment would be one which excluded human activity there altogether (and even then, the environment would remain susceptible to influences from outside Antarctica). The questions to be faced in practice are whether the value of the activity to be undertaken outweighs the environmental impact which will inevitably accompany it, and whether those impacts can be minimized without undermining the value of the activity giving rise to it. In short, a balance has to be struck (1992: 253).

The Dilemma of Human Development

Wilderness areas are usually thought of as having minimal incursion from human development and associated technologies and structures. How can this generally accepted requirement for wilderness be married with the needs of survival of any human being in the region? It may be difficult for those who have not experienced the southern environment to realize that safety is fundamental to the discussion. Inadequate clothing or equipment, which might cause temporary discomfort in another wilderness area, may lead to serious injury or death in the Antarctic. The hostility of the environment cannot be ignored, which raises the question of accommodation. So far, most nonscientific visitors come in the austral summer, with the greatest numbers as cruise-based tourists. Other recreational visitors, such as mountaineers, are able to use tents for relatively long periods. Fieldwork parties may also use such accommodation. But without the backup of more substantial station buildings, the variety and quality of scientific studies would be seriously affected.

As far as Antarctic transport is concerned, there has been no truly feasible and environmentally acceptable alternative to the internal combustion engine. Huskies, beloved by many, were removed from the continent in 1994, and although some visitors, such as the mountaineer Messner, have occasionally been able to use parachute sails to assist them when skiing, the scope of scientific work, for

example, would be considerably limited by the absence of airplanes and vehicles.

Tourists visiting by ship carry their accommodation and their means of propulsion with them, but while they may be spectators to the wilderness that is the land, they live and move through the wilderness that is the sea. The adventurers, whether mountaineers or skiers, also come either by ship or airplane. They may not depend on further transport if their plans go well, but all responsible expeditions have to have emergency backup plans. The conclusion is simple. If any form of human activity is to continue on the continent, there will be buildings, ships, airplanes, and motorized vehicles.

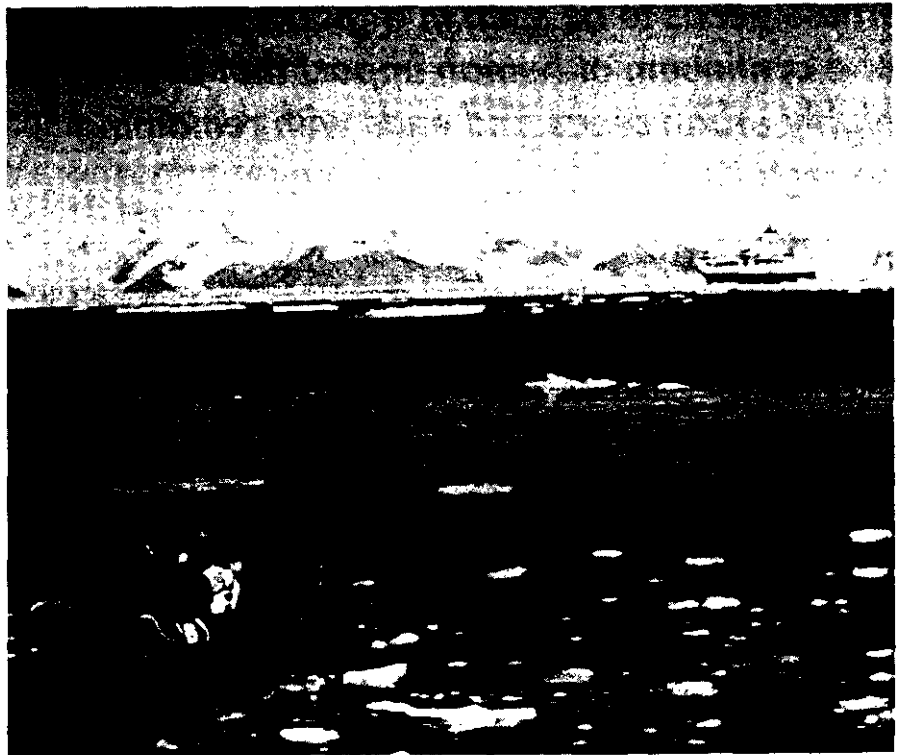
Wilderness in Antarctic Conservation Planning

For conservation planning purposes, a working approach to the concept of wilderness in the Antarctic could consider the following two propositions: (1) begin by the acceptance of the Antarctic, including its surrounding seas and islands, as a wilderness, and (2) declassify from this area only those parts that do not conform to generally accepted definitions of wilderness, such as scientific stations and transport corridors.

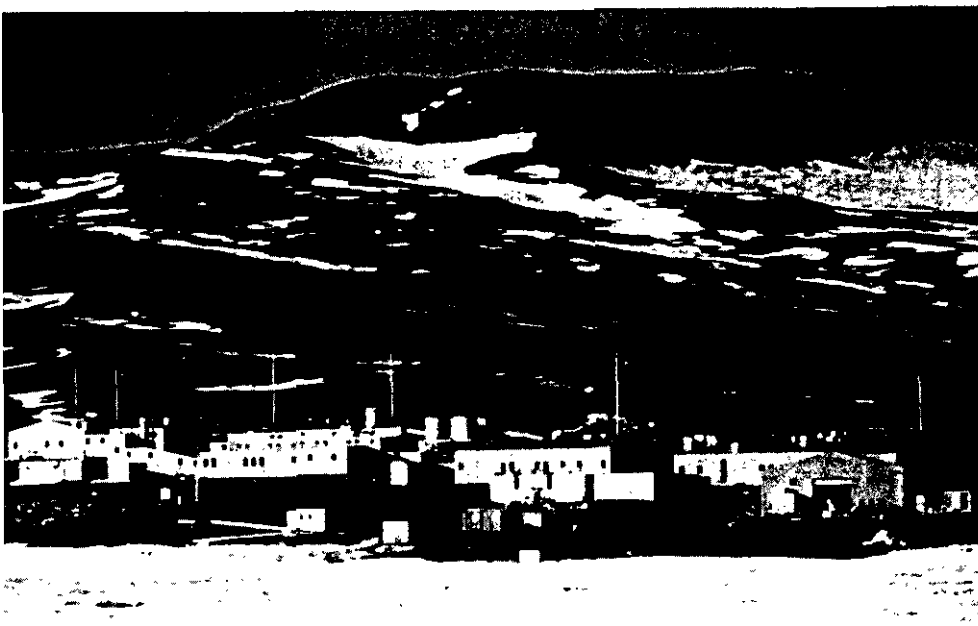
Scientific Stations

The methodology used by the Australian National Wilderness Inventory (Lesslie,

Tourists visiting by ship carry their accommodation and their means of propulsion with them, but while they may be spectators to the wilderness that is the land, they live and move through the wilderness that is the sea.



Tourists aboard an inflatable craft look small compared with the scale of the Antarctic landscape surrounding them. Photo courtesy of the Department of Conservation, New Zealand.



Scientific stations, such as New Zealand's Scott Base, are highly visible as human intrusions into the otherwise stark Antarctic landscape. Photo by *Antarctica NZ*.

et al. 1993) offers some help in this regard. In this system, four indicators are applied: remoteness from settlement, remoteness from access, apparent naturalness, and biophysical naturalness. The

of visibility" from the surrounding land and sea. As shown diagrammatically in Figure 1, an "Area of human influence" could be represented by the outer of two circles, although in practice the actual

Wilderness needs to be seen in a global context, as part of a continuum of human impact that begins with highly urban areas and ends with remaining pristine regions.

first two indicators dealing with remoteness merge in the Antarctic, as roads and tracks on the continent are limited to settlements (taken to include both existing and former stations) and their immediate surroundings. Any modifications resulting from the third indicator, apparent naturalness, will also be predominantly linked to stations, although there may also be isolated areas elsewhere, which have been modified by human action. Thus, three of the four indicators coalesce into a single indicator suggesting evidence of the presence of people.

On the ground, this would correspond to the total station area, including all outlying structures, such as refuges, masts, and so forth, plus an "assessment

area would be influenced by local topography. In the case of Rothera, a British coastal station, the whole Rothera Point would be included, with a somewhat arbitrary outer line at the 5-kilometer radius, suggesting an "assessment of visibility."

The final indicator in the Australian system is biophysical naturalness. Ecologists may identify areas on the continent, over and above the defined "areas of human influence," which show degradation of "biophysical naturalness." If such areas are present, grading of their condition could modify wilderness values, suggesting greater or lesser quality. However, it seems more likely that a straightforward designation of "Antarctic wilderness" could be made in all areas

where there is no indication of human presence.

Transport Corridors

With present technology, there seems to be no adequate alternative to the use of motorized transport in the Antarctic for scientific work and the support of recreation and tourism. Yet there is continued pressure for enjoyment by "simple, quiet, non-polluting and non-intrusive means of travel"—the description offered by the International Union for the Conservation of Nature (IUCN 1994: 18). Given this preference, perhaps the following proposal might be debated. Some have called for the establishment of inviolate or pristine control areas for scientific comparison with localities that have been disturbed by humans (Lewis Smith 1994; Protocol 1991, Annex V, Article 3.2[a]). Taken to the logical conclusion, motorized transport and overflying would also be prohibited in these areas, so as to avoid contamination. These locations, with a surrounding buffer zone would lie within the greater "Antarctic wilderness." Perhaps motor-free recreation could be permitted within the buffer zone.

Conclusion

Wilderness needs to be seen in a global context, as part of a continuum of human impact that begins with highly urban areas and ends with remaining pristine regions. If this hierarchy of "paved to pristine" is recognized, then each element should be valued for the part it can play in the life and work of people. In the case of the Antarctic, there may be the temptation to assume that the areas of human influence are of little or no consequence. However, some of the problems associated with cumulative impacts have already been identified (see p. 27 of Dalziell and De Poorter article in this issue). The wise use of all areas to the highest environmental standards is essential, even if they appear to be "only an odd hectare or two" in the middle of a continent 14 million km² in size. A possible planning approach to assist in meeting these ends is suggested above, the implications of which go beyond the 1991 Madrid Protocol. **IJW**

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Wilderness and aesthetic values in Antarctica

Paper submitted to the Foreign and Commonwealth Office
and subsequently put forward as an information paper at the
XXII Antarctic Treaty Consultative Meeting, held in Tromsø, Norway,
May 1998.

**WILDERNESS AND AESTHETIC VALUES IN ANTARCTICA
AN INFORMATION PAPER BY ROSAMUNDE CODLING**

'The protection of the Antarctic environment ... and the intrinsic value of Antarctica, including its wilderness and aesthetic values ... shall be fundamental considerations in the planning and conduct of all activities in the Antarctic treaty area.'

Protocol on Environmental Protection to the Antarctic Treaty, Article 3 (1).

'Parties shall seek to identify, within a systematic environmental-geographical framework, ... areas of outstanding aesthetic and wilderness value.'

Annex V to the Protocol, Area Protection and Management, Article 3.

Introduction

Article 3 (1) of the Protocol states that protection of the wilderness and aesthetic values of Antarctica is one of the Protocol's fundamental objectives. Article 3 of Annex V requires Parties to give effect to this provision by designating areas within a systematic framework. Neither the Protocol nor Annex V elaborate on what is meant by the wilderness and aesthetic values of Antarctica, or on the systematic environmental-geographical framework.

Wilderness and aesthetic values are often assumed to be notoriously subjective - one person's wilderness may be something to enjoy while to another wilderness may be frightening; one person's aesthetic heaven may be another's hell. The author's interest is to see to what extent it is possible to give an objective basis to the judgements that will be required when giving effect to Article 3 (2) (g). This paper sets out some fundamental considerations, based on a desk study and field work undertaken in the 1996-97 season with the British Antarctic Survey.

Wilderness and aesthetic values

The Protocol and Annex V always use both terms - wilderness and aesthetic - together. There is no guidance as to whether the intention was a portmanteau term or whether they were to be considered as having different meanings. Outside Antarctica, however, they have come to have different meanings and it seems preferable to proceed accordingly.

Annex V, Article 3 (2) speaks of 'a ... framework' for the identification of widely differing

values, studied by a number of diverse disciplines (Article 3 (2) (a)-(i)). It is assumed that this provision for a single framework was not intended to be prescriptive and the outcome will be a composite of frameworks specifically designed for the different purposes set out in the sub-paragraphs of Article 3 (2).

Wilderness

Wilderness is a designator of land use, rather than a description of the land itself. It conveys no image of the character of the landscape. Wilderness is as applicable to rain forest or sand desert as it is to a mountain range or the inland ice of Antarctica. In connection with environmental planning, however, wilderness has come to have certain clear connotations relating to the absence of motorised transport and of permanent habitation. Translated into terms relevant to the Antarctic the following appears to be a reasonable working definition of wilderness:

Any part of the Antarctic in which neither permanent habitation nor any other permanent evidence of present or past human presence is visible.

Such a definition would allow field work to be pursued, using motorised transport and temporary accommodation, without prejudice to the longer term wilderness state of the area in which the fieldwork was done. While relatively simple and objective in its application this definition requires that any area which does not count as wilderness (eg scientific stations) be identified. Such identification would be based primarily on visibility at ground level, with further considerations given to the extent of noise and access routes.

The size of each area will differ greatly, mainly due to ground relief. At the simplest level, a study related to a base would result in a plan which answered the question: 'How far do I have to go away from this base to be unaware of human presence?'

Aesthetic values

The question implicitly posed by Annex V, Article 3 is whether it is possible to distinguish between areas of lesser or greater ('outstanding') aesthetic value. One thing is clear: it is necessary to compare 'like with like'. It would be virtually impossible to distinguish between the values represented by areas of totally different character, for example the Transantarctic Mountains, the Ross Ice Shelf and the South Shetland Islands. To attempt to do so would be unsystematic - a way of proceeding which is forbidden by the requirement to identify areas of outstanding aesthetic value 'within a

systematic environmental-geographical framework'.

The fieldwork was planned to develop a framework tailored to the need to accord value, whether less or more, to Antarctic landscapes of similar character - which for this purpose includes seascape, 'terrestrial' scape and ice-scape, and any combination of them. Such a framework would, in the end, lead to a 'landscape assessment' - a description of the whole of Antarctica at a level of detail which enable landscapes with a similar character to be distinguished and categorised. Article 12 (1) (j) of the Protocol, describing the functions of the Committee for Environmental Protection, requires the Committee to provide advice on: 'the state of the Antarctic environment'. Whilst landscape assessment stands in its own right, it should also be part of this collation of material to provide the wider canvas into which studies, such as site-specific Environmental Impact Assessments (EIAs, the subject of Annex I of the Protocol) may be fitted.

Many factors contribute to the concept called 'landscape'. In the Antarctic, inputs such as the geology and glaciology of an area have to be considered, but there are also less tangible factors such as historical connotations. It appears unlikely that designation will ever be based on 'aesthetic values' alone. Lengthy definitions of concepts such as 'beauty' would serve no purpose, as it is believed that other, more objective factors (such as presence of a variety of landscape features) would provide a basis to enable comparisons to be fairly made.

Methodology

Various techniques have been developed to carry out landscape assessment, and the procedure that was tested in the field is a composite method specifically adapted for Antarctic use. Initially, the main physical features are described, before consideration of landscape attributes such as scale (ranging from 'intimate' to 'vast') and enclosure ('confined' to 'exposed'). These attributes can be judged in a rational, if not wholly objective way. A further stage of fieldwork covered perceptions/impressions, including aspects such as diversity ('uniform' to 'complex') and rarity ('predominant' to 'unique'). These are more subjective, and as responses are likely to vary, the ideal is for survey work to be carried out by more than one person.

The methodology of landscape assessment is reasonably clear from experience elsewhere in the world - although it has never been applied to such a vast area as Antarctica - and is intended to provide for objectivity in the process of description,

inventory and classification of landscape. The basically objective process may then be taken further by evaluating different areas with a similar character against agreed criteria, in order to establish lesser or greater aesthetic value. This final stage of evaluation requires subjective choices, and opinions will probably vary, but provided decisions are well documented, differences may be accommodated.

The size of Antarctica brings inherent problems. Ground-based surveying over the whole continent is clearly impossible, but it is essential that basic principles be established, before tools such as geographic information systems (GIS) are adopted. Although GIS has already been used in a limited number of landscape assessments elsewhere in the world, there are unresolved queries about its capabilities to handle certain aspects. The most positive option appears to be the identification of epitome landscapes by ground-based work, prior to the utilisation of remote sensing. This pattern has been satisfactorily tested in the United Kingdom, but it remains to be seen if it would be suitable in Antarctica.

Form of designation

Annex V of the Protocol provides for designation of Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs). Designation under either rubric requires the preparation of management plans. Such plans are flexible in terms of values to be protected and mechanisms by which protection is to be accorded. Given, however, that the purpose of ASMAs is to protect values associated with activities, it would probably be inconsistent to seek designation of an area as an ASMA if wilderness value was amongst the reason for designation. Beyond that, however, there is no reason why aesthetic value could not, in principle, be protected under either rubric.

Conclusions

If it is accepted that 'wilderness' is used in the Protocol and Annex V as a land use designation that is distinct from 'aesthetic value', it should be possible relatively easily to define areas which are not wilderness, and therefore accord wilderness status to the rest of the Antarctic. Such a conclusion has the effect of concentrating the question of area designation in accordance with Annex 5 Article 3 (2), on 'aesthetic value'. The essential steps leading to designation would be, firstly, objective landscape description, and secondly, judgement of less or more aesthetic value on the basis of comparing like with like. Success, in terms of the likelihood of acceptance of such value judgements, is more likely the more objective the whole process can be made.