

Exploring Antarctic Values

Proceedings of the workshop

*Exploring Linkages between Environmental Management and Value Systems: The
Case of Antarctica*

held at the University of Canterbury, Christchurch, New Zealand
(5 December 2011)

SCAR Social Sciences Action Group

Edited by Daniela Liggett and Alan D. Hemmings



© Daniela Liggett (2012)

University of Canterbury

Gateway Antarctica Special Publication Series

Number 1301

2013

GATEWAY ANTARCTICA SPECIAL PUBLICATION

University of Canterbury

Private Bag 4800

Christchurch 8140

New Zealand

www.anta.canterbury.ac.nz

© EDITOR AND CONTRIBUTORS 2013

ISBN 978-0-473-24851-2 (Paperback)

ISBN 978-0-473-24852-9 (PDF)

ISBN 978-0-473-24853-6 (iBook)

First published 2013

This book is copyright. Apart from any fair dealing for the purpose of private study, research or review, as permitted under the Copyright Act, no part may be reproduced by any process without the permission of the publisher.

COVER PHOTO BY: D. LIGGETT, 2012

CONTENTS

ACKNOWLEDGEMENTS	6
1. INTRODUCTION (DANIELA LIGGETT & ALAN D. HEMMINGS)	7
MAP OF ANTARCTICA WITH YEAR-ROUND AND SEASONAL STATIONS	9
2. VALUE THEORY FOR AN ANTARCTIC CASE STUDY (SIRA ENGELBERTZ, DANIELA LIGGETT & GARY STEEL).....	10
INTRODUCTION	10
METHOD	10
AXIOLOGY – THE STUDY OF VALUE.....	11
INTRINSIC VALUE.....	12
ECONOMIC VALUE.....	13
HUMAN VALUES	13
VALUES AND DECISIONS	15
INDIVIDUAL VALUES AND SOCIAL NORMS.....	15
VALUE CONSENSUS	16
CONCLUSIONS	17
REFERENCES.....	18
3. WILDERNESS AND AESTHETIC VALUES OF ANTARCTICA (RUPERT SUMMERSON)	22
INTRODUCTION	22
VALUES AND THE MADRID PROTOCOL	23
INTRINSIC AND INSTRUMENTAL VALUE.....	24
WILDERNESS AND AESTHETIC VALUES.....	27
<i>Wilderness Values in Antarctica</i>	27
<i>Aesthetic Values in Antarctica</i>	29
SYNTHESIS	30
<i>Empirical Methods of Defining Wilderness and Aesthetic Values</i>	30
<i>The Impact of Human Activity and Infrastructure on Perceptions of Wilderness and how this Helps Shape a Definition of Wilderness</i>	35
<i>Semantic Evaluations of Landscapes with and without Evidence of Human Activity Helping Define how We Value Landscapes</i>	38
<i>Demographic Factors in Perceptions of Wilderness and Aesthetic Value.</i>	40
DISCUSSION	41
CONCLUSIONS	43
ACKNOWLEDGMENTS	44
REFERENCES	44
4. PERCEPTIONS AND OPINIONS OF ANTARCTIC VALUES IN CHILE (JUAN FRANCISCO SALAZAR)	48
INTRODUCTION	48
METHOD	49
PRELIMINARY FINDINGS	51
<i>a. Levels of Information and Concern about Antarctic Issues</i>	51
<i>b. Values and Perceptions of Antarctica</i>	54

DISCUSSION: KNOWLEDGE PRACTICES, VALUES AND THE MEANING OF ACTIONS	59
CONCLUDING REMARKS	65
REFERENCES.....	67
5. 'ENVIRONMENTAL MANAGEMENT' AS DIPLOMATIC METHOD: THE ADVANCEMENT OF STRATEGIC NATIONAL INTEREST IN ANTARCTICA (ALAN D. HEMMINGS)	70
INTRODUCTION: CONTEXTS AND CONTINGENCIES.....	70
'ENVIRONMENTAL MANAGEMENT' AND ATS INSTITUTIONAL FACTORS	74
STATE PRACTICE IN RELATION TO ENVIRONMENTAL MANAGEMENT	76
(1) CEE Application	77
(2) Marine Protected Areas	78
(3) Larsemann Hills	79
THE PROGNOSIS FOR ENVIRONMENTAL MANAGEMENT.....	81
(1) Continental Shelf.....	81
(2) Bioprospecting	82
(3) Tourism	83
CONCLUDING REMARKS	84
ACKNOWLEDGMENTS	86
REFERENCES.....	86
6. THE UTILITY OF OFFICIAL ANTARCTIC INSPECTIONS: SYMBOLISM WITHOUT SANCTION? (JULIA JABOUR)	90
INTRODUCTION.....	90
INSPECTION PROVISIONS UNDER ARTICLE VII OF THE ANTARCTIC TREATY	91
INSPECTION PROVISIONS UNDER ARTICLE 24 OF CCAMLR	92
INSPECTION PROVISIONS UNDER THE MADRID PROTOCOL	94
Article 14 Inspections	95
Frequency and Intensity of Inspections	96
IDENTITY OF INSPECTING STATES	97
Locations of Inspections	97
Findings of Inspections	98
Great Wall Station	98
Rothera Station.....	99
SANAE IV	100
KEY FINDINGS.....	100
CONCLUSIONS	101
REFERENCES.....	103
7. HEGEMONIC DEFINITIONS FROM THE "NORTH": ENVIRONMENTAL CONCERN AS A WESTERN CONSTRUCT AND ITS APPLICABILITY TO THE SOUTH AFRICAN AND ANTARCTIC CONTEXT (SEAN BECKETT & HEIDI PROZESKY)	107
INTRODUCTION.....	107
TOWARDS A BROADENING OF ENVIRONMENTAL DISCOURSE	109
CONCEPTUALISING ENVIRONMENTAL VALUES.....	111
The Value-Action Gap.....	112
Practice-Based Understanding of Environmental Values.....	113
THE CONSTRUCT OF ENVIRONMENTAL CONCERN	114
Taking Anthropocentric Orientations into Account.....	114

<i>Taking Experience into Account</i>	116
<i>The Post-Materialist Thesis</i>	116
CONCLUDING REMARKS	118
ACKNOWLEDGEMENTS	119
REFERENCES	119
8. LINES IN THE ICE: CLASSIFYING ANTARCTIC ENVIRONMENTS (FRASER MORGAN)	124
INTRODUCTION	124
BACKGROUND	125
PREVIOUS CLASSIFICATIONS OF ANTARCTICA.....	126
ENVIRONMENTAL DOMAINS ANALYSIS.....	126
DATA LAYERS USED IN THE EDA	130
ENVIRONMENTAL DOMAINS OF ANTARCTICA CLASSIFICATION	132
<i>Heterogeneity of the Classification</i>	133
CURRENT USES OF THE CLASSIFICATION	135
<i>Protocol Mandated Use</i>	135
<i>Protected Areas Management</i>	135
<i>Complementary Uses</i>	136
<i>Monitoring</i>	136
<i>Non-Native Species Management</i>	136
<i>Tourism Management</i>	136
INTERPRETATION OF THE CLASSIFICATION FROM A HUMAN VALUES PERSPECTIVE	137
<i>Current Classification</i>	137
<i>Future Classifications</i>	138
CONCLUSION	139
ACKNOWLEDGEMENTS	140
REFERENCES	140
9. EXPLOITING THE SOUTHERN OCEAN: RATIONAL USE OR REVERSION TO TRAGEDY OF THE COMMONS? (DAVID AINLEY & CASSANDRA BROOKS)	143
ACKNOWLEDGEMENTS	151
REFERENCES	151
10. CONCLUDING REMARKS: TOWARDS INTERDISCIPLINARY STUDY OF ANTARCTIC VALUES (ALAN D. HEMMINGS & DANIELA LIGGETT)	155
THE CHALLENGES OF A VALUES-ORIENTATED ENQUIRY	155
THE WORKSHOP	156
GAPS AND THE FUTURE	157
REFERENCES	158

Acknowledgements

Our sincere thanks go to Gary Steel, one of the original co-chairs of the SCAR Social Sciences Action Group and a co-organiser of this workshop. He has put tremendous time and energy into the Antarctic values project, and we would not be where we are now without his contributions. Similarly, Emma Stewart has been instrumental in keeping this project alive, and we are grateful for her advice and for always being there to lend a hand.

We are indebted to the diligent reviewers of the papers submitted to these proceedings: Kees Bastmeijer, Sanjay Chaturvedi, Christie Collis, Klaus Dodds, Andriy Fedchuk, Lorne Kriwoken, Machiel Lamers, Ewan McIvor, Steve Nicol, Jessica O'Reilly, Leslie Roberts, Ricardo Roura, Emma Stewart, Lance Van Sittert and Eric Woehler.

We wish to acknowledge the members of the Steering Group of SCAR's Social Sciences Action Group (Kees Bastmeijer, Paul Berkman, Sanjay Chaturvedi, Enrique del Acebo Ibáñez, Bernard Herber, Machiel Lamers, Elizabeth Leane, Juan Francisco Salazar, Gary Steel, Emma Stewart and Veronika del Valle), who, in numerous online meetings, have offered sound advice, much enthusiasm and have shared their ideas which helped shape this workshop.

We are grateful to Gateway Antarctica for the financial and in-kind support provided that enabled us to host this workshop at the University of Canterbury. Finally, we wish to thank the SCAR Executive (Mike Sparrow and Renuka Badhe) and the SCAR Delegates for their continued endorsement and funding.

1. Introduction

The costs of human activities in Antarctica, not merely from an economic perspective but also from environmental, social and cultural points of view, are increasingly acknowledged. In light of the coverage (in the media and in policy discussions) of the many aspects of human endeavour in the Antarctic, policy-makers, educators, scientists and the wider public are asked to weigh multiple costs and benefits against one another. The balancing of these costs and benefits influences a wide range of decisions. Some of these decisions will be limited to a local impact, while others may affect entire global systems, primarily via their effects on climate, culture, and international policy. The benefits of human engagement with the Antarctic are often seen through the lens of human values, i.e. notions of worth or goodness that are said to drive human behaviour and decision-making. The values that we associate with Antarctica address a wide range of motivations: from aiming to protect Antarctic wilderness as an end in and of itself (*intrinsic values*), to minimising human impacts on the Antarctic environment for the purpose of safeguarding vital ecosystem services or retaining a relatively pristine scientific laboratory (*extrinsic values*), to realising Antarctica's economic value through resource exploitation. Antarctic values have been encoded in legal documents, e.g. Article 3(1) of the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) highlights the importance of protecting

“the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research”.

Doubtlessly, such explicit statements on Antarctic values have influenced political decision-making and scholarly debates surrounding Antarctic governance and environmental management. However, it is yet to be established to what extent the values communicated in legal documents and policy papers (a) reflect the values actually held by Antarctic stakeholders, and (b) guide human behaviour in the field and in decision-making on Antarctic matters. Drawing on value theory (see Chapter 1), a range of basic human values underpin the idea of 'self' and, as such, have a bearing on individual and collective human behaviour. This leads us to assume that values other than those mentioned in the Madrid Protocol and other Antarctic Treaty System documents influence our activities in and governance of Antarctica. In fact, the values heralded in legal documents might not even enter our own value systems, let alone be dominant values as mandated by these documents. So far, the extent and nature of values humans actually assign to Antarctica resembles a black box. Untangling the contents of this black box is meaningful and necessary exercise if we wish to understand and anticipate human engagement with and activity in the Antarctic in the future. Recognising the importance of studying human values linked to Antarctica, an action group¹ was formed under the aegis of the Scientific Committee on Antarctic Research (SCAR). This action group consists of social

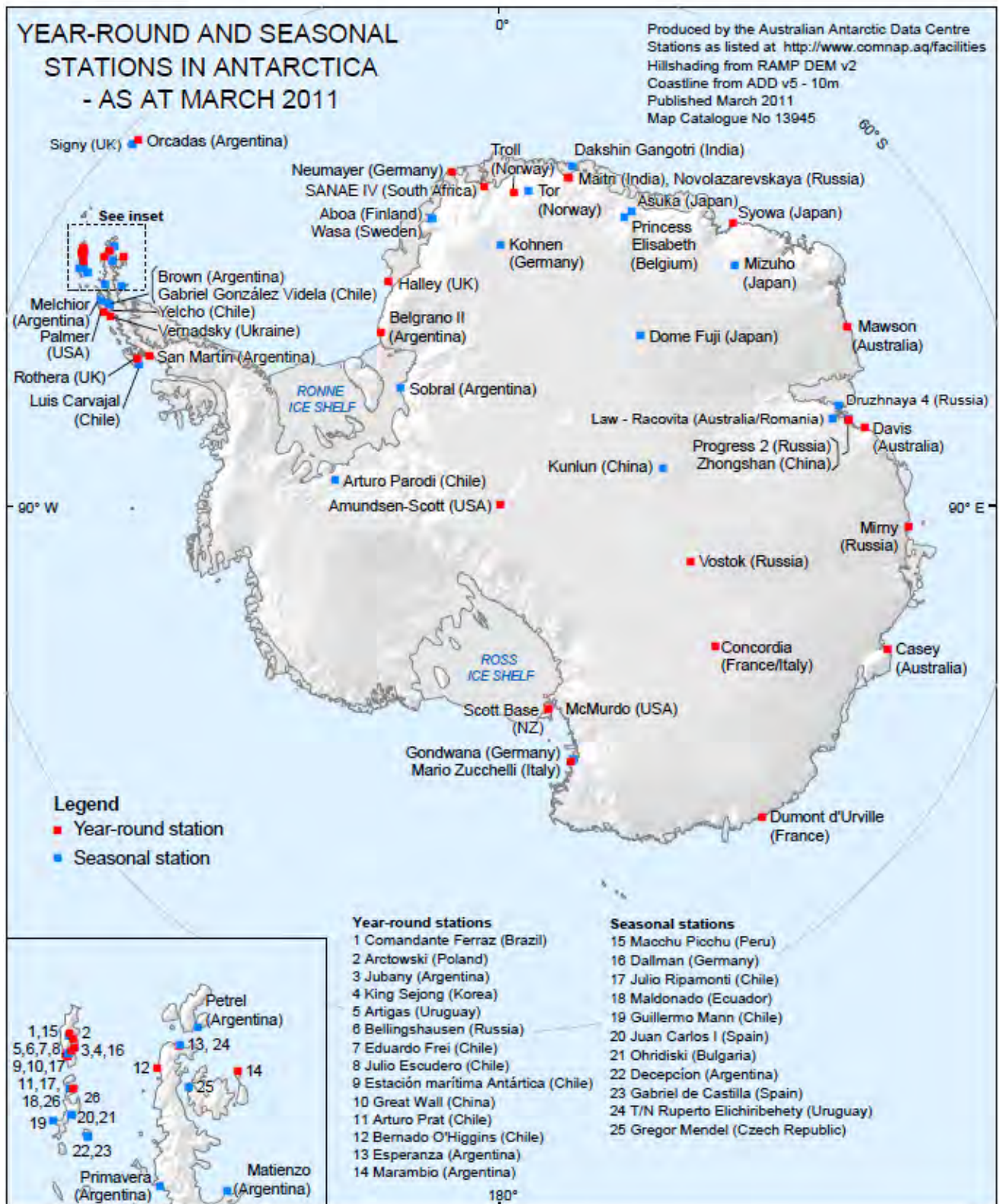
¹ More information about the SCAR Social Sciences Action Group online (www.scar.org/researchgroups/via/).

scientists and humanities researchers who have the expertise and tools to lead an academic assessment of Antarctic values and who can offer different perspectives to those of stakeholders more directly involved in Antarctic science and policy.

These proceedings report on the first workshop of the SCAR Social Sciences Action Group. In many respects, the workshop as well as work of the action group itself represents a peculiar project, in that it draws together a very diverse intellectual community to consider a theme which of itself does not lend itself to canalised thinking. A consideration and exploration of Antarctic values cannot be compared to a discussion of clear-cut themes such as Antarctic protected areas or Southern Ocean fishing. As no work has been done so far in this field, we are operating without compass or map and cannot rely on existing discourse or established analytical practices. Our exploration of Antarctic values involves scholars of different disciplinary backgrounds, which is a challenge and a merit at the same time, but inevitably we end up with very different framings and understandings of value. These proceedings capture this diversity, which can be regarded as a snapshot of the complexity of some of the values or motivations driving Antarctic governance and the varying conceptualisations and interpretations of these drivers.

The papers included in these proceedings are based on presentations made by scholars of Antarctic literature, geopolitics, anthropology, environmental management, tourism, and sociology during a one-day workshop hosted by Gateway Antarctica, University of Canterbury, in Christchurch, New Zealand. Presenters were selected based on peer-reviewed abstracts submitted to us following a call for papers for this workshop. The presenters were asked to prepare brief working papers that were distributed to all workshop participants prior to the workshop. During the workshop, the authors presented their ideas to an audience that included not only focus and discipline diversity but intellectual development ranging from students to senior academics. Then each presenter was asked to tidy up their working papers and presentations into a more formal paper which again was externally peer-reviewed. The resulting workshop proceedings are a generalised first-order treatment of issues around the wider theme of Antarctic values to get an inevitably diverse readership to first think about these matters. Consequently, these proceedings are not to be seen as the final word on the topic of Antarctic values – they are just the opposite: an initial exploration of the diverse understandings of this topic and a platform for more in-depth examinations by the scholar down the line. We certainly hope that the authors' considerations act as a stimulant to others to develop or challenge these preliminary ideas.

Map of Antarctica with year-round and seasonal stations



Source: Australian Antarctic Data Centre (2011)

2. Value Theory for an Antarctic Case Study

Sira Engelbertz¹, Daniela Liggett², Gary Steel²

Introduction

Antarctica is often characterized by its uniqueness. Indeed Antarctica is an unusual place, and extreme in many ways. Apart from the extreme climatic conditions, Antarctica is geographically isolated in the midst of the Southern Ocean and without any indigenous population. In a sense, we find a natural separation of nature and civilization. Nevertheless, the history of human contact with Antarctica goes back centuries. The number of people visiting Antarctica each year – whether as scientists, station personnel, commercial tourists or private adventurers – has increased enormously in recent decades. Approximately one hundred years ago, explorers such as Scott and Shackleton built first huts on Antarctica. Today, there are over 80 research stations from 29 countries spread across the continent. Some of the international research teams and operational personnel even stay in Antarctica over the winter months when temperatures drop drastically and endless darkness takes over the place. During the Austral summer, there are also around 30,000 tourists annually making their way to Antarctica through commercial tourism outfits. Moreover, the number of signatories to the Antarctic Treaty has grown from the original twelve in 1959 to fifty states today. This increased human participation disrupts the natural separation of nature and civilization, creating a direct (referring to Antarctic visits) or indirect (e.g. Antarctic policy) connection between the two spaces. This is the issue that the SCAR Social Sciences Action Group (SSAG) targets. While investigating human connections to Antarctica, the group focuses on the aspect of values as a – metaphorically speaking – bridge-building element. This requires a good understanding of what values are and what they mean in the Antarctic context. Against this background, the objective of this paper is to offer a theory-based representation of possible approaches to how values in Antarctica can be studied.

Method

Through the reflection of various value concepts, as they occur in different academic disciplines, it is intended to identify value-relevant research areas and try to apply them to the Antarctic case. For this purpose, an interdisciplinary literature review on value theory forms the basis for this paper. Relevant academic disciplines include those that are traditionally engaged in value theory, such as philosophy, psychology and economics. The political science perspective is also considered in the context of the role values play in (political) decision-making. Due to this rather broad and diversified alignment, this paper may not discuss each

¹ Gateway Antarctica, University of Canterbury, Christchurch, New Zealand

² Lincoln University, Lincoln, New Zealand

theory in detail. The aim of this paper is rather to capture the key ideas and questions posed by these theories to allow a basic understanding of the respective conceptions of value. On this basis, it will be then assessed, whether a theory of value is applicable to the Antarctic case and, if so, in what specific context. Generally, this paper presupposes a good knowledge of Antarctic characteristics and conditions. When applying a theory to the case of Antarctica only those Antarctic characteristics will be referred to which are relevant in the context.

Axiology – The Study of Value

The ambiguity of the term “value” becomes apparent in everyday language. A value can refer to a measured value, stocks or real estate value, empirical value, moral value, etc. A unique and generally accepted definition does not exist. However, there have been attempts in the past to grasp and to define the concept of value per se in its true essence. This pursuit is at the heart of axiology, the philosophical study of value. Axiology became a philosophical discipline at the turn of the nineteenth and twentieth centuries and was, at the time, dominantly represented in Western Europe and the United States (e.g. Bahm, 1993; Grünberg, 2000; Hart, 1971). At its very core lies the fundamental question of the good and the right (Brandt, 1979). Understanding value as something essentially intangible, Rescher (1969) summarises three primary tasks in the quest for a general theory of value: first, “the grounding of a generic conception of value to provide a unified basis for the wide diversity of contexts in which evaluation takes place”, second, “the study of the phenomenology of valuation in general”, and third, “the development of a system of value axiomatic codifying the universal rules of valuation” (p. 51). As a verb, the term value often emerges together with notions of belief, affect, desire, or need (Gaus, 1990). Foci range from ethics and moral judgments (Moore, 1903; Wittgenstein, 1965), to emotion and cognition (e.g. Brentano, and the Second Austrian School) or to education and experience (Dewey, 1939, 1944). Consequently, this results in the plurality of the various coexisting value concepts we find today.

A controversial issue is the dichotomy between facts and values (Putnam, 2002) – accompanied by related dichotomies of objectivity and subjectivity, or reason and emotion (Railton, 2003). In the axiological tradition, intrinsic value is defined as a value that is good in itself – opposed to extrinsic value which refers to something that is good for the sake of something else it is related to in some way (Rønnow-Rasmussen & Zimmerman, 2005). The distinction of intrinsic and extrinsic value is often compared with Aristotle’s distinction between ends and means. In *Metaphysics*, Aristotle (1988) argues that for-the-sake-of series are directed towards and limited by a final cause, which he defines as an end. “A” might be good for the sake of “B” that, again, is good for the sake of “C”, and so on. However, eventually one will arrive at something that is just good in its own right and which will terminate this series (Rescher, 1969). Irrespective of the question whether or not intrinsic value exists, there seems to be consensus about the fact that values may have different qualities, and that this variation also affects our actions. The question of the relationship between values and rationality will be discussed at a later stage in this paper. First, it will be useful to look closer at the concept of intrinsic value.

Intrinsic Value

As noted above, a value in itself is intangible and can vary in its significance. A certain type of value can be considered intrinsic in comparison to other types of values, which appear less fundamental. When we speak of an intrinsic value of Antarctica – as the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) does – Antarctica as a place becomes an object to which we ascribe an intrinsic value. The question of What is intrinsic value? then shifts to the question of What has intrinsic value? Lewis (1983) distinguishes between intrinsic and extrinsic properties of an object. In Lewis' theory, extrinsic properties are modifiable while intrinsic values are firmly rooted in the object's nature and define the object. The Madrid Protocol refers to the intrinsic value of Antarctica in its Article 3 as follows:

ARTICLE 3

Environmental Principles

1. The protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research, in particular research essential to understanding the global environment, shall be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area.

With regard to Lewis, the question arises whether Antarctic wilderness, aesthetic values and science are to be classified as intrinsic or extrinsic properties. Are wilderness, aesthetic values and science only relational properties or entirely about Antarctica? Imagine, if you will, the following scenario: Antarctica's climate changes to a more human-friendly one that allows more people to come and settle there. Antarctica's ice is lost and the landscape severely altered. Maybe even scientific research institutes and universities are established there. In short, Antarctica would become a place not much different from any other on earth. Antarctica would certainly forfeit its often emphasized unique character as an icy continent. However, it would remain the same land mass. Geologists are telling us that Antarctica used to be much warmer ages ago. The just described scenario is, in principle, possible. Consequently, Antarctica's wilderness, aesthetic values and science cannot be classified as intrinsic values according to Lewis' definition, because they are modifiable.

The notion of intrinsic value has been also used in the financial sector. Here, intrinsic value refers to the value of a corporation. Graham (2003) distinguishes between the intrinsic value of a company and its stock market value – while claiming that the former is more stable than the latter. Due to highly fluctuating market values, Graham postulates a focus on the intrinsic value of a company for safer stock investments. As for his proposed security analysis, a company's intrinsic value derives from the assessments of its various attributes (e.g. the assets, earnings, dividends, future prospects, management, etc.). However, since Aristotle we know that the whole is greater than the sum of its parts. Thus, the intrinsic value of a company cannot be the

mere addition of the values of its attributes, but must be something else that arises from the system as a whole – although, attributes mark valuation criteria. With a view to Antarctica, the Madrid Protocol's claimed intrinsic value of Antarctica could be understood in the sense just discussed. Then, wilderness, aesthetic values and science became Antarctic attributes by which the intrinsic value of Antarctica could be measured.

Economic Value

One aspect that has not been mentioned yet is the one of utility. Utility is fundamental in the classical theory of economic value (e.g. Mill, 1863; Smith, 1776). The underlying value concept focuses on the wellbeing of individuals and the collective. A value in its intangible nature is assessed by the value's ability to make a "favourable difference to a person's life" (Baier, 1967, p. 3). In this sense, the satisfaction of needs becomes another important feature of a value. However, economic value is mostly discussed as the value of a good. To determine the quality of a good, awareness is required of this good's causal relation to the satisfaction of a certain need and its contribution towards the desired quality of life (Menger, 1871). The circumstances under which this occurs are also relevant. The ratio of benefits and costs is crucial for the evaluation of a good – while a value is always benefit-oriented. Additionally, and again with reference to Aristotle, the availability of a good is a crucial indicator for the value of a good. Here, a basic rule applies: the rarer the good, the more valuable it is. Typically, the value of a good is expressed by a market price. In cases where no market exists, as in the case of collective goods, the value of a good is assessed through individual preferences (Bateman & Willis, 2001; Bennett, 2011; Whitehead, Haab, & Huang, 2011). Preferences are understood as value expressions (Hansson & Grüne-Yanoff, 2011; Wright, 1972). One thing is preferred over another because one ascribes a greater value to the first against the second. The same principle applies to a set of alternative courses of action. Here, it is to choose the best possible option as perceived. At this point, there is an interface to human values, which will be discussed in the next section. In an Antarctic context, it should be noted that features of the natural environment can be classified as public goods (Sachs, 2011). The above-mentioned principles for the economic valuation of goods are therefore just as relevant for the assessment of Antarctica's economic value. With regard to the Antarctic Treaty's primary goals of political stability and scientific research, Herbert also considers peace and science as public goods in Antarctica (2007). Furthermore, cost-benefit analyses underlie the evaluation of Antarctic attributes that contribute to the intrinsic value of Antarctica as discussed above.

Human Values

From a psychological point of view, there seems to be a general agreement about the fact that human values are motivational drivers for action (e.g. Atran & Axelrod, 2008; Leiserowitz, Kates, & Parris, 2006). As philosophers do, psychologists see values as symbolising goals that direct human behaviour. On this basis, values can be used to detect behavioural patterns and

explain human behaviour. The theory of universal values constitutes the foundations for both intra-cultural and cross-cultural comparison. On the individual level, a relatively small number of basic, deeply rooted, timeless human values are assumed to exist in all cultures. However, each of these values may vary in its importance, which, again, is reflected in differences in values priorities (Kluckhohn, 1951; Rokeach, 1973; Schwartz, 1992, 2005). When categorising these basic cross-cultural human values, Rokeach (1973) assumed a hierarchical ordered value system of terminal and instrumental values – a distinction very similar to the Aristotelian dichotomy of means and end values. This approach was replaced by Schwartz's theory of dynamic relationships between values. According to Schwartz (2005), basic values can be defined by their respective motivating goal. Under these motivational goals, similarities or differences of values arise that present the critical moment in their relationships between each other. Secondly, in their motivational goal, heavily differential values are not compatible and compete with each other. The centre of this value system can vary individually, which results in differences in priorities and in people's actions.

Based on Rokeach's and Schwartz's ideas, Stern et al. (1994; 1999) developed a theory that outlines the interplay of values, beliefs, attitudes and behaviour. Values, in this theory, form the core, while beliefs play a mediating role between values and attitudes. Attitudes toward an attitude object (e.g. people, places, situations or phenomena) reflect certain worldviews and beliefs about consequences and responsibilities that the attitude object triggers in relation to particular values. Stern et al. argue that this process activates personal norms that obligate individuals to act in a certain manner. The researchers, followed by many others (e.g. Nordlund & Garvill, 2002; Oreg & Katz-Gerro, 2006; Schultz, et al., 2005), tested the significance of values in the context of environmental concerns and pro-environmental behaviour. Environmental concerns are understood, and categorized accordingly, through three different dimensions: egoistic, social-altruistic, and biospheric. The empirical studies confirm a causal relationship between values, and environmental concerns and pro-environmental behaviour. However, the psychological mechanisms through which basic values manifest themselves in human behaviour are highly complex and involve a set of variables that may redirect courses of action. Thus, the influence of basic values on environmental behaviour has been characterized as indirect (Nordlund & Garvill, 2002). For that reason, it is necessary to understand the dynamics in the interplay of values, beliefs and norms as a whole in order to identify basic values in human behaviour.

In an Antarctic context, the psychological approach to understanding values is particularly relevant because it allows the study of the relationship between people and nature. Environmental concerns on the egoistic, social-altruistic and biospheric level give clues about a person's positioning in his or her relationship to nature and how he or she values Antarctic properties. As discussed in the previous paragraph, value orientations are crucial for the way people interact with Antarctica. Considering the lack of a permanent overarching supervisory body for Antarctica, it is in principle up to individual responsibility (and responsible national authorities) to ensure correct behaviour in Antarctica. What is defined as the "right" behaviour is associated with moral value judgments (Wittgenstein, 1965). In the Antarctic Treaty System

(ATS), we find a number of such value judgments as fundamental principles that, at the same time, dictate the legal framework for Antarctic governance. The challenge is, in a concrete situation, to recognize the right actions that are in accordance with the ATS principles. In this context, implications of moral values have been discussed in connection with decision-making – a topic that is, especially in recent times, not only highly relevant but is also becoming a focus for increased research interest (Bennis, Medin, & Bartels, 2010).

Values and Decisions

Values are thought of providing the underlying genuine reason for decisions when determining the best course of action, especially in the context of practical reasoning and rational choice (Audi, 2006; Becker, 1993). In this sense, values not only justify decisions but also allow rational action. Difficulties may arise because of value pluralism characterised by the fact that several different values are activated at the same time and perceived as equally important (Berlin, 1969). In cases of conflict in values, it is believed that rational decision-making is only possible if there is a common measure, by which the importance of the respective values can be balanced against each other (Richardson, 1997). So-called incommensurable values – in which cases there is no common measure for comparison – can never out such function. Moral dilemmas arise from situations of an unavoidable choice between incommensurable values where there is no right or wrong answer and where no objective, rational decision can be made based on a superior value (Railton, 2003). In the case of Antarctica we can also find situations where values clash. By pursuing one value one risks the non-fulfilment – or at least limitation – of another value. Environmental protection and the freedom of scientific investigation – both firmly rooted as principles in the ATS – represent such an example. Strictly speaking, any kind of human activity in Antarctica has an impact on its natural environment. In turn, strict regulations for human activities in Antarctica in favour of the conservation of the native flora and fauna, and wildlife confines scientific research. This creates potential moral dilemmas that require compromise on either one or the other or both sides. The example used here is also an inherently political issue that demands a political decision. As such, an already complex situation gets even more complicated. Following the democratic principle, political decisions for Antarctica need to be made in the interests of all parties and in consensus.

Individual Values and Social Norms

One of the most difficult, but perhaps also one of the most important issues, in value theory is the relationship between individual preferences and preferences of groups or societies (Rescher, 1969). Researchers seem to agree that individuals' value systems are influenced by culture (Harrison & Huntington, 2001; Hofstede, 2003; Kluckhohn & Strodtbeck, 1961). This implies people's ability to learn about the value orientations emphasised by their own culture (Atran, Medin, & Ross, 2005). But, how does a culture get its value orientations? The concept of social norms might offer some explanation. Philosophers such as Ullmann-Margalit (1977) and

Bicchieri (2006) believe that social norms emerge, in a way, naturally as “the endogenous product of individuals’ interaction” (Bicchieri & Mylroon, 2011, p. 2). In this sense, social norms are social constructs, but as such neither consciously planned nor designed by people. Ostrom (2000) defines social norms as “shared understandings about actions that are obligatory, permitted or forbidden” (pp. 143-144). Accordingly, social norms work similar to values as motivating mechanisms. At the same time, social norms restrict individual behaviour within a group or society in so far as they set standards for what behaviour is accepted in the group or society. For social norms to be effective they heavily rely on the group or society members’ trust – not only in the accuracy of the social norms but also in others to follow these standards (Bicchieri, 2006; Ostrom, 2000). In classical sociology, the aspect of collective consciousness has been emphasised, alongside individual agreement and conformity, with social norms as the key elements for the production of social order and to guide collective action (e.g. Durkheim; Parsons). Ideally, individual ends should be seen as achievable through social norms (Elster, 1989; Ostrom, 2000).

Political actors in Antarctic policy processes are, for the most part, representatives of governments or organisations (governmental as well as non-governmental). A study of value orientations and preferences that drive and shape Antarctic policy, will consequently need to focus on the values hold by these representatives. As delegates, they represent the interests of the government or organisation they belong to. Accordingly, the value orientations of these governments or organizations feed into the political discourse and decision-making process. However, this does not mean that in some cases individuals and their personal preferences may not have influence in policy-making processes. In any case, it is crucial for the study of values to distinguish between the level of the individual and the collective. As discussed above, social norms play an intermediary role between these two levels and can give clues to value orientations of both governments or organizations and individuals. With a focus on value orientations of groups or cultures in general, the aspect of value consensus will be discussed in the following paragraph.

Value Consensus

Schwartz (2011) noted that “[s]hared values encourage members of a society to identify with one another, accept common goals, and to agree on how these goals should be achieved. Thus, value consensus may be as important a feature of culture as value importance” (p. 313). Romney et al. (1987; 1986) believe that value consensus strongly depends on the distribution of knowledge within a culture and the concordance in cultural knowledge and beliefs among its members. In line with this, Atran et al. (2005) argue that “a culturally specific learning landscape further constrains the canalization process, much as an artificially built dam further channels the flow and shapes the path of water in a natural river basin” (p. 754). Sieck et al. (2010), argue that cultural groups share networks of ideas and define themselves through those cultural networks of ideas in the first place and not through mere formal factors such as nationality, notwithstanding the linkages between such formal factors and group members. The

degree of cultural knowledge is highly contextual, and a cultural (information) domain can be defined as “the kind and topic of knowledge of interest” (Sieck et al., 2010, p. 4). A dramatic example of such a cultural domain is climate change. Hulme (2009) argues that disagreement on climate change – understood not only as a physical, but also as a social phenomenon – is linked to different cultural backgrounds. It is crucial how, in each case, the phenomenon of climate change is understood and contextualised. Using the examples of political decisions in tornado situations on the one hand and the debate over abortion legislation on the other, Pielke (2007) shows how the role of scientific data may depend on value consensus. To allow science to play a critical role in political decision-making, a shared understanding of a given situation and shared commitments to specific goals are necessary. Here, uncertainty – including the type that is caused by ethical questions – represents the greatest interference. In principle, the higher the level of uncertainty and the greater options for alternative courses of action, the higher the chances of value conflicts (Pielke, 2007; Tannert, Elvers, & Jandrig, 2007).

Value consensus is of critical moment for Antarctica, in particular with regard to governance and political decision-making in Antarctic affairs. Antarctic governance is global with a large number of decision-makers involved and a high degree of cultural diversity. Moreover, various other stakeholders (such as SCAR, COMNAP, IAATO or ASOC) act as political actors and, assumedly, influence political decisions. Additional complexity in Antarctic policy-making is caused by the participation (active or passive) of the different cultural groups, including the nation states themselves, coalitions of states based on identical or very similar views and interests, and international alliances of individuals or non-governmental organizations sharing very specific interests. The question of the role of science in policy-making in Antarctica is an interesting one. As has been emphasised in this paper, the ATS assigns science and scientific research an important role in Antarctica. It can be assumed that all parties agree on the value of science as an Antarctic property. However, the same does not automatically apply to the value of the knowledge produced by science in Antarctica. Value consensus relies on the distribution and acceptance of knowledge in a cultural group and alternative courses of action associated with the political issue and decision. Taking the diversity of Antarctic decision-makers into account, reaching value consensus in the Antarctic policy forum seems challenging. The question about the role of science in policy becomes a question of the value consensus on interpretation of scientific data.

Conclusions

As a research topic, values appear extremely multi-faceted and the study of values has been approached from various angles. The list of approaches discussed in this paper is not exhaustive. There are more opportunities to study the value aspect not only in other contexts, but also in the Antarctic contexts in particular. The arts, for example, have been completely omitted here. The emotional dimension of values and aesthetics, which were not addressed in the scope of this paper, offer further potential for value studies in Antarctica. However, the consideration of different perspectives offered by different disciplines investigating the concept

of value is reasonable. It is obvious that the concept of value is not just highly complex, but also, because of its intangible nature, not easy to grasp or explore. A pluralistic view should help for a better understanding of the concept of value as a whole. Besides, the axiological, economic and psychological concepts of value – as presented in this paper – contain linking elements. From a methodological point of view, an interdisciplinary approach advantages a wider source of tools, which can be fruitful for the study of value.

Values are at the core in human connections to Antarctica. Besides, since the Madrid Protocol explicitly speaks of the intrinsic value of Antarctica and its associated values, Antarctic policy makers are forced to deal with the question of Antarctic values. Every decision on how to manage human contact to and activity on the icy continent is necessarily linked to most basic questions of moral nature. The protection of the Antarctic environment and its surrounded Ocean as a guiding principle and fundamental feature for the management of human activity in the Antarctic area bear the burden of moral dilemmas in the context of value pluralism. All human activity in Antarctica has an impact on its environment. The difficulty in the task of the protection of the Antarctic environment lays in the fact that we feel the need to protect Antarctica from the perceived damage we cause by using Antarctic space in the first place. In this sense, it is the paradox of being the cause, defender and judge at the same time that makes the challenge for the value question in Antarctica.

References

- Aristotle. 1988. *Metaphysics* (J. Annas, Trans.). Oxford Clarendon Press.
- Atran, S., & Axelrod, R. 2008. Reframing Sacred Values. *Negotiation Journal*, 24(3), 221-246.
- Atran, S., Medin, D. L., & Ross, N. O. 2005. The Cultural Mind: Environmental Decision Making and Cultural Modeling Within and Across Populations. *Psychological Review*, 112(4), 744-776.
- Audi, R. 2006. *Practical Reasoning and Ethical Decision*. New York: Routledge.
- Bahm, A. J. 1993. *Axiology: The Science of Values* (Vol. 2). Amsterdam: Editions Rodopi B.V.
- Baier, K. 1967. The Concept of Value. *The Journal of Value Inquiry*, 1(1), 1-11.
- Bateman, I. J., & Willis, K. G. (Eds.). 2001. *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the US, EU, and Developing Countries*. New York: Oxford University Press.
- Becker, G. S. 1993. Nobel Lecture: The Economic Way of Looking at Behavior. *Journal of Political Economy*, 101(3), 385-409.
- Bennett, J. (Ed.). 2011. *The International Handbook on Non-Market Environmental Valuation*. Cheltenham: Edward Elgar Publishing.
- Bennis, W. M., Medin, D. L., & Bartels, D. M. 2010. The Costs and Benefits of Calculation and Moral Rules. *Perspectives on Psychological Science*, 5(2), 187-202.
- Berlin, I. 1969. *Four Essays on Liberalism*. Oxford: Oxford University Press.
- Bicchieri, C. 2006. *The Grammar of Society: The Nature and Dynamics of Social Norms*. New York: Cambridge University Press.

- Bicchieri, C., & Muldoon, R. 2011. Social Norms. *The Stanford Encyclopedia of Philosophy* (Spring 2011 Edition), Edward N. Zalta (ed.),
<<http://plato.stanford.edu/archives/spr2011/entries/social-norms/>>.
- Brandt, R. B. 1979. *A Theory of the Good and the Right*. Oxford: Clarendon Press.
- Brentano, F. 1924. *Psychologie vom Empirischen Standpunkt*. Erster Band. Leipzig: Felix Meiner.
- Brentano, F. 1968. *Psychologie vom Empirischen Standpunkt*. Dritter Band. Hamburg: Felix Meiner.
- Dewey, J. (Ed.) 1939. *International Encyclopedia of Unified Science* (Vols. II). Chicago: The University of Chicago Press.
- Dewey, J. 1944. Some Questions About Value. *The Journal of Philosophy*, 41(17), 449-455.
- Durkheim, E. 1964 [1893]. *The Division of Labor* (G. Simpson, Trans.). Glencoe, IL: Free Press.
- Elster, J. 1989. Social Norms and Economic Theory. *The Journal of Economic Perspectives*, 3(4), 99-117.
- Gaus, G. F. 1990. *Value and Justification: The Foundations of Liberal Theory*. New York: Cambridge University Press.
- Graham, B. 2003. *The Intelligent Investor* (Vol. Revised Edition). New York: Harper Collins.
- Grünberg, L. 2000. *The Mystery of Values: Studies in Axiology* (Vol. 95). Amsterdam: Editions Rodopi B.V.
- Hansson, S. O., & Grüne-Yanoff, T. 2012. Preferences. *The Stanford Encyclopedia of Philosophy* (Winter 2012 Edition), Edward N. Zalta (ed.), URL =
<<http://plato.stanford.edu/archives/win2012/entries/preferences/>>.
- Harrison, L. E., & Huntington, S. P. (Eds.). 2001. *Culture Matters: How Values Shape Human Progress*. New York: Basic Books.
- Hart, S. L. 1971. Axiology: Theory of Values. *Philosophy and Phenomenological Research*, 32(1), 29-41.
- Herbert, B. P. 2007. *Protecting the Antarctic Commons: Problems of Economic Efficiency*. Tucson, AZ: Udall Center for Studies in Public Policy, University of Arizona.
- Hofstede, G. H. 2003. *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations*. Thousand Oaks, CA: Sage Publications.
- Hulme, M. 2009. *Why We Disagree About Climate Change: Understanding Controversy, Inaction and Opportunity*. Cambridge: Cambridge University Press.
- Kluckhohn, C. 1951. Values and Value Orientation in the Theory of Action: An Exploration in Definition and Classification. In T. E. Parsons (Ed.), *Toward a General Theory of Action* (389-433). Cambridge, MA: Harvard University Press.
- Kluckhohn, F. R., & Strodtbeck, F. L. 1961. *Variations in Value Orientations*. Evanston, IL, Elmsford, NY: Row, Peterson and Company.
- Kraus, O. 1937. *Die Werttheorien: Geschichte und Kritik* (Vol. 2). Brunn: Verlag Rudolf M. Rohrer.
- Leiserowitz, A. A., Kates, R. W., & Parris, T. M. 2006. Sustainability Values, Attitudes, and Behaviors: A Review of Multinational and Global Trends. *Annual Review of Environment and Resources*, 31(1), 413-444.

- Lewis, D. 1983. Extrinsic Properties. *Philosophical Studies: An International Journal for Philosophy in the Analytic Tradition*, 44(2), 197-200.
- Meinong, A. 1894. Psychologisch-ethische Untersuchungen zur Werttheorie (Vol. 1). Graz: Leuschner & Lubensky.
- Menger, C. 1871. Grundsätze der Volkswirtschaftslehre. Wien: Wilhelm Braumüller.
- Mill, J. S. 1863. *Utilitarianism*. London: Parker, Son, and Bourn.
- Moore, G. E. 1903. *Principia Ethica*. Cambridge: Cambridge University Press.
- Nordlund, A. M., & Garvill, J. 2002. Value Structures behind Proenvironmental Behavior. *Environment and Behavior*, 34(6), 740-756.
- Oreg, S., & Katz-Gerro, T. 2006. Predicting Proenvironmental Behavior Cross-Nationally: Values, the Theory of Planned Behavior, and Value-Belief-Norm Theory. *Environment and Behavior*, 38(4), 462-483.
- Ostrom, E. 2000. Collective Action and the Evolution of Social Norms. *The Journal of Economic Perspectives*, 14(3), 137-158.
- Parsons, T. 1951. *The Social System*. Glencoe, IL: Free Press.
- Pielke, R. A. 2007. *The Honest Broker: Making Sense of Science in Policy and Politics*. New York: Cambridge University Press.
- Putnam, H. 2002. *The Collapse of the Fact/Value Dichotomy and Other Essays*. Cambridge, MA: Harvard University Press.
- Railton, P. A. 2003. *Facts, Values, and Norms: Essays Toward a Morality of Consequence*. New York: Cambridge University Press.
- Rescher, N. 1969. *Introduction to Value Theory*. Englewood Cliffs, N.J.: Prentice-Hall.
- Richardson, H. S. 1997. *Practical Reasoning About Final Ends*. New York: Cambridge University Press.
- Rokeach, M. 1973. *The Nature of Human Values*. New York: Free Press.
- Romney, A. K., Batchelder, W. H., & Weller, S. C. 1987. Recent Applications of Cultural Consensus Theory. *American Behavioral Scientist*, 31(2), 163-177.
- Romney, A. K., Weller, S. C., & Batchelder, W. H. 1986. Culture as Consensus: A Theory of Culture and Informant Accuracy. *American Anthropologist*, 88(2), 313-338.
- Rønnow-Rasmussen, T., & Zimmerman, M. J. (Eds.). 2005. *Recent Work on Intrinsic Value*. Dordrecht: Springer.
- Sachs, J. D. 2011. *The Price of Civilization: Reawakening American Virtue and Prosperity*. New York: Random House.
- Schultz, P., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Fran k, M. 2005. Values and their Relationship to Environmental Concern and Conservation Behavior. *Journal of Cross-Cultural Psychology*, 36(4), 457-475.
- Schwartz, S. H. 1992. Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 25, pp. 1-65). New York: Academic Press.
- Schwartz, S. H. 2005. *Basic Human Values: An Overview*. 1-20. < <http://segr-did2.fmag.unict.it/Allegati/convegno%207-8-10-05/Schwartzpaper.pdf>>.

- Schwartz, S. H. 2011. Values: Cultural and Individual. In F. J. R. van de Vijver, A. Chasiotis & S. M. Breugelmans (Eds.), *Fundamental Questions in Cross-Cultural Psychology* (pp. 463 - 492). Cambridge: Cambridge University Press.
- Sieck, W., Rasmussen, L., & Smart, P. R. 2010. Cultural Network Analysis: A Cognitive Approach to Cultural Modeling. In D. Verma (Ed.), *Network Science for Military Coalition Operations: Information Extraction and Interaction* (pp. 237-255). Hershey, PE: IGI Global.
- Smith, A. 1776. *The Wealth of Nations*. London: W. Strahan and T. Cadell.
- Stern, P. C., & Dietz, T. 1994. The Value Basis of Environmental Concern. *Journal of Social Issues*, 50(3), 65-84.
- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. 1999. A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. *Human Ecology Review*, 6(2), 81-98.
- Tannert, C., Elvers, H.-D., & Jandrig, B. 2007. *The Ethics of Uncertainty*. [10.1038/sj.embor.7401072]. *EMBO Rep*, 8(10), 892-896.
- Ullmann-Margalit, E. 1977. *The Emergence of Norms*. Oxford: Clarendon Press.
- Whitehead, J., Haab, T., & Huang, J.-C. (Eds.). 2011. *Preference Data for Environmental Valuation: Combining Revealed and Stated Approaches*. London: Routledge.
- Wittgenstein, L. 1965. A Lecture on Ethics. *The Philosophical Review*, 74(1), 3-12.
- Wright, G. H. 1972. The Logic of Preference Reconsidered. *Theory and Decision*, 3(2), 140-169.

3. Wilderness and Aesthetic Values of Antarctica

Rupert Summerson⁴

Introduction

The protection of wilderness and aesthetic values in Antarctica was introduced by the Madrid Protocol, which came into force in 1998. The principles are laid out in two parts of the Protocol: in Article 3:

The protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research, in particular research essential to understanding the global environment, shall be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area.

...

To this end:

...

b) activities in the Antarctic Treaty area shall be planned and conducted so as to avoid:

(vi) degradation of, or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance.

and in Annex V:

Article 3

Antarctic Specially Protected Areas

1. 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.

2 Parties shall seek to identify, within a systematic environmental-geographical framework, and to include in the series of Antarctic Specially Protected Areas:

...

(g) areas of outstanding aesthetic and wilderness value.

(ATS, 1991)

Despite the Madrid Protocol being in force for over fourteen years, little progress has been made with implementation of protection for these values, apparently because of the difficulty

⁴ Faculty of Architecture, Building and Planning, The University of Melbourne, Australia.

in formulating acceptable definitions (H. Keys, *pers. comm.*), no doubt as a result of the perceived “vague and very subjective qualities” (Watts, 1992: 278) that they entail. Of the 71 Antarctic Specially Protected Areas (ASPAs) that have been established, only twelve include wilderness and aesthetic values among the values to be protected and none have been established solely for the protection of wilderness or aesthetic values. The Committee for Environmental Protection’s current five year work plan includes “Human footprint/wilderness management” as an “Issue/Environmental Pressure” item, but as a Priority 2 issue (CEP, 2010).

The aim of this research is to collect empirical data on perceptions of wilderness and aesthetic values from people with a wide variety of backgrounds, nationalities and Antarctic experience with which to formulate definitions that will hopefully be acceptable to policy makers and will ultimately bring about full implementation of this part of the Madrid Protocol.

Values and the Madrid Protocol

The Madrid Protocol calls for the protection of three sets of values:

- Intrinsic value;
- Wilderness and aesthetic values; and
- Value as an area for the conduct of scientific research.

The phrasing of the Madrid Protocol implies that wilderness and aesthetic values are a subset of intrinsic value. This idea does not sit comfortably with conventional thought on intrinsic value where aesthetic value is often thought to be an instrumental value (Fox, 1990: 155-156, Godfrey-Smith, 1979: 310). Intrinsic and instrumental values are discussed further below. The phrasing in Article 3, Section 1 is ambiguous as to whether the authors of the Protocol intended wilderness and aesthetic values to be one or two sets of values. The re-phrasing in Article 3, Section 2 (b) (vi) as “aesthetic or wilderness significance” suggests that the authors intended that wilderness and aesthetic values be considered as separate sets of values. This reasoning was also adopted by Codling (2001: 338). Re-phrasing notwithstanding, wilderness values are conventionally thought of as relating to the absence of human activity in large undisturbed natural areas (Washington, 2006) whereas aesthetic values relate to perceptions of scenic beauty (a simplified but adequate definition of aesthetic for this stage of the argument, *pace* proponents of ecological aesthetics). Wilderness areas can contain areas of high aesthetic value, but they need not do so to be considered wilderness. Similarly, areas of high aesthetic value need not necessarily be wilderness, for example Areas of Outstanding Natural Beauty in England and Wales in most cases do not include wilderness areas (Anderson, 1980: 9). Consideration as two sets of values would certainly make implementation of protection easier (Tin & Hemmings, 2011: 148).

It is also notable that the Madrid Protocol is phrased to protect the wilderness and aesthetic *values*, not to protect wilderness or the landscape aesthetics *per se*. This phrasing has troubled some commentators and caused some confusion (Neufeld et al., In Press). There has been a general recognition that the Protocol contains some inconsistencies, ambiguities and flaws,

many of which are a result of the haste with which the Protocol was negotiated (Jackson & Kriwoken, 2011: 316). Nevertheless, there is some merit in specifying, or at least implying, that wilderness and aesthetics must be valued in order to merit protection. This implicit requirement for valuation seems to conflict with the idea of intrinsic value and may be one of the inconsistencies that is a relic of the haste with which the Protocol was drawn up. The minutes of the special Antarctic Treaty Consultative Meetings held during the negotiations leading up to the Madrid Protocol have not yet been published so it is not yet possible to determine what the intentions of the authors of the Madrid Protocol were in this regard. It is not, however, considered safe to presume that the authors of the Madrid Protocol intended anything other than what they signed. The Vienna Convention on the Law of Treaties (1969) states explicitly that “A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose” (Section 3, Article 31, Part 1) (Vienna Convention 1969). That being the case, what are wilderness values and aesthetic values? And, what was intended by the overarching phrase:

The protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica ... (Article 3, Madrid Protocol)

Intrinsic and Instrumental Value

The concept of environmental values originated in the 1960s with the publication of seminal papers such as “The historical roots of our ecologic crisis” by Lynn White (White, 1967) and “The tragedy of the commons” by Garrett Hardin (Hardin, 1968). The field of environmental philosophy emerged in the early 1970s and with it the concept of an environmental ethic. The categorisation of values into instrumental and intrinsic value, already one of the most widely debated fields in value theory (Smith, 1998: 429; Brennan & Lo, 2010), took on an additional dimension when applied to developing theoretical positions on human relations with the natural world (Fox, 1990: 149). As Katie McShane put it, “... in the early days of environmental ethics, intrinsic value (and that of nature in particular) was the theoretical holy grail” (McShane, 2007: 46). Intrinsic value is said to be the value that something has “in itself,” “for its own sake,” or “in its own right” and thereby deserves moral consideration (Bowman, 2002: 43). As John O’Neill put it, “To hold an environmental ethic is to hold that non-human beings and states of affairs in the natural world have intrinsic value” (O’Neill, 1992: 119). Instrumental value, by contrast, is conventionally defined as where something is valued for the benefit it bestows on another entity and often relates to things of value to people, such as trees for the timber they produce and rivers for the water they provide. The position of intrinsic value in environmental philosophy is still the subject of intense debate (see e.g. Godfrey-Smith, (1980); Zimmerman, (2001) and Morito, (2003)). At its heart is the issue of whether non-humans can be thought to be intrinsically valuable. These and other issues related to intrinsic value and the natural environment are reviewed and debated in Smith (1992).

The Madrid Protocol is the source of protection for wilderness and aesthetic values, so in developing a theoretical position about wilderness and aesthetic values, it is important not to

undermine it. Is it possible to construct a theoretical position that is consistent with current environmental and philosophical thinking also supporting the phrasing of the Madrid Protocol which appears to have confused intrinsic and instrumental values? At the risk of “cherry picking”, a definition that suits the intentions of the Protocol, I have chosen two authors to illustrate the complexities involved in defining intrinsic value and a third to, hopefully, provide a resolution. Paul Taylor proposes that having “an attitude of respect for nature is to regard the wild plants and animals of the Earth’s natural ecosystems as possessing inherent worth” (Taylor, 1986: 71). Inherent worth, according to his definition, is that which possesses such worth regardless of any instrumental or inherent value it may have and without any reference to the good of other beings. Intrinsic value, by contrast, is when “humans or other conscious beings place positive value on an event or condition in their lives which they directly experience to be enjoyable in and of itself.” “... Intrinsic value is likewise placed on goals that conscious beings seek to bring about as ends in themselves and also on interests they pursue as intrinsically worthwhile.” Inherent value is the “value we place on an object or a place ... that we believe should be preserved, not because of its usefulness or its commercial value but simply because it has beauty, or historical importance or cultural significance.” “... living things themselves can be judged to have inherent value.” (Taylor. 1986: 74).

John O’Neill (1992: 119-120) identifies three meanings for intrinsic value:

1. As a synonym for non-instrumental value;
2. The value an object has solely in virtue of its intrinsic properties;
3. As a synonym for objective value, i.e. the value that an object possesses independently of the valuations of others.

There is some common ground between the two authors; for example, Taylor’s definition of inherent worth is close to O’Neill’s first definition for intrinsic value.

The third author, Val Plumwood, cuts through the philosophical hair-splitting and offers a sensible and practical definition when she says “in my own work the meaning intended in claiming that an item is intrinsically valuable is that its value cannot be explained by or reduced to instrumental considerations” (Plumwood, 1991: 141). This is clearly the same as O’Neill’s first definition and could equate to any of Taylor’s definitions. If this definition can serve as the basis for a definition for intrinsic value in Antarctica, could it also help define wilderness and aesthetic values as values that cannot be “explained by or reduced to instrumental considerations”?

The history of the concept of wilderness has been recounted by a number of environmental historians, e.g. Nash (1975) and Oelschlaeger (1991), and its position in environmental thought has been widely debated, e.g. Callicott & Nelson (1998) and Low (2002). There are many definitions of wilderness. The Oxford English Dictionary, for example, offers the following:

1. Wild or uncultivated land;
2. A wild or uncultivated region or tract of land, uninhabited or inhabited only by wild animals. (OED, 1989)

Washington (2006) reviews many of the modern definitions and proposes “large natural intact area” as a simple definition that avoids some of the confusion and cultural “baggage” that has accumulated around the word ‘wilderness’.

In the USA, the protection of wilderness is codified in the Wilderness Act (1964), which defines wilderness (in part) as follows:

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.... (US Wilderness Act, 1964).

The International Union for the Conservation of Nature (IUCN) has published guidelines for applying protected area categories that specify that for Protected Area Category 1b (wilderness areas), the distinguishing features should generally “[b]e free of modern infrastructure, development and industrial extractive activity” (Dudley, 2008: 14).

Given that wilderness is the antithesis of human presence, it is an appropriate candidate for intrinsic value, on condition that the wilderness is protected for its own sake, not for instrumental reasons. One of the reasons to think that wilderness has instrumental value is that the US Wilderness Act also defines wilderness as an area that “...has outstanding opportunities for solitude or a primitive and unconfined type of recreation.” (US Wilderness Act, 1964). While it is true that there is a thriving tourism industry in Antarctica and that Antarctic wilderness is one of the major drawcards for tourists, the vast majority of tourists visit Antarctica by ship and land at a relatively small number of sites where they spend a few hours ashore (Mortimer, 2004). There is no suggestion that the purpose of protecting wilderness by the Madrid Protocol is to benefit tourists.

The position of aesthetic value is more complex. Godfrey-Smith (1979: 310) and Fox (1990: 155), argue that aesthetic pleasure is an instrumental argument for the preservation of the nonhuman world, though Godfrey-Smith acknowledges that his “cathedral” argument for protecting wilderness, which includes “aesthetic delight”, frequently approaches an intrinsic value attitude (Godfrey-Smith, 1979: 311). Kant (1987 [1776]: 45), however, argued that an aesthetic judgement is a disinterested judgement and therefore has no instrumental consideration. The concept of disinterestedness is central to aesthetic theory (Stolnitz, 1961, Scruton, 2009b: 18) though it has been criticised by a number of environmental philosophers including, for example, Arnold Berleant who rejects it in favour of what he terms the aesthetics of engagement (Berleant, 2004: 77). Most contemporary environmental philosophers, e.g. Carlson (2009: 99), accept the concept of disinterestedness, subject to a number of conditions, perhaps best expressed by Emily Brady who says “... the logic of disinterestedness does not entail abstraction or passive contemplation, but only that we value the object for its aesthetic qualities rather than how it might serve our ends.” (Brady, 2004: 169). Even though consensus is lacking, a strong case can be made for aesthetic value being an intrinsic value on the basis of disinterestedness.

Wilderness and Aesthetic Values

The Madrid Protocol calls for the protection of the intrinsic values of Antarctica, including its wilderness and aesthetic values. As argued above, I believe that these are separate sets of values so each set of values will be considered separately.

Wilderness Values in Antarctica

“But most of the continent is seldom if ever visited. If any such wilderness remains on Earth, surely it is here” (Rolston, 2002: 129).

In the absence of any other information, it has to be assumed that the authors of the Madrid Protocol intended wilderness values in Antarctica to encompass similar concepts to those on the settled continents, in other words the absence of human infrastructure. Bill Green in describing the shores of Lake Vanda in the Dry Valleys talked about “... its howling emptiness in this valley, for which “wilderness” is far too tame a word” (Green, 1995: 254). The word ‘wilderness’ may have become degraded in his mind through its application to relatively small areas of land in the US; there are 128 wilderness areas in the US with an area of less than 25km² (Wilderness, 1996). Antarctica, however, is the least disturbed continent and the world’s largest desert (Schofield, 1972: 193), so wilderness is an appropriate term for its undisturbed areas. In addition, given the relatively low human impact and the intentions of the Madrid Protocol, a higher standard of care should be expected of its custodians.

Humans are only relatively recent visitors to Antarctica. There are no records of indigenous peoples in Antarctica (Walton, 1987: vii). The first landing on the continent is thought to have been in 1821, and the first party spent a winter on the Antarctic continent in 1899 (Headland, 2009: 132, 231). Therefore, the history of human occupation in Antarctica is relatively short, and the physical human footprint, i.e. the extent of infrastructure establishment in Antarctica is concomitantly relatively small in comparison with the other continents. Tourists, who now account for approximately 80% of all visitors to Antarctica in any one year, spend between one and five hours ashore, mostly at about thirteen sites on the Antarctic Peninsula over a period of two to three weeks (Mortimer, 2004). In any one year, there are up to about 4,500 national Antarctic programme staff during the summer months and about 1,100 during the winter (COMNAP, 2012). People overwintering spend the longest periods of time in Antarctica, with a small number spending up to 32 months continuously (BAS, 2012). As illustrated in Figure 1, the distribution of the physical footprints of Antarctic stations and associated infrastructure is uneven, both spatially and environmentally, with nearly 50% of Antarctic stations being sited on the Antarctic Peninsula and 60% of all stations being sited adjacent to the coast (COMNAP, 2012).

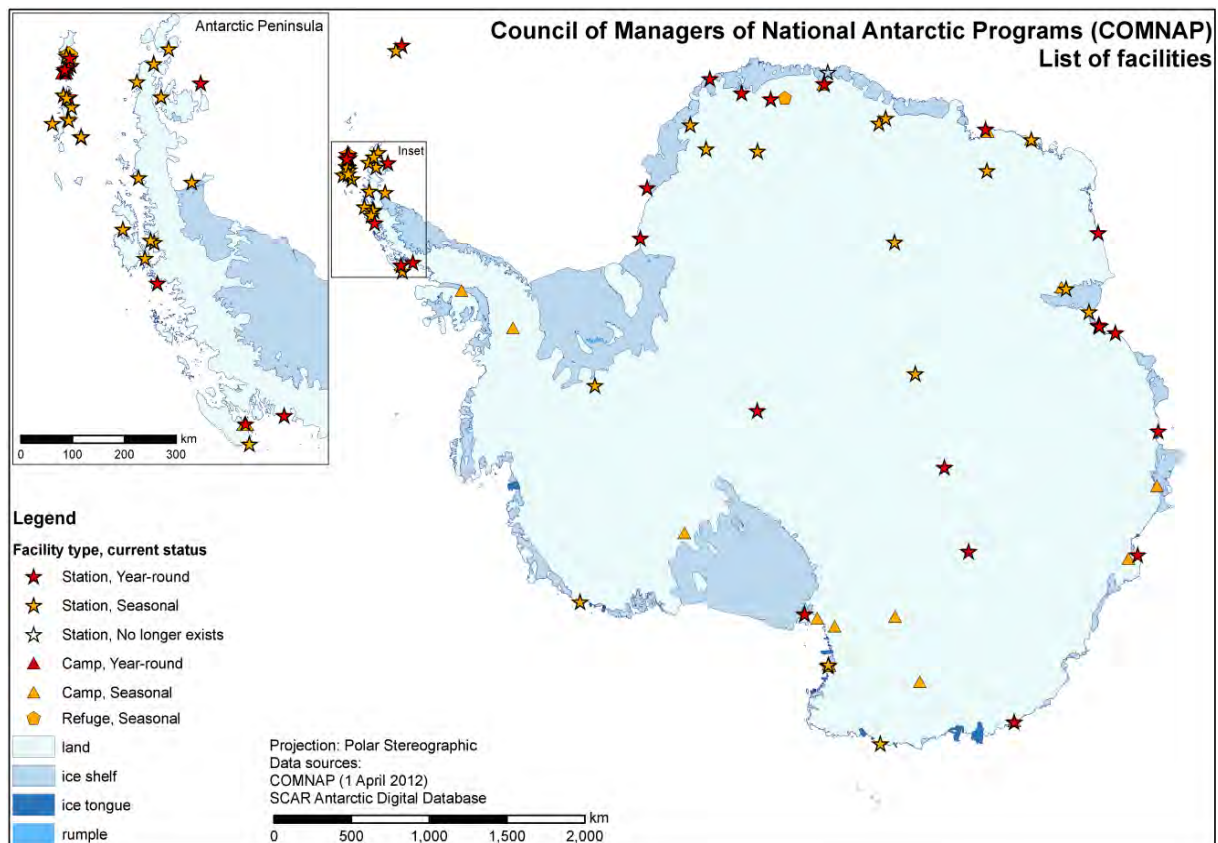


Figure 1: Map of Antarctica showing the facilities operated by national Antarctic programs as listed on the Council of Managers of National Antarctic Programs (COMNAP) website.

Since, as noted above, wilderness is generally defined as a lack of human presence, I believe that the whole of Antarctica can be defined as wilderness, with the exception of those parts where the intensity of human activity has rendered the term wilderness inappropriate. Such areas can be characterised by the erection of infrastructure implying a long-term, if not permanent presence (e.g. Kormos & Locke, 2008: 5). This is contrasted with transient activity which leaves practically no permanent traces. There are also intermediate cases, for example summer field camps which may be in operation for a number of years, e.g. for the West Antarctic Ice Sheet (WAIS) Divide project (WAIS, 2012). In such cases, wilderness may be degraded for the duration of occupation, but once the camp is closed would quickly revert to wilderness. Antarctica is defined as the Antarctic Treaty area, i.e. south of 60° South (ATS, 1959). All land areas and quasi-land areas such as ice shelves can potentially be wilderness areas. The application of the concept of wilderness to marine environments is not well developed (Sloan, 2002), but the sea ice zone that surrounds Antarctica during the winter and spring months has similar characteristics to Antarctic terrestrial wilderness and should not be omitted from consideration, despite the unusual characteristic that it disappears each summer (Summerson, 2012: 89).

If wilderness can be characterised as all those parts of Antarctica beyond sight and sound of human infrastructure, what is it about these places that we value? In other words, what are their wilderness values, and how can human activities degrade them? There have been a

number of attempts to define wilderness in terms of landscape properties. Kliskey (1998: 81) distinguished four general properties of wilderness: artefactualism, naturalness, remoteness and solitude. Lesslie & Maslen (1995: 4) proposed four indicators: remoteness from settlement, remoteness from access, apparent naturalness and biophysical naturalness. Machado (2004) developed an eleven-point index of naturalness from 100% cultural to 100% natural. Although the use of indicators is not always appropriate (Bradbury, 1996), the selection of characteristics that are either directly or indirectly measurable is an established procedure with which to evaluate wilderness. In the current study, a different approach to defining the boundaries of wilderness was adopted, which is described below.

Aesthetic Values in Antarctica

Precedents for the preservation of aesthetic values are to be found in the designation of Areas of Outstanding Natural Beauty under the UK National Parks and Access to the Countryside Act (1949), the UNESCO World Heritage Convention (1972), which recognises the aesthetic value of both cultural and natural sites, including natural beauty, and the US National Environmental Policy Act (1970), which includes amongst its aims the assurance for all Americans of "...aesthetically and culturally pleasing surroundings".

Many authors, from Plato to the present, have tried to understand what beauty is and why we humans are so captivated by it. The mid-eighteenth century saw a number of seminal works with several authors identifying two discrete forms of aesthetic response. Edmund Burke in England and Immanuel Kant in Germany independently proposed the idea of there being a distinction between the beautiful and the sublime, where the beautiful tends to comprise smaller-scale, more tranquil places, whereas the sublime comprises the grand, the spectacular, terrifying and awe-inspiring (Burke, 1998 [1759], Kant, 1987 [1776]). According to Kant, the beautiful and the sublime are both forms of aesthetic judgement. Aesthetic value is difficult to define (Scruton, 2009a: 137), but Stolnitz (1961: 139) asserts that "beauty" is synonymous with "aesthetic value". Bradley (1950: 40) suggests that 'beautiful', the sublime and similar terms represent some of the "many modes of beauty". Aesthetic responses to Antarctic landscapes can be characterised as including both the beautiful and the sublime (Summerson and Bishop, 2011). Parsons prefers the term "aesthetic quality" to beauty, in order to include concepts such as the picturesque. He defines aesthetic quality as "a visual or auditory appearance that is pleasing or displeasing for its own sake." (Parsons, 2008: 17). Scruton (2009a: 140) notes that "the aesthetic is a realm of *value*" (his italics). This leads to the conclusion that the "many modes of beauty" could, in fact, be re-defined as "aesthetic values". As noted in the section on wilderness above, the phrasing of the Madrid Protocol implies that wilderness and aesthetic values are sub-components of intrinsic value (noted also by Tin & Hemmings, 2011: 148). This being the case, aesthetic value relates to that which is intrinsic in Antarctica, i.e. the natural environment.

Synthesis

The Madrid Protocol, in mandating the protection of the intrinsic values of Antarctica, is evoking an ethical position and thereby calling for respect. The Protocol also calls for the protection of the wilderness and aesthetic values, which are two ways in which we humans can value this continent for itself. Wilderness values are those which relate to the absence of human infrastructure. Aesthetic values, while being human-centred, are also disinterested (Kant, 1987 [1776]: 45) and can be considered as non-instrumental and therefore, by Plumwood's definition, as being intrinsic.

Empirical Methods of Defining Wilderness and Aesthetic Values

In seeking definitions for the terms wilderness and aesthetic values, a number of research questions were drawn up, including:

1. Can wilderness be defined as the absence of humans?
2. What effect does human activity have on perceptions of wilderness and aesthetic value?
3. Do people respond equally to infrastructure and transient activity?
4. How do people respond aesthetically to Antarctic landscapes?
5. Are some Antarctic landscapes aesthetically more preferred than others?

In order to provide answers to these and other questions, an online survey was established to sample the opinions of as many people as possible across a wide range of Antarctic interests from professionals in national Antarctic programs, tourists, the tourism industry and interested members of the general public. The survey was established on the Internet in July 2009 and, to date, has received 365 responses⁵. It comprises 90 colour images of Antarctic landscapes and a series of questions, which are described below. The images were selected by the author from a range of sources. Half of the images are of natural scenes and half are scenes which include human activity or infrastructure at varying levels of intensity and proximity. As outlined above, the distinction between transient activity and permanent infrastructure is important. The 90 images are divided into three sets of 30 images. As respondents enter the survey, they are randomly allocated one set. Included in the survey are sixteen images that were digitally manipulated to remove evidence of human presence. The originals and their manipulated equivalents are distributed through the three sets of images so that no one respondent sees both the original and the manipulated images. This provides us with a powerful test for the impact of human activity on perceptions of wilderness and aesthetic value.

The images were also chosen to represent six broad groupings of Antarctic landscapes created from a concatenation of the Environmental Domains of Antarctica (EDA) (Morgan, this volume, and Morgan et al., 2007). ATCM XXXI (Kyiv) has recommended that the EDA be used as the basis for designating Antarctic protected areas (ATS, 2008). The concatenated domains, "environmental regions", were created to represent, as far as possible, groupings of landscape

⁵ The analyses reported in this paper were based on an earlier sample of 337 responses.

that are perceptually similar. The environmental regions are shown in Figure 2. The distribution of EDA regions and the human content of images in the survey are listed Table 1.

Table 1: Number of survey images in each of the EDA regions and the type of human activity in each. “No human” indicates the images without human content. There is some overlap between infrastructure and transient activity, for example vehicles parked near a field hut so some images are counted twice.

EDA region/Human content	Infrastructure	Transient activity	No human	Total
Coastal ice free	9	5	10	21
Mountainous ice free	4	6	11	18
Ice shelves	3	4	6	12
Coastal-continental margin	4	6	6	14
Antarctic Peninsula ice fields	2	4	8	13
Central Antarctic ice sheet	5	7	4	12
TOTAL	27	32	45	90

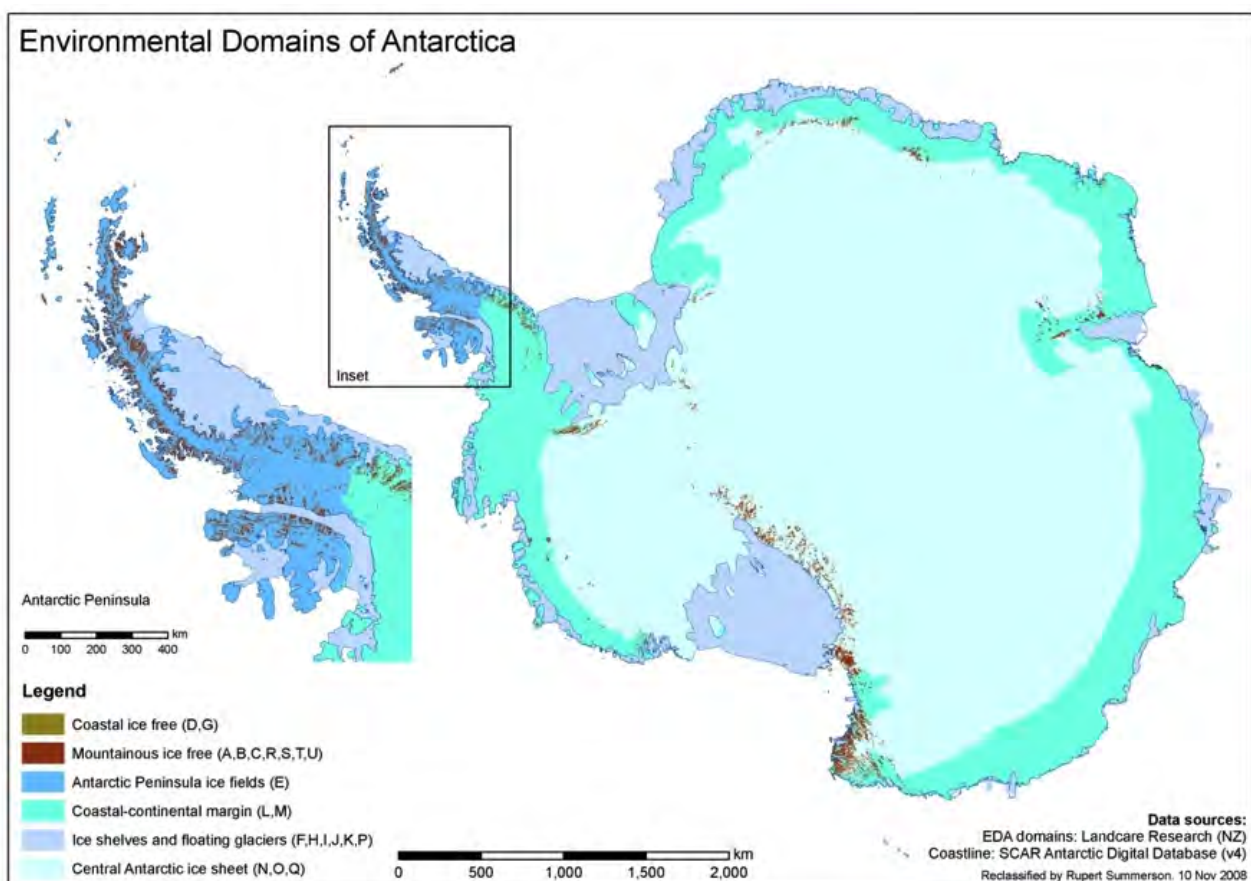


Figure 2: Six broad groupings of Antarctic landscapes (environmental regions) derived from the Environmental Domains of Antarctica (EDA) dataset.

Respondents were asked for brief demographic details. They were then shown a mock-up of the questions page, followed by a preview of all thirty images so they could establish the range of images they were asked to assess. Finally each of the thirty images was presented individually but in random order. Respondents were asked to view each image and answer a set of three questions as shown in Figure 3.

1. “Does the scene represent wilderness to you? Yes or No”.
2. “Perceptions of Aesthetic Quality. Please select your preference rating on a scale of 1 (low) to 7 (high)”.
3. “Descriptive words. How well does each of the following words describe this scene?”

Respondents were then asked to rate four words as in Figure 3. The words offered were selected from Antarctic literature ranging from published accounts to field hut log books and were divided into two lists: words associated with the beautiful and words associated with the sublime (Table 2). The aesthetic concepts of the beautiful and the sublime were taken as the starting point for this research as these concepts are the best developed and best theorised ideas in aesthetics and intuitively suited Antarctica. This part of the survey and the results derived from it are described in detail in Summerson and Bishop (2011).

Table 2: Words chosen for semantic assessments of scenes in the survey

Beautiful	Sublime
Beautiful	Austere
Delightful	Barren
Lovely	Bleak
Pleasant	Desolate
Pretty	Breathtaking
Glorious	Grand
Wonderful	Impressive
Magnificent	Spectacular
Ugly	Vast
Unpleasant	Awesome



Click on image for full size.

Perceptions of wilderness

Does this scene represent wilderness to you? ☐ Yes ☐ No

Perceptions of aesthetic quality

Please select your preference rating on a scale of 1(low) to 7(high)

☐ ☐ ☐ ☐ ☐ ☐ ☐
 1 2 3 4 5 6 7

Descriptive words

How well does each of the following words describe this scene?

	Not at all	Not well	Neutral	Well	Very well
Perfect	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beautiful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Austere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please press here to preview the full set of images. [PREVIEW](#)

Figure 3: A typical questions page from the survey showing the image and three sets of questions. (Note that “perfect” and “grim” were not used in the final set of adjectives). (Photo: Frédérique Olivier).

Results

The results described here are an overview of the results obtained from the survey. More detailed analyses are published elsewhere (see e.g. Summerson, 2012; Summerson & Bishop, In review; Summerson & Bishop, 2011).

The data analysed in this paper are based on 337 responses from 23 nationalities (Table 3). Among the respondents were:

- 266 people who have experienced Antarctica
- 71 people who have not experienced Antarctica
- Of the people who have experienced Antarctica:
 - 176 scientists, science support & operations (national Antarctic programmes)
 - 74 tourists
 - 40 tourism industry staff (guides, etc.)
 - 19 private expeditions participants
 - 26 others, or not specified
 - some combinations of the above, for example former national Antarctic programme staff who have later visited as tourists

Table 3: Numbers of each nationality, or group of nationalities, participating in the survey

Nationality	Count
Australia	146
UK	58
USA	47
Japan	18
New Zealand	16
Canada	9
Other European	21
South America	11
Other	4
Not specified	7

Not all respondents completed all 30 scenes in a set, and the randomisation algorithm used to allocate sets to respondents produced an uneven number of respondents per set, as follows (Table 4).

Table 4: Maximum number of respondents in each set of images

Set 1 (Images 101-130)	Set 2 (Images 201-230)	Set 3 (Images 301-330)
94	125	118

In total, 8778 individual evaluations of images were carried out which gives a high degree of statistical power to the survey results.

The Impact of Human Activity and Infrastructure on Perceptions of Wilderness and how this Helps Shape a Definition of Wilderness

A Chi-square test for independence (with Yates Continuity Correction) was carried out on all assessments to test the effect of human presence on wilderness. A significant association between human presence in the scenes and ratings of 'not wilderness' was found, $\chi^2 (1, n = 8778) = 677.8, p = 0.0, \phi = -0.28$. Chi-square tests were also carried out on images with and without human presence aggregated into each of the six EDA regions. In each case, a significant difference between wilderness ratings for images with and without human presence was detected.

Chi-square tests for independence were also carried out on wilderness assessments of the sixteen pairs of manipulated images. Table 5 lists the results. Figures 4 and 5 illustrate manipulated images with different forms of human presence; Figure 4 is an example of a scene including infrastructure and Figure 5 of a scene including transient activity.

Table 5: Results of chi-square tests for independence (with Yates Continuity Correction) on wilderness assessments of sixteen manipulated images. $\alpha = 0.05$.

Scene	Infrastructure (I) or Activity (A)	EDA region	χ^2	p	Significant?
Radio masts	I	CIF	13.05	0	yes
Field hut	I	CIF	1.35	0.24	no
Cairn	I	CIF	0.01	0.9	no
Icebreakers	A	CCM	24.56	0	yes
Field hut	I	CCM	8.7	0.0	yes
Field hut	I	CCM	12.84	0	yes
Tractor train (fig. 4)	A	IS	5.95	0.0	yes
McMurdo airfield	I	IS	36.41	0	yes
McMurdo airfield	I	IS	10.29	0.0	yes
Field Party	A	IS	0.011	0.9	no
AWS	I	IS	38.29	0	yes
Field Hut (fig. 3)	I	MIF	3.88	0.04	yes
Field Hut	I	MIF	33.39	0	yes
Field party	A	MIF	0.07	0.7	no
Field Party	A	PIF	5.06	0.02	yes
South Pole station	I	CIS	33.18	0	yes



Figure 4: Field hut in the mountain ice-free EDA region. The left hand image has had the field hut (on the rocks on the right hand side of the image) digitally removed. $X^2 = 3.882$, $p = 0.049$ ($N^{\text{manipulated}} = 80$, $N^{\text{original}} = 110$). (Photo: Australian Antarctic Division).



Figure 5: Tractor train in the ice shelf EDA region. The left hand image has had the vehicles digitally removed. $X^2 = 5.955$, $p = 0.015$ ($N^{\text{manipulated}} = 79$, $N^{\text{original}} = 101$). (Photo: John Penney/United States Antarctic Program Photo Library) Ranking of landscape type by aesthetic preference, which helps define what we value in Antarctic landscape aesthetics.

Aesthetic preference scores were converted from the seven point ordinal scale of the original data in the survey to Z scores (Daniel & Boster, 1976: 10) in order to correct some of the biases inherent in ordinal ratings. A plot of the mean of the Z scores of the 45 images without human presence demonstrates the much lower aesthetic preference ratings given to natural scenes in the coastal ice free (CIF) EDA region (Figure 6).

Many of the images of CIF areas were taken in Eastern Antarctica which expeditioners from the Australian National Antarctic Research Expeditions (ANARE) would probably have visited. In order to test whether people who have experienced coastal ice free areas may have different perceptions, respondents were selected with the following characteristics: people who have identified themselves as Australian, have visited Antarctica in the role of scientist, science

support or operations, which, taken together, would be likely to identify people who have been in the Australian Antarctic Programme.

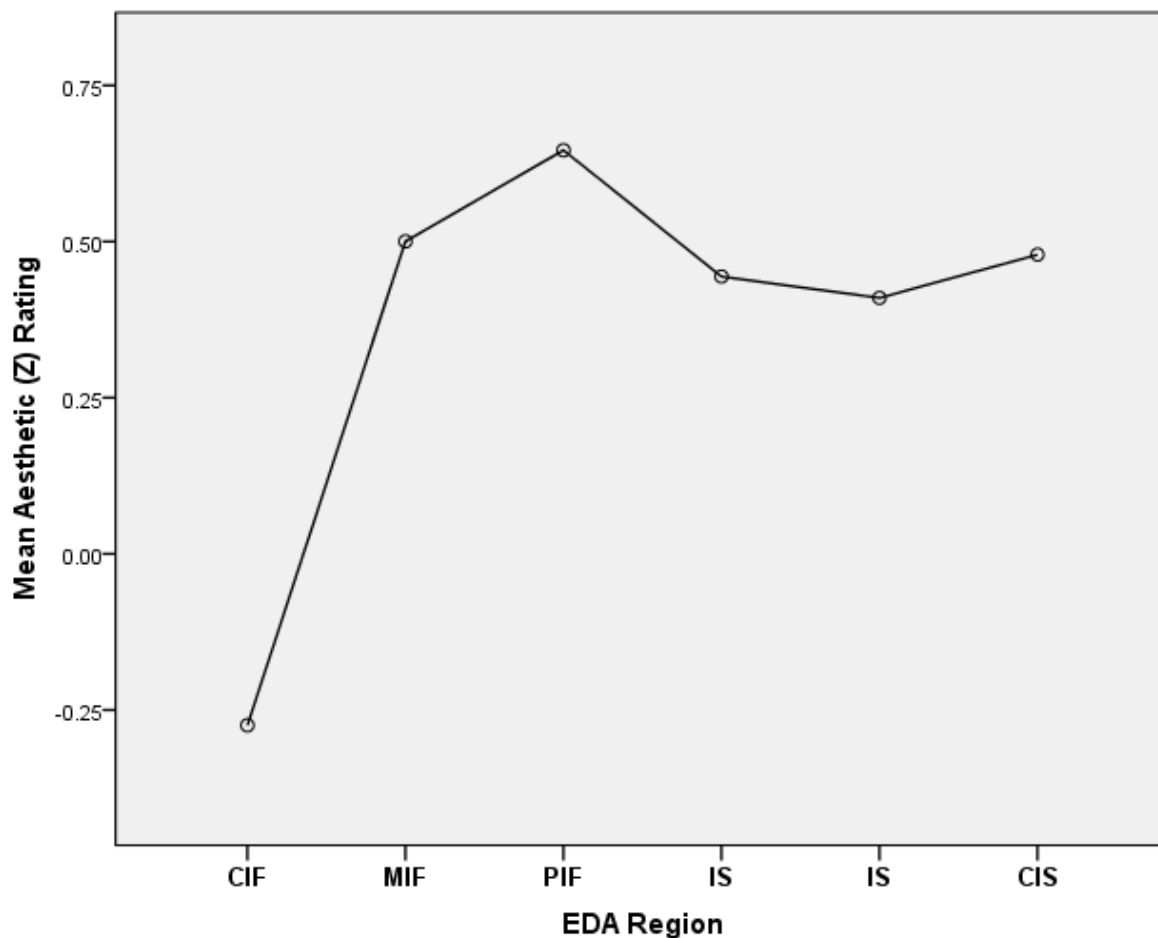


Figure 6: Mean aesthetic ratings, expressed as Z scores, for all images without human presence plotted by (concatenated) EDA region. CIF = coastal ice-free; CIS = central ice sheet; IS = ice shelves and floating glaciers; CCM = coastal continental margin; PIF = (Antarctic) peninsula ice fields; MIF = mountainous ice free.

A further t-test was run to compare these people with people who have not visited Antarctica. The result was a significant difference in aesthetic preference ratings, with ANARE expeditioners having higher aesthetic preference ratings:

Non-visitors: (Mean) $M = -0.33$, (Standard deviation) $SD = 0.81$.

ANARE expeditioners: $M = -0.175$, $SD = 0.74$.

$t(379) = -1.95$, $p = 0.05$ (two-tailed), ($\alpha = 0.05$).

The magnitude of the difference in the means (mean difference -0.15 95% CI: 0.31 to 0.001) was very small (eta squared = 0.01). The implication is that, in this case, experience leads to appreciation, but only by a very narrow margin.

Semantic Evaluations of Landscapes with and without Evidence of Human Activity Helping Define how We Value Landscapes

The semantic component of the survey is described in detail in Summerson and Bishop (2011). In summary, responses were aggregated by concatenated EDA region. The qualitative responses (“not well”, “very well”, etc.) were given numeric scores, and the scores were summed and then averaged by the total number of responses to each image. The resulting scores were then plotted on radar graphs (see Figure 7).

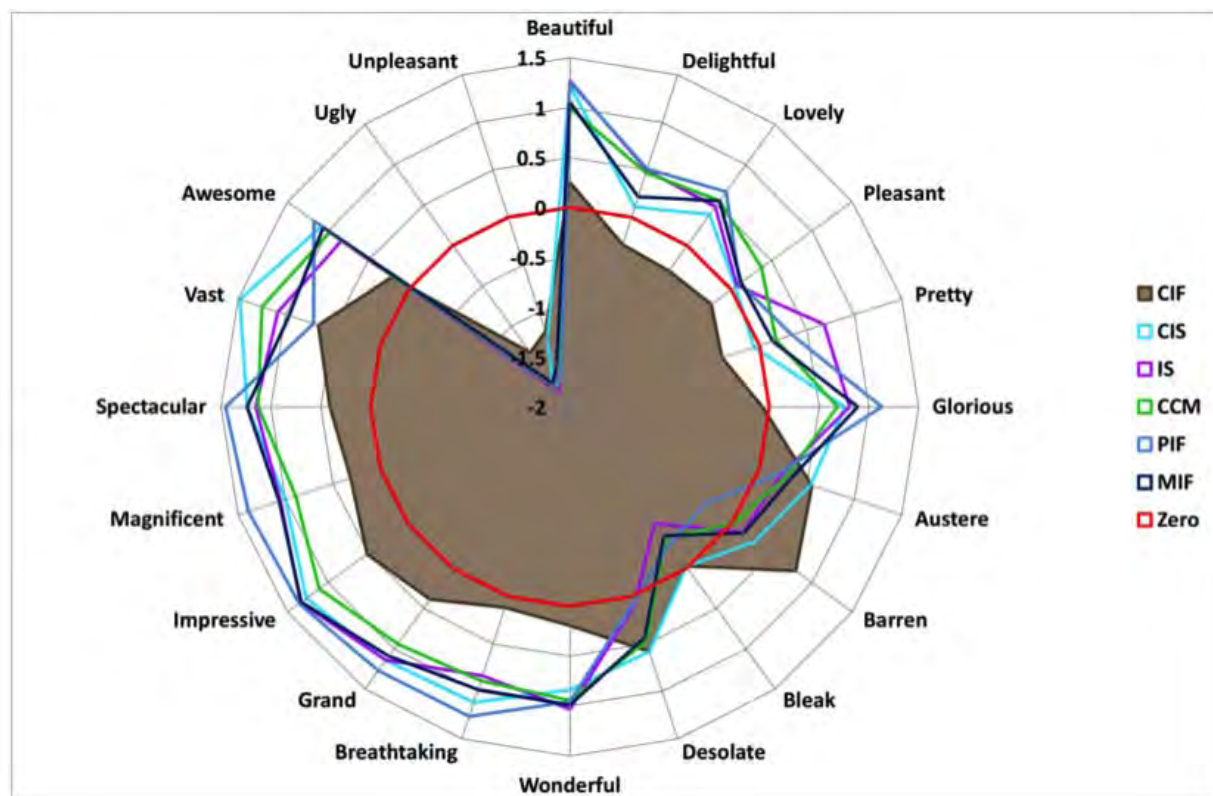


Figure 7: Aggregated scores for each of the concatenated EDA regions plotted on a common scale. CIF = coastal ice free; CIS = central ice sheet; IS = ice shelves and floating glaciers; CCM = coastal continental margin; PIF = (Antarctic) peninsula ice fields; MIF = mountainous ice free. The zero line is shown in red for reference.

Scenes with human presence were excluded because responses to these were distorted in comparison with natural scenes (for example, Figure 8). The radar graphs of semantic responses from the original and modified images are noticeably different with most adjectives being rated as less suitable in the original scene, with the automatic weather station (AWS), than in the modified, apparently natural, scene.

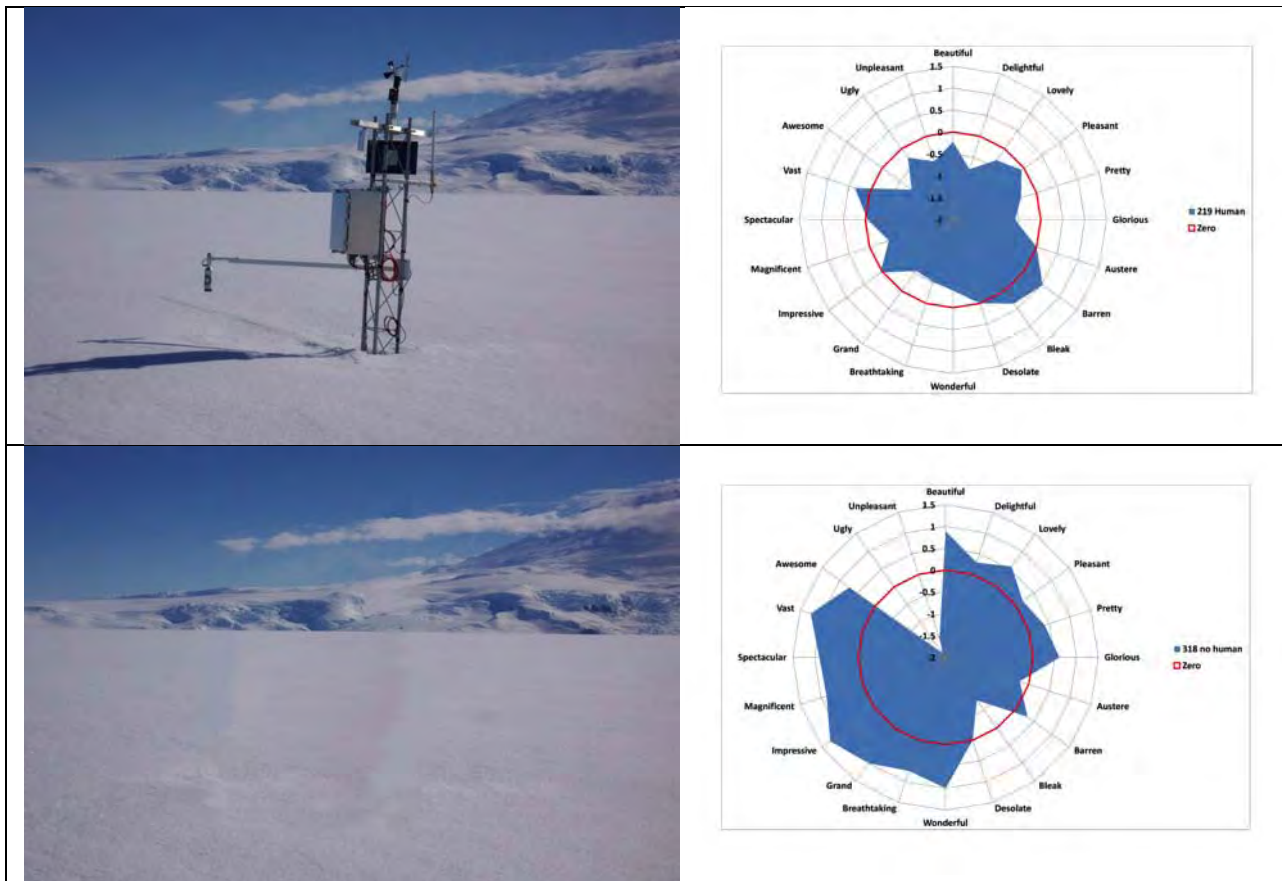


Figure 8: A manipulated pair of images. The upper left image is the original; the AWS has been digitally removed from the lower left image. Graphed semantic responses to both images are shown on the right. (Photo: Antarctic Meteorological Research Center, University of Wisconsin–Madison).

Multi-dimensional scaling was carried out to investigate the relationships between the adjectives. The averaged scores of only those 45 images that did not contain evidence of human activity were used. This was necessary to avoid the distortions that occur when infrastructure or activity is present (e.g. Figure 8).

Figure 9 is a plot of two dimensions that were detected by the multi-dimensional scaling process. There are five distinct groupings of adjectives (one adjective has been chosen to represent the others): “ugly,” pretty,” “desolate,” “beautiful” and “vast.” The isolation of “vast” as a grouping in its own right is notable. “Vast” was most often rated as suitable for scenes of horizontal vastness. Vastness is a key characteristic of Antarctica that has been frequently commented on in Antarctic literature. Dimension 1 ranges from the group of sublime words: “grand”, “awesome”, “vast”, etc., plotted as positive 1–2, to “ugly” and “unpleasant”, which are strongly negative (-3). The rest of the beautiful words (“pretty”, “pleasant”, etc.), and the group of “desolate” words are plotted at roughly the same level (0 – -1). Dimension 2 groups most of the adjectives from 0– +0.5 with the “desolate” group plus “vast” together between -0.5 and -1.

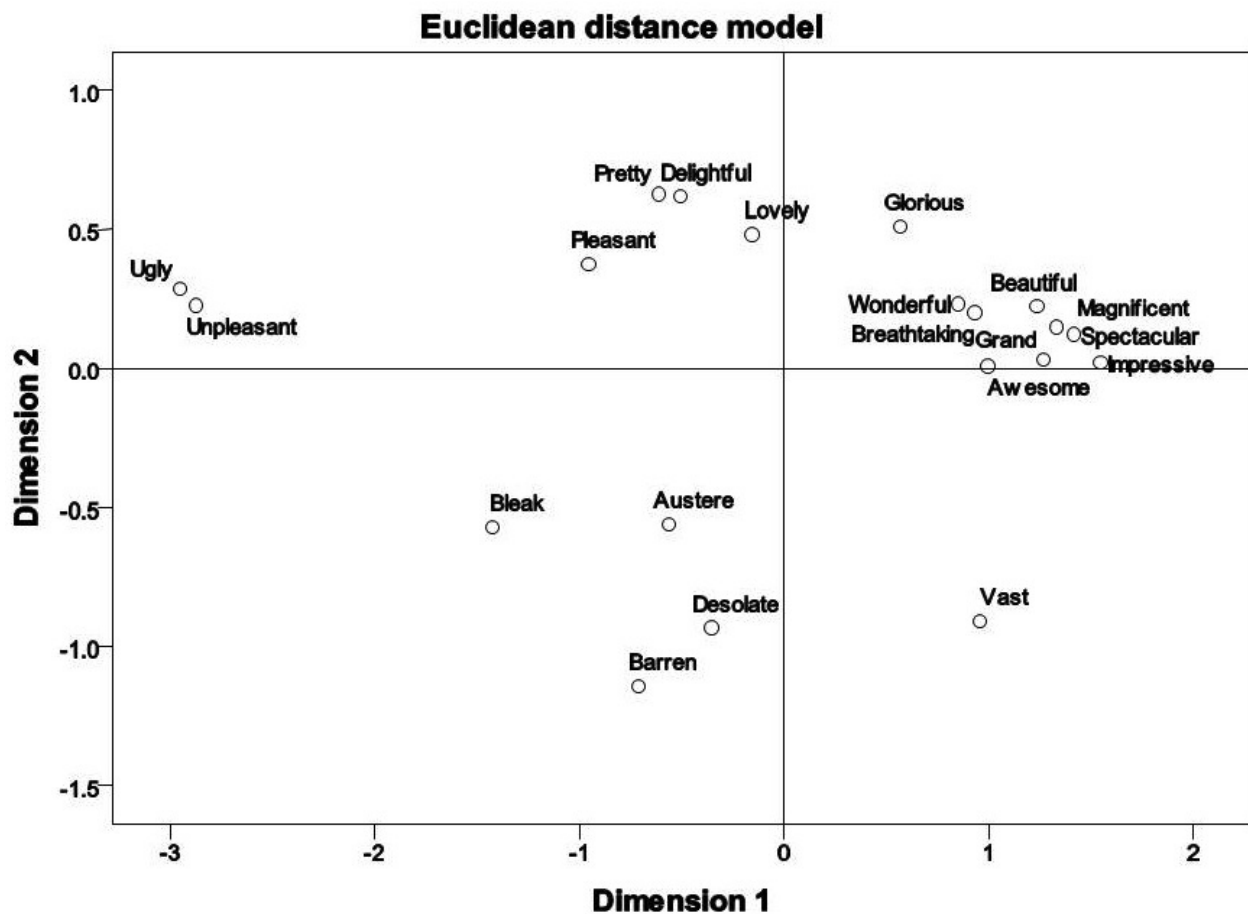


Figure 9: Multi-dimensional scaling plot of averaged scores for all 20 adjectives in the survey from the 45 images without evidence of human activity.

Demographic Factors in Perceptions of Wilderness and Aesthetic Value.

Respondents were asked to provide brief demographic details including age, gender, educational level, nationality, whether or not they have visited Antarctica and, if they have visited Antarctica, in what capacity and how many times. Wilderness ratings, being a “yes” or “no” response, were analysed using chi-square statistics; aesthetic responses, having been converted into Z scores were treated as interval scale data and analysed with a range of parametric techniques. Three questions follow below to illustrate demographic influences on responses.

1. How do people who have not visited Antarctica assess the wilderness and aesthetic values in comparison with those who have?

A chi-square test for independence (with Yates Continuity Correction) on all results (including images with and without human presence) showed no significant association between perception of wilderness and whether respondents had visited Antarctica [χ^2 (1, n= 8731) = 0.42, p = 0.52, ϕ = -0.007]. Subsequent tests on images with and without human presence made no appreciable difference to these ratings. For example, a comparison of people who

had served with national Antarctic programmes and people who had not visited Antarctica showed no significant association [χ^2 (1, $n = 6451$) = 1.32, $p = 0.25$, $\phi = -0.15$].

2. Do tourists have a greater appreciation for aesthetic values than Antarctic professionals?

An independent samples t-test of images without human presence was conducted to compare the Z scores of people who have had experience in Antarctica as members of national Antarctic programmes (NAPs) with people who have experienced Antarctica solely as tourists. No significant difference was found between the scores for NAP members [$M = 0.34$, $SD = 0.77$; t (3155) = 1.18, $p = 0.24$, two-tailed]. The difference between the means was very small [mean difference = 0.037, 95% CI: -0.025 to 0.1] and the effect size very small (eta squared = 0.0004). That does not mean that there were no differences in individual images, however. More analyses are needed to investigate this further.

3. Are there differences in assessments of wilderness and aesthetic values by people of different nationalities?

Preliminary analyses suggest that there are some similarities, and differences, in assessments of wilderness and aesthetic values by people from different nationalities. Respondents have different types and levels of Antarctic experience, educational levels, genders, etc., and any differences must be interpreted with care. However, preliminary analyses suggest that, in common with other demographic data, there are few differences between nationalities. This observation needs to be confirmed though after more sophisticated testing.

Discussion

The aim of this research is to help formulate definitions for the terms wilderness and aesthetic values in order to help with implementation of protection for wilderness and aesthetic values as required under the Madrid Protocol. The first part of this paper discusses the phrasing in the Madrid Protocol and whether wilderness and aesthetic values are elements of intrinsic value. The conclusion is that, because both are non-instrumental values, following Plumwood (1991), they can be considered as intrinsic values. Wilderness values can be seen as elements of intrinsic values because of the desire to protect wilderness over the whole of Antarctica, and aesthetic value, a result of a disinterested judgment, can be considered within that same category. The second part of this paper describes an empirical approach to defining wilderness through perceptions of wilderness of sets of digital images showing both natural scenes and scenes with human presence at a variety of degrees of proximity and intensity. The same images are used to elicit aesthetic preference and the appropriateness of sets of adjectives. A number of manipulated images provide a direct test of impact of human presence on perceptions of wilderness and aesthetic value.

The survey results are reassuringly consistent; the impacts of infrastructure and human activity on assessments of wilderness, aesthetic preference and semantic responses (Summerson & Bishop, 2011) all follow similar patterns. There is little doubt that responses to the imagery in

the survey would translate into similar responses in the real world (Arriaza et al., 2004; Daniel & Boster, 1976; Kaplan & Kaplan, 1995; Shuttleworth, 1980), which is confirmed by unsolicited comments from survey respondents. There is a gradient in perceptions of aesthetic preference from images with no human presence, which were given the highest aesthetic preference scores, to images with strong human presence, e.g. Antarctic stations, which were given the lowest scores (Summerson, 2012: 103) (See Figure 10).

Many authors have noted the strong correlation between higher aesthetic preference ratings and environments without human presence than environments with human presence (e.g. Kaplan & Kaplan, 1995: 43, Wu et al., 2006: 18.16), so it should not be surprising that the same should apply in Antarctica. It is also reassuring that similar judgements of wilderness and aesthetic preference are made by people who have Antarctic experience, either as Antarctic professionals or as tourists, and those who do not such experience. It will be much easier to make a case for the protection of these values if they are universally held.

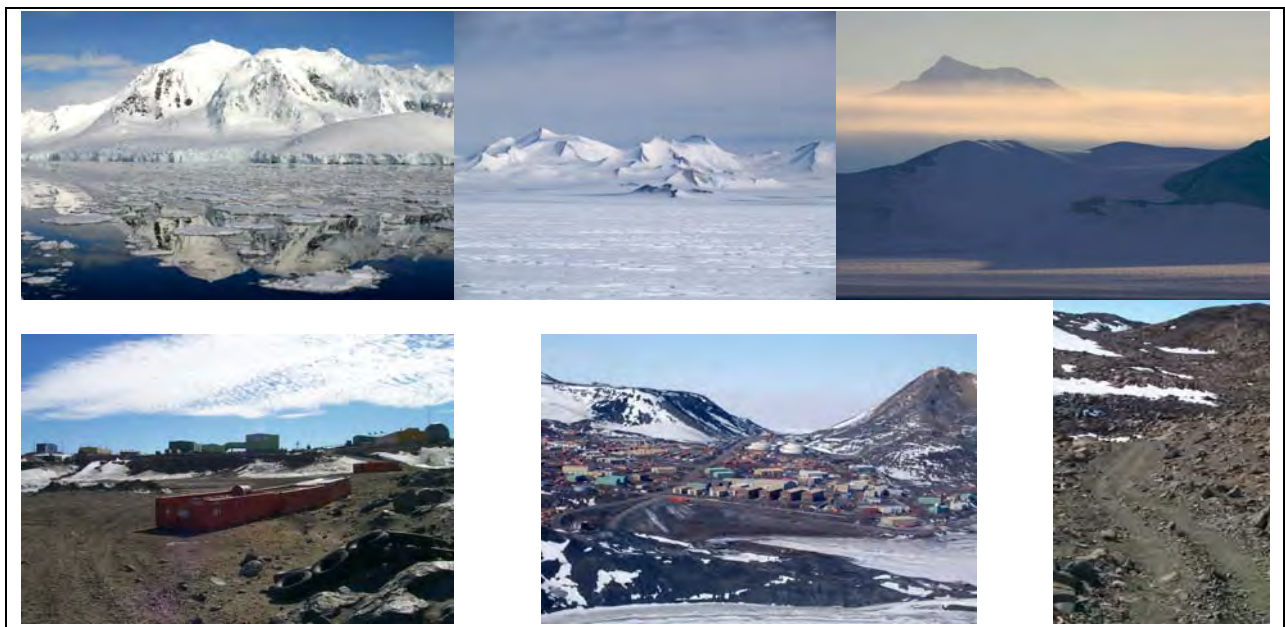


Figure 10: Top row: the three images with the highest aesthetic preference ratings. Bottom row: the three images with the lowest aesthetic preference ratings. Photo credits: (left to right, top to bottom) Zee Evans*, Paul Thur*, Richard Barwick, Rupert Summerson, Bob Koch*, Rupert Summerson. (* = Courtesy of US National Science Foundation Antarctic Photo Library).

The apparent under-valuing of coastal ice-free areas in comparison with other Antarctic environments, both in terms of perceptions of wilderness and aesthetic preference, is a cause for concern, especially as these are areas where most human activity takes place. If these environments are under-valued, there is a risk that they will become degraded through lack of care. It is not clear what the cause of this is, but the comments made by Dr Phillip Law, the

founder of Davis Station, about the Vestfold Hills being a “depressing desert” (Summerson & Bishop, 2011: 241) may indicate a factor in their under-valuation.

A number of problems were encountered with the suitability of the Environmental Domains of Antarctica as a regionalisation for human landscape perception. The main problem was that of overlapping areas, for example an observer being in one region but being influenced by an adjacent region. This is not, perhaps, a surprising observation given that the EDA was designed as a bio-climatic regionalisation. As observed above, the adoption of the EDA as the approved regionalisation for designating protected areas makes a powerful argument for retaining it, but perhaps the boundaries could be modified to suit human perception. The results obtained in this research suggest that a regionalisation may be redundant, other than to distinguish between coastal ice-free areas and the ice-covered terrains of the rest of Antarctica.

Conclusions

A number of conclusions can be drawn from this research:

- A good case can be made to think of wilderness and aesthetic values to be considered as intrinsic values in Antarctica.
- Most infrastructure detracts from aesthetic value and wilderness value;
- Large-scale human activity, such as ship and aircraft movements, also detracts from aesthetic value and wilderness value;
- Light vehicle and foot transient activity may result in a detectable but not statistically significant loss of aesthetic and wilderness value;
- Semantic responses to landscapes are also sensitive to human presence;
- Wilderness, aesthetic preference and semantic responses seem to be different to coastal ice-free areas than the other landscape types.

The application of this research to policy development is therefore reasonably clear, especially in terms of providing definitions. As argued above, all of Antarctica can be considered as wilderness, except for those areas that have been degraded by human activity. The results of the survey show that large-scale infrastructure, for example an Antarctic station, is perceived as “not wilderness”, which can also be expressed as having lost its wilderness value. The extent of the loss of wilderness is the distance from which the station can be seen or heard. Therefore, a preliminary definition of wilderness, is the area from which human infrastructure is not visible or audible. The results of the survey also show that all of Antarctica has aesthetic value except where human activity has degraded it. All landscape types appear to be similarly highly valued, except for coastal ice-free areas. The depreciation of the aesthetic value of coastal ice free areas is cause for concern and needs more research.

Acknowledgments

I would like to thank Patty Hobsbawn and Ian Bishop for helping to set up the Internet survey, the many people who took part in it and all those who helped promulgate it. Many people supplied photographs and their contribution is acknowledged in the figure captions. I would also like to thank the Australian Antarctic Division for their logistics support for field work in Antarctica. Finally I would like to thank Ian Bishop and Mark Chambers for their help with the analyses of the survey results.

References

- Anderson, M.A. 1980. The land pattern of areas of outstanding natural beauty in England and Wales. *Landscape Planning*, 7(1), 1-22.
- Arriaza, M., Canas-Ortega, J.F., Canas-Madueno, J.A., & Ruiz-Aviles, P. 2004. Assessing the visual quality of rural landscapes. *Landscape and Urban Planning*, 69, 115-125.
- ATS. 1959. Text of the Antarctic Treaty. http://www.ats.aq/documents/ats/treaty_original.pdf
- ATS. 1991. Protocol on environmental protection to the Antarctic Treaty. http://www.ats.aq/documents/recatt/Att006_e.pdf
- ATS. 2008. Resolution 3 (2008) - ATCM XXXI - CEP XI, Kyiv. Environmental Domains Analysis for the Antarctic Continent. http://www.ats.aq/documents/recatt/att408_e.pdf
- BAS. 2012. Employment at BAS. http://www.antarctica.ac.uk/employment/career_areas/supporting_science/index.php
- Berleant, A. 2004. The Aesthetics of Art and Nature. In Carlson, A., & Berleant, A. eds. *The Aesthetics of Natural Environments*. Peterborough, Ontario: Broadview Press, 76-88.
- Bowman, M. 2002. Biodiversity, Intrinsic Value, and the Definition and Valuation of Environmental Harm. In Bowman, M., & Boyle, A. eds. *Environmental Damage in International and Comparative Law*. Oxford: Oxford University Press, 41-61.
- Bradbury, R. 1996. Are indicators yesterday's news? In *Tracking progress. 1996 Australian Academy of Science Fenner Conference on the Environment*. Institute of Environmental Studies University of NSW.
- Bradley, A.C. 1950. The Sublime. In *Oxford Lectures on Poetry*. London: Macmillan & Co. Ltd, 395.
- Brady, E. 2004. Imagination and the Aesthetic Appreciation of Nature. In Carlson, A., & Berleant, A. eds. *The Aesthetics of Natural Environments*. Peterborough, Ontario: Broadview Press, 156-169.
- Brennan, A., & Lo, Y.-S. 2010. Environmental Ethics. In Zalta, E.N. ed. *The Stanford Encyclopedia of Philosophy* (Fall 2011 Edition).

- Burke, E. 1998 [1759]. A philosophical enquiry into the origin of our ideas of the sublime and the beautiful. *In* Womersley, D. ed. London: Penguin, 50-199.
- Callicott, J.B., & Nelson, M.P., Eds.1998. *The Great New Wilderness Debate*. Athens, Georgia, USA: University of Georgia Press. 697 pp.
- Carlson, A. 2009. *Nature and landscape. An introduction to environmental aesthetics*. New York: Columbia University Press. 188 pp.
- CEP. 2010. Committee for Environmental Protection Five Year Work Plan. http://www.ats.aq/documents/ATCM33/Att/atcm33_att117_e.pdf
- Codling, R. 2001. Wilderness and aesthetic values in the Antarctic. *Polar Record*, 37(203), 337-352.
- COMNAP. 2012. COMNAP list of Antarctic facilities. https://www.comnap.aq/Members/Shared%20Documents/Antarctic_Facilities_List_1April2012.xls
- Daniel, T.C., & Boster, R.S. 1976. Measuring landscape esthetics: the scenic beauty estimation method. *In* Fort Collins, Colorado: United States Department of Agriculture Forest Service, 66.
- Dudley, N., Ed.2008. *Guidelines for Applying Protected Area Management Categories*. Gland, Switzerland: IUCN. 86 pp.
- Fox, W. 1990. *Towards a Transpersonal Ecology*. Boston: Shambala. 380 pp.
- Godfrey-Smith, W. 1979. The value of wilderness. *Environmental Ethics*, 1, 309-319.
- Godfrey-Smith, W. 1980. The rights of non-humans and intrinsic value. *In* Mannison, D., et al. eds. *Environmental Philosophy*. Canberra: Australian National University, 30-47.
- Green, B. 1995. *Water Ice and Stone*. New York: Harmony Books. 287 pp.
- Hardin, G. 1968. The Tragedy of the Commons. *Science*, 162, 1243-1248.
- Headland, R.K. 2009. *A Chronology of Antarctic Exploration*. London: Quaritch. 722 pp.
- Jackson, A., & Kriwoken, L. 2011. The Protocol in action, 1991-2010. *In* Haward, M., & Griffiths, T. eds. *Australia and the Antarctic Treaty System: 50 years of influence*. Sydney: University of New South Wales Press, 414.
- Kant, I. 1987 [1776]. *Critique of Judgment*. Indianapolis, Indiana.: Hackett Publishing Company. 576 pp.
- Kaplan, R., & Kaplan, S. 1995. *The experience of nature - a psychological perspective*. Ann Arbor, Michigan: Ulrich's Bookstore. 340 pp.
- Kliskey, A., D. 1998. Linking wilderness perception mapping concept to the recreation opportunity. *Environmental Management*, 22(1), 79-88.
- Kormos, C.F., & Locke, H. 2008. Introduction. *In* Kormos, C.F. ed. *A Handbook on International Wilderness Law and Policy*. Golden, CO: Fulcrum, 3-29.

- Lesslie, R., & Maslen, M. 1995. National Wilderness Inventory. *In* Canberra: Australian Heritage Commission, 98.
- Low, T. 2002. *The New Nature*. Camberwell, Victoria: Viking. 378 pp.
- Machado, A. 2004. An index of naturalness. *Journal for Nature Conservation*, 12, 95-110.
- McShane, K. 2007. Why environmental ethics shouldn't give up on intrinsic value. *Environmental Ethics*, 29, 43-61.
- Morgan, F., Barker, G., Briggs, C., Price, R., & Keys, H. 2007. Environmental Domains of Antarctica. Version 2.0 Final Report. *In*, 89.
- Morito, B. 2003. Intrinsic Value: A Modern Albatross for the Ecological Approach. *Environmental Values*, 12(3), 317-336.
- Mortimer, G. 2004. Antarctic Tourism - Past, Present and Future. [http://www.development.tas.gov.au/_data/assets/pdf_file/0014/2093/2004 - Greg Mortimer - Phillip Law Lecture.pdf](http://www.development.tas.gov.au/_data/assets/pdf_file/0014/2093/2004_-_Greg_Mortimer_-_Phillip_Law_Lecture.pdf).
- Nash, R. 1975. *Wilderness and the American Mind*. New Haven: Yale University Press. 300 pp.
- Neufeld, E., O'Reilly, J., Summerson, R., & Tin, T. In preparation. Valuing Antarctica: Emerging Views from International Studies. *In* Tin, T., et al. eds. *Futures of the Antarctic environment: human impacts, strategic planning and values for conservation (working title)*. Dordrecht, Netherlands: Springer.
- O'Neill, J. 1992. The varieties of intrinsic value. *The Monist*, 75(2), 119-133.
- OED. 1989. The Oxford English Dictionary. Oxford: Clarendon Press.
- Oelschlaeger, M. 1991. *The Idea of Wilderness*. New Haven: Yale University Press. 477 pp.
- Parsons, G. 2008. *Aesthetics and Nature*. London: Continuum. 164 pp.
- Plumwood, V. 1991. Ethics and instrumentalism: a response to Joanna Thompson. *Environmental Ethics*, 13, 139-149.
- Rolston, H.I. 2002. Environmental ethics in Antarctica. *Environmental Ethics*, 24, 115-134.
- Schofield, E. 1972. Preserving the scientific value of cold desert ecosystems: past and present practices and a rationale for the future. *In* Parker, B.C. ed. *Proceedings of the Colloquium on Conservation Problems in Antarctica*. Blacksburg, Virginia: Virginia Polytechnic Institute and State University, 193-223.
- Scruton, R. 2009a. The Aesthetic Gaze. *In* Dooley, M. ed. *The Roger Scruton Reader*. London: Continuum, 137-151.
- Scruton, R. 2009b. *Beauty*. Oxford: Oxford University Press. 223 pp.
- Shuttleworth, S. 1980. The use of photographs as an environment presentation medium in landscape studies. *Journal of Environmental Management*, 11, 61-76.

- Sloan, N.A. 2002. History and Application of the Wilderness Concept in Marine Conservation. *Conservation Biology*, 16(2), 294-305.
- Smith, B. 1992. The Intrinsic Value of Nature. *The Monist*, 75(2).
- Smith, B.H. 1998. Value. In Kelly, M. ed. *Encyclopedia of Aesthetics*. Oxford: Oxford University Press, 429-431.
- Stolnitz, J. 1961. On the Origins of "Aesthetic Disinterestedness". *Journal of Aesthetics and Art Criticism*, 20, 13.
- Summerson, R. 2012. Protection of Wilderness and Aesthetic Values in Antarctica. In Huettmann, F. ed. *Protection of the Three Poles*. Springer, 79-111.
- Summerson, R., & Bishop, I. In review. The impact of human activities on wilderness and aesthetic values of Antarctica. *Polar Research*.
- Summerson, R., & Bishop, I.D. 2011. Aesthetic value in Antarctica: beautiful or sublime? *The Polar Journal*, 1(2), 225-250.
- Taylor, P.W. 1986. *Respect for Nature. A Theory of Environmental Ethics*. Princeton, New Jersey: Princeton University Press. 329 pp.
- Tin, T., & Hemmings, A.D. 2011. Challenges in Protecting the Wilderness of Antarctica. In Watson, A., et al. eds. *Science and Stewardship to Protect and Sustain Wilderness Values. Ninth World Wilderness Congress Symposium*. Meridá, Yucatán, Mexico: USDA Forest Service. Rocky Mountain Research Station, 147-152.
- WAIS. 2012. West Antarctic Ice Sheet Divide Ice Core. <http://www.waisdivide.unh.edu/>
- Walton, D.W.H., Ed. 1987. *Antarctic Science*. Cambridge: Cambridge University Press. 280 pp.
- Washington, H. 2006. *The Wilderness Knot*. Unpublished PhD thesis. University of Western Sydney, 378 pp.
- Watts, A., Sir 1992. *International Law and the Antarctic Treaty System*. Cambridge: Grotius Publications. 469 pp.
- White, L. 1967. The historical roots of our ecologic crisis. *Science*, 155, 1203-1207.
- Wilderness. 1996. Wilderness.net. <http://wilderness.net/>
- Wu, Y., Bishop, I., Hossain, H., & Sposito, V. 2006. Using GIS in landscape visual quality assessment. *Applied GIS*, 2(3), 18.11-18.20.
- Zimmerman, M.J. 2001. *The Nature of Intrinsic Value*. Lanham, Maryland: Rowman and Littlefield. 279 pp.

4. Perceptions and Opinions of Antarctic Values in Chile

Juan Francisco Salazar⁶

Introduction

This article presents preliminary results of a survey of public opinions and attitudes implemented in July 2011 in two Chilean cities. The aim of the research is to provide an initial understanding of the core values and perceptions that a representative sample of the Chilean public may hold about Antarctica. The survey was administered as a telephone survey with 600 residents in Santiago ($n=300$) and Punta Arenas ($n=300$) through a two-staged random sample with random selection of homes with landlines, and selection of respondents over 18 years old, according to age, gender and socio-economic level quotas. The cities were chosen because of their importance: Santiago as the largest city and national capital and Punta Arenas as the regional capital and Chile's Antarctic gateway city.

Interpretation of survey results suggests that a large proportion of respondents in both cities are not well informed about specific Antarctic issues. However, and perhaps paradoxically, a large proportion of respondents also stated that they were aware and concerned about problems affecting the continent at present and into the future. In general terms, participants perceived Antarctica as a continent with 'problems' due to social, political and environmental uncertainties. The survey also asked respondents to identify the most important values associated with Antarctica with respondents ranking the environment and scientific research as the most important. A statistically significant number of responses shows that cultural values associated with Antarctica are also important particularly in shaping a Chilean national identity and a regional cultural identity within the Magallanes Region⁷.

A wide range of surveys on public perceptions of the Antarctic have been implemented in recent years, such as a study of perceptions on Antarctic wilderness in the Netherlands (Tin *et al.*, 2011), a study of attitudes and behaviours toward environmental problems in Antarctica among Argentinean youth (del Acebo Ibáñez & Costa 2010); perceptions of Antarctic tourism within New Zealand's Antarctic community (Stewart *et al.*, 2006) and an international internet survey on attitudes to wilderness and aesthetic values of Antarctica (Summerson, this volume). The research presented here is the first survey of this kind to be conducted in Chile. Its main purpose is to obtain a tentative representation of Chilean publics' awareness, perceptions, and general attitudes towards Antarctica, as a way of contributing to current efforts to catalogue

⁶ School of Humanities & Communication Arts, Institute for Cultural and Society, University of Western Sydney, Australia

⁷ The Magallanes y Antártica Chilena Region is one of Chile's 15 first order administrative divisions. It is the southernmost, largest and second least populated region of Chile. It comprises four provinces: Última Esperanza, Magallanes, Tierra del Fuego, and Antártica Chilena. Its capital city is Punta Arenas where the Chilean Antarctic Institute headquarters are located.

the human values associated with the Antarctic. Alongside this aim, the paper hopes to advance a notion of values informed by recent anthropological writings in which values are mobilised as the meaning of actions (Graeber, 2001). In this paper, 'values' that are held of Antarctica are constructed as principles that govern our behaviour towards Antarctica and are bounded by knowledge practices. Furthermore, it is suggested that the relationship between values and actions is also important if we acknowledge that intrinsic values associated with Antarctica have a discursive as well as a performative force.

Like other South American countries, Chile has had a prolonged connection to the Antarctic⁸. This long-standing connection can be traced back to what Jorge Berguño described as an "awakening of an Antarctic consciousness" (Berguño, 1999:1) in Chile during the late 19th and early 20th centuries and the shaping of a "Chilean Antarctic mentality" (León-Woppke, 2009: 262) in the decades immediately preceding the International Geophysical Year of 1957/1958 and the signing and ratification of the Antarctic Treaty (1959/1961). The historical, geopolitical and legal foundations of Chile's Antarctic territorial claim and occupation have garnered considerable attention and have been extensively documented, discussed and critiqued (Pinochet de la Barra, 1976; Berguño, 1999; Child, 1988; Dodds, 1997; Howkins, 2006; Leon Woppke, 2009). It is not the aim of this paper to contribute to these matters, but rather to begin a discussion on how Chilean citizens value their relationship and engagement with the Antarctic continent.

Method

The telephone survey was administered in the cities of Santiago ($n=300$) and Punta Arenas ($n=300$) in six days (Friday to Sunday) during two consecutive weekends in July 2011⁹. The survey was administered as a telephone survey with 600 residents in Santiago ($n=300$) and Punta Arenas ($n=300$) through a two-staged random sample with random selection of homes with landlines, and selection of respondents according to age, gender and socio-economic level quotas. While mobile telephony in Chile is relatively high for Latin American standards¹⁰, the survey was conducted using only a single frame to build the telephone sampling frame: landline

⁸ Chile's engagement with Antarctica has been largely documented and staged through two journals, both of which capture to a certain extent some of the most significant Chilean discursive practices on Antarctica. One is *Revista Diplomacia* published since 1974 by the Chilean Ministry of Foreign Relations, and the *Boletín Antártico Chileno*, published since 1982 by the Chilean National Antarctic Institute (INACH). Punta Arenas is 1,200 kilometres northeast of the South Shetland Islands, Antarctic Peninsula.

⁹ The survey was part of a seed research project titled "Picturing Antarctica: emerging agendas for Antarctic cultural research", University of Western Sydney, 2011. The survey was implemented in Santiago and Punta Arenas by Ekho I+C Consultants, <http://www.ekho.cl/>

¹⁰ Chile's mobile telephony penetration is among of the highest in Latin America and the country's mobile phone tariffs and smart phones are among the cheapest in Latin America as a proportion of per capita income. As of July 2011 54.8% of the population in Chile had access to the internet. Latin America is home to five of the most engaged social networking markets worldwide. Internet users in Chile averaged 9.5 hours per visitor on social networking sites in December 2011.

phone numbers using a computer-assisted telephone interviewing (CATI) telephone surveying technique. In order to reduce possible bias introduced by the survey, consideration was given to a landline frame – rather than a dual frame incorporating mobile phones - as a way to avoid major discrepancies within the four socio-economic levels, even if the coverage error could introduce a possible bias in the survey estimates. The landline sampling frame provides a very good coverage for telephone surveys in Chile, given that 95% of households have landline phones and are hence potentially included in the frame. The total telephone numbers used was 12,664 with 4,469 successful contacts (35.3%) for the final completed survey of 600 responses (4.7%).

In terms of survey design, questions addressed some of the key global issues affecting the Antarctic today and into the future. The design also took into consideration the historical and geographical connection of Chile to the Antarctic Peninsula, and set out to collect data about public perceptions of Antarctic values and the role Antarctica has in shaping a national and a regional identity. A random sample survey, which consisted of 23 open and closed questions in two main sections, was chosen as a way to solicit opinions. The first set of questions identified respondents' level of information about Antarctic issues, the main media through which participants were informed, and the degree of concern they felt about Antarctica. The second set of questions tried to identify values held about Antarctica and key issues regarding participants' opinions of Antarctica. This section aimed to identify cultural perceptions of Antarctica's role in the formation of a Chilean national identity, and in the regional development of the Magallanes region and the city of Punta Arenas. This section also sought respondents' perceptions of future inhabitation in Antarctica and the perceived role of Chile in Antarctica.

The responses were distributed across the four target socio-demographic categories: by place of residence (Santiago/Punta Arenas); gender, age (4 categories: 18-27; 28-36; 37-50 and 51+) and socio-economic level (4 income thresholds: high; medium high; medium and medium-low). Santiago is Chile's largest city with a total population of 5.7 million inhabitants (36% of the national total) in the Greater Metropolitan Area (estimated 2010). While Santiago is the capital city, and the country's industrial and financial centre (accounting for 45% of the country's GDP), the National Congress meets since 1990 in the coastal city of Valparaíso, 120 km to the north-west, and the Chilean Antarctic Institute was re-located to Punta Arenas in 2003. Chile's Human Development Index (HDI) is 0.805, which gives the country a rank of 44 out of 187 countries. In Santiago, while a few local government areas (*comunas*) have an index above 0.950, other areas rank below 0.600 (medium to low HDI) indicating high degrees of socio-economic inequality. Punta Arenas is the capital city of the XIII Region of Magallanes and Chilean Antarctica, located on the Strait of Magellan at 54°S Lat. It has an estimated population of 126,000 inhabitants (86% of the regional total) (2010) and an HDI of 0.788, ranking 2nd in the country after the Metropolitan Region (Santiago)

Preliminary Findings

a. Levels of Information and Concern about Antarctic Issues

The first section of the survey, *Level of Information*, comprised eight questions. Respondents were asked about their perceived level of information on Antarctic issues (Table 1), the communication media through which they inform themselves about Antarctic issues, and the level of concern they have about Antarctica.

This section also included questions of “general knowledge” about Chile’s territorial claim in Antarctica. For example, in response to questions of sovereignty and territorial claims, 66% of respondents thought Chile had effective sovereignty over a territory in Antarctica, while 15% thought no country had effective sovereignty, and 8% thought that Chile only had a claim under the Antarctic Treaty System.

An open question was included for respondents to state those countries with claims over an Antarctic territory. The responses were: Argentina (17.2%), the United Kingdom (8.9%), Australia (4.5%), France (2.2%), New Zealand (1.5%) and Norway (0.7%). Some non-claimant countries were also mentioned, such as the United States (13.4%), Japan (2.2%), Russia (1.5%), Brazil (1.5%) and China (0.7%).

Another general knowledge question asked respondents to identify the date that celebrates Chilean Antarctic Day. An overwhelming majority (99.2%) responded they did not know and only 0.2% of respondents were correct in pointing out November 6th as the day that commemorates Chilean Antarctic Day¹¹.

Table 1: Respondents’ level of information about Antarctic issues (n=600) Percentage of responses by place of residence, gender, age and socio-economic level.

	Place of Residence		Gender		Age					Socio-economic Level		
	Santiago	Punta Arenas	Male	Female	18-27	28-36	37-50	51 +	High	Medium High	Medium	Medium Low
Not informed	24.3	19.3	20.1	23.6	27.5	19.9	22.3	17.3	21.6	20.1	18.1	25.7
Little informed	47.3	44.3	45.8	45.8	48.1	49.7	42.4	42.7	45.9	41.8	46.4	47.8
Somewhat informed	25.0	29.7	28.1	26.6	21.9	27.2	29.5	31.3	27.0	33.6	30.1	21.7
Well informed	3.0	6.7	6.0	3.7	2.5	3.3	5.8	8.0	5.4	4.5	4.8	4.9

¹¹ This date was established in 1965 to commemorate the Decree-Law 1747 of 6th November 1940 that established the limits of the Chilean territorial claim.

The source of information (Figure 1 and Table 2) was consistent across the three categories of residence, age and socio-economic level (SEL). As expected, most people nationally informed themselves through print media (24.4%) and television (35.8%), followed by the internet and social media combined (16%). However, there is a significant statistical difference between Santiago (29.1%) and Punta Arenas (42.5%) with respect to those whose main medium of information on Antarctic issues was television. This difference is also noted in socio-economic level, with television being more prevalent in medium-low socio-economic level (44.7%) in comparison to 25.7% within the high socio-economic quarter. As it may be expected, this tendency is reversed with the internet and social media where the proportion for high SEL (27%) in comparison with medium-low SEL (11.5%) is significant. Nationally, three-quarters of the people in the sample informed themselves from print media (press), radio and online media.

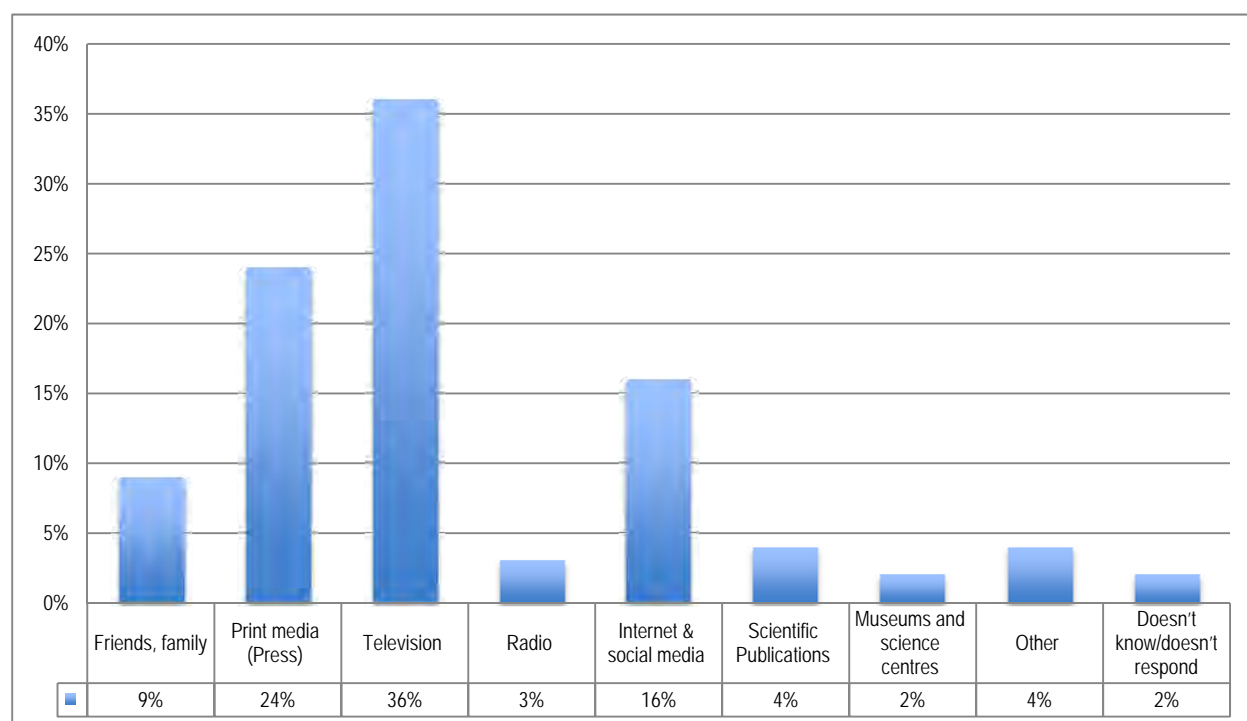


Figure 1: Respondents' media of information on Antarctic issues. (n=600). Percentage of responses (first preferences only).

Within other categories (friends/family, science publications and science institutions), a higher percentage of people in Punta Arenas access information from other sources such as relatives, friends, or acquaintances, and from museums and science centres. However, scientific publications and museums or science centres play a minimal information role across all four categories nationally. There is a significant difference in social media and online media for the 18-36 age groups (23%) in comparison to the 37-50 and 51+ groups (8%).

Table 2: Respondents' media of information on Antarctic issues ($n=600$). Percentage of responses by place of residence, age and socio-economic level.

	Place of Residence		Age				Socio-economic Level			
	Santiago	Punta Arenas	18-27	28-36	37-50	51 +	High	Medium High	Medium	Medium Low
Friends, family	8.4	9.3	9.4	3.3	3.6	7.3	9.5	5.2	13.3	7.5
Print media	27.1	21.6	20.6	19.9	23.0	22.7	21.6	32.8	23.5	20.8
Television	29.1	42.5	21.3	27.2	23.0	25.3	25.7	28.4	34.3	44.7
Radio	4.7	2.3	6.3	10.6	19.4	14.7	2.7	3.0	3.6	4.0
Internet & social media	19.4	13.3	23.8	22.5	9.4	6.7	27.0	18.7	16.3	11.5
Scientific Publications	4.3	2.7	3.8	4.0	4.3	3.3	5.4	3.7	3.0	3.1
Museums and science institutions	1.3	2.0	1.9	0.7	2.2	1.3	1.4	2.2	1.8	1.3

With regards to levels of concern about Antarctica (Table 3), 49.3% of respondents in Santiago stated that they had heard of problems relating to Antarctica, compared to 54.3% in Punta Arenas. Similarly, 56.7% of respondents in Santiago and 63.4% in Punta Arenas said they were worried about the future of Antarctica. Despite these findings, 67.6% of respondents declared to be little or not informed about Antarctic issues (71.6% in Santiago and 63.6% in Punta Arenas). The level of concern about Antarctica's future was slightly higher in the 18-27 and 51+ age group. There is a slight [expected] difference in level of information by socio-economic level (at a national scale), particularly between medium-high (38% declared to be informed and well informed) and medium-low (26%).

Table 3: Respondents' concern about the future of Antarctica ($n=600$). Percentage of responses by place of residence, gender, age and socio-economic level.

	Place of Residence		Gender		Age				Socio-economic Level			
	Santiago	Punta Arenas	Male	Female	18-27	28-36	37-50	51 +	High	Medium High	Medium	Medium Low
Not at all concerned	19.3	13.3	13.7	18.9	13.8	17.9	18.0	16.0	10.8	15.7	12.7	21.2
Little concerned	24.0	23.3	27.4	19.9	28.1	21.2	28.1	17.3	28.4	22.4	21.7	24.3
Somewhat concerned	36.0	35.7	35.1	36.5	39.4	35.1	33.8	34.7	33.8	38.8	40.4	31.4
Very concerned	20.7	27.7	23.7	24.6	18.8	25.8	20.1	32.0	27.0	23.1	25.3	23.0

An open-ended question was included to have a sense of what people thought were the most important 'problems' associated with Antarctica. The most mentioned categories were: melting of glaciers (35%), global warming (16.2%), environmental problems (7.7%) pollution (6.4%) thinning of the ozone layer (5.1%), climate change (4.3%) and over exploitation of natural resources (0.8%). Other problems mentioned were territorial problems (4.8%), hunting of animals (2.4%), lack of services and connectivity (2.4%), too much tourism (2.1%), population growth (1.1%) and territorial dispute with Argentina (0.5%).

b. Values and Perceptions of Antarctica

The second section of the survey, Values and Perceptions, included fifteen questions, and the following paragraphs of the paper summarise some of the most important findings.

The first question asked respondents to rank what they thought was the most important value of Antarctica (from a list of seven options). The results were relatively consistent across both cities and across gender, age and socio-economic level. As it is shown on Figure 2, the most important values identified (in first and second preferences) were "environmental", with 35.3% in Santiago and 28.7% in Punta Arenas (with 38.1% in age bracket 18-27), and "scientific" with 21.0% and 37.0% respectively (with 35.8% in the age bracket 28-36). At a national level, environmental and scientific values also ranked highly in second and third preferences with 25%/19% and 19%/15% respectively. However, in second preferences, touristic values were ranked second equal with scientific values; and in third preferences, tourism values were ranked first, equal with environmental values. While political and strategic/military values accounted for 11% of first preferences (aggregated), they climbed to 19% and 23% in second and third preferences. Economic values remained steady across all three preferences at 11-13%. Cultural values, climbed from 6% in first preferences, to 7% in second and 12% in third preferences.

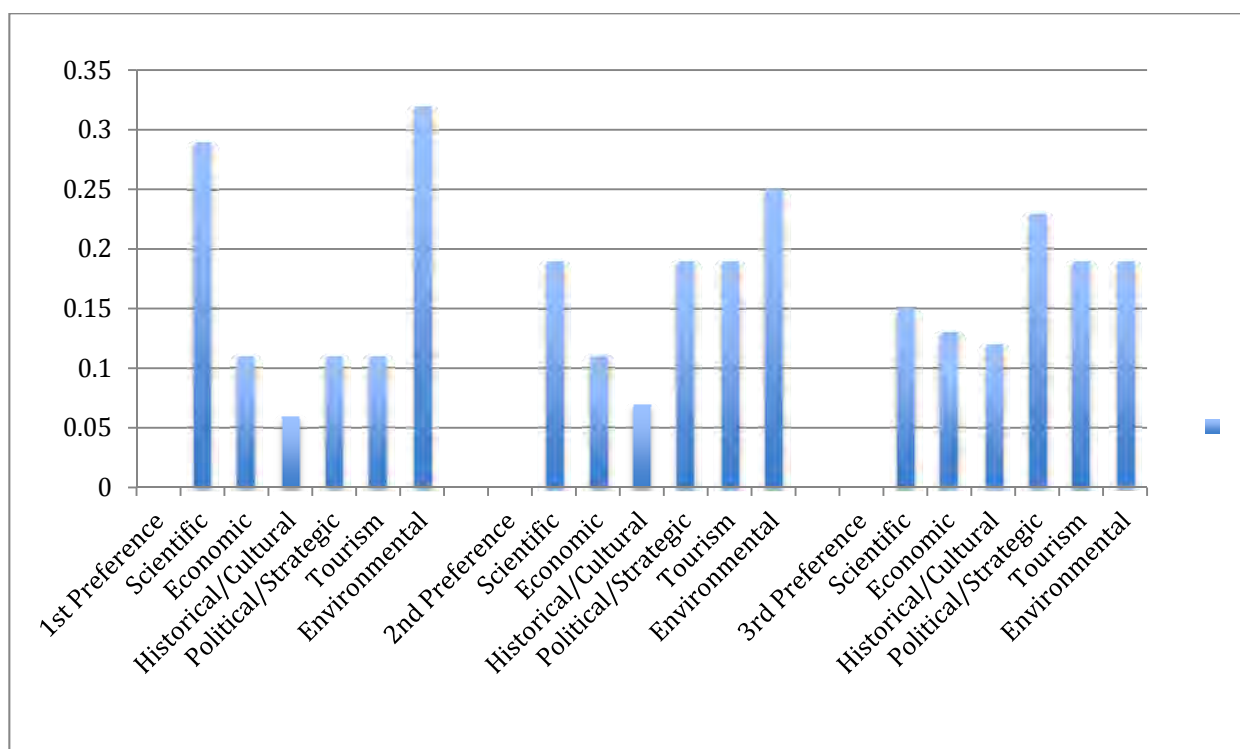


Figure 2: Respondents' values about Antarctica (n=600). Percentage of responses (1st, 2nd and 3rd preferences) by listed options.

A second question in this section used a Likert scale and asked the participants to respond to the following statement: *the cultural value of Antarctica is as important as its economic, political and environmental value*. At a national level, 77% of respondents agreed or strongly agreed: 56.3% and 16.0% respectively in Santiago, and 62.7% and 19.7% in Punta Arenas. At a national level, there was a slightly higher percentage of female respondents (83%) than male (72%) who agreed or strongly agreed with this statement. The responses were consistent across age, but there were differences by SEL. In the high-income bracket, 66.2% agreed while the other segments showed a higher level of agreement: 76.9% in medium-high, 79.5% in medium and 79.6% in medium-low.

The section also included several questions on the perceived understanding of the role the country plays in Antarctic affairs and the degree to which respondents perceive a role that Antarctica might play in shaping national and regional identity formations. This section also looked for opinions about the perception of the future of Antarctica. The section was based on a series of statements using Likert scales and, while the statements did not ask directly about values, the responses could certainly be integrated into a discussion of Antarctic values (see Table 4).

Table 4: Respondents' perceptions about Antarctica ($n=600$). Percentage of responses by place of residence and level of agreement with statements listed.¹²

Statement	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Santiago	Punta Arenas	Santiago	Punta Arenas	Santiago	Punta Arenas	Santiago	Punta Arenas
Only those Southern Hemisphere countries should have territorial claims in Antarctica.	7.0	6.0	42.0	38.7	39.7	45.0	6.3	5.0
An armed conflict in Antarctica would be likely within the next 20 years.	3.3	3.7	34.7	21.3	50.3	55.0	7.0	14.7
Only scientists should live and work in Antarctica.	4.0	8.0	31.7	32.0	54.7	54.7	7.7	4.7
Human settlements in Antarctica should include families and children.	9.0	10.3	54.7	60.3	31.0	24.3	3.7	4.7
Antarctica plays an important role in shaping the Chilean identity.	13.3	22.0	58.7	62.7	23.0	13.0	2.7	1.3
Antarctica plays an important role in shaping the cultural identity of Magallanes region and Punta Arenas city.	19.0	36.7	61.7	54.7	10.7	7.7	8.7	1.0
Punta Arenas should be a development hub for Antarctic research.	12.7	31.7	56.3	54.7	19.7	9.7	2.3	3.3

Issues of 'Antarctic identity' are of particular interest for Southern Ocean rim countries, for instance, where Antarctica, as Klaus Dodds suggests, exercises "a powerful hold on the collective and individual geographical imaginations" (Dodds, 1997: 4), albeit in differing degrees and through differing national narratives of engagement with the Antarctic. This survey with a small sample of adult citizens in two Chilean cities indicates that there is a perception of a sense of Antarctic identity in Chile, most significantly at a regional level. In Santiago for example, 72%

¹² For this question, a force-choice approach was implemented where a middle option of "neither agree nor disagree" was not included.

of respondents were of the opinion that Antarctica played a role in shaping a national sense of identity, and 84.7% felt similarly in Punta Arenas. This figure was even higher in terms of shaping a regional identity for the Region of Magallanes, with 80.7% agreeing or strongly agreeing in Santiago and a staggering 91.4% in Punta Arenas, where 86.4% of respondents also were of the opinion that Antarctica could become a development hub for the city of Punta Arenas.

Similar to other Southern Ocean rim gateway countries, the idea of “Chile an Antarctic country” begins to take force more cohesively from the early 1990s. Undoubtedly the Antarctic received considerable attention in earlier periods (such as the construction of President Eduardo Frei Montalva Base in Fildes Peninsula, King George Island in 1969) and throughout the armed conflicts in the South Atlantic in the late 1970s and early 1980s. In fact, the Chilean Antarctic Territory was formally incorporated into the political administrative division of the country following the post military coup political reforms of 1974. During the military regime (1973-1989), considerable geopolitical priority was given to regional development and logistical resourcing by the Chilean armed forces, including, for example, the opening of Villa Las Estrellas in 1984, a settlement within Base Presidente Eduardo Frei Montalva for families of Air Force officials who live for up to two years and where several children were born in late 1984 and early 1985.

However, it was not until the late 1990s that a new vision for Antarctica was fleshed out, crystalizing in a National Antarctic Policy introduced as a presidential decree in 2000.¹³ The last decade has seen concerted efforts to strengthen the Chilean Antarctic science programme with an on-going emphasis on Chile’s ‘geographical contiguity’, and the challenges and opportunities arising from its position as a gateway to Antarctica and its ability to operate there. It is interesting to note how differing knowledge practices (science, policy or tourism operators) converge on this discursive practice of connectivity between South America and Antarctica, mobilizing perhaps a sense of positive (extrinsic) value which in the imagining of Chile as an Antarctic country, operates as much as a commanding geopolitical imperative as a scientific and a cultural one. The 2000 Chilean National Antarctic Policy framework identifies the priorities and principles that underpin Chile’s policies and actions toward the Antarctic continent. The policy clearly demonstrates the challenges associated with creating a national framework that successfully integrates views from various knowledge practices and actors. This policy charter on the Antarctic sets out, as part of its main purposes, ‘the protection and strengthening of Chile’s rights on the Antarctic, supported by clear geographical, historic and juridical grounds; the advertising of Chile as a gateway country, and the promotion of controlled tourism in Antarctica’ (Bastmeijer et.al, 2008: 99).

¹³ The National Antarctic Policy (*Política Antártica Nacional*) is Decree Law 429 of the Chilean Ministry of Foreign Affairs, which entered into force on March 28, 2000.

On a related matter, opinions of the Chilean public participating in this survey were divided in response to the statement that only Southern Hemisphere countries should have territorial claims in Antarctica. Moreover, and despite the low level of information and the high level of concern expressed by respondents of both cities in the first section of the survey, only 38% of respondents in Santiago and just 25% in Punta Arenas were of the opinion that an armed conflict in Antarctica would be likely within the next 20 years.

With regard to opinions toward the future of Antarctica, the survey included two questions using a nominal-polytomous format, by which the respondents had four and five unordered options respectively. The first one asked participants to express their opinions on what ought to be the main outcome (purpose) for Antarctica in the future (see Figure 3)¹⁴, while the second asked participants to express their attitude with respect to a list of options on what the role of Chile in Antarctica should be (see Table 5).

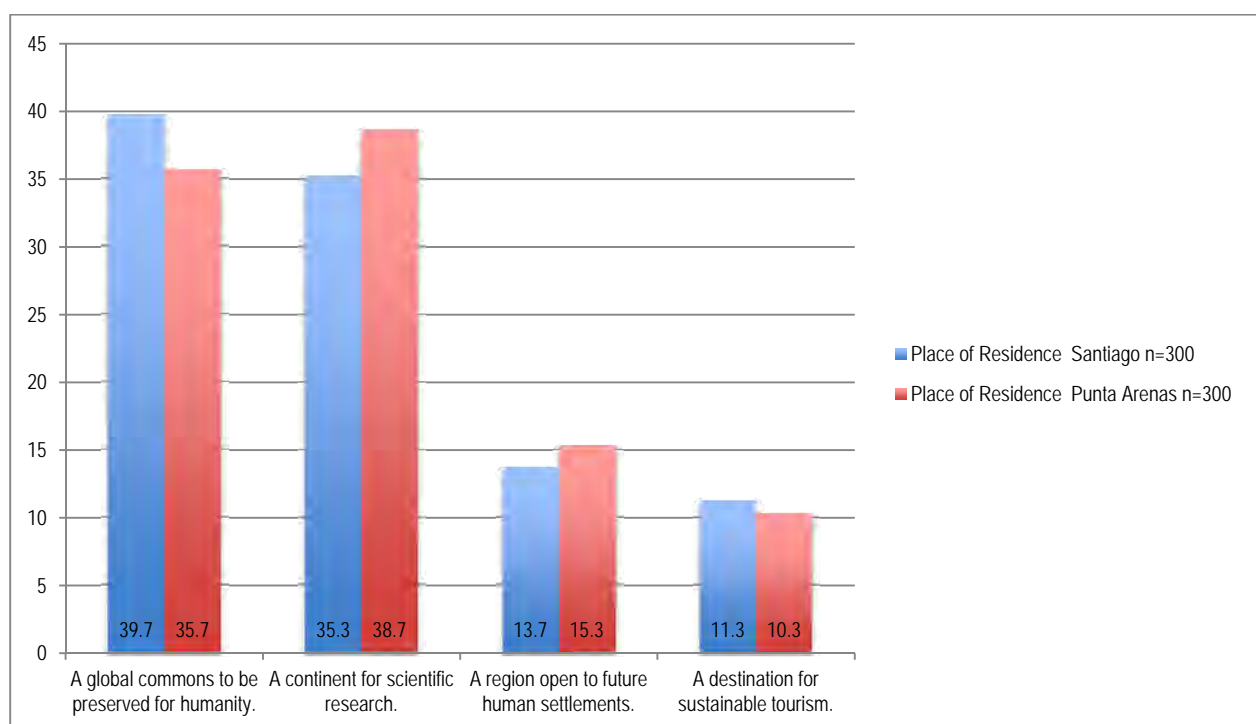


Figure 3: Respondents' opinions on four possible future outcomes for Antarctica (n=600). Percentage of responses by place of residence.

¹⁴ This question does not translate directly in English. In Spanish the question was En su opinión ¿Cuál es el principal destino que la Antártica debiese tener en el futuro?

Table 5: Respondents' opinions on possible future roles for Chile in Antarctica (n=600). Percentage of responses by place of residence

Preferences (n = 600)	National 1 ^s pref.	National 2 nd pref.	National 3 rd pref.	Santiago 1 st pref.	Punta Arenas 1 st pref.
To strengthen national scientific research	32	19	19	27.0	36.0
Conservation of Antarctic environment and ecosystems	29	23	29	28.0	29.3
To defend national interests over its Antarctic territory	13	20	14	14.3	11.0
Exploration and exploitation of non-renewable energy resources	12	7	15	13.0	10.3
To promote international scientific research	11	23	12	13.3	9.3
To promote a borderless Antarctica	4	8	11	4.3	4.0

These two questions were in turn complemented with two final questions aimed at identifying possible affective connections to the continent and included questions that asked respondents to name the images, feelings and people (personalities) they most associate with Antarctica. These sets of questions should become the basis for future qualitative and ethnographic work.

Discussion: Knowledge Practices, Values and the Meaning of Actions

The survey was designed to obtain information on Chilean public perceptions of Antarctica's key current issues and Chile's role in Antarctica. In part, the aim was also to compare these opinions with those values that, as Hemmings (2012) argues, "have been granted considerability" within the Antarctic Treaty System and which "continue to shape the Antarctic regime today" (Hemmings, 2012: 148). These key current issues respond to attempts to find ways of accommodating differing interests and knowledges, which Hemmings summarizes as:

"global justice and equity, resource and geopolitical interests of states able to operate there, territorial aspirations of the seven claimant and two 'semi-claimant' states, the need to protect the Antarctic environment, continuing interest in Antarctica as a global laboratory, commercial interests in marine harvesting, tourism, bioprospecting and (notwithstanding the present prohibition) mineral resource activities in the medium term" (Hemmings, 2012: 148).

A simple residential telephone survey of a small sample of a population cannot in itself answer any of these questions. At best, the data collected can provide an indication of tendencies and propensities in public opinion on the sorts of values "that can gain a hearing" within the Antarctic Treaty System (Hemmings, 2012: 137) as well as the impact on policy of these sorts of values communicated in lay and expert knowledges.

In general, participants expressed the opinion that they were poorly informed about Antarctic issues, with more than two thirds of participants stating they were not informed or little informed. The number of respondents claiming they were not informed or little informed was slightly higher among young people in both cities (18-36 years old), and slightly higher among female participants and respondents from medium-low socio-economic level. Among those who felt they were somewhat or well informed, the highest proportion was in Punta Arenas, in medium-high socio economic level and among people older than 51 years. Another interesting aspect arising from the survey responses is the mediated engagement with the Antarctic. The questionnaire did not ask whether the respondent had visited Antarctica or not. Through this survey, it is not possible to evaluate the role of the media in shaping an idea or a perception of Antarctica, or of the core values ascribed by the general public. Therefore, the survey is limited in the intent to have a greater link between exposure to Antarctic issues in the media, the level of information and knowledge, and the attitudes and opinions toward Antarctic research and its applications. However, it is worth noting the high degree of respondents (36%) who claimed their information of Antarctica comes from television (a figure that was significantly higher in Punta Arenas - 42.5%). Television was by far the most mentioned medium of information in lower socio economic levels, where television more than doubled print media and tripled internet media. As previously noted, internet and social media were as important as television for young people of higher socio economic levels. Also striking is the lack of information made available to the public through museums and science institutions across the board, but specially the lack of engagement of young people.

Nevertheless, and despite the limited information on Antarctic issues that the respondents claimed to have, there was explicit recognition of Antarctica's importance for the country and for the planet. The survey results make clear the importance given to conservation of the Antarctic environment and ecosystems and the scientific values of the Antarctic. Furthermore, the survey illustrated the comparative positive values associated with Antarctic science (in contrast with tourism, for example) and the opinion that Chile should strengthen its national scientific research in Antarctica. The scientific value of Antarctica and the role of science and scientists were positively evaluated especially by citizens of Punta Arenas. Thirty-six percent of respondents thought that *strengthening the national Antarctic science program* was the most important future role for Chile in Antarctica. Over 29.3% thought that *conservation of Antarctic environment and ecosystems* played the most significant role and only 9.3% believed that to *promote international scientific research* was most important. 11% saw this role to be to *defend national interests over its Antarctic territory*, and a further 10.3% thought it to be the exploration and exploitation of non-renewable energy resources. It would be interesting to see how these perceptions correlate with views held by the participants from Punta Arenas who believed that Antarctica played a role in shaping the cultural identity of their region, or with the 88% of people in Punta Arenas who agreed that Antarctica was an important factor in the city's growth as an Antarctic research and logistics hub. While attention could be drawn to the relatively low percentage of respondents giving primacy to the option that the role of Chile in Antarctica should be strengthening international research, this might be the result of a

problematic phrasing of the question. The responses to this question would vary with a simple but important change in the statement to include the word international science 'cooperation' (rather than research).

Another interesting aspect of the survey responses is the perception or opinion that not only scientists should live and work in Antarctica. There is a positive sentiment toward the development of human settlements that include families and children. It remains to be further analysed what the role of Villa Las Estrellas, in Presidente Eduardo Frei Base (Fildes Peninsula) may have in this perception or opinion, but 64% of respondents in Santiago and 70,6% in Punta Arenas supported families and children living in Antarctica. The positive evaluation for this mode of civilian occupation of the continent (scientists, families) contrasts with a low percentage of respondents who emphasized the defence of national interests in the Antarctic, the low importance given to natural resource prospecting and exploitation.

This is in sharp contrast to the centrality that national interest plays in the Chilean Antarctic Policy framework. The latter certainly promotes the safeguarding and enhancing of the Antarctic Treaty but is clear in its view of the need to strengthen and increase the influence and effective participation of Chile in the Antarctic Treaty System, including international cooperation in science, marine resources regulation and monitoring, controlled development of tourism, and strengthening of its national scientific programme. In fact, what this framework ultimately advocates is a redefinition of the strategic priorities (and associated systems of values) on the basis of a better balance between the interests and knowledge practices of scientific research, environmental protection, tourism and a type of economic value that may no longer be able to focus primarily on direct exploitation of resources (with the enduring the exception of the fishing industries). This view has been recently reiterated in the Chilean president's address to the nation in 2012¹⁵ where a renewed impetus has been given to Antarctic activities on the basis of three main pillars: (1) strengthening the presence in the Antarctic by improving and modernizing the existing infrastructure and logistics and reinforcing the status of Punta Arenas and Puerto Williams as gateway to the Antarctic, (2) evaluating the construction of a new base within the Antarctic Circle, and (3) promoting controlled Antarctic tourism. As previously stated, this political emphasis on modernizing existing infrastructure and reinforcing the status of Punta Arenas as gateway and logistics hub for Antarctic research and tourism is reflected in our survey by the strong agreement expressed by the respondents (69% in Santiago and 86.4% in Punta Arenas). This correlates strongly with the unequivocal views from Punta Arenas respondents (90.4%) that Antarctica plays an important role in the shaping of the cultural identity of the Magallanes region.

What can be observed in the case of Chile, as in many other countries that operate in Antarctica, are the prevailing challenges in accommodating differing interests and knowledges of the Antarctic, most significantly arising from science, policy and civil society. These

¹⁵ Chilean Government. *Presidential Address May 21*. <http://www.gob.cl/media/2011/05/Mensaje-Presidencial-21-de-Mayo-2011.pdf>.

knowledge practices may certainly converge around the importance of identifying Chile as an Antarctic country but they also differ in many other regards. Each will emphasize a different system of values, taking into consideration specific values over other values. It has been over half a century since the inception of the Antarctic Treaty System and, despite the success of science as diplomatic practice and method, on-going tensions are still observable from a juxtaposition of interests and knowledge practices in the Antarctic. The interests and practices of knowledge simultaneously 'place' and 'displace' Antarctica, depending on the position of observation as well as from the actions and doings through which it is performed. We might call it Antarctica's enduring "parallax gap" (Žižek, 2006:1) where ontological differences among differing knowledge practices of the Antarctic are at play, and where national Antarctic policies and frameworks become discursive practices through which politics are "waged over ontic and epistemic commitments; ...politics over what there is and who/what can know it" (Verran, 1998: 238). Scientific research, competing claims over Antarctic territories, global and national governance structures, tourist visits, global circuits of logistical infrastructure, environmentalist campaigns, decreasing levels of phytoplankton, melting of ice-sheets, artistic interventions, are all part of what Sarah Whatmore calls

"a politically charged climate of relations between science and society, technology and democracy in which the knowledge practices of social and natural scientists, civil servants ... NGOs and direct action groups, citizens and consumers rub up against one another in the event of all manner of knowledge controversies" (Whatmore, 2006: 600).

These knowledge controversies appear today more important than ever, when confronted, for example, with an uncertain future of accelerating climate change and political and social instabilities. The Antarctic is certainly playing an increasingly important role in global matters of concern and, while important and exhaustive work has been done in tracking the intersections of science and policy in the Antarctic, far less attention has been placed on citizens' engagements with the Antarctic. As Leach *et al.* claim with regard to their work on science, citizenship and globalisation, "the need to clarify our understanding of the complex interfaces and intersections between science and citizenship is now more pertinent than ever" (Leach, *et al.*, 2006: 3).

Antarctic expert knowledges are practiced within complex assemblages where differing political and policy priorities are advanced on the basis of changing attitudes and values about Antarctica. As often the case, political and scientific knowledge practices take prominence over citizens' perspectives. Significant attention has been placed on understanding the expediency of science as a "tool of diplomacy" (Jacobson, 2011: 1; Berkman et al. 2011: 304) within a wide range of science-policy interfaces at play in Antarctica (Berkman, 2002; Berkman et al. 2011). However, far less attention has been consigned to understanding the relation between Antarctic science and civil society. This endeavour is informed by Sheila Jasanoff's notion of 'civic epistemologies' (Jasanoff, 2005), for which the authority of science is not a given, and scientific knowledge comes to be authoritative in precise and specific political settings. In so

arguing, Jasanoff claims that the 'public understanding of science' framework obliterates lay and other forms of knowledge. As Jasanoff notes, it

"diminishes civic agency, erases history, neglects culture and privileges people's knowledge of isolated facts (or their ignorance of such facts) over the mastery of more complex frames of meaning. It reduces human cognition to a one-dimensional scale. It makes no allowance for the multivalency of interpretation" (Jasanoff, 2005: 270).

The relevant question that arises is in which way differing knowledge practices develop converging and diverging values of Antarctica, and most critically, how do these values materialize into actions? A consideration of values associated with Antarctica as conceived by a wide range of knowledge practices with interests in Antarctica is certainly an interesting angle from where to analyse these "ontic and epistemic commitments" (Verran, 1998: 238), particularly when considering that values often only have discursive force. In relation to environmental values ascribed to the Antarctic, Julia Jabour has questioned the notion of intrinsic values as defined, for example, in the Protocol on Environmental Protection to the Antarctic Treaty, raising questions regarding the deliberately undefined nature of Antarctic values as they "permit states parties to the Antarctic Treaty/Madrid protocol to interpret environmental responsibility as they see fit" (Jabour, this volume). Through an examination of a selection of inspection reports that have evaluated environmental practices at Antarctic bases, Jabour suggests that:

"legal clarity itself is futile, since the parties operate on a practical level within their financial, logistical and technical limitations irrespective of their understanding of environmental values and requirements", and therefore "the value of inspections is symbolic in the absence of sanction" (Jabour, this volume).

This gap between discourse and performativity also points out to a gap between the representational and material nature of Antarctic values, or between values as "conceptions of the desirable" (Graeber, 2001) and modes in which values materialize in different ways (into objects and things, and also into practices and actions). Furthermore, this permits asking the question of how the materialization of values reflects (or diffracts) the recognition of new synergies between expert and lay knowledges of the Antarctic, knowledges that work in multiple scales linking local and global processes and new relationships between state, civil society, non-governmental action and science. To assess the weight that the concept of value may have for a better understanding of management and decision-making of human-related activities in or engagement with the Antarctic, I propose to look at David Graeber's notion of values as a potentially relevant framework. In his book *Toward an Anthropological Theory of Value* (2001), Graeber contends that considerable attention has been given in axiology to identifying the governing principles of valuing systems that influence human perceptions, behaviours, decisions and actions, yet there is virtually no systematic "theory of value" in empirical social sciences. Graeber identifies three large streams of thought in social theory that

converge in the present term and which look at “values” in the sociological sense, “value” in the economic sense, and “value” in the linguistic sense. He then goes on to propose that values can be seen the ways in which “actions become meaningful to the actor by being incorporated in some larger, social totality - even if in many cases the totality in question exists primarily in the actor’s imagination” (Graeber, 2001: xii). In discussing the work of Nancy Dunn, Graeber contends that “value emerges in action; it is the process by which a person’s invisible ‘potency’ -their capacity to act- is transformed into concrete, perceptible forms” (2001: 45).

If Antarctic values are to be defined as the meaning of actions, and the way we present the importance of our own actions in and about the Antarctic, then the relationship between values and action is as important as that between values and behaviour. Values might be constructed as principles that govern our behaviour towards Antarctica, but up to what point do they oversee our actions? Why do certain international organizations and governments fail to *act* (for example, to set up marine protection areas), even though there is clear agreement on the values intended to guide action? Or, is it the case that the intrinsic values associated with Antarctica, as defined by the Madrid Protocol, for example, only have a discursive power but fail to have performative power? If this was the case, then the aesthetic and environmental values of Antarctica would be based primarily on contemplation and reflection, rather than practices and embodied dispositions.

An example of this is the National Antarctic Policy, which takes a circumspect perspective on Antarctica as a natural reserve for humanity, moving against the view that the expansion of protected areas, managed without a system of representative values arising from the effective needs of environmental protection, may limit the development of scientific research, tourism and “other legitimate uses of Antarctica” (PAN, 2000). The matter of what the “legitimate uses” of Antarctica are remains seriously indeterminate and poses ethical questions around the difference knowledge practices associated with Antarctic governance and management of Antarctic related activities. As Alan Hemmings maintains, knowledge practices such as environmental management of the Antarctic are often deployed as “diplomatic method” in the advancement of specific national interests (Hemmings, this volume). Interestingly, knowledge practices do have material consequences, and as Karen Barad contends, “practices of knowing are specific material engagements that participate in (re)configuring the world” (Barad, 2007, 168). Therefore, intrinsic to this argument is that understanding how (or why) certain practices in Antarctica are enacted while others are not is crucial. It is important to acknowledge that knowledge practices are “not simply about making facts but about making worlds, or rather, it is about making specific worldly configurations - not in the sense of making them up *ex nihilo*, or out of language, beliefs, or ideas, but in the sense of materially engaging as part of the world in giving it specific material form” (Barad, 2007, 168). Consequently, if differing knowledge practices, and their associated method assemblages, create differing values of Antarctica, which in turn shape the actions of countries and organizations with respect to the continent, is it possible to develop, and if so in which terms, an action-based value system for Antarctica? The question that would follow then is how can this system move beyond “conceptions of the desirable” and up to what point is the consideration of the nature of the media a significant

method through which 'social' values might be realized? If values circulate largely through modes of performance, how can these values be catalogued across differing knowledge practices?

Concluding Remarks

Survey results can only demonstrate knowledge in particular and circumscribed ways. As others have argued, the 'survey as method' "performs certain kinds of social realities whilst not performing others ... actually bringing realities into being while shutting down others" (Law et.al, 2011: 8). Nevertheless, the results of this survey administered in 2011 may be indicative of existing 'lay knowledges' that everyday publics make of Antarctica. This includes a better understanding of the level of information and knowledge they have (or do not have), the means and media through which certain types of Antarctic values are mobilized and circulated, the perception of Antarctic science, and their perceived levels of concern about present and future Antarctic issues.

One of the ways in which social and cultural research can contribute to Antarctic studies is in developing appropriate interdisciplinary theoretical frameworks and methods to expose those epistemic 'blind spots' from where Antarctic interests and values are created, shaped and acted upon. To this effect, the paper highlights notions such as 'civic epistemologies' to underscore the importance of public opinions and attitudes towards Antarctica. It also highlights what its perceived values might be in order to have a better understanding of the contrast between lay and expert knowledge practices through which Antarctica is experienced, valued and performed by general and informed publics. The survey is informed by my own conviction that citizens, as bearers of knowledge and agency, must be able to engage in critical scientific and policy debates and decisions that affect their futures (Gaventa, 2006: vii). The Antarctic is no different for Chilean citizens. In this particular aspect, this preliminary small-scale survey suggests that, at least for part of the public, there is an important re-articulation of the idea of sovereignty over a claimed Antarctic territory which manifests itself through a series of latent transnational values of Antarctica as a global common heritage for humanity and an environment to be protected, where science plays a pivotal role and where other civilian forms of occupation are considered important.

There is nothing overly original in acknowledging that differing knowledge practices of Antarctica do elaborate differing systems of values. Nonetheless, there might be an interesting line for further research in the study of values as the meanings of actions, looking at the discursive *and* performative dimensions of those "considerable" values in Antarctica, particularly as the continent continues to be 'placed' and 'located' at the same time as it is 'displaced' and 'dislocated' by the tensions between its symbolic, biopolitical and economic capital arising from differing knowledge practices and method assemblages deployed by a wide range of interested parties. If these knowledge practices are not only intellectual behaviours but also actions tangled up in a range of social and material processes, how would new ways of

knowing Antarctica be able to produce new kinds of social actors - new kinds of experts and agencies?

While the Chilean Antarctic Policy framework promotes the strengthening of Chilean interests, rights and influences in Antarctica within the framework of the ATS, the preliminary data gathered in this study invites a post-national approach to understanding the emergence of other topologies of identity and affiliation to Antarctica, particularly as the congruence between the geography of existing states and the geography of a transnational “commons” sentiment becomes ever more contingent. While there is a sentiment of regional and national identity and a positive evaluation of strengthening national Antarctic research, it is also interesting to note that the data from the survey may be suggesting that Antarctica is more than a frontier to expand geopolitical and commercial interests but that Antarctica is viewed as a fragile continent that should be protected and cared for. The latter imposes a global moral responsibility rather than an opportunity for the national domain. A preliminary analysis of the survey data shows a tendency for the local and the global to be irrevocably entangled in contemporary public understandings of Antarctica and for the boundaries of ‘the national’ to be inescapably porous. This importance, however, seems to “jump” over the classic national territorial positioning linked to the concept of sovereignty. But a closer interpretative reading suggests that in fact sovereignty is now deployed beyond geopolitics and into different spheres and knowledge practices such as science, environmental management or cultural development activities and events. In this regard, further work is necessary to articulate in a more meaningful manner the ways that prior and current human actions get, in some sense, congealed in Antarctica in such a way that make the continent valuable. For this particular purpose, this quantitative survey only provides a preliminary outline of Chilean citizens’ public perceptions and opinions of Antarctica and its values and calls for a more meaningful consideration of the potential relevance of incorporating lay knowledges in a more holistic and three-dimensional perspective on the management, governance and performance of Antarctic activities.

Larger comparative quantitative studies might also be interesting to construct a more holistic account of Antarctic values, which must be complemented by further ethnographic work. This might enable us to understand the ways Antarctica is perceived and valued, to understand how civic engagements with Antarctica take place in ways that are not amenable to ready survey responses, and to understand values as actions and values as the importance of meaning-making actions (conservation, inspections, prospecting). The use of ethnographic rather than quantitative survey methods would also be useful in defining a relationship between science and the public that is not abstract but locally situated, and a conception of both expert and lay knowledge as socially and culturally contingent. However, it is important not to forget that productivity in science is measured primarily in investment and that the most productive countries in Antarctic science are also those with higher gross domestic expenditure on research and development. Moreover, as Klaus Dodds has argued, more attention should be paid to examining the role of science and the production of scientific knowledge as a mode of Antarctic colonisation (especially when funded by national governments and their specialist agencies). This is most important if we consider that scientific endeavours in Antarctica, as

Dodds contends, “have enabled states such as the United States and English speaking allies – Britain, Australia and New Zealand – to shape political agendas and crucially to disadvantage states such as India, which do not have the capacity to mobilise comparable levels of scientific/logistical investment and expertise” (Dodds, 2006: 62).

If conducting science in collaborative modes is a key challenge in shaping intercultural dialogue in the Antarctic, then so is the quest for experimental transdisciplinary research practices that may work against prevailing divisions between natural and social sciences, and 'expert' and 'lay' knowledges of Antarctica. For Chile to continue to develop an Antarctic identity that connects with global values of the Antarctic, the emphasis ought not to be on sovereignty over a claimed territory but on designing policy processes through which citizens engage with Antarctic science (natural and social). These should be processes where global networks of multilateral cooperation are mobilized to assist the creation and development new forms of Antarctic knowledges, values, and actions as a way of imagining the cultural futures of the Antarctic. The way we value Antarctica must translate into matters of practices/doings/actions.

Values emerge in action, through processes by which individual and collective agencies enact their capacities to act, transforming words and desires into concrete, embodied dispositions. The way we imagine these Antarctic futures must rely not only on building infrastructure and Antarctic bases, but also in strengthening the role that museums and other cultural institutions, for example, play in shaping the way we value the human engagement to the Antarctic in a world where the divide between the natural and the social world collapse, and where citizens can engage – and act upon – those cultural values that the Antarctic holds for the future of humanity.

References

- Bastmeijer, K., Lamers, M., & Harcha, J. 2008. Permanent land-based facilities for tourism in Antarctica: The need for regulation. *Review of European Community & International Environmental Law*, 17(1), 84-99.
- Battaglia, D. 2011. Writing the parallax gap: An itinerary, in *Recasting anthropological knowledge: Inspiration and social science*. Cambridge: Cambridge University Press: 19-30.
- Berguño, J. 1999 El Despertar de la Conciencia Antártica, 1874-1914. *Boletín Antártico de Chile*, 18(2): 1-21.
- Berkman, P. A. 2002. *Science into policy: Global lessons from Antarctica*. San Diego, California: Academic Press.
- Berkman, P. A., Lang, M. A., Walton, D. W. H., & Young, O. R. (2011). *Science diplomacy: Antarctica, science, and the governance of international spaces*. Washington D.C: Smithsonian Institution.

- Bucchi M. and F. Neresini. 2008. *Science and Public Participation. The Handbook of Science and Technology Studies* (Third Edition). Edited by Edward J. Hackett, Olga Amsterdamska, Michael Lynch, Judy Wajcman. Cambridge: Mass. MIT Press: 449-472.
- Child, J. 1988. *Antarctica and South American Geopolitics: Frozen Lebensraum*. New York: Praeger.
- Dastidar, P. G. and O. Persson. 2005. Mapping the Global Structure of Antarctic Research *vis-à-vis* Antarctic Treaty System, in *Current Science* 89(9): 1552-1554.
- Dastidar, P. G. and S. Ramachandran. 2008. Intellectual Structure of Antarctic Science: A 25-Years Analysis, in *Scientometrics* 77(3): 389-414.
- Dodds, K. J. 1997. *Geopolitics in Antarctica: Views from the Southern Oceanic Rim*. West Sussex, UK: John Wiley & Sons.
- Dodds, K. J. 2006. Post-Colonial Antarctica: An Emerging Engagement, in *Polar Record* 42(1): 59-70.
- Gaventa, J. 2006. Foreword, in M. Leach, I. Scoones and B. Wynne (eds.) *Science and citizens: globalization and the challenge of engagement*. London: Zed Books.
- Gobierno de Chile. *Mensaje Presidencial 21 de Mayo*.
<http://www.gob.cl/media/2011/05/Mensaje-Presidencial-21-de-Mayo-2011.pdf>
- Graeber, D. 2001. *Toward an Anthropological Theory of Value*. New York: Palgrave MacMillan.
- Green, S., P. Harvey and H. Knox. 2005. Scales of Place and Networks: An Ethnography of the Imperative to Connect through Information and Communications Technologies, in *Current Anthropology*, 46(5): 805-826.
- Hemmings, A.D. (2011) Environmental Management as Diplomatic Method: Advancing Strategic National Values in Antarctica. *Exploring Linkages between Environmental Management and Value Systems: The Case of Antarctica*, University of Canterbury, Christchurch, New Zealand, 5 Dec 2011.
- Howkins, A. 2006. Icy Relations: The Emergence of South American Antarctica During the Second World War, in *Polar Record* 42(2): 153-165.
- Hemmings, A.D. (2012) Considerable values in Antarctica. *The Polar Journal* 2(1): 137-154.
- Jabour, J. 2006. High Latitude Diplomacy: Australia's Antarctic Extended Continental Shelf, in *Marine Policy* 30(2): 197-198.
- Jacobson, M. 2011. Building the International Legal Framework of Antarctica. In Berkman, P.A, M.A. Lang, D. Walton and O.Young (eds.) *Science Diplomacy: Antarctic, Science and the Governance of International Spaces*. Washington, D.C: Smithsonian Institution Scholarly Press.
- Jasanoff, S. 2005. *Designs on Nature: Science and Democracy in Europe and the United States*. Princeton: Princeton University Press.

- Law, J. & A. Mol (eds.) 2002. *Complexities: Social studies of knowledge practices*. Duke University Press.
- Law, J., E. Ruppert, and M. Savage. 2011. The Double Social Life of Methods. *Working Paper No. 95 CRESC Working Paper Series*. CRESC, Open University.
- Layton, D., Davey, A., & Jenkins, E. 1986. Science for special social purposes: Perspectives on adult scientific literacy, in *Studies in Science Education*, 13: 27-52.
- Leach, M., I. Scoones and B. Wynne (eds.) 2006. *Science and citizens: globalization and the challenge of engagement*. London: Zed Books.
- Leon Woppke, C. 2009. The Formation and Context of the Chilean Antarctic Mentality from the Colonial Era through the IGY, in *Legacies and Change in Polar Sciences: Historical, Legal and Political Reflections on the International Polar Year*, edited by Jessica M. Shadian and Monica Tennberg. Global Interdisciplinary Studies Series, Farnham, UK: Ashgate Press: 145-170.
- Ministerio de Relaciones Exteriores de Chile. 2000. *Política Antártica Nacional*. <http://www.leychile.cl/Navegar?idNorma=168860&idVersion=2000-05-18>. Accessed May, 1, 2012.
- Pinochet de la Barra, O. 1976. *La Antártica Chilena*. Santiago: Andrés Bello.
- Retamales, J. 2009. Welcome Introduction, in *Boletín Antártico Chileno, Special Issue on 2nd SCAR Workshop on the History of Antarctic Research: Multidimensional Exploration of Antarctica Around the 1950s*: 5-6.
- Stewart, E., Kirby, V., & Steel, G. (2006). Perceptions of Antarctic tourism: A question of tolerance. *Landscape Research*, 31(3), 193-214.
- Tin, T., Bastmeijer, K., O'Reilly, J., & Maher, P. 2011. Public perception of the Antarctic wilderness: Surveys from an educated, environmentally knowledgeable European community. *USDA Forest Service Proceedings*, (64), 109-117
- Verran, H. 1998. Re-imagining land ownership in Australia, in *Postcolonial Studies*, 1(2): 237-254.
- Whatmore, S. (2006). Materialist returns: Practising cultural geography in and for a more-than-human world. *Cultural Geographies*, 13(4), 600-609.

5. 'Environmental Management' as Diplomatic Method: The Advancement of Strategic National Interest in Antarctica

Alan D. Hemmings¹⁶

Introduction: Contexts and Contingencies

The complex politico-legal regime of the Antarctic Treaty System (ATS)¹⁷ plainly does many things. Quite what it does varies in the assessment of its actors. The norms (Hemmings, 2010a), the values, aspirations and interests¹⁸ (Hemmings, 2007: 178; Hemmings, 2012) it both reflects and delivers, and the challenges it faces (e.g. in relation to 'security': Hemmings, Rothwell & Scott, 2012a) are generally contested. The actors in Antarctica and the ATS are increasingly diverse and now include not only states but international organizations, corporations, civil-society entities and a limited international public citizenry. But, whatever their other points of difference, no current Antarctic actor repudiates a commitment to what is both generally and legally cast as "protection of the Antarctic environment".¹⁹ Indeed, this commitment, coupled to the Antarctic Treaty foundational meta-principles (Hemmings, 2012a) of "peaceful purposes"²⁰ and "freedom of scientific investigation",²¹ form the normative 'Trinity' of the Antarctic Treaty system (ATS). The commitment to protection of the Antarctic environment requires a mechanism of delivery, and that is provided through "environmental management". What this generic concept comprises also varies with context (Wilson & Bryant, 1997: 5-16). Within the ATS, it has evolved from protections afforded particular taxa and discrete areas under the 1964 Agreed Measures²² (reflecting an essentially science-orientated "conservation" ethic)²³, through attention to whole-ecosystem maintenance concerns under CCAMLR and the

¹⁶ Adjunct Associate Professor, Gateway Antarctica Centre for Antarctic Studies and Research, University of Canterbury, Christchurch New Zealand. Resident in Australia.

¹⁷ The ATS is defined in Article 1 of the 1991 *Protocol on Environmental Protection to the Antarctic Treaty* (Madrid Protocol): " 'Antarctic Treaty system' means the Antarctic Treaty, the measures in effect under that Treaty, its associated separate international instruments in force and the measures in effect under those instruments." The separate international instruments in force are: the *Convention for the Conservation of Antarctic Seals* (CCAS); the *Convention on the Conservation of Antarctic Marine Living Resources* (CCAMLR); and the Madrid Protocol.

¹⁸ In this essay, "values" are taken to mean the principles or moral stances adopted in relation to something and "interests" to mean a share, concern or right in relation to something.

¹⁹ See the Madrid Protocol at, *inter alia*, Preamble, Article 2, Article 3. The 1980 *Convention on the Conservation of Antarctic Marine Living Resources* (CCAMLR) adopts a subtly different norm around a commitment to a qualified "conservation" of the Antarctic "marine living resources".

²⁰ 1959 *Antarctic Treaty* at Preamble and Article I.

²¹ *Ibid.* at Preamble and Article II.

²² Agreed Measures for the Conservation of Antarctic Fauna and Flora, adopted as Recommendation VIII at the Third Antarctic Treaty Consultative Meeting in Brussels in 1964.

²³ There was, from early in the life of the ATS a distinction between "conservation" and "resource management", see Hemmings & Jabour, 2011: 127-130.

appearance of obligations in relation to the “Antarctic environment and dependent and associated ecosystems” under the aborted Convention on the Regulation of Antarctic Minerals Resource Activities (CRAMRA). Since its adoption in 1991, the Madrid Protocol is the prime basis for environmental management of the Antarctic terrestrial and near-shore environments.²⁴ The Madrid Protocol established a set of standards and processes,²⁵ whose detail is laid out in separate technical annexes to the Protocol²⁶ (for an overview of the evolution of the Antarctic environmental regime see Hemmings, 2011). Antarctic “environmental management” deploys and integrates a range of generic tools (Environmental Impact Assessment (EIA), species protection, area protection, etc.), the environmental principles of the Madrid Protocol, and the administrative and procedural mechanisms of the Committee for Environmental Protection (CEP).

Whilst participants and observers recognise the inescapable: that the ATS is, *sensu stricto*, an inter-governmental arrangement arrived at through diplomatic process whose regular transactions are centred on annual *diplomatic* conference, there has been an assumption that technical processes *within* that system are somehow unaffected by the diplomatic context. It was traditionally assumed that notwithstanding the centrality of science in the Antarctic Treaty, science was itself neutral, objective and uncontaminated by the national self-interest ordinarily seen to reside in relations between states. Thus, George Fogg was able to argue that because of key achievements of the Antarctic Treaty there had been “little pressure from governments for the science to be utilitarian in its objectives” (Fogg, 1992: 405). With all due respect to an eminent historian of Antarctic science, it is debatable whether this still held in 1992, let alone today.²⁷ The neutrality and objectivity of the Antarctic science project is perhaps the foundational myth of the ATS. Its roots are in a contemporaneous popular framing of the International Geophysical Year, and a counterpoising of relatively relaxed relations between Antarctic scientists at the height of the Cold War with the grim reality elsewhere, which gave birth to the “Continent for Science” (e.g. Lewis, 1965) cliché. With time the geopolitical role of Antarctic science has come to be more critically examined (e.g. Elzinga, 1993; Dodds, 2010a), and the “double-edged nature of science itself” and “its [use] to promote aggressive forms of nationalism and territorial bellicosity” argued (Dodds, 2010b: 146). Recently the complications that may arise when science and scientists become participant actors in an activity (bioprospecting) have been considered (Hemmings, 2010b). In brief, notwithstanding a

²⁴ Consideration here is largely confined to that part of the Antarctic environment subject to the Madrid Protocol, with no substantive treatment of the marine environment subject to CCAMLR.

²⁵ For example: Environmental Principles are expounded in Article 3 of the Madrid Protocol; the duty to conduct prior EIA for all activities, and the establishment of the three tier Environmental Impact Assessment system, is specified in Article 8; and the technical obligations set out in Annex I.

²⁶ Annex I Environmental Impact Assessment; Annex II Conservation of Antarctic Fauna and Flora (already revised but with that revision not yet in force); Annex III Waste Disposal and Waste Management; Annex IV Prevention of Marine Pollution; Annex V Area Protection and Management; and Annex VI Liability Arising from Environmental Emergencies (not yet in force).

²⁷ Fogg may have seen a challenge to this happy state in science’s “growing bureaucracy” (Fogg, 1992: 409).

continuing, if more limited, validity to the “science as currency” argument (Herr & Hall, 1989), we have developed an increasingly nuanced (and frankly, less naïve) understanding of how science fits into the broader Antarctic scene.

No such revisionist examination appears to have been undertaken in relation to Antarctic environmental management. Observers have certainly seen that the success or failure of ostensibly environmental initiatives has been dependent on national political judgements and the stances of state delegations at Antarctic diplomatic meetings.²⁸ Clearly, at critical points, national interest has been decisive in relation to the direction in which ATS development was allowed to go. So, the opposition of some Consultative Parties to CRAMRA, formally on environmental grounds, but in practice on a wider basis, manifestly altered the ATS pathway by causing the abandonment of CRAMRA and the adoption in its place of the Madrid Protocol. But this was not part and parcel of an environmental management debate per se. What was at work here was a quite fundamental divergence of key parties around what strategic Antarctic futures were acceptable. In some respects one might view this episode as a hiatus between different environmental management regimes, with the emerging environmental obligations of the Madrid Protocol creating a materially more developed management regime. Indeed, it may be only with the appearance of the Madrid Protocol that the Antarctic can sensibly be claimed to have acquired “environmental management” as it would be broadly understood elsewhere.

The focus here is not on those few points of great transformation in the Antarctic system, but on the nominally routine operation of environmental management. Within this framing, there seems not to have been any enquiry into whether, or to what degree, the environmental management pathway itself – i.e. the initiative, rather than merely the reception and fate of such initiatives – around environmental issues was part of a diplomatic strategy. Implicitly, it seems, diplomacy and the underlying national interest which it reflects, were cast as external to the process of environmental management.

What is meant by the use of “*strategic* national interest” in the title to this contribution? The intention is to capture those high policy national interests which inform states’ national security policies. Indeed, the terms “national interest” and “national security” are often used interchangeably (e.g. Cronin, 2009). Following the famous formulation ascribed to Lord Palmerston, such national interests are often characterised as “enduring” (e.g. White House, 2010: 17). At the global level, the United States, for example, identifies “four enduring national interests”, “security”, “prosperity”, “values” and “international order” (Ibid.). Whilst Antarctica is not mentioned, national interests in the Arctic are identified as “meet[ing] our national security needs, protect[ing] the environment, responsibly manage[ing] resources, account[ing] for indigenous communities, support[ing] scientific research, and strengthen[ing] international cooperation” (Ibid.: 50). A fuller US statement of strategic national interests in relation to the Arctic (the document relating to Antarctica is not publicly available – see Hemmings, 2012b: 82-

²⁸ Antarctic decision-making requires consensus, so blocking a disagreeable proposal is straightforward.

83) is provided in a National Security Presidential Directive (White House, 2009). Other states explicitly declare their strategic interests in Antarctica (e.g. New Zealand, 2012). States have, of course, any number of other interests. Within ATS fora, these may range from aspiring to place a particular national in an office to securing consensus on a particular technical issue (e.g. a standard of waste management). These are not, however, ordinarily of high (or “strategic”) national interest value, gratifying and useful as they may be.

In my view, diplomacy and strategic national interest have in practice *not* been external to the process of environmental management within the ATS. After some decades of seeing the Antarctic arrangements at quite close quarters,²⁹ it seems to me that environmental management within the ATS is much more diplomatically contingent than either the black-letter of the legal instruments or the secondary interpretive literature around the functioning of the system ordinarily suggests. It is not simply that, after a rational, objective, disinterested process of elaboration, politically neutral environmental management proposals are successful, significantly altered, or founder when they encounter the gatekeepers (the dreadful lawyers and senior diplomats of the popular imagination) of an Antarctic realpolitik. Of course, the assessment that a particular initiative is a device may itself *contribute* to the inclination of other states to block it. My point is that the purpose and process of what is labelled³⁰ ‘environmental management’ may often be *diplomatic* rather than *environmental* from inception for some critical actors. Initiatives around environmental management can be viewed in instrumental terms as part of a national interest strategy just like any other initiative. There is nothing new about this, even in Antarctica, which makes it all the more surprising that it has attracted no attention. The evidence is there from the early 1960s that, for example, Australia saw conservation and living resources issues within a quite conventional diplomatic framework of traditional national strategic interests (Hemmings & Jabour, 2011: 127-130).³¹

One may, or may not, be surprised at this as a state of affairs. But beyond its bearing on whether our descriptions of the functioning of the ATS are in even a general sense reasonable and accurate, it is immensely important to the project of defining, understanding and (if you will) *projecting* values in the Antarctic. If what we describe and place in one category as “environmentally” directed,³² is in fact primarily instrumental³³ in relation to *another* interest

²⁹ The author has participated in 15 ATCMs and many other ATS diplomatic and technical meetings between 1989 and 2010.

³⁰ One might take an initiative to be labelled thus from the agenda item it is assigned to in the work schedule of the Antarctic Treaty Consultative Meeting or Committee for Environmental Protection.

³¹ That study drew upon Australian delegation briefs. There are indications therein that other states – both those sharing Australian positions and those whose interests differed – behaved in similar ways.

³² The term is used here merely to mean valuations focussed on the environment, rather than a normative project of environmental advocacy, and thus I have preferred to avoid the use of “environmentalism” here.

³³ “Instrumental” in either intention or in practice.

such as strategic national interests, or regime-stability,³⁴ or if it means in practice different things in-parallel (i.e. it is still environmentally directed, but *also* directed to values x, y and z, which may or may not be commensurable), we need to understand this.

The present essay is a preliminary attempt to do so. Has environmental management been appropriated to “diplomatic method”, to use Harold Nicolson’s term of art (Nicolson, 1954; Drinkwater, 2005)? “Diplomacy is both a process, with its own momentum, and a profession that aims at persuasion and has its club rules” (Woodward, 2007: 159). It is directed to the *implementation* of foreign policy, which in the modern state is made by government on the basis of input from diverse agencies and interests, in the light of an array of domestic and international considerations. Diplomatic “method” “include[s], not only the actual machinery for negotiation, but also the general theory, in accordance with which the machinery [is] used” (Nicolson, 1954: 2). The only peculiarity of the Antarctic may be that both the development of the state’s ‘foreign’ policy,³⁵ and its implementation through diplomacy, involves a smaller and narrower community than many other areas of international interest.

Finally, there is no consideration here of the political dimension of bringing environmental management into legal force. This is an immensely significant area, as one may see in relation to the Antarctic Treaty Consultative Parties’ approach to the question of liability for environmental damage.³⁶ It also speaks to values in a quite critical way, but space precludes its adequate treatment here.

‘Environmental Management’ and ATS Institutional Factors

A paradox of some significance presents itself in relation to the declared objective of the Madrid Protocol, the primary instrument giving expression to states’ declaratory position in relation to the value of the Antarctic environment. This is that, whilst “Parties commit themselves to the comprehensive protection of the Antarctic environment and dependent and associated ecosystems”,³⁷ the Madrid Protocol is interpreted by Parties with significant self-

³⁴ Valued by *all* Antarctic Treaty parties irrespective of their various other national interests (see Hemmings, Rothwell & Scott, 2012b).

³⁵ For claimant states, Antarctic policy may be a special case embracing domestic as well as foreign policy considerations even more than other “overseas” issues. See Hemmings & Jabour, 2011.

³⁶ The need for a liability regime to underpin declaratory commitments in relation to “protection of the Antarctic environment” was recognised in the 1980s during the negotiation of the *Convention on the Regulation of Antarctic Mineral Resource Activities* (CRAMRA). A commitment to develop liability rules and procedures was enshrined in Article 16 of the Madrid Protocol which replaced CRAMRA, was adopted in 1991, and entered into force in 1998. Annex VI on ‘Liability Arising from Environmental Emergencies’ was finally adopted in 2005. But, as of early 2012, only 5 of the required 28 states have approved it. Its entry into force is years off, if ever. Plainly there is a gap here between the declaratory valuation of environmental need and actual state practice.

³⁷ Madrid Protocol, Article 2.

denying ordinances in relation to what it actually covers.³⁸ Thus, it does not apply to cetaceans, because these are supposed to fall to the International Whaling Commission; it does not cover marine living resources as broadly defined within CCAMLR;³⁹ and it avoids competing with the prerogatives of the United Nations Convention on the Law of the Sea (UNCLOS) and has so far not concerned itself with the deep seabed. Further, quite what “dependent and associated ecosystems” means has not been clarified, and consequently these obligations are effectively ignored in the routine implementation of Protocol obligations. So, in fact, the Madrid Protocol addresses only a *part* of the Antarctic environment it nominally claims, and the comprehensive protection promised is not (and cannot) in fact be delivered for these structural reasons.

From an environmental management perspective, it appears counter-intuitive to fractionate Antarctic environmental management across instruments. Yet, this is precisely what we find. In fact, the environmental management structure across the Antarctic region, and even within the ATS, is fractionated as a matter of deliberate strategic policy. True, given the ATS evolved over time, inevitably historical contingencies have a bearing. The ATS grew by topic-specific instrument accretion. But states could have re-negotiated existing obligations into one or more integrated instruments, or periodically revised older instruments to ensure a more seamless environmental coverage across the ATS. Indeed, at the time of most acute ATS ‘crisis’, when it was clear that CRAMRA would not enter into force, and the process of negotiating an alternate, more environmentally-focussed, instrument had just begun, there was consideration of what was often called in public, by its proponents (Australia and France), a “Conservation Convention”, and in the papers tabled at the XV ATCM in Paris in 1989 a “Comprehensive Convention” approach (France, 1989: 220-230), that might have integrated existing instruments with new environmental undertakings. This option was rejected in Paris (author’s personal observation; Jackson & Boyce, 2011: 250), and subsequently the innovative but more restricted Madrid Protocol emerged instead. A more comprehensive re-jigging of Antarctic instruments was rejected, not just because the mechanics of such an undertaking were complex (as they surely would have been), but because key Antarctic states wished to preserve the autonomy and differential standards delivered by an ATS made up of *different* instruments, and had an eye to the likely timeline of this project.

There are complex historic and strategic explanations for this situation, which in my view include the continuing significant role that territorial sovereignty continues to play in relation to state behaviour in Antarctica (see Hemmings, 2012b) and the ways in which the ATS has sheltered the interests of particular states, including the United States⁴⁰ in particular (Scott,

³⁸ The non-applicability is contested by some external observers, e.g. in relation to the relevance of the Madrid Protocol to some parts of the Antarctic whaling activity (Canberra Panel, 2009).

³⁹ And it is not just that legal responsibility is *split* across instruments – IWC and CCAMLR entirely lack the requirement for, *inter alia*, the prior EIA that one finds in the Madrid Protocol (Hemmings, Scott & Finnemore, 2006).

⁴⁰ The state that I have elsewhere termed the *deus ex machina* in relation to the Antarctic Treaty (see Hemmings, 2012b: 82).

2011). Amongst the recurrent concerns of both claimant and other foundational members of the Antarctic Treaty is the determination that the ATS not become *too* internationalised. A number of the environmental initiatives, from early discussions around sealing and the elaboration of the 1964 Agreed Measures for the Conservation of Antarctic Fauna and Flora, were seen as posing acute jurisdictional and other ‘problems’ (Hemmings & Jabour, 2011: 127-128). The long postponement of the final acceptance of the need for an Antarctic Treaty Secretariat (which post-Protocol became objectively essential for the effective delivery of the mandated environmental outcomes), and the conditionality attached to its eventual legal status (Vigni, 2007: 20-22), was *in part*⁴¹ the product of a wish to avoid creating too autonomous and too great an international identity for what would, inevitably, become the ‘shop-front’ of the ATS. The critical point here is not whether these considerations were, or were not, reasonable. It is that these problems were evidently *not environmental*, and the relevant contingencies were around something else, even if the debate was in fact laundered as one about preferable environmental outcomes. It is as a result of these considerations that we end up with the primary environmental instrument of the ATS (the Madrid Protocol) in the shape that it is, and with the capacities that it has.

Given that there are reasonable grounds for seeing the main structure of environmental management as the result of strategic national interest, is there also evidence that state *practice* in relation to environmental management under it (the Madrid Protocol) reflects diplomatic method?

State Practice in Relation to Environmental Management

From a considerable array of potential candidates, three well-documented cases of state practice in relation to environmental management are considered here: (1) the manner in which Comprehensive Environmental Evaluation (CEE), the top-tier EIA category, has been applied; (2) the experience in relation to designating marine protected areas; and (3) state practice in relation to managing infrastructure in a particular area (the Larsemann Hills).

In each case, the focus is on what is essentially a *component* of environmental management: EIA process, protected area designation, and area management arrangements respectively. However, in practice these cases involve a rather broader engagement with overall “environmental management”, and are thus taken as useful case studies of its application.

⁴¹ There were significant other diplomatic issues around location, tensions between Argentina and the United Kingdom, and cost.

(1) CEE Application

CEEs address activities where there is a possibility of more than a minor or transitory impact resulting from the proposed activity.⁴² This level of EIA has been considered appropriate for particular categories of activity: construction or substantial further development of stations, airstrips or other infrastructure, drilling and some sorts of major scientific activity. CEE was present from the inception of the Antarctic EIA system, since it had been included in pre-Protocol Recommendation XIV-2 in 1987. A substantial number have been completed. Specific duties and processes in relation to CEEs are mandatory in the Madrid Protocol. Amongst these are a consideration of the option of not proceeding with the activity. The CEE is essentially the only place where we see international scrutiny of the specific proposal of an individual state (for detail on the CEE process see Hemmings & Kriwoken, 2010). The CEE process is a well understood and embedded tool of contemporary Antarctic environmental management. The formal intention is plainly to contribute to the securing of environmental values by enabling the avoidance and mitigation of impacts, and requiring a rationalisation and international acceptance of those impacts which cannot be avoided.

The CEE has been a useful tool. But in its application some deficiencies are evident, and these appear to have arisen because of the significance states attach to other values. The deficiencies include the (i) non-application of CEE to certain sorts of activities (e.g. the transportation systems of National Antarctic Programmes (NAPs), commercial tourism activities) and within particular NAPs; (ii) a focus on procedural rather than substantive compliance (e.g. the Lake Vostok drilling programme); and (iii) the fact that, remarkably, not one CEE has in fact led to a decision not to proceed with the activity as proposed. The causal factors, in my judgement, include:

that the limited international scrutiny of the CEE process is not allowed to be a formal veto on activity, because states seek to preserve national autonomy in decision-making, for reasons of national dignity (and for some states for reasons of asserted territorial sovereignty). i.e. a rationale attaching to strategic geopolitical values obtains.

that operational freedom of action, justified in terms of not only the above, but on safety and freedom of scientific activity criteria, is considered by states an important value in its own right.

that in relation to tourism, the industry has been not only a successful advocate for its autonomy and freedom of action (as above) but is seen by some states as a strategic tool in relation to their (i.e. the states') wider geopolitical valuation of Antarctica (variously to bolster economic or territorial interests - or to counter the territorial aspirations of other states).

Thus, the CEE process, whilst certainly improving Antarctic environmental management, has also been a useful tool when it comes to securing other interests and values. Has it been more than this; has it been a diplomatic tool crafted and deployed in order to actively serve other

⁴² Madrid Protocol, Annex I, Article 3.

values? On reflection, I think it has. CEE has most vigorously been applied in relation to what one might term second-tier Antarctic states. In part, this may reflect the greater resourcing and (albeit this is often self-nominating) environmental experience of other states, which are thereby better placed to both apply the EIA system and to scrutinise the performance of others. But, allowing that this assertion requires more work, it looks also to be a device whereby a hierarchy of influence is maintained within the ATCM, and the CEP. The issues around coverage (transportation systems and tourism) could certainly have been addressed by ATCPs by now had they wished to, but here perhaps another consideration intrudes. It is a peculiarity of the Antarctic environmental management community that it is very frequently drawn from the ranks of the Antarctic operational community, specifically the national Antarctic programmes of ATCPs, and this raises a potential conflict of interest. This may not be a matter of diplomatic method per se, but an institutional capture issue. But in that these people engage with the system internationally as members of their national delegations, there may be some consequences in relation to preferred diplomatic stances too.

(2) Marine Protected Areas

The capacity to designate marine protected areas (MPAs) exists with both Antarctic Specially Protected Areas (ASPAs)⁴³ and Antarctic Specially Managed Areas (ASMA)⁴⁴ categories under the Madrid Protocol. The reach into the marine environment was just one of the broadenings of the Protected Areas system agreed in the Protocol (Goldsworthy & Hemmings, 2009). But it has proven the most problematic since states acting as ATCPs in relation to the Madrid Protocol have been altogether less enthusiastic about closing areas to fishing when wearing their CCAMLR Commission hats. In their latter guise, concerns about economic interests, avoiding environmental regulation creep from the Antarctic 'terrestrial' into the marine world, and concerns about the Antarctic marine environment setting 'unfortunate' precedents elsewhere, have been evident. Whilst there are indeed differences between the 'terrestrial' and marine environments, the construction of 'rational' arguments of substantive difference necessitating different policy approaches has been somewhat overstated. The approach in relation to MPAs parallels the alleged dual approach across a number of other environmental management tools, including EIA, species protection and ethical duties. The marine environment is plainly not seen to warrant environmental standards long-established in Antarctica's 'terrestrial' realm, but states still launder their positions as environmental positions, and are readily able to produce fishery biologists or modellers who will argue that we are not yet at a level of concern requiring 'extreme' responses.

In the case of MPAs, the ATCPs essentially granted themselves as CCAMLR Commission members the right of engagement in assessing any proposal for a protected area that includes

⁴³ Madrid Protocol, Annex V, Article 3.

⁴⁴ Madrid Protocol, Annex V, Article 2.

marine areas. Since CCAMLR, like the ATCM, operates on the basis of consensus, the practical result is a veto power over MPA designation. Bear in mind that, notwithstanding intense discussion of large MPAs recently, and its capacity to designate areas through a Conservation Measure, in its 30 years of existence CCAMLR has so far only created one, the South Orkney Islands Southern Shelf Marine Protected Area in 2009⁴⁵. Whilst the major Antarctic fishing states have been prime opponents of MPAs, they have not been alone. Other states have formally used arguments of non-derogation from CCAMLR's primacy (as an institutional issue), concerns about improper intrusion on the prerogatives of UNCLOS, fears that proposals such as New Zealand's proposal to place the Balleny Islands archipelago in the Ross Sea within an ASMA (Burgess et al, 2003) were really about sovereignty assertion, and national economic interests in relation to regulation of Ross Sea marine harvesting.

To pick up just the last of these: there is a plausible argument that New Zealand's interest in Balleny Islands area protection at the time it was also opening up commercial fishing in the hitherto un-fished Ross Sea was indeed in part about bolstering its sovereignty over the Ross Dependency. The fact that it was also driven by other considerations was perhaps beside the point. New Zealand was not above using one argument for more than one purpose, and in this it is hardly alone in Antarctic affairs. The difficulty – ultimately a fatal difficulty for the proposal – was that other states saw New Zealand's environmental proposal here as fundamentally insincere, both because there was a reasonable ground for so feeling, and because it was a convenient way to launder their opposition to restraints on acceptable activities in the marine environment, which were also predicated on non-environmental interests. The proposal to designate the Balleny Islands archipelago as an ASPA failed. On any objective environmental management assessment, that was unfortunate.

(3) Larsemann Hills

In the Larsemann Hills on the Ingrid Christensen Coast of East Antarctica there are facilities operated by Australia, China, India, Romania and Russia. It is one of Antarctica's quasi urban areas! The roots of this situation are that Australia and Russia sought to counter each other's positions on sovereignty, China subsequently showed interest and Australia assisted them to establish their base in the curious game of claimant welcoming what it could not prevent. Because the Australian summer station was significant more for its politics than its scientific values, a sharing arrangement was agreed with Romania when they sought a station. Australia sought to initiate and lead the quite reasonable development (for there *would* be environmental benefits) of an ASMA for the Larsemann Hills, involving China, Romania and Russia (Figure 1). To lead the management of multi-state relationships was considered of value in relation to Australia's claim to the area within the Australian Antarctic Territory, and Australian officials can reasonably claim expertise and to be in the vanguard of environmental

⁴⁵ Conservation Measure 91-03 (2009).

management. Australia noted that it had been discussing an ASMA here with Russia and China since the mid 1990s.

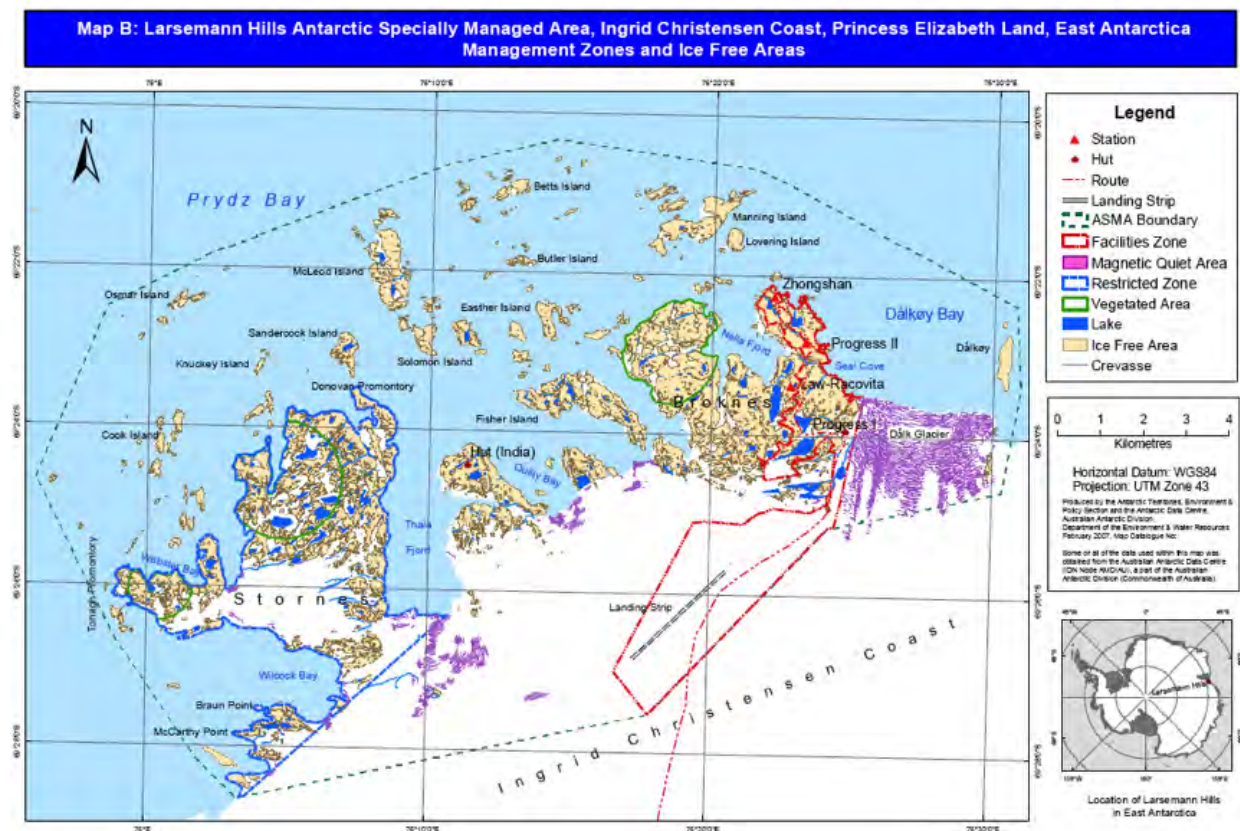


Figure 1: The Larsemann Hills. Figure taken from Measure 2 (2007): Management Plan for Antarctic Specially Managed Area No. 6 Larsemann Hills, East Antarctica (Antarctic Treaty Secretariat, 2007).

The ASMA process developed and, just at the moment it was coming to fruition, India queered the pitch by announcing its own plans for a new main station (Bharati) in the Larsemann Hills, for which it prepared the mandatory CEE. The station proposal was seen to have implications for the ASMA proposal, and Australian officials in particular felt that their Indian counterparts had failed to advise appropriately or engage with the ongoing ASMA process. Unfortunately, this came to a head at the XXX ATCM held in New Delhi in 2007, where not surprisingly India was not terribly enthusiastic about being berated. In an unusual, but sensible, attempt to reconcile the issues, the separate agenda items of ASMA and Draft CEE consideration were combined for the Larsemann Hills.⁴⁶ But the sentiment, taken up by other states, if more carefully reflected in the official record, was that India had not played fair, had concocted spurious reasons for why its station needed to be there, and must have been aware of the

⁴⁶ See the substantial coverage, paragraphs 43-72 in Secretariat of the Antarctic Treaty, 2007.

ASMA development but chose not to engage, or to inform the other local states of their plans. India, it was felt, played a hand nominally based on science and environment which was really about geostrategic and domestic populist interests. A recent paper has reflected this framing (O'Reilly, 2011). There may be something to be said for this explanation. But nowhere does anybody seem to have considered that Australia too was playing a strategic game here. It was deploying environmental processes to shore up a non-environmental value – protecting its position in relation to its claim to the Australian Antarctic Territory.⁴⁷

The Prognosis for Environmental Management

To conclude this preliminary survey, what is the prognosis for environmental management responses to three current Antarctic issues: (1) in relation to the Antarctic continental shelf, (2) bioprospecting and (3) tourism?

(1) Continental Shelf

There is a voluminous literature on the many issues posed by the Antarctic continental shelf and in a sense the situation in relation to submissions to the Commission on the Limits of the Continental Shelf (CLCS) by claimants who see themselves as coastal states *sensu* UNCLOS is now clear (see details and references in, e.g. Hemmings & Stephens 2010; Weber, 2012). More interestingly, for our purposes, we can see what has *not* been done in relation to environmental management. The discussion around coastal state rights in relation to the Antarctic continental shelf pursuant to articles 76 and 77 of UNCLOS is essentially about resource access and management. This would surely be a proper concern for the ATCPs, and particularly for the CEP and CCAMLR's Scientific Committee – in other words, one might expect the main institutions and instruments of the ATS to have a bearing on this discourse. The ATS has, after all, developed largely through responses to emergent resource issues and their implication for the Antarctic Trinity. Were a disinterested observer – the proverbial Martian – to read the Madrid Protocol and hear of the interest in the Antarctic continental shelf, it is a fair supposition that they would expect the latter to be discussed in the context of the former.

In fact, in this case the environmental (and other) issues posed were not considered in the Antarctic meetings at all, despite the reality that interest in legal rights in relation to the Antarctic continental shelf has been obvious and well documented for over a decade. So, why was it not considered within the ATS? Essentially, because the core value here was seen by claimants as being the preservation of their rights under Antarctic Treaty Article IV; the non-claimants could reiterate their positions (also secured under Article IV) in notes to the CLCS (see

⁴⁷ Codicil to this saga: At XXXV ATCM, Hobart, 2012, the states active in the Larsemann Hills tabled a joint report on the need to revise the Management Plan for the ASMA (Australia et al, 2012) and India tabled a paper on establishment and operation of 'Bharati' station (India, 2012).

Hemmings & Stephens, 2010); and all states attach considerable value to ATS regime security. These are matters that, whilst going to the heart of the ATS, are so sensitive that, in an extraordinary paradox, they seemingly cannot be discussed in the ATS. And against *these* values, the values around the Antarctic environment, which are the stimulant to Antarctic environmental management, simply do not cut any ice.

(2) Bioprospecting

Bioprospecting presents multi-way challenges for Antarctic environmental management (see Joyner, 2011). Firstly, whilst it emanates from the long history of Antarctic scientific enquiry, and is situated on what Sanjay Chaturvedi terms a “science-geopolitics interface” (Chaturvedi, 2009), it continues to have elements in common with science in general. However, it is in the process of transforming into a new resource extraction industry. Whilst different in detail to other extractive industries, it presents some of the same risks and promises. So, bioprospecting is presently a hybrid activity – part science, part industry. How should it be managed? As science, or as the latest resource activity? Post-CRAMRA,⁴⁸ developed states are particularly sensitive to entering into a process that may end up with the activity ‘overly’ regulated or actually prohibited; and they are certainly not at all keen on opening Pandora’s Box on benefit sharing and technology transfer, those certain accompaniments of a biodiversity-related discourse. Nor is the Convention on Biological Diversity a favoured partner, given the ATS preference for in-house control, and the fact that the United States, still the leading Antarctic power, has not ratified it.

With the science component of bioprospecting so evident, the science community which is granted particular privileges under the Antarctic Treaty, is wary of any inroads into its freedoms. Commercial entities, and the states which are the main beneficiaries of these capabilities are not presently advocates for regulation. Whereas Antarctica is generally a sink for expenditure, fishing, tourism and now bioprospecting *make* money, and this simple reality causes states to caution about the desirability of restraints. In short, activities which promise financial returns tend to be in a relatively stronger position than activities which cost the state money.

Bioprospecting transcends the traditional ‘terrestrial’/marine divide upon which Antarctic environmental management within the ATS has been predicated. This poses institutional and legal challenges. Try to regulate it as one and you need to create a new Antarctic legal instrument; try to regulate it separately in the presently existing ATS instruments and you face issues of consistency, administrative coherence, and extended timelines for completing the project. Finally, bioprospecting is not confined to Antarctica and for states still feeling their way domestically and in other international contexts, the question of unfortunate precedents raises

⁴⁸ The *Convention on the Regulation of Antarctic Mineral Resource Activities*, adopted in 1988 but subsequently abandoned in favour of the Madrid Protocol and not now likely ever to enter into force.

its head again. States may be cautious about adopting restrictive stances in Antarctica in advance of regulation of the same sort of activity domestically.

Against this background, and the general institutional stasis that has overtaken the ATS post Madrid Protocol (Hemmings, 2009), the prospects for the application of particular environmental management approaches to bioprospecting in the near-term do not look high. No state is entirely indifferent to the environmental risks which bioprospecting *may* pose, and all do argue for the application of generic obligations to the activity precisely so that environmental and other embedded values are protected. But unless and until a demonstrable problem arises, the other values (including variously: freedom of scientific activity; national scientific prestige; potential benefits; not complicating administration, and restraining further internationalisation of Antarctic activities) trump these.

(3) Tourism

Tourism presents some common issues with bioprospecting, which need not be repeated. In addition, it provides the public-good of broadened access, supposed enhanced public awareness (not insignificantly for states and their agencies, including awareness of national programme activities), and a particular engagement with a politically-connected clientele. These are significant value-areas. If they start to compete with established Antarctic values (particularly scientific research), we may see some inclination to further regulation, but alternatively we might see moves to more formally entrench within the ATS the values said to be delivered by tourism. Tourism might be on a pathway to such entrenchment already. Interestingly, to date, the limited constraints on tourism have been around concerns about safety and search and rescue capability.

Environmental management has been substantially disabled in relation to tourism activities. Whilst formally, at both international⁴⁹ and state⁵⁰ level, the Madrid Protocol applies to tourism (and other NGO) activities, in reality it often does not apply as rigorously as it does in relation to many national Antarctic programmes. This disparity arises from three considerations:

1. Because, notwithstanding generic application of the Madrid Protocol, its obligations are in fact predicated on the pre-tourism, national Antarctic programme dominated era of Antarctic activity;
2. Because of a particularly successful advocacy of environmental bona-fides by the industry; and
3. Because of the perception that a 'non-extractive' resource use is inherently less likely to pose environmental risk.

⁴⁹ I.e. under the Madrid Protocol.

⁵⁰ Via Madrid Protocol implementing legislation and other domestic law.

Since the industry is built on the back of environmental attraction, it has been relatively easy for the industry to assert that it is already on-side (and to be fair, to a great extent it is). One consequence has been the progressive embedding of the industry in the Antarctic polity, and its engagement in the technical fora of Antarctic environmental management (which is why it may be en route to entrenching its values more formally). Tourist interests now figure in some Protected Area Management Plans. Like other engaged communities, including historically the science community and particular states, the question arises whether some management policies are in fact directed to environmental or other values. Consideration of tourism within the ATS is invariably said to be about managing its environmental footprint.

What is often overlooked is the relationship between the tourism industry, or components of it, and particular states. The industry is often posited as a third force, in large measure separate from the state. It may sometimes be this. But national Antarctic tourism companies often figure quite strongly in national projection, and states are not blind to the instrumental benefits of using tourism industry interests to advance other state interests. For an already powerful state such as the US, its dominance of the Antarctic tourism industry (companies and clients) allows it a further rationale for its opposition to constraints on activities, that its strategic position in Antarctica has long been built upon, and an effective tool to counter territorial sovereignty pretensions. By contrast, Argentina, which sees the majority of Antarctic Peninsula tourism traffic routed through Ushuaia, is able to utilize this in ways that bolster its freedom of action as an assertive claimant. As the examples of the US and Argentina suggest, states need not view the tourism industry in identical ways in order to use it in furtherance of national interest. Further, in the peculiar jurisdictional circumstances of Antarctica, are we entirely sure that non-state operators cannot establish usufructuary or other rights through long use? As a lucrative earner and provider of a product strongly desired by its consumers, tourism has been able to argue values (equity in relation to access, creation of “ambassadors” for Antarctica, capacity to exercise oversight of national programmes and environmental performance, etc) that they believe can sit alongside any others evident or likely in Antarctica (see Hemmings, 2012a: 151-152). Whether the suite of values argued for, and on behalf of, the Antarctic tourism industry are in fact commensurable with other values will continue to be contested.

Concluding Remarks

There are, it seems to me, reasonable grounds for asserting that environmental management in Antarctica is often deployed as a component of a state’s diplomatic method, in the service of strategic national interests, rather than solely in the environmental interests of the region itself. This deployment may occur in both active and passive variants. Strategic national interests may be pursued under cover of environmental rationale. In other cases, where a *prima facie* case may exist for a particular environmental management response, this may be thwarted if the state concludes that it would compete with a particular strategic national interests *even if it*

would offer objective environmental benefits. In the first case, successful environmental management outcomes may well still result.⁵¹ To a degree, from the environmental management perspective, one might argue that it does not matter what the strategic purpose of the effort is, *if* it secures environmental values: that it is environmental management in effect, even if not in intent. But the qualifier ‘if’ is critical. The danger of being satisfied with incidental benefits is both a cynicism about ultimate purposes when the environmental rationale is banded about (and thus less likelihood of support, particularly if there are – as will generally be the case – costs to supporting the proposal), and the risk that, if it is not really about environmental management, we miss the target anyway. As we know, in Antarctica as elsewhere, there can be significant gaps between the rhetoric and reality of environmental management even without ambiguity of purpose. The cases of the Balleny Islands and the Larsemann Hills, considered in this paper, give some intimation of the complications that may arise when there is uncertainty over just what interests are leading the debate.

To suggest that what is marketed as environmental management may really be about something else is not necessarily to impugn the integrity of the individuals and agencies responsible for environmental management proposals. They may very well hold the environmental imperatives as sufficient unto themselves, or at least the pre-eminent values to be advanced. Some of the time, if it looks like an environmental management proposal it may very well be exactly that, and not a mechanism for advancing national interests per se (although one might need to demonstrate that states are likely to sanction those initiatives that are *not* in the national interest). The point is that environmental managers will rarely be the final gatekeepers of their state’s Antarctic policy, and all sorts of other factors – administrative signals, thematic jurisdictional boundaries, research directions and budgetary allocations – affect the nature of what state X can say and do around Antarctic environmental management before one is at a point where a formal policy choice has to be made about what we will formally propose.

There is no silver bullet to deal with this reality, and the reality is rarely anything but complex and multi-faceted. But greater transparency about the range of strategic national values that states seek to realise in Antarctica would certainly be helpful, and this perhaps requires us to be a little clearer-eyed about what state interests actually are than may historically have been the case. A less glib assumption that what is marketed as ‘environmental management’ is necessarily only or primarily this, might be helpful. We are still generally much more naïve about policy drivers in Antarctica than we are in our metropolitan environments. Without encouraging cynicism it may not be out of place to encourage a more rigorous examination of Antarctic environmental, and other, policies. Ensuring this transparency is almost certainly a task that will only be done by international civil society, since states as such, and their agencies, may have a vested interest in avoiding such disclosure.

⁵¹ Failures of environmental management may, of course, occur under any number of circumstances.

Acknowledgments

The author thanks participants in the Workshops for illuminating discussion around the themes addressed in the presentation, and Daniela Liggett, Sanjay Chaturvedi and Klaus Dodds for extremely helpful and considered comments on the manuscript. Naturally, all interpretations, errors and omissions remain the sole responsibility of the author.

References

- Antarctic Treaty Secretariat. 2007. *Final Report of the Thirtieth Antarctic Treaty Consultative Meeting, New Delhi, India, 30 April – 11 May 2007*. Buenos Aires: Secretariat of the Antarctic Treaty.
- Australia, China, India, Romania, Russian Federation. 2012. Report of the Larsemann Hills Antarctic Specially Managed Area (ASMA) Management Group. *Information Paper 61, XXXV Antarctic Treaty Consultative Meeting, Hobart*.
- Burgess, J., Waterhouse, E., Hemmings, A.D. & Wilson, P. 2003. Declaration of Marine Protected Areas – the case of the Balleny Islands, Antarctica, in *Aquatic Protected Areas: What works best and how do we know? Proceedings of the World Congress on Aquatic Protected Areas*, edited by J.P. Breumer, A. Grant & D.C. Smith. Cairns: Australian Society for Fish Biology: 196-202.
- Canberra Panel. 2009. [Donald R. Rothwell (Chair); Tim Stephens (Rapporteur); Alan D. Hemmings; Stuart Kaye; Joanna Mossop & Gillian Triggs]. *Japan's 'Scientific' Whaling Program and the Antarctic Treaty System – Independent Panel of Legal and Policy Experts*. Report of the Canberra Panel, 12 January 2009. 20pp.
- Chaturvedi, S. 2009. Biological prospecting in the southern polar region: Science-geopolitics interface, in *Legacies and Change in Polar Sciences: Historical and Political Reflections on the International Polar Year*, edited by Jessica M. Shadian & Monica Tennberg. Farnham: Ashgate: 171-188.
- Cronin, P.M. (ed.) 2009. *Global Strategic Assessment 2009: America's Security Role in a Changing World*. Institute for National Strategic Studies. Washington DC: National Defense University Press.
- Dodds, K. 2010a. Assault on the unknown: Geopolitics, Antarctic science and the International Geophysical Year (1957-8), in *New Spaces of Exploration: Geographies of Discovery in the Twentieth Century*, edited by Simon Naylor & James R. Ryan. London: I.B. Taurus: 148-172.
- Dodds, K. 2010b. Guest Editorial – the 1959 Antarctic Treaty: reflecting on the 50th anniversary of a landmark agreement. *Polar Research*, 29: 145-149.
- Drinkwater, D. 2005. *Sir Harold Nicolson and International Relations: The Practitioner as Theorist*. Oxford: Oxford University Press.

- Elzinga, A. 1993. Science as the continuation of politics by other means, in *Controversial Science: From Content to Contention*, edited by Thomas Brante, Steve Fuller & William Lynch. Albany: State University of New York Press: 127-152.
- Fogg, G.E. 1992. *A History of Antarctic Science*. Cambridge: Cambridge University Press.
- France. 1989. *Final Report of the Fifteenth Antarctic Treaty Consultative Meeting, Paris, 9-20 October 2009*. Paris: Ministry of Foreign Affairs.
- Goldsworthy, L. & Hemmings, A.D. 2009. The Antarctic Protected Area Approach, in *Shared Resources: Issues of Governance*, edited by Sharelle Hart. IUCN Environmental Policy and Law Paper No. 72. Gland: IUCN: 105-128.
- Hemmings, A.D. 2007. Globalisation's Cold Genius and the Ending of Antarctic Isolation', in *Looking South: Australia's Antarctic Agenda*, edited by Lorne K. Kriwoken, Julia Jabour and Alan D. Hemmings. Leichhardt: Federation Press: 176-190.
- Hemmings, A.D. 2009. From the new geopolitics of resources to nanotechnology: Emerging challenges of globalism in Antarctica. *The Yearbook of Polar Law*, 1: 55-72.
- Hemmings, A.D. 2010a. Considerable Norms in the Antarctic. Paper delivered at the Conference *Antarctic Visions: Cultural Perspectives on the Southern Continent*. Hobart: University of Tasmania, 21-23 June 2010.
- Hemmings, A.D. 2010b. Does bioprospecting risk moral hazard for science in the Antarctic Treaty System? *Ethics in Science and Environmental Politics*, 10: 5-12.
- Hemmings, A.D. 2011. Environmental Law – Antarctica, *The Encyclopedia of Sustainability, Vol 3: The Law and Politics of Sustainability*, edited by Klaus Bosselmann, Daniel S. Fogel and J.B. Ruhl. Great Barrington MA: Berkshire Publishing: 188-194.
- Hemmings, A.D. 2012a. Considerable Values in Antarctica. *The Polar Journal*, 2(1): 139-156.
- Hemmings, A.D. 2012b. Security beyond claims, in *Antarctic Security in the Twenty-First Century: Legal and Policy Perspectives*, edited by Alan D. Hemmings, Donald R. Rothwell & Karen N. Scott. Abingdon: Routledge: 70-94.
- Hemmings, A.D. & Jabour, J. 2011. Already a Special Case? Australian Antarctic Policy in the First Decade of the Antarctic Treaty, in *Australia and the Antarctic Treaty System: 50 Years of Influence*, edited by Marcus Haward & Tom Griffiths. Sydney: UNSW Press: 118-137.
- Hemmings, A.D. & Kriwoken, L.K. 2010. High Level Antarctic EIA under the Madrid Protocol: State Practice and the Effectiveness of the Comprehensive Environmental Evaluation Process. *Journal of International Environmental Agreements: Politics, Law & Economics*, 10(3): 187-208.
- Hemmings, A.D., Rothwell, D.R. & Scott, K.N. (editors). 2012a. *Antarctic Security in the Twenty-First Century: Legal and Policy Perspectives*. Abingdon: Routledge.

- Hemmings, A.D., Rothwell, D.R. & Scott, K.N. 2012b. Antarctic security in a global context, in *Antarctic Security in the Twenty-First Century: Legal and Policy Perspectives*, edited by Alan D. Hemmings, Donald R. Rothwell & Karen N. Scott. Abingdon: Routledge: 328-336.
- Hemmings, A.D., Scott, K.R. and Rogan-Finnemore, M. 2007. Broadening the duty in relation to Environmental Impact Assessment across the legal instruments applying in Antarctica. Canberra: 15th Annual Conference, Australian & New Zealand Society of International Law, 28-30 Jun 2007. <http://www.worldlii.org/int/journals/IHLRes/2007/11.html#fn1>
- Hemmings, A.D. & Stephens, T. 2010. The extended continental shelves of sub-Antarctic Islands: implications for Antarctic governance. *Polar Record*, 46(4): 312-327.
- Herr, R. & Hall, R. 1989. Science as currency and the currency of science, in *Antarctica: Policies and Policy Development*, edited by John Handmer. Canberra: Centre for Resource and Environmental Studies, Australian National University: 13-24.
- India. 2012. Establishment and operation of new Indian research station "Bharati" at Larsemann Hills. *Information Paper 41, XXXV Antarctic Treaty Consultative Meeting, Hobart*.
- Jackson, A. & Boyce, P. 2011. Mining and 'World Park Antarctica', 1982-1991, in *Australia and the Antarctic Treaty System: 50 Years of Influence*, edited by Marcus Haward & Tom Griffiths. Sydney: UNSW Press: 243-273.
- Joyner, C.C. 2012. Bioprospecting as a challenge to the Antarctic Treaty, in *Antarctic Security in the Twenty-First Century: Legal and Policy Perspectives*, edited by Alan D. Hemmings, Donald R. Rothwell & Karen N. Scott. Abingdon: Routledge: 197-214.
- Lewis, R.S. 1965. *A Continent for Science: The Antarctic Adventure*. London: Secker & Warburg.
- New Zealand. 2012. New Zealand's strategic interests in Antarctica. 2002 Revised New Zealand Statement of Strategic Interest. Ministry of Foreign Affairs and Trade. <http://www.mfat.govt.nz/Foreign-Relations/Antarctica/1-New-Zealand-and-Antarctica/0-nzstrat.php>
- Nicolson, H. 1954. *The Evolution of Diplomatic Method: Being the Chichele Lectures Delivered at the University of Oxford in November 1953*. London: Constable.
- O'Reilly, J. 2011. Tectonic history and Gondwanan Geopolitics in the Larsemann Hills, Antarctica. *PoLAR: Political and Legal Anthropology Review*, 34(2): 214-232.
- Scott, S.V. 2011. Ingenious and innocuous? Article IV of the Antarctic Treaty as imperialism. *The Polar Journal*, 1(1): 51-62.
- Secretariat of the Antarctic Treaty. 2007. *Final Report of the Thirtieth Antarctic Treaty Consultative Meeting*. Buenos Aires: Secretariat of the Antarctic Treaty.
- Vigni, P. 2007. The Secretariat of the Antarctic Treaty: Achievements and weaknesses three years after its establishment, in *Antarctica: Legal and Environmental Challenges for the*

Future, edited by Gillian Triggs & Anna Riddell. London: British Institute of International and Comparative Law: 17-37.

Weber, M. 2012. Delimitation of the continental shelves in the Antarctic Treaty area: lessons for regime, resource and environmental security, in *Antarctic Security in the Twenty-First Century: Legal and Policy Perspectives*, edited by Alan D. Hemmings, Donald R. Rothwell & Karen N. Scott. Abingdon: Routledge: 172-196.

White House. 2009. *National Security Presidential Directive/NSPD-62: Arctic Region Policy - 9 January 2009* (released 12 January 2009).

White House. 2010. *National Security Strategy, May 2010* .

Wilson, G.A. & Bryant, R.L. 1997. *Environmental Management: New Directions for the Twenty-First Century*. London: Routledge.

Woodward, G. 2007. Diplomacy, in *The Oxford Companion to Australian Politics*, edited by Brian Galligan & Winsome Roberts. Melbourne: Oxford University Press: 158-160.

6. The Utility of Official Antarctic Inspections: Symbolism without Sanction?

*Julia Jabour*⁵²

Introduction

In its modern history—less than 200 years old—the continent of Antarctica and its surrounding oceans have been discovered, explored, exploited (the marine resources) and subjected to a broad-ranging legal regime aimed at regulating and managing uses of the region and its resources. Some law came after the fact (e.g. the conservation of seals⁵³) and some pre-empted a rush on resources (e.g. the fishing convention⁵⁴ and the minerals convention⁵⁵). But the principal legal instrument that spawned all the others, and contained the ideological basis for today's management approaches, was the Antarctic Treaty of 1959.⁵⁶

This modest but visionary treaty, adopted during the paranoia of the Cold War but entering into force a mere two years later, established custody of the Antarctic in the hands of the twelve States parties that at the time held the most interest in the region. Some commentators suggest that the States parties included inspection provisions in the Treaty as the seventh of only fourteen articles as a means of maintaining the integrity of their agreement to use Antarctica for peaceful purposes only (Auburn 1982: 112–113; Watts 1992; Giuliani 1996). The fact that the Antarctic Treaty has endured for 53 years is testament to the degree to which these provisions have achieved their aims. This paper focuses on the what are termed the 'foundation' values of peace and science, as outlined in the Antarctic Treaty, because they are arguably the easiest to qualify. Other *values* typically expressed in relation to the Antarctic are vague and usually developed-country concepts such as 'wilderness', 'aesthetic' or 'intrinsic'. They are less clear because the potential for subjective definition is large and substantively tied to the specific socialisation of the person making the judgment. In an attempt to assess how well the values of peace and science have been maintained within the Antarctic Treaty System this chapter has taken as a starting point the specific provisions in the Antarctic Treaty relating

⁵² Institute for Marine and Antarctic Studies, University of Tasmania, Australia.

⁵³ ATS (Antarctic Treaty Secretariat) Compilation of key documents of the Antarctic Treaty System. Convention for the Conservation of Antarctic Seals (CCAS). [Online]. Available: http://www.ats.aq/e/ats_keydocs.htm (8 February 2012).

⁵⁴ ATS (Antarctic Treaty Secretariat) Compilation of key documents of the Antarctic Treaty System. Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). [Online]. Available: http://www.ats.aq/e/ats_keydocs.htm (8 February 2012).

⁵⁵ ATS (Antarctic Treaty Secretariat) Compilation of key documents of the Antarctic Treaty System. Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA). [Online]. Available: http://www.ats.aq/e/ats_keydocs.htm (8 February 2012).

⁵⁶ ATS (Antarctic Treaty Secretariat) Compilation of key documents of the Antarctic Treaty System. Antarctic Treaty. [Online]. Available: http://www.ats.aq/e/ats_keydocs.htm (8 February 2012).

to inspections—the de facto policing of these two values through the right of scrutiny of State party activities by other States parties. It then follows the path of inspections as they are included in subsequent instruments within the System: first, the Convention on the Conservation of Antarctic Marine Living Resources and then the Protocol on Environmental Protection to the Antarctic Treaty.

Inspection Provisions under Article VII of the Antarctic Treaty

The purpose of Article VII is two-fold. It was designed to ‘promote the objectives’ of the Treaty (Article VII.1). However, in the absence of an article in the Treaty expressly stating what its objectives are, it is assumed, *arguendo*, that they include Antarctica being used ‘exclusively for peaceful purposes’ and not becoming ‘the scene or object of international discord’ and the continuance of ‘freedom of scientific investigation’—all of which are mentioned, without qualification, in the Treaty’s Preamble. Article VII also outlines the extensive—though not unlimited (Auburn 1982: 111–112) rights of inspection and observation of stations, installations and platforms. The aim of these rights is to encourage compliance with the prohibitions contained within the Treaty. These are specifically a prohibition on military activities (except for logistic support) and the testing of weapons (Article I), and nuclear explosions and the disposal of radioactive waste (Article V). It has been noted that once the Treaty was adopted, and the right to inspect was confirmed, there appeared to be no real need to do so (Auburn 1982: 111–112) and indeed evidence shows that more than half of the Consultative Parties have never taken up this right (Huber 2011: 92). Nevertheless, it has been claimed that the deterrence effect of these provisions set a precedent between the superpowers (the USA and the then Soviet Union) for arms limitations discussions elsewhere (Auburn 1982: 111–112).

The inspection provisions are also data-gathering tools for the States Parties. In addition to permitting a search for compliance with military-related prohibitions, there is also a requirement for Parties active in the Antarctic to provide information on their activities. Article VII.5 states that:

Each Contracting Party shall, at the time when the present Treaty enters into force for it, inform the other Contracting Parties, and thereafter shall give them notice in advance, of

- a) all expeditions to and within Antarctica, on the part of its ships or nationals, and all expeditions to Antarctica organized in or proceeding from its territory;*
- b) all stations in Antarctica occupied by its nationals; and*
- c) any military personnel or equipment intended to be introduced by it into Antarctica subject to the conditions prescribed in paragraph 2 of Article I of the present Treaty.*

Expeditions or military personnel under a State’s jurisdiction or departing from their territory are not necessarily the same thing. Gateway cities such as Hobart (Australia), Christchurch

(New Zealand), Cape Town (South Africa) and Ushuaia (Argentina) all have expeditions from a range of State parties departing from their ports.

This attempt at transparency in Article VII augments earlier provisions (Article III), under which States Parties are encouraged to exchange scientific personnel, information on plans for scientific programs and the results of scientific research in Antarctica, ostensibly for the sake of mutually beneficial cooperation and efficiencies of operation. This exchanged information gives inspectors a basis from which to compare what is being reported by a State Party through the Article III information channels with what is observed first hand in the Antarctic.

The provisions of Articles III and VII together amount to a full and frank disclosure of all authorised human activity in the Antarctic. But the actual mechanisms of inspection and reporting attract criticisms about their efficacy. For logistical reasons it is necessary for inspectors to give advance notice; Antarctica is not a place that encourages or supports spontaneous visits. While giving advance notice in theory nullifies the objective of the inspection by providing opportunity to conceal evidence of aberrant behaviour, there is no evidence of practice to either obstruct inspectors or conceal information from them. Rather, anecdotes tend to support the idea that breaches or potential breaches are treated with indifference by the perpetrators (Auburn 1982: 113–114). No matter what an inspection report eventually contains, the responsibility for rectifying any problems remains solely with the State party that was inspected.

Inspection Provisions under Article 24 of CCAMLR

The concept of observation and inspection was carried over into the fishing convention, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), which was adopted in 1980 and entered into force in 1982. All of the original signatories to the Antarctic Treaty were original CCAMLR signatories and then States parties.

Article 24 establishes a system to ‘promote the objective and ensure observance of the provisions of [this] Convention’. Article 2 of CCAMLR expressly states:

1. *The objective of this Convention is the conservation of Antarctic marine living resources.*
2. *For the purposes of this Convention, the term “conservation” includes rational use.*

Compliance with ‘conservation measures’—the annual update of regulations agreed by the Commission Members by consensus and aimed at promoting sustainable fisheries within an ecosystem based management approach—is monitored through a suite of rules. These are firstly contained within Articles X, XX, XXI and XXII of the Convention, and augmented with stronger or more direct regulations through specific conservation measures.

Article X contains the general compliance requirement for both States Parties and non-parties:

ARTICLE X

1. *The Commission shall draw the attention of any State which is not a Party to this Convention to any activity undertaken by its nationals or vessels which, in the opinion of the Commission, affects the implementation of the objective of this Convention.*
2. *The Commission shall draw the attention of all Contracting Parties to any activity which, in the opinion of the Commission, affects the implementation by a Contracting Party of the objective of this Convention or the compliance by that Contracting Party with its obligations under this Convention.*

In addition to the requirement in Article XX to exchange scientific information, CCAMLR urges all States Parties to be more specific about how they implement conservation measures:

3. *The Members of the Commission shall provide to the Commission at such intervals as may be prescribed information on steps taken to implement the conservation measures adopted by the Commission.*

Article XXI establishes that the States Parties are responsible for imposing flag and national jurisdiction over activities under their control. Actions taken under this article are to be reported to the CCAMLR Commission.

Article XXII—similar to Article X of the Antarctic Treaty—suggests that the States Parties should treat CCAMLR as an objective regime, i.e. one applying to all countries, whether or not they are party to the Convention, using the phrase ‘to the end that no one engages in any activity contrary to the objective of this Convention’.

Finally, Article XXIV sets out the schemes of inspection and scientific observation to assess and enhance compliance. These schemes, along with other specific conservation measures dealing directly with compliance, form strong deterrence and compliance incentives (CCAMLR 2012), though they have not been without their problems. The objective of the CCAMLR convention is the conservation of marine living resources, including their rational use, and it is rather a long bow to suggest that this accords with the values of peace and science in the Antarctic Treaty—the subject of this chapter. However it should be noted that the Southern Ocean has become the scene of discord through the insidious practice of illegal, unreported and unregulated (IUU) fishing (by both Commission Members and non-members) and through protest action against the conduct of scientific research on whales. While these activities do not directly threaten peace on the Antarctic continent, they have turned an unfavourable spotlight on the Southern Ocean (Kaye 2007; Turner et al 2008; Jabour and Iliff 2009).

With the adoption of the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol⁵⁷) in 1991, the whole of the Antarctic continent, but arguably not the [activity of

⁵⁷ ATS (Antarctic Treaty Secretariat) Compilation of key documents of the Antarctic Treaty System. Protocol on Environmental Protection to the Antarctic Treaty. [Online]. Available: http://www.ats.aq/e/ats_keydocs.htm (8 February 2012).

fishing in] Southern Ocean, became viewed through an environmental lens. In this instrument, the original rationale for inspections developed in the Antarctic Treaty was thus substantially altered, with the ATCM 'no longer concerned with demilitarization but rather protection of the Antarctic environment against the consequences of mankind's increasing access to the continent' (Huber 2011: 90).

Inspection Provisions under the Madrid Protocol

Inspection provisions are expressly outlined in Madrid Protocol Article 14, even though Article VII of the Treaty is still applicable since the Protocol is linked directly to the Treaty. The objective of Article 14 is made more apparent than that of its parent article:

- 1. In order to promote the protection of the Antarctic environment and dependent and associated ecosystems, and to ensure compliance with this Protocol, the Antarctic Treaty Consultative Parties shall arrange, individually or collectively, for inspections by observers to be made in accordance with Article VII of the Antarctic Treaty (Article 14.1, emphasis added).*

The language here appears stronger than in the Treaty provisions, where it is simply the facilities that shall be made available for inspection. Article 14 then establishes

- who observers are (14.2);
- the requirement to cooperate with an observation team ('shall co-operate fully'; 14.3); and
- the distribution and consideration of reports (14.4).

The final point outlines the pathway of an inspection report, first submitted to the State party responsible for the facilities and documents inspected and giving the State the opportunity to comment. Article 14 permits inspection teams to scrutinize all records required under the Madrid Protocol. These, presumably, contain information on all authorised human activity for which the State Party is responsible. The report is then circulated to all Antarctic Treaty Consultative Parties (ATCPs) and the Committee for Environmental Protection (CEP). Reports end up on the table at the following Antarctic Treaty Consultative Meeting (ATCM) and eventually are made public. The pathway is clear and unambiguous, but does not alter the fact that responsibility ultimately rests with the State party and no official sanction is provided for.

To achieve the objective of the comprehensive protection of the Antarctic environment and its dependent and associated ecosystems, values within which human activities must be framed are articulated in the Madrid Protocol. First, it designates Antarctica 'a natural reserve devoted to peace and science' (Article 2)—strictly speaking, a legally meaningless phrase that nevertheless illustrates relatively clearly the intent and emphasis of the States parties at negotiation. Secondly, value-laden adjectives such as 'biological', 'scientific', 'historic', 'aesthetic', 'intrinsic' and 'wilderness' are given throughout the Protocol as context for its environmental principles. These terms are not specifically defined therefore there is plenty of room for idiosyncratic interpretation by States parties. It is commonly accepted that consensus

decision-making, of the kind adopted and practiced by the ATCPs, leads to ‘flexibility’ of interpretation—although this is not necessarily seen as a negative attribute. This flexibility is sometimes referred to as ‘bifocalism’ (Stokke 1996: 129; Boyce and Press 2011: 286–90; Press 2012). Bifocalism most commonly arises in the context of the acknowledgement of claims to Antarctic territory established in the Treaty’s Article IV, but the tacit agreement among all Parties to suspend all *argument* about claims to allow them ‘to collaborate and work together for common goals’ (Press 2012: 116).

Finally, it is important to also note that there are express compliance provisions in Article 13 of the Madrid Protocol, the key elements of which are contained in two of its five paragraphs:

1. *Each Party shall take appropriate measures within its competence, including the adoption of laws and regulations, administrative actions and enforcement measures, to ensure compliance with this Protocol.*
2. *Each Party shall draw the attention of all other Parties to any activity which in its opinion affects the implementation of the objectives and principles of this Protocol.*

The weakness is the phrase ‘within its competence’ and as the following examination of inspection reports confirms, it is a weakness that renders inspections virtually useless in practical terms, although due acknowledgement should be given to the prospect that the members of inspection teams could learn some valuable lessons they could then apply to their own infrastructure.

Article 14 Inspections

The companion document for inspectors is contained in Resolution 3(2010) adopted at ATCM XXXIII. This Resolution revises previously adopted inspection checklists, e.g. Checklist 'A' (permanent Antarctic stations and associated installations) agreed in 1994 (ATCM XVIII), Checklist 'B' (vessels within the Antarctic Treaty area) and Checklist 'C' (abandoned Antarctic stations and associated installations) adopted through Resolution 5 (1995) at ATCM XIX. The Resolution lists the categories of information to be collected during an inspection and is both a tool for guiding and standardising inspections and for simplifying comparisons between reports. It also provides a mechanism for demonstrating transparency. There is only one small section relating specifically to compliance with the Madrid Protocol—Section 11: Matters related to the Madrid Protocol. This section covers environmental impact assessment, the conservation of flora and fauna, waste management and management of protected areas. As Giuliani pointed out in his paper (written prior to the entry into force of the Protocol and at the time of the first checklist) a checklist does not limit the actions of inspectors (Giuliani 1996: 462).

Following and augmenting the work of Giuliani (1996) and various papers submitted to ATCMs, including one by the Antarctic and Southern Ocean Coalition examining inspections from 1959–2001 (ASOC 2003), this research examined inspection reports filed since the entry into force of the Madrid Protocol in 1998 to determine the frequency and intensity of inspections, the

locations and the findings. From this information it was anticipated that some objective judgment could be made about the utility of inspection reports for helping to maintain the foundation values of peace and science. The methodology was simple and preliminary and points to weaknesses that require further examination.

Frequency and Intensity of Inspections

Figure 1 represents the total frequency and intensity of inspections, which included among other things, current and abandoned scientific bases, historic sites and monuments, specially protected and managed areas, and ships. Of note is the erratic number of inspections, ranging from none to 40 in any season. For two consecutive seasons, 2001/02 and 2002/03, there were no inspections, which may have been an artefact of the terrorist bombings of 9/11 (2001). Similarly, there were no inspections during the International Polar Year 2007/08 when it seems likely that resources were diverted away from inspections and into scientific research programs for the IPY. Alternatively, in the 2004/05 season there was a very large joint exercise with Australia, Peru and the United Kingdom inspecting the plethora of Antarctic Peninsula stations, along with Australia's lone inspection of the many facilities in the Ross Sea (including historic sites and Specially Protected Areas, of which there are a number; see Appendix 1).

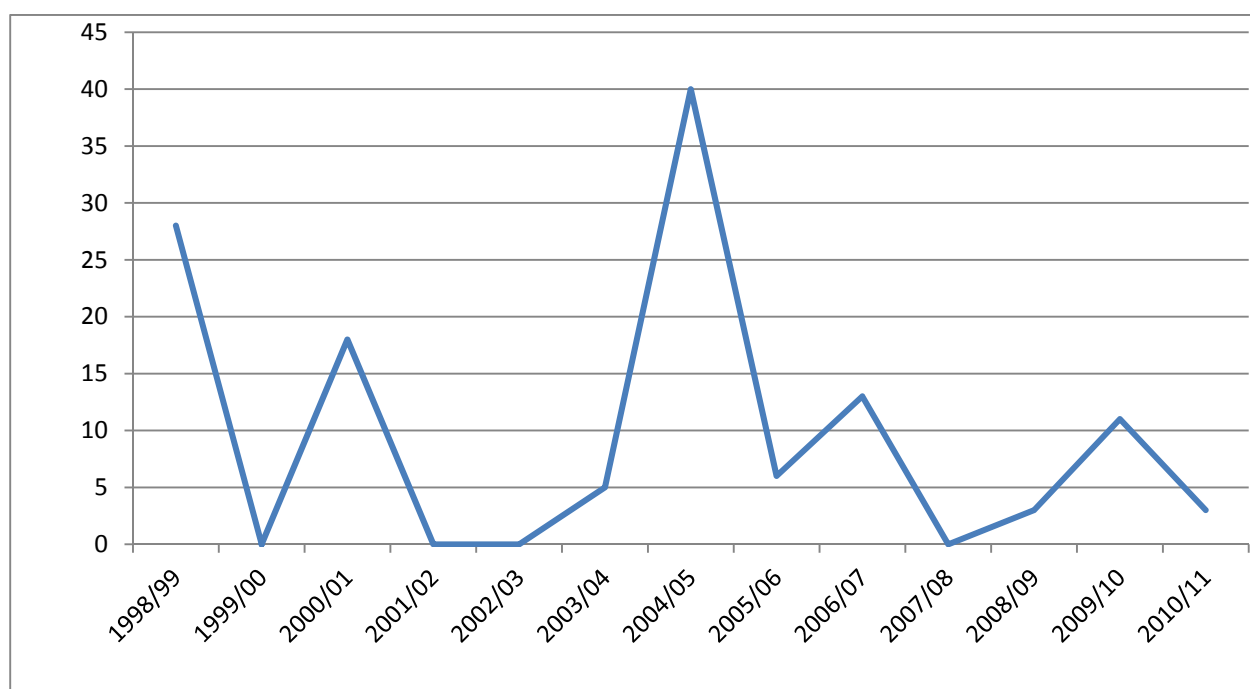


Figure 1: Number of inspections per season since the entry into force of the Madrid Protocol in 1998 (Source: Antarctic Treaty Secretariat [http://www.ats.aq/e/ats_governance_listinspections.htm])

Identity of Inspecting States

It is perhaps to be expected that those countries carrying out most of the inspections had both the motivation to do so (for example, they are claimants, or with reservations to claim in the future) and the means (they are developed countries, with the possible exception of Peru). Note that numbers in Figures 1 and 2 do not tally because most inspection teams visited and observed more than one facility.

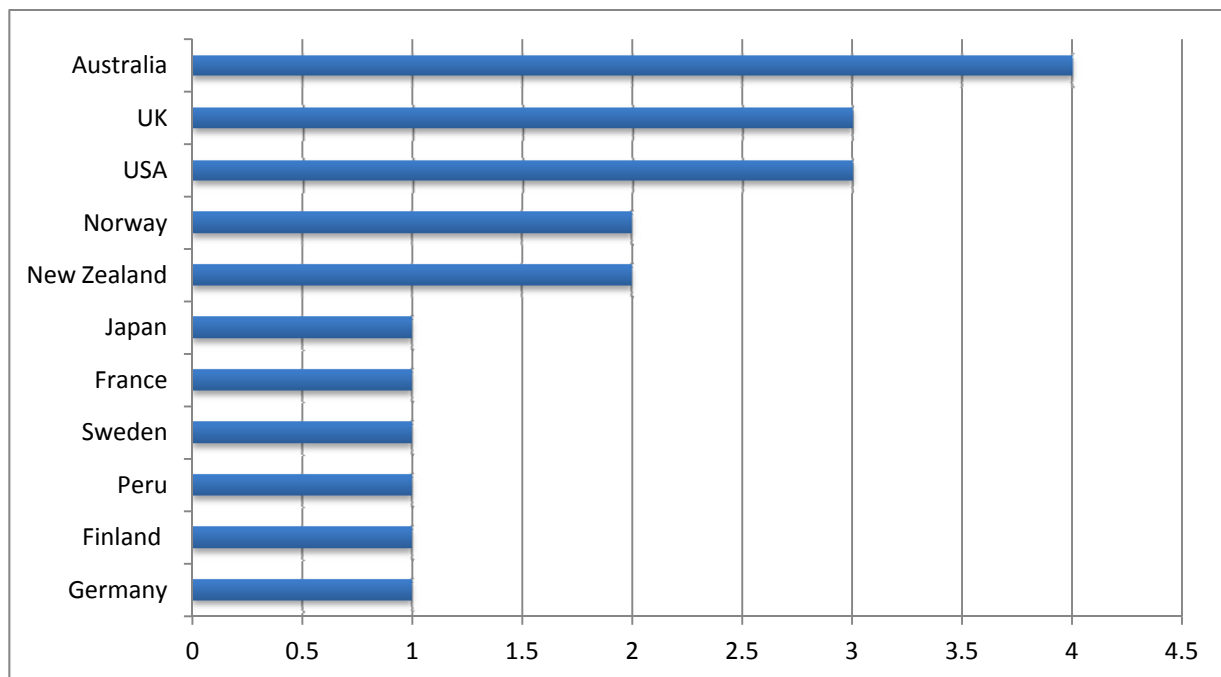


Figure 2: Identity of inspecting States since the entry into force of the Madrid Protocol in 1998
(Source: Antarctic Treaty Secretariat

[http://www.ats.aq/e/ats_governance_listinspections.htm])

Locations of Inspections

Appendix 1 (to be read in conjunction with the map on p. 858) identifies the approximately 127 locations of inspections during this 13-season study. Clearly the majority were carried out at locations in the Antarctic Peninsula and Dronning Maud Land because of their relative accessibility and proximity of facilities to each other. It is of note, however, that one of the

⁵⁸ A map showing the locations of inspections was envisaged but because the majority were on the Antarctic Peninsula, where there are many facilities within close proximity, and with a sparse scattering of other locations across the entire continent, it was impossible to represent the findings in fine scale. Instead, the Appendix 1 list should be read in conjunction with the map on p. 8.

most inaccessible places in Antarctica, Russia's Vostok Station, was inspected by Australia in 2010/2011.

While this initial research has revealed that a number of locations have been inspected more than once, of note are the following scientific research stations that have been inspected more than twice during this period:

- Bellingshausen (Russia, x4)
- Esperanza (Argentina, x3)
- Great Wall (China, x4)
- Juan Carlos I (Spain, x3)
- (St) Kliment Ohridsky (Bulgaria, x3)
- Rothera (UK, x3)
- SANAE IV (South Africa, x3)
- Troll (Norway, x3)

For the purposes of illustration only, from all of the above inspections, three all year round stations – Great Wall (China) and Rothera (UK) in the Peninsula and SANAE IV (South Africa) in Dronning Maud Land, East Antarctica have been chosen for closer examination, the rationale being that these reports of repeated inspection might provide evidence of the value of inspections in encouraging compliance with the Madrid Protocol. Note that others, such as Russia's Bellingshausen, the Bulgarian or Spanish stations could have equally served the purpose for this preliminary examination.

Findings of Inspections

Great Wall Station

Great Wall was inspected in 1998/99 by Germany and the United Kingdom (Germany/UK 1999); in 2000/01 by the United States (US 2001); in 2004/05 by the joint inspection team from Australia, Peru and the United Kingdom (Australia, Peru and UK 2005); and again in 2006/07 by the United States (US 2007).

It was noted in these reports, along with all others examined for this research project, that no infringements of the Antarctic Treaty were uncovered. However there were a number of potential and actual breaches of the Madrid Protocol, and evidence of bad practices enhancing the possibility of environmental damage.

In the 1998/99 report by Germany and the UK, for example, the team noted generically that there was a lack of up-to-date information available, which made the job of inspectors difficult and sometimes meant that communication to provide advance notice of the inspection was unsuccessful. The inspectors were careful not to apportion 'blame' for poor environmental practices to any one of the stations visited. However, a best practice list appeared at the end of the report and while Rothera appeared a total of eight times in relation to good practices, Great

Wall Station did not appear at all. Further, while there was a general comment about infringements of the Madrid Protocol relating to the presence of houseplants in soil, a tank containing tropical fish and vegetables being grown, no direct reference was made to particular stations. This made it difficult to determine which stations were being referred to and accordingly, whether practices might have been modified as a result of inspections. The existence of inspection checklists does not seem to have interfered with inspection diplomacy.

Not all inspection reports were as diplomatic in their language or as committed to the widely-held 'no blame' practice (or bifocalism in another form). In 2006/07, the US commented on the presence of polystyrene beads at Great Wall, which were supposed to have been removed from the Treaty Area according to the Protocol Annex III Article 2.

None of these relatively minor breaches of the Madrid Protocol seem particularly offensive to the environmental values of the Antarctic, although strictly speaking they are. When breaches are contained or secluded within a structure already intruding on the landscape, it seems churlish to cast houseplants and tropical fish as offensive.

Rothera Station

Rothera was inspected in 1998/99 by Germany and the United Kingdom; in 2004/05 by Australia, Peru and the UK; and again in 2006/07 by the USA.

Overall, Rothera was considered a well-managed station with excellent science and collaborative programs in place. However it did receive minor criticism about environmental evaluation of fuel drum storage in depots off station. The British Antarctic Survey (BAS) responded to the inspection report and maintained that environmental evaluation had been conducted and the activities (fuel depots) were found acceptable, with a less than minor or transitory impact. Furthermore, the ATCM was informed that copies of Preliminary Assessments were available from BAS.

This raises a widespread concern about the disparities found by inspection teams in relation to environmental evaluations. Disparities were noted by the German/UK report in 1999/00, when lack of understanding and experience would be forgivable considering that the Protocol had only been in force for less than two years. However, it was also noted in 2006/07 when the US conducted their inspection of, among other stations, Rothera. The weakness in the Madrid Protocol's Article 8/Annex I provisions which allow EIA to be conducted by the proponent of the activity (albeit sometimes by different administrative units within the same organisation), and with no veto power by the ATCM, are well known and exist in fact. The results of discretionary evaluations are differing standards and applications, which have consequences for how environmental measures are operationalised *in situ*; as Japan reported in 2010: 'Disparities were found among the stations with regard to the level of environmental protection measures, reflecting different physical, financial and other circumstances of respective stations' (Japan 2010).

Unlike the rather innocuous tropical fish—unlikely to survive an accidental release, a poorly constructed or badly maintained fuel depot has the potential to be of real significance in this discussion. The leaching of fuel into the substrate—almost impossible to comprehensively clean up, and the ugliness of the site is offensive in both an environmental and aesthetic sense.

SANAE IV

SANAE IV was inspected in 2000/01 by Norway (Norway 2001); in 2003/04 by Finland (Finland 2004); and in 2009/10 by Japan (Japan 2010).

In 2003/04, the Finnish team found the South African station, SANAE IV, ‘outstanding’ (Finland 2004: 12). It was reported as having good environmental practices—although according to the later Japanese inspection, potted plants previously noted to be in breach of the Protocol had been removed (Japan 2010: 12), and the South Africans were conducting a good range of scientific activities.

SANAE IV is one of a number of inland stations, and these locations have a different range of operational constraints to coastal stations. For example, there may not be wildlife in their vicinity therefore the need for strict regulation of interaction with wildlife is less of an imperative. However, these stations have greater difficulty disposing of wastewater, for example, and the Norwegian Inspection in 2000/01 noted SANAE IV as discharging effluent onto the ice-free Vesleskarvet cliff face nearby, which is prohibited under the Madrid Protocol Annex III Article 4.1 (Norway 2001: 39).

The discharge of wastewater onto an ice-free area is a subject of some concern. Like fuel, waste liquids would be impossible to clean up and would make a perhaps significant mark on the landscape—undesirable from a number of angles. But the fact that no alternative discharge practice was noted in subsequent inspections of SANAE IV undoubtedly reflects the operational realities of the location.

Key Findings

In this very brief and preliminary examination of a random selection of reports of inspections carried out under Article VII of the Antarctic Treaty and Article 14 of the Madrid Protocol, a number of common features have become apparent:

- Inspections were seen to ‘promote openness and stimulate cooperation and it was seen as an advantage to have “new eyes” to judge ongoing activities’ (Norway 2001: 10);
- Inspections were seen to have value because they could be used to verify information required to be exchanged under the Antarctic Treaty;
- In many cases, reports stopped short of openly naming stations where minor breaches had occurred (the presence of fish and plants, for example), therefore it was not possible to adequately compare different inspections of the same location for changes

- in behaviour or compliance;
- No infringements of the Antarctic Treaty were found in this 13-season study;
- In some cases, it was noted that minor infringements of the Madrid Protocol had been addressed. For example, in 2001 a US inspection team reported that Bellingshausen Station was collecting waste, including metal, to be removed, and a subsequent inspection by the US in 2006/07 reported that the waste had, in fact, been removed (US 2007: 39). Anecdotes in a similar vein record the removal of explosives and houseplants contained in non-sterile soil.
- Behaviour and practices that could lead to major environmental damage did not appear to alter, however. For example, fuel handling was reported as a major cause for concern in the German/UK 1998/99 Inspection, the Norwegian 2000/01 Inspection and the Finnish 2003/04 Inspection of different locations around Antarctica. Australia reported in its joint inspection in 2004/05 that, 'At some stations, fuel is transferred up to 5 times from the resupply vessel to its final destination in power generation' (Australia, Peru and UK 2005: 7). Given that a fuel spill on land is a very likely scenario, the lack of action to address fuel handling is suspected to be a practical constraint.
- Other infringements (the presence of polystyrene, open incinerators, effluent discharge) do not appear to have been dealt with in a satisfactory manner, i.e. reporting and subsequent discussion at the CEP or ATCMs did not appear to alter behaviour.

Conclusions

Great disparities exist between States parties regarding interpretation and operationalisation of the Madrid Protocol, despite offers of assistance, guidelines, checklists and manuals, and recommendations for improvements made in inspection reports. It is likely that such disparities will continue to exist because capacity, culture and politics are practically and politically outside the control of the CEP and the ATCM. There have been calls for institutional development to make the ATCM, for example, more effective in environmental matters, however as Huber points out (2011: 93) any issue that might have 'embarrassing political consequences' is avoided in order to protect the sensitivities of various Parties. The no-blame practice is likely to prevail under these circumstances.

Some facilities such as Belgium's new Princess Elisabeth station are exemplars of how well Antarctic stations can be managed, environmentally. The architecture of Princess Elisabeth and the philosophy of its managers addresses all of the significant values outlined in the Protocol, except of course for the obvious landscape values of wilderness and aesthetics. The station will run almost entirely on alternative energy (solar and wind) although it is noted that this advanced technology was only possible because the new station was partly funded by public subscriptions (Japan 2011: 33). Even an exemplar station such as this will still have an impact on the landscape that some would judge unacceptable. Others, such as the old Russian station, Novolazarevskaya, are far from perfect, due mostly to resource-poor operators. The Norwegian Inspection of Novolazarevskaya in 2000/01 reported that: 'It was clear to the inspection team

that there had been no major changes at the station (with respect to either installations or operations) since the last inspection in 1996' and they referred the reader to previous inspections by Sweden in 1994 and Norway in 1996 (Norway 2001: 24).

However, some of the criticism raised within the inspection reports examined and eluded to here, leads to a suggestion that the problems stem from as much from systemic negligence and/or disinterest, as capacity. Criticisms are not directed at the station personnel, who were often living and working under quite austere conditions but rather at the culture of the operators (and to a lesser extent staff in general).

This preliminary research did not uncover compelling evidence of extensive changes in behaviour as a result of inspections, therefore it can be surmised that the utility of inspections, both under the Treaty, CCAMLR to a degree, and the Protocol, is more symbolic than practical. In the case of the Treaty and the Protocol, States parties exercise their rights to inspect if they so choose (Figure 1), and accept their duty to be inspected (Appendix 1) and there is no evidence of deliberate obstruction or concealment. The parties who have carried out inspections are those who could reasonably be expected to have the means and/or the motive to do so—and there is ample evidence of collaboration and cooperation in conducting inspections. This collaboration and cooperation lends a measure of legitimacy and credibility to inspections and mitigates the potential for bias by one Party against another.

However it cannot be concluded that the provisions of the Madrid Protocol are being adhered to strictly in all cases, primarily because of operational realities. The discovery of a few houseplants or tropical fish is neither here nor there in the scheme of things; of more concern are fuel depots and poor environmental practices relating to waste management. In many cases it seems that better behaviour is constrained by operational realities, which then begs the question: How can Parties to the Madrid Protocol appropriately and adequately comply with the values of the Protocol yet maintain a safe, secure and properly functioning work environment for their scientific research personnel?

The evidence provided in this preliminary examination of inspection reports supports the suggestion that Parties intentionally prioritise Antarctic values and rank 'scientific' value as number one, equally with 'peace'. The value of 'peace' must be related back to its origins, i.e. the prohibition of military activities or nuclear explosions and disposal of radioactive waste, in order to foster scientific cooperation and the conduct of scientific research. There is no evidence in the inspection reports examined of any breaches of these prohibitions during the operations of bases or the conduct of research. The other values—'wilderness', 'aesthetic' and 'intrinsic'—all relate to the state of the environment and ways of perceiving human impact on what must originally have been considered a 'pristine' environment. But these are nebulous and subjective terms, making it almost impossible to qualify how Parties ensure that they are taken into account consistently in the planning and conduct of their individual activities in the Antarctic. Further comprehensive research into actual compliance with all inspection recommendations is now required, commencing with reports from 1998 when the Protocol entered into force.

References

- Antarctic and Southern Ocean Coalition and United Nations Environment Programme. 2003. 'A Review of Inspections Under Article 7 of the Antarctic Treaty and Article 14 of its Protocol on Environmental Protection, 1959–2001' Information Paper IP118/Rev.1, ATCM XXVI (2003). Antarctic Treaty Secretariat. [Online]. Available <http://www.ats.aq> (8 February 2012).
- Auburn, F. 1982. *Antarctic Law and Politics*. London: C Hurst & Co.
- Australia, Peru and the United Kingdom. 2005. 'Report of Joint Inspections Under Article VII of the Antarctic Treaty and Article 14 of the Environmental Protocol. WP32 to ATCM XXVIII Stockholm, 2005. Antarctic Treaty Secretariat. [Online]. Available <http://www.ats.aq> (8 February 2012).
- Boyce, P. and Press, A.J. 2011. Diplomacy, in *Australia and the Antarctic Treaty System: 50 Years of Influence*. Edited by Marcus Haward and Tom Griffiths. Sydney: University of New South Wales Press: 286–290.
- CCAMLR. 2012. Summary of Conservation Measures and Resolutions in Force 2011/12. CCAMLR Commission. [Online]. Available http://www.ccamlr.org/pu/E/e_pubs/cm/11-12/toc.htm (8 February 2012).
- Finland. 2004. "Report of the Antarctic Inspection Team of Finland, 2004". Antarctic Treaty Secretariat. [Online]. Available <http://www.ats.aq> (8 February 2012).
- Germany and the United Kingdom. 1999. 'Report of a Joint Inspection Under Article VII of the Antarctic Treaty, Antarctic Treaty Inspection Programme: January, 1999'. Antarctic Treaty Secretariat. [Online]. Available <http://www.ats.aq> (8 February 2012).
- Giuliani, P. 1996. Inspections under the Antarctic Treaty, in *International Law for Antarctica*. 2nd Edition, edited by Francesco Francioni and Tullio Scovazzi. The Hague: Kluwer Law International: 459–474, at 460.
- Huber, J. 2011. The Antarctic Treaty: Toward a New Partnership, in *Science Diplomacy: Antarctica, Science, and the Governance of International Spaces*. Edited by Paul Arthur Berkman, Michael A. Lang, David W. H. Walton, and Oran R. Young. Washington, D.C.: Smithsonian Institution Scholarly Press: 89–95, at 90.
- Jabour, J and Iliff, M. 2009. Theatre sports in the Southern Ocean: Engagement options for Australia in whale research protest action, *Australian Journal of International Affairs*, 63:2, 268.
- Japan. 2011. 'Japanese Inspection Report 2010', IP4 to ATCM XXXIV, Buenos Aires 2011. Antarctic Treaty Secretariat. [Online]. Available <http://www.ats.aq> (8 February 2012), 9.

- Kaye, S. 2007. IUU Fishing in the Southern Ocean: Challenge and Response. In *Antarctica: Legal and Environmental Challenges for the Future*. Edited by Gillian Triggs G and Anna Riddell. London: British Institute of International and Comparative Law, 39–59.
- Norway. 2001. 'Report of the Norwegian Antarctic Inspection under Article VII of the Antarctic Treaty and Article 14 of the Protocol on Environmental Protection to the Antarctic Treaty. Antarctic Treaty Secretariat. [Online]. Available <http://www.ats.aq> (8 February 2012).
- Press, A.J. 2012. Strategic Bifocalism: National Views in an International Context, in *Australia's Antarctica*. Proceedings of a Symposium to mark the 75th Anniversary of the Proclamation of the Australian Antarctic Territory, Hobart, 24 August 2011. Edited by Julia Jabour, Marcus Haward and Tony Press. Hobart: Institute for Marine and Antarctic Studies Research Report #2: 115–119.
- Stokke, O.S. 1996. The Effectiveness of CCAMLR, in *Governing the Antarctic: The Effectiveness and Legitimacy of the Antarctic Treaty System*. Edited by Olav Schramm Stokke and Davor Vidas. Cambridge: Cambridge University Press: at 129.
- Turner, J, Jabour, J and Miller, D. 2008. Consensus or not Consensus: That is the CCAMLR question. *Ocean Yearbook*, Vol. 22, 117.
- United States. 2001. 'Report of the United States Antarctic Inspection – February 2 to February 16, 2001'. Antarctic Treaty Secretariat. [Online]. Available <http://www.ats.aq> (8 February 2012).
- United States. 2007. Antarctic Inspection Team, 'Report of Inspections under Article VII of the Antarctic Treaty and Article 14 of the Protocol on Environmental Protection', Antarctic Treaty Secretariat. [Online]. Available <http://www.ats.aq> (8 February 2012).
- Watts, A. 1992. *International Law and the Antarctic Treaty System*. Cambridge: Grotius Publications: 170–172.

APPENDIX 1

List of Inspections since the Madrid Protocol entered into force in 1998 (see map at xxx for locations of Stations. The Sundry Locations (including HSM, ASMA and ASPAs) are not featured on the map).

Stations

Aboa (Finland)	Mawson (Australia)
Amundsen-Scott South Pole (US)	McMurdo Station (US)
Arctowski (Poland) x 2	Molodezhnaya Station (Russian Federation; aerial observation)
Artigas (Uruguay) x 2	Neumayer (Germany) x 2
Bellingshausen (Russian Federation) x 4	Novolazarevskaya Station (Russian Federation) x 2
Brown (Argentina)	O'Higgins (Chile)
Capitán Arturo Prat (Chile)	Palmer (US) x 2
Casey (Australia)	Pedro Vicente Maldonado (Ecuador)
Comandante Ferraz (Brazil) x 2	Petrel (Argentina)
Concordia (France-Italy)	Presidente Arturo Frei (Chile)
Davis (Australia)	Princess Elisabeth Antarctica (Belgium) x 2
Decepción (Argentina)	Profesor Julio Escudero (Chile)
Druzhnaya IV (Russian Federation)	Risopatron (Chile)
Escudero (Chile)	Rothera (UK) x 3
Esperanza (Argentina) x 3	Ruperto Elichiribehety (Uruguay) x 2
Frei (Chile)	San Martín (Argentina)
Gabriel de Castilla (Spain) x 2	SANAE IV (South Africa) x 3
Gabriel Gonzalez Videla (Chile)	Scott Base (New Zealand)
General Bernardo O'Higgins (Chile)	Soyuz Station (Russian Federation)
Gondwana Station (Germany)	Syowa Station (Japan)
Great Wall (People's Republic of China) x 4	Teniente Luis Carvajal Villaroel (Chile)
Halley (United Kingdom)	Troll (Norway) x 3
Juan Carlos I (Spain) x 3	Unnamed Czech Station, James Ross Island (Czech Republic)
Jubany (Argentina) x 2	Vernadsky (Ukraine) x 2
King Sejong (Republic of Korea) x 2	Vostok Station (Russian Federation)
Kliment Ohridsky (Bulgaria) x 3	Wasa (Sweden)
Leningradskaya Station (Russian Federation; aerial observation)	Wilkes (Australia & US)
Maitri (India) x 2	Yelcho (Chile)
Marambio (Argentina)	

Sundry

Eco-Nelson (Non Governmental, South Shetlands; see <<http://www.econelson.org>>)

EPICA drilling site (Germany)

German Receiving Station at O'Higgins (Germany) x 2

Novo Runway and ALCI Airbase (Russian Federation and ALCI)

Petermann Island field camp (tour operations)

Ross Island tourist activities

Site of the former Georg Forster station (Germany)

Ships

Academic Ioffe (Tourist vessel)

Aurora Australis (Australian Program vessel)

Explorer II

Lyubov Orlova

Marco Polo (Tourist vessel)

Nathanial B Palmer (US vessel)

National Geographic Endeavour

Professor Molchanov (Tourist vessel)

ASPAs

ASPAs 116: Cape Bird, New College Valley

ASPAs 122: Arrival Heights, Hut Point Peninsula, Ross Island x 2

ASPAs 154: Cape Evans

ASPAs 157: Cape Royds

ASPAs 158: Hut Point, Ross Island x 2

ASPAs 168: Mount Harding

ASMAs

ASMA 2: McMurdo Dry Valleys

HSMs

HSM 18: Hut at Hut Point, Ross Island

HSM 19: Cross at Hut Point, Ross Island

HSM 20: Cross on Observation Hill, Ross Island

HSM 38: Snow Hill

HSM 54: Richard E. Byrd Historic Monument, McMurdo Station

HSM 55: Stonington- East Base

HSM 61: Base A, Port Lockroy x 2

HSM 62: 'Base F' (Wordie House) Winter Island x 2

HSM 63: 'Base Y', Horseshoe Island

HSM 64: 'Base E', Stonington Island

HSM 71: Whalers Bay, Deception Island

HSM 75: The A Hut of Scott Base

7. Hegemonic Definitions from the “North”: Environmental Concern as a Western Construct and its Applicability to the South African and Antarctic Context

Sean Beckett⁵⁹ and Heidi Prozesky⁶⁰

Introduction

Aitken (1977, as cited in Codling, 2001: 338) defines wilderness as “a human concept of a natural environment devoid of human influence”. Applying this definition to Antarctica, Codling (2000: 339) conceptualizes wilderness in the Antarctic as a recreation area devoid of human influence, including human activities associated with scientific research. From a legislative perspective, in Article 3 of the 1991 Protocol on Environmental Protection to the Antarctic Treaty, the Antarctic Treaty (AT) Consultative Parties committed themselves to “[t]he protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica, including its wilderness and aesthetic values” as “fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area” (AT System, 1991: 2).

Views such as these are constitutive of the way “the environment” has been framed in most western, Anglo-Saxon societies, which tend to focus almost exclusively on its intrinsic and aesthetic value. This framing of the environment typifies what Hannigan (2006: 39) refers to as “Arcadian” environmental discourse, which tends to assign a priceless aesthetic and spiritual value to nature. Moreover, Arcadian discourse often employs stereotypical images of pristine nature, which are then starkly contrasted with industrial society. As such, Arcadian discourse is juxtaposed to environmental justice discourse, which focuses on “incorporating environmental issues into the broader intellectual and institutional framework of human rights and democratic accountability” (McDonald, 2002: 3). Still today, “a local ideology which still sees the environment in terms of wilderness more than human livelihood” (combined with a globalized economy) is viewed as “the main enemy of environmental justice in South Africa” (Martínez-Alier, 2003: 135).

Environmental values often conflict with other values. Carlson and Van Staden (2006: 4-5) ask, for example, “should game reserves continue to be developed when a large proportion of South Africa’s population does not have adequate housing?” This tension is further illustrated by the 2005 South African National Attitudes Survey, which found that 40% of South Africans

⁵⁹ Department of Sociology and Social Anthropology, Stellenbosch University, South Africa.

⁶⁰ Department of Sociology and Social Anthropology and DST-NRF Centre of Excellence for Invasion Biology, Stellenbosch University, South Africa.

(especially Africans in urban informal areas) agree that nature conservation parks only benefit wealthy people (Struwig, 2010: 205). More recent (although not nationally representative) research conducted by the BBC World Service Trust found that the majority of South Africans are reluctant to tackle climate change, which they perceive as a “green issue” that concerns only the wealthy (2009: 5).

Such tensions between different ways in which the environment is constituted, and the way in which environmental issues are mediated through socio-economic status, need to be taken into account in attempts to measure environmental concern among the South African public at large. This is particularly relevant for South African society, which is characterised by especially large and persistent inequality in income distribution, resources and opportunities (Van der Berg, 2010: 3), and where the probability of having visited any national park in the country is significantly related to income (Turpie, 2003: 206). In addition, it may be argued that South Africa offers a special setting in which to examine public perceptions, awareness and behaviours regarding environmental issues. First, redressing of disparities that result from over 300 years of history requires addressing of primarily economic needs of those who have been historically disadvantaged, which directly affects the environment. Secondly, environmental rights have been enshrined in the South African Constitution, which connects the issue of civil rights and human dignity to environmental deprivation, and may lead one to expect a greater public awareness of environmental matters (Anderson *et al.*, 2007: 134). At the same time, the 2005 South African Social Attitudes Survey has shown that a third of South Africans agree that there are more important things to do in life than “protect the environment” (Struwig, 2010: 203).

Theoretical and methodological challenges associated with measuring environmental concern in the South African context are heightened in any attempt to measure South Africans’ concerns regarding the environment of Antarctica, as this environment remains “peripheral to the public imagination” (Van der Watt, 2011: 1). This paper therefore aims to critically discuss the multiple ways in which environmental concern can be operationalized, by focusing on the particular issues that may arise were one to consider measuring South African’s concern for the natural environment of the Antarctic region. While no study with this objective has yet been undertaken, it is important to consider how and why such a study might be conceptualized.

We argue that a thorough understanding of the social value that Antarctica may have for the majority of South Africans would be important for the development, in future, of any national policy regarding environmental conservation in Antarctica. In terms of the “rights-based” politics of South Africa in the post-1994 democracy, state institutions have had to engage in inclusive processes of deliberation and develop the “rules of the game” of legitimate environmental policymaking. Thus, attempts are made in environmental policymaking and practice to incorporate the diversity of discourses and take account of “multi-signification”, i.e. the recognition of the diversity of discourses on participants in the deliberation process (Oelofse *et al.*, 2009:486). Procedures for adequately representing the social voices of social groups in environment decision-making processes, we contend, requires the development of a clear understanding of how those social groups conceive of this “environment”.

Taking into account such “multi-signification” poses a challenge for the development of surveys of environmental concern, particularly those aimed at measuring concern about the Antarctic environment among publics in a diverse developing country such as South Africa. In order to develop a more sophisticated understanding of how environmental concern can be measured in different contexts, it first needs to be acknowledged that the general public – which itself varies according to variables relating to environmental concern, such as race, class and geographical (urban/rural) location – as well as environmental managers, policy makers and scientists circulate ideas on environmental values in the form of political, ethical and cultural discourses. With specific reference to Antarctica, this need is clearly expressed by an academic respondent in a recent study of tourism stakeholders, according to whom “Antarctica’s status as a wilderness will be increasingly challenged, and we will need, as a global community, to have a far more sophisticated debate about *what Antarctica means*” (Liggett *et al.*, 2011: 363 – italics added).

Against this background, this paper first considers the construct of environmental concern and how it has been conceptualized in social research. More specifically, it critiques the way cross-national surveys, such as the World Values Survey, have led to the application, in a context such as South Africa of a western ideal of what “the environment” constitutes – an ideal embodied in the “wild nature” of Antarctica that has, until now, been the focus of Antarctic scientists and, more recently, tourists. This ideal will not be criticized, but rather unpacked to highlight the nuances between different conceptions of what “the environment” constitutes, and the way in which cross-national surveys measure constructs that many poor people in developing nations may have never encountered. When applied to Antarctica, this raises unique challenges for the measurement of environmental values and concerns towards Antarctica among the majority of South Africans who have never visited a nature reserve, let alone Antarctica.

Towards a Broadening of Environmental Discourse

At present, and in line with the Arcadian discourse, a “conservationist paradigm” is adopted by most Antarctic scientists and tourism stakeholders, which includes an apprehension about increasing environmental pressures and disturbance through tourism development, and a strong conservation imperative that underlies their vision for future Antarctic tourism development and regulation (Liggett *et al.*, 2011: 363). Such a paradigm disregards the environmental justice discourse, which is driven rather by a collaborative natural resource management imperative, and is aimed at reducing conflict among stakeholders and addressing environmental, social, and economic issues simultaneously (Bernard & Young, 1997, as cited in Conley & Moote, 2003: 371). Although payments for ecosystem/environmental services interventions are often posited as “win-win solutions to contemporary ecological, developmental and economic quagmires”, these are modernist, technical interventions that stimulate economic market dynamics, and therefore fail to solve and/or replace complex socio-political dynamics, especially if the (colonial, racialised, capitalist, conservation) roots of these dynamics are ignored (Büscher, 2012: 29&39).

Environmental justice is an attempt to take these dynamics into account, and therefore tends to increasingly call into question the relevance of conservation areas to the lives of those in the developing world (Neumann, 2002: 5). These calls for “conservation justice” further suggest that local communities are entitled to receive fair treatment and meaningful involvement in the development and implementation of conservation policy (Ferketic *et al.*, 2010: 1168). This would not only require a broadening of environmental discourse beyond the Arcadian, but also stands in stark contrast to the argument that national or even international jurisdiction over a global commons, such as Antarctica, will decrease the exploitation of natural resources (Wijkman, 1982: 511). Is it indeed possible to conceptualize Antarctic “nature” in a more holistic way that extends beyond “green issues”, by considering “red agenda issues” (Cock, 2010; 2006), such as environmental rights, in particular rights of access to natural resources and decision-making?

From a methodological perspective, the hegemony of the Arcadian discourse and its definition of what “the environment” entails is not very useful as a basis from which to conceptualize and operationalize, in a developing country such as South Africa, the construct of environmental concern towards the Antarctic. Neumann (2002: 10) argues that “educated westerners” recognize certain landscapes as natural, as they have been trained to expect a particular vision through centuries of painting, poetry, literature and landscape design. In addition, the idea that nature can be preserved (for example, in parks) is culturally and socially produced and can be traced to certain historical processes in specific locales. This Anglo-American aesthetic does not take into account what nature means from a “non-western” perspective.

In contrast to this social constructionist perspective, an evolutionary argument is posited by Dutton (2010), i.e. that because humans have an inherent or biological love for landscapes, many aesthetic tastes are shared across cultures. However, it seems that the social constructionist perspective of Neumann (2002) is more useful to explain the “couldn’t-care-less” indifference, scepticism and lack of knowledge about the environmental problems facing Antarctica, which have been found to be predominant among many young Argentinians⁶¹, in one of the very few surveys on public attitudes towards Antarctica ever conducted (Acebo Ibáñez & Costa, 2010: 257, 259 & 261).

From a social constructivist perspective, measuring concern for an “environment” which is defined exclusively in terms of its aesthetic value will necessarily exclude “non-westerners” from displaying this hegemonic form of environmental concern, and will perpetuate certain stereotypical notions of who (in sociological terms) is concerned towards the environment. This is reiterated by Acebo Ibáñez and Costa’s (2010: 257) call, in their study of attitudes towards Antarctic environmental problems, to go “[b]eyond the original concept of environment, which has centred predominantly on its physical and natural specification as ‘ecological system’”. These authors therefore argue in favour of an emphasis on anthropological and socio-cultural

⁶¹ This is despite the fact that, in contrast to South Africans, many young inhabitants see Antarctica as a part of Argentinian national territory, rather than as a continent (Acebo Ibáñez & Costa, 2010: 260).

components which are inextricably integrated into any concept of environment. Applying this argument to attempts at understanding environmental concern should improve the validity of current measurements of environmental concern, especially those that are employed in cross-national surveys.

Conceptualising Environmental Values

According to Kalof and Satterfield (2005: xxii), there are two broad categories that underlie much of the values literature. The first category is known as axiomatic or axiom-focused values. The values that fall into this broad category are viewed as better or “truer”, which implies that these values are necessary to life, self-evident and intellectually defensible. Therefore environmental policy should be based on these axiomatic values. Axiomatic traditions are expert-driven, “with values set by assessment, argument or measurement produced by disciplinary specialists” (Kalof & Satterfield, 2005: xxii). These specialists may refer to academics or other researchers; often these specialists are not attendant to the opinions of stakeholders or non-specialists. Instead, these experts place emphasis on the functioning of ecosystems, or the intrinsic value of such systems.

The second category is referred to as the relativistic or subjectivist position. The values in this category are guided by the principle of expressed or revealed preference. Hence, there are no “right” or “wrong” preferences, only different ones. Researchers are expected to capture, but not judge or influence, these disparate perspectives during the process of drawing out the values. According to Kalof and Satterfield (2005: xxii), “the findings thus produced are used to inform people responsible for conducting benefit-cost analyses or land management decisions”.

From a cross-cultural perspective, two major dimensions of values have been suggested, i.e., traditional/secular-rational and survival/self-expressional values (World Values Survey, 2008: 6). This conceptualisation is linked to the post-materialist thesis, which primarily informs the measurement of environmental concern in cross-national surveys such as the World Values Survey, European Values Survey and the Health of the Planet Survey. The underlying assumption of this thesis is that only highly industrialised, wealthy nations show concern towards the environment (Dunlap & York, 2008: 529). This assumption is based upon (1) the emergence of environmentalism and green parties in North America and Northern European countries before anywhere else in the world; and (2) the cautious reaction of developing nations to the 1972 United Nations Conference on the Human Environment in Stockholm.

The post-materialist thesis posits that industrial societies have experienced a strong shift from a concern with economic and physical security, towards an emphasis on subjective well-being, self-expression and quality of life. Of particular relevance to this paper is the argument that self-expression values place a high priority on environmental protection (amongst other concerns) (World Values Survey, 2008: 6). In order to critically examine this proposition, it is necessary to consider more closely the relationship between values and behaviour, particularly as they pertain to the environment.

The Value-Action Gap

According to Callan *et al.* (1991, as cited in Willers, 1996: 25), values can be conceptualised as goals people strive for; they are central to a person's system of attitudes⁶² and beliefs, and play a deciding role in how attitudes are organised. Eagly and Chaiken (1993, as cited in Willers, 1996: 25) treat values as attitudes toward relatively abstract goals that a person strives towards. In addition, a distinction needs to be drawn between socio-cultural values and individual ones. Dietz *et al.* (2005: 335) argue that the social sciences⁶³ focus on four value clusters: self-interest, altruism, traditionalism, and openness to change. There has been consistent theoretical and empirical support for the existence of relationships between these values and environmentalism. However, there is a lack of literature concerning the causes of value change and the effects of value change on behaviour (Dietz *et al.*, 2005: 335).

In research pertaining to values there has been a discussion as to whether one can draw inferences about behaviour on the basis of a measurement of specific values or attitudes, i.e., the issue of attitude-behaviour correspondence (Carlson & Van Staden, 2006; Redclift & Benton, 1994, as cited in Kollmuss & Agyeman, 2002: 247). Carlson and Van Staden (2006: 24) state that "reasonable attitude-behaviour consistency cannot always be assumed". With specific reference to environmental values, Redclift and Benton (1994, as cited in Kollmuss & Agyeman, 2002: 247) argue that:

One of the most important insights which the social scientist can offer in the environmental debate is that the eminently rational appeals on the part of environmentalists for "us" to change our attitudes or lifestyles, so as to advance a general "human interest" are liable to be ineffective. This is not because [...] "we" are irrational, but because the power to make a significant difference, one way or the other, to global or even local environmental change, is immensely unevenly distributed. This new body of research points out that people's values are "negotiated, transitory, and sometimes contradictory".

This highlights the problem with the assumption that a display of concern towards the environment will automatically lead to pro-environmental behaviour. A similar assumption has been addressed by Kollmuss and Agyeman (2002: 242), who state that knowledge and awareness of environmental problems do not necessarily lead to pro-environmental behaviour, as mechanistic, linear and simplistic behavioural models would have us believe (Finger, 1994, as cited in Scott, 2011: 153). Thus, people may be aware of environmental issues, but might not

⁶² An attitude may therefore be conceptualised as a positive or negative evaluation of something quite specific (Dietz *et al.*, 2005: 346), whereas a value is more general in nature.

⁶³ Dietz *et al.* (2005) consider economics, political science, social psychology and sociology as constituting the social sciences.

act on this knowledge. Instead, they internalise this knowledge and reproduce it in their own “everyday discourses” (Smith & Pangasapa, 2008, as cited in Scott, 2011: 153), which has implications for any research conducted on environmental values and the way this research is conceptualised.

One reason for the value-action gap that has particular relevance for the measurement of environmental concern about Antarctica is that direct experience has a stronger influence on people’s behaviour than indirect experience does (Rajecki, 1982, as cited in Kollmuss & Agyeman, 2002: 242). A second reason relates to normative influence: if an environmentally unfriendly lifestyle is encouraged by the dominant culture, the gap between attitude and action will widen. Thus, in a country such as South Africa, which comprises a diversity of cultures, “variations in environmentally responsible behaviour may result from very different reasons” (Carlson & Van Staden, 2006: 24). Currently, however, the dominant social norm regarding pro-environmental behaviour in South Africa seems to be that such behaviour is “elitist and anti-development” (Scott, 2011: 159). The third reason concerns temporal discrepancy: if attitudes change over time and data are collected first about attitudes and only later on behaviour, inconsistent results would be produced. The final reason refers to attitude-behaviour measurement. Often the measured attitudes are much broader in scope than the behaviour that is being measured. For instance, the attitude “Do you care about the environment?” is usually measured against “Do you recycle?”

Practice-Based Understanding of Environmental Values

Reser and Bentrupperbäumer (2005, as cited in Hards, 2011: 130) state that the concept of environmental values has often been understood as a “psychological and/or social construct and parameter, residing within individuals, finding reflection and expression in human behaviour, institutions, and practices – and in human accounts, explanations, and rationalisations”. However, practice-based approaches conceptualise values differently, not as located within individuals, but as expressions of ideas circulating within society as cultural, ethical and political discourses and norms. “Therefore, environmental values are conceptualised as part of a broader system, which create emergent structures called practices” (Hards, 2011: 26). Practices can be defined by shared ideas, i.e., there exists a shared idea of what it means to live a low-carbon life. It is these shared values/ideas that make up a practice and limit as well as enable the thoughts and actions of those performing it (Hards, 2011: 26).

In a practice-based understanding of environmental values, social interaction is very important: when a group of people participate in a shared practice and engage in sustained interaction, they form a community of practice (Lave & Wenger, 1991, as cited in Hards, 2011: 26). Therefore, values are not inherent properties of individuals; rather, people express ideas that are circulating in their social environment. This highlights the fundamentally social nature of environmental values. Moreover, to understand these values better we need to consider what it means to express them as practices in society, including the way these practices interact with the dominant social norms in the society. This understanding of environmental values requires

a consideration of the dominant discourses about the Antarctic and how the different members of the AT conceive of Antarctica in their publics' imagination. This allows for an understanding of how the environmental values are assimilated into the public discourse of the specific countries. This is significant, because different worldviews of what Antarctica "means" may be observed both between and within countries.

The Construct of Environmental Concern

Environmental concern has been variously defined in the literature, ranging from the very broad "composite of environmental attitudes and environmental behaviours" (Parker & McDonough, 1999, as cited in Struwig, 2010: 212), to the very limited "positive attitudes towards preserving the environment" (Minton & Rose, 1997). In her research on environmental concern in South Africa, Willers (1996: 39) conceptualises such concern as "a psychological tendency expressed by evaluating issues related to degradation of the environment and depletion of natural resources with feelings of worry or distress". It is important to note that, included within this definition are behavioural intentions, in the form of active personal involvement concerning environmental matters (Willers, 1996: 43). The issue with such an operationalization of environmental concern is that often personal involvement concerning environmental matters is formalised through institutions, and requires access to and investment of personal financial resources. The absence of such resources again renders the majority of South Africans "not concerned" towards environmental matters, by virtue of the way in which such concern is measured. In addition, the legacy of discounting black participation in protected area management during apartheid has perpetuated the "simplistic and inaccurate" perception among conservationists that rural black populations have little interest in wildlife or biodiversity conservation per se (Picard, 2003: 182 & 189).

Taking Anthropocentric Orientations into Account

One way in which this issue may be addressed, is to take into account both "anthropocentric" and "ecocentric" dimensions of orientations when constructing scales to measure environmental concern, as Carlson and Van Staden (2006) have done in South Africa. The difference between these two dimensions lies in the motivations for expressing environmental concern. An anthropocentric orientation towards the environment generally highlights the utilitarian aspects of the environment⁶⁴. In contrast, an ecocentric orientation towards the environment focuses on the intrinsic value and the moral relevance of the natural world (Gagnon Thompson & Barton, 1994: 149, as cited in Carlson & Van Staden, 2006). This distinction is important, as it recognises the fact that concern regarding any "natural

⁶⁴ A weak version of anthropocentrism does, however, move away from this instrumentalist view. It considers human consciousness to be the source of all values, and is based on the belief that the experience of beauty is something that humans bring into the world (Hargrove, 1992: 204).

environment”, even the “pristine wilderness” of Antarctica, may be motivated either anthropocentrically or ecocentrically. This, in turn, leads to the recognition that different kinds of equally valid environmental concerns exist. For example, a New York urbanite who makes a financial contribution to the South African National Antarctic Programme exhibits a kind of environmental concern that differs completely from that exhibited by a grassroots activist defending South Africans’ constitutional right to a pollutant-free environment.

There is an interesting parallel to be drawn between environmental discourse currently driving environmental management in Antarctica on the one hand, and that which dominated during South Africa’s colonial and apartheid years, when environmental management legislation and policies focused exclusively on the ecocentric dimension, ignoring the anthropocentric. During apartheid, the dominant environmental ideology was characterised by a wildlife-centred, preservationist approach, which appealed mainly to the affluent, educated, white minority. Conservation areas were framed through “fences, patrols, breeding and cultivation programmes and, of course, research into bio-diversity” (De Beer & Marais, 2005: 51). Furthermore, conservation areas were off limits to all but the paying tourists. With regard to Antarctica, this exclusivism is illustrated by, for example, Bastmeijer, Lamers and Harcha’s (2008) argument in favour of regulation of permanent land-based facilities for tourism in Antarctica, i.e. that one of the components of an “Antarctic Wilderness Policy” would be to prevent permanent facilities and to keep tourism ship-based. Even though such a policy might not succeed in prohibiting human influence, there is still a concern and institutional discourse that advocates keeping Antarctica exclusive. This, we argue, echoes much conservation policy during the colonial and apartheid eras of South Africa.

The authoritarian and punitive model of conservation of the colonial and apartheid eras and the agenda of the mainstream environmental movement – i.e., the conservation of threatened plants, animals and wilderness areas – alienated most black South Africans from conservation issues, many of whom were hostile to what they perceived as an elitist concern, peripheral to their struggle for survival in a harsh socioeconomic and political climate (Khan, 2002: 15). In the South African context the concept of nature conservation has become intimately associated with dispossession and apartheid policies of the previous national government, the current social norm regarding conservation is still that it is elitist and anti-development, and development (conceptualised as economic growth and job creation) and conservation are viewed as two diametrically opposed options (Scott, 2011; Cock 2007). Against this background, the fact that significant public funds have been spent on Antarctic exploration and research⁶⁵, which have shown little, if any tangible returns (Van der Watt, 2011) to the average South African, becomes highly relevant from a political perspective.

⁶⁵ Recently, a R250 million base on Marion Island was inaugurated, and a R1.3 billion polar vessel built (Van der Watt, 2011: 12).

Taking Experience into Account

Willers and Van Staden (1998, as cited in Carlson & Van Staden, 2006: 8) suggest that environmental concern develops from interactions between individual subjective experience, personal factors, structures at the socio-level, and temporal and spatial structures. Furthermore, Van Staden (1983, as cited in Carlson & Van Staden, 2006: 10) argues that the expression of environmental concern may therefore be viewed as the result of a dynamic process of interactions between various factors at different levels of experience. By including experience into a measurement of environmental concern allows for a more inclusive notion of “who” (in sociological terms) is environmentally concerned. In other words, understanding what experiences a particular person had of his/her environment fosters an understanding of what type of environmental concern that person displays.

However, this focus on experience rather than on orientations is particularly problematic when one considers the measurement of environmental concern towards Antarctica. Although it has been found that tourism plays a very important role in fostering an awareness and interest in Antarctica, and that Antarctica is increasingly popular as a tourist destination (Liggett *et al.*, 2002: 363), the average tourist cannot physically experience the landscape of the continent, due to the high prices for land-based visits (Liggett *et al.*, 2011: 359). In the South African context, the “wild nature” of Antarctica continues to be the product of the experiences of a predominantly white minority of scientists⁶⁶, while the continent remains “peripheral to the public imagination” (Van der Watt, 2011: 1).

It has to be noted that numerically, South African scientists are actually in the minority in Antarctica, as engineers, ships’ officers, administrative staff, chaplains, engineers, pilots, doctors, construction workers, stewards, boatswains, chippies, crew are all necessary to facilitate South African research and presence in this environment (Van der Watt, 2011: 14). Of particular relevance to this study is that, among these diverse South African visitors to Antarctica,

[...] not every group nor individual necessarily experiences the environment the same way, nor is the role that nature play[s] in these experiences static [...] Not everyone going to Antarctica see it in terms of ‘wilderness’, in that sense. It is not a universal concept (Van der Watt, 2011: 14-15).

The Post-Materialist Thesis

As already briefly mentioned, the post-materialist thesis has produced a theoretical understanding of environmental concern as a luxury that is accorded a high position on Maslow’s hierarchy of needs, and as such only considered once more basic material needs have

⁶⁶ Only among South African scientists in Antarctica, did whites predominate (and still do), while in the wider context of the ATS, a less stark racial picture has obtained.

been fulfilled (Dunlap, 1975, as cited in Dietz *et al.*, 2005: 360). For example, Inglehart (1995) argues that mass support for environmental concern occurred in countries with publics that hold post-materialist values.

This hypothesis has sparked critique from a number of authors (e.g., Guha & Martinez-Alier, 1997; Lowe & Rudig, 1986; Brechin & Kempton, 1994), who argue that the post-materialist thesis emphasises value change rather than “objective environmental deterioration” (Dunlap & York, 2008: 531). The reason for this emphasis may be found in environmental sociologists’ tendency towards socio-cultural determinism in order to compensate for the environmental determinism propagated by geographers during the 19th and early-20th centuries (Hannigan, 2006: 2-3). Therefore, when measuring environmentalism, “objective” environmental conditions tend to be conspicuously absent from sociological analysis. Secondly, the post-materialist thesis is very similar to popular “modernization theories”, which assume that “continued economic development will lead to affluent, socially and politically tolerant industrial futures” (Roberts & Hite, 2002, as cited in Dunlap & York, 2008: 531). In addition, many empirical anomalies have been identified in the post-materialist thesis (*cf.* Dunlap & York, 2008; Brechin & Kempton, 1994; Dunlap & Mertig, 1997), which suggest that citizen concern for the environment is not dependent on national affluence, nor is it dependent on post-materialist values.

Nevertheless, the post-materialist thesis has undoubtedly become one of the most influential theoretical frameworks in cross-national and cross-temporal research (Bean & Papadakis, 1994) on social, economic and political values, and strongly informs the way in which environmental concern is measured in cross-national surveys. One could therefore assume that it would most probably inform future attempts at measuring South African’s concern for the natural environment of the Antarctic region. The way in which items are formulated within this theoretical framework do, however, fall prey to the pitfalls already mentioned, by (1) assuming access to financial resources needed to act in an environmentally concerned manner; and (2) employing a western, ecocentric conceptualisation of “environment” and the motivations that drive concern about that environment⁶⁷. Consequently, those who lack such resources and/or do not ascribe to the hegemonic conceptualisation of environmental concern, i.e. primarily the poor in non-western and developing countries, tend to be simplistically accorded the status of “environmentally unconcerned”, who exhibit a “couldn’t-care-less” indifference.

⁶⁷ Such ecocentrism is being increasingly replaced by an emphasis on the importance of ecosystem services, as popularised by the Millennium Ecosystem Assessment in 2003. This shift is arguably based on the recognition among environmental scientists and managers that a neoliberal discourse of (payment for) ecosystem services (Büscher, 2011) will be more useful in attempts to convince politicians to take action to conserve nature.

Concluding Remarks

Due to South Africa's colonial and apartheid past, environmental issues have always been political, and there is sensitivity (at least among environmental sociologists) about the potentially negative effects of perpetuating a hegemonic environmental discourse. These effects need to be taken seriously when considering what Antarctica – a place that only a very tiny fraction of the population ever sees – means to the majority of citizens of developing countries such as South Africa. The currently dominant Arcadian discourse of the AT needs to be recognised as one of a number of possible discourses on Antarctica. Thus, different ways in which the environment is constituted, in particular the environmental justice discourse and the way in which environmental values are mediated through socio-economic-status, need to be taken into account.

From an international perspective, marginalising developing countries through the perpetuation of a hegemonic Arcadian environmental discourse, in the development of both policy and social surveys, may undermine the legitimacy of the AT as a ruling body. Therefore, by creating a more inclusive notion of what the environment constitutes, at least when measuring concern towards the environment, would produce not only more valid findings, but also more inclusive management strategies based upon such findings, in the attempt to garner support and awareness of Antarctica.

Developing culturally appropriate scales for the measurement of environmental values of a multi-cultural and multi-lingual population is highly challenging. We hope that this paper may assist sociologists and other researchers interested in measuring environmental values, to develop the most context-appropriate way to conceptualize and operationalize such values, as well as to assist such researchers in assessing why environmental policies may not have been effective or well-received by the public. The urge to draw inferences about environmentally sound behaviour on the basis of a measurement of values should be resisted, as should the assumption of access to financial resources to act in an environmentally concerned manner. Rather, a practice-based understanding would assist in producing more valid findings concerning the environmental values of a more diverse population. Taking cognizance of different environmental discourses, as well as the various (anthropocentric in addition to ecocentric) dimensions of environmental orientations, should provide insight into why people have not adopted pro-environmental behaviours, or why they are simply not interested in Antarctica. Methodologically, we suggest more qualitative research to be conducted, in order to develop a practice-based understanding of environmental attitudes towards the Antarctic, as the basis for a more nuanced measure of environmental concern.

Acknowledgements

The authors hereby acknowledge the generous financial assistance, in the form of a core team member grant awarded to the second author by the DST-NRF Centre of Excellence for Invasion Biology, and which allowed the first author to present a first draft this paper at the SCAR Social Science Action Group Interdisciplinary Workshop in December 2011 in New Zealand. We would also like to thank the other workshop participants, the editors of the proceedings, and two anonymous reviewers for their useful comments and suggestions.

References

- Acebo Ibáñez, E. & Costa, M. 2010. Antarctic environmental problems: Attitudes and behaviours of young inhabitants of two Argentine cities (Buenos Aires and San Carlos de Bariloche). *Polar Record*, 46(238):257–263.
- Aitken, R. 1977. Wilderness areas in Scotland. Unpublished doctoral thesis. Aberdeen: University of Aberdeen.
- Anderson, B.A., Romani, J.H., Phillips, H., Wentzel, M. & Tlabela, K. 2007. Exploring environmental perceptions, behaviors and awareness: Water and water pollution in South Africa. *Population and Environment*, 28:133–161.
- Antarctic Treaty System. 1991. *Protocol on environmental protection to the Antarctic Treaty* [Online]. Available: http://www.ats.aq/documents/recatt/Att006_e.pdf [2012, February 29].
- Bastmeijer, K., Lamers, M. & Harcha, J. 2008. Permanent land-based facilities for tourism in Antarctica: The need for regulation. *Review of European Community & International Environmental Law*, 17(1):84–99.
- BBC World Service Trust. 2010. *Africa talks climate: Public understanding of climate change* [Online]. Available: <http://africatalksclimate.com/sites> [2011, September 21].
- Bean, C. & Papadakis, E. 1994. Polarized priorities or flexible alternatives? Inglehart's materialism-postmaterialism scale. *International Journal of Public Opinion Research*, 6(3):264–288.
- Bernard, T. & Young, J. 1997. *The ecology of hope: Communities collaborate for sustainability*. Gabriola Island: New Society.
- Brechin, S. & Kempton, R. 1994. Global environmentalism: A challenge to the postmaterialism thesis? *Social Science Quarterly*, 75:245–69.
- Büscher, B. 2011. The neoliberalisation of nature in Africa, in Dietz, T., Havnevik, K., Kaag, M. & Ostigard, T. (eds.). *New topographies of power? Africa negotiating an emerging multi-polar world*. Leiden: Brill. 84–109.

- Büscher, B. 2012. Payments for ecosystem services as neoliberal conservation: (Re)interpreting evidence from the Maloti-Drakensberg, South Africa. *Conservation and Society*, 10(1):29–41.
- Callan, V., Gallois, P., Noller, P. & Kashima, Y. 1991. *Social Psychology*. London: Harcourt Brace Jovanovich.
- Carlson, D. & Van Staden, F. 2006. Environmental concern in South Africa: The development of a measurement scale. *New Voices in Psychology*, 2(1):3–30.
- Cock, J. 2006. Connecting the red, brown and green: The environmental justice movement in South Africa, in Ballard, R., Habib, A. & Valodia, I. (eds.). *Voices of protest: Social movements in post-apartheid South Africa*. Scottsville: University of KwaZulu-Natal Press. 203–224.
- Cock, J. 2007. Sustainable development or environmental justice: Questions for the South African labour movement from the Steel Valley struggle. *LABOUR, Capital and Society*, 40(1&2):36–55.
- Cock, J. 2010. Connecting nature, power and justice, in Heineken, L. & Prozesky, H. (eds.). *Society in focus – Change, challenge and resistance: Reflections from South Africa and beyond*. Cambridge: Cambridge Scholars Publishing. 43–53.
- Codling, R. 2001. Wilderness and aesthetic values in the Antarctic. *Polar Record*, 37(203):337–352.
- Conley, A. & Moote, M. 2003. Evaluating collaborative natural resource management. *Society and Natural Resources*, 16:371–386.
- De Beer, F. & Marais, M. 2005. Rural communities, the natural environment and development: Some challenges, some successes. *Community Development Journal*, 40(1):50–61.
- Dietz, T., Fitzgerald, A. & Schwom, R. 2005. Environmental values. *Annual Review of Environmental Resources*, 30:335–372.
- Dunlap, R., Grieneeks, J. & Rokeach, M. 1975. Human values and “pro-environmental” behavior. Unpublished paper delivered at Annual Meeting of the Pacific Sociological Association, Victoria.
- Dunlap, R. & Mertig, A. 1997. Global environmental concern: An anomaly for postmaterialism. *Social Science Quarterly*, 78:24–29.
- Dunlap, R. & York, R. 2008. The globalization of environmental concern and the limits of the post-materialism values explanation: Evidence from four multinational surveys. *The Sociological Quarterly*, 49:529–563.
- Dutton, D. 2010. *The art instinct: Beauty, pleasure and human evolution*. Oxford: Oxford University Press.
- Eagly, A & Chaiken, S. 1993. *The psychology of attitudes*. Fort Worth: Harcourt Brace Jovanovich College

- Ferketic, J.S., Latimer, A.M. & Silander, J.A. Jr. 2010. Conservation justice in metropolitan Cape Town: A study at the Macassar Dunes Conservation Area. *Biological Conservation*, 143:1168–1174.
- Finger, M. 1994. From knowledge to action? Exploring the relationships between environmental experiences, learning and behaviour. *Journal of Social Issues*, 50(3):141–160.
- Gagnon Thompson, S.C. & Barton, M.A. 1994. Ecocentric and anthropocentric attitudes towards the environment. *Journal of Environmental Psychology*, 14:149–157.
- Guha, R. & Martinez-Alier, J. 1997. *Varieties of environmentalism: Essays north and south*. London: Earthscan.
- Hannigan, J. 2006. *Environmental sociology*. New York: Routledge.
- Hards, S. 2011. Social practice and the evolution of personal environmental values. *Environmental Values*, 20:23–42.
- Hargrove, E. 1992. Weak anthropocentric intrinsic value. *Monist*, 75(2):183–208.
- Inglehart, R. 1995. Public support for environmental protection: Objective problems and subjective values in 43 societies. *Political Science Politics*, 28:57–72.
- Kalof, L & Satterfield, T. 2005. Environmental values: An introduction – relativistic and axiomatic traditions in the study of environmental values, in Kalof, L. & Satterfield, T. (eds.). *Earthscan reader in environmental values*. London: Earthscan. xxi–xxxiii.
- Khan, F. 2002. Roots of environmental racism and the rise of environmental justice in the 1990's, in McDonald, D. (ed.). *Environmental justice in South Africa*. Cape Town: University of Cape Town Press. 15–49.
- Kollmuss, A. & Agyeman, J. 2002. Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research*, 8(3):239–260.
- Lave, J. & Wenger, E. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.
- Liggett, D., McIntosh, A., Thompson, A., Gilbert, N. & Storey, B. 2011. From frozen continent to tourism hotspot? Five decades of Antarctic tourism development and management, and a glimpse into the future. *Tourism management*, 32:357–366.
- Lowe, P. & Rudig, W. 1986. Review article: Political ecology and the social sciences – The state of the art. *British Journal of Political Science*, 16:513–50.
- Martínez-Alier, J. 2003. Problems of ecological degradation: Environmental justice or ecological modernization? *Capitalism Nature Socialism*, 14(1):133–138.
- McDonald, D. 2002. Introduction: What is environmental justice?, in McDonald, D. (ed.). *Environmental justice in South Africa*. Cape Town: University of Cape Town Press. 1–12.

- Minton, A. & Rose, R. 1997. The effects of environmental concern on environmentally friendly consumer behaviour: An exploratory study. *Journal of Business Research*, 40:37–48.
- Neumann, R. 2002. *Imposing wilderness: Struggles over livelihood and nature preservation in Africa*. Berkley: University of California Press.
- Oelofse, C., Scott, D., Oelofse, G. & Houghton, J. 2009. Shifts within ecological modernization in South Africa: Deliberation, innovation and institutional opportunities, in Mol, A.P.J., Sonnenfeld, D.A. & Spaargaren, G. (eds.). *The ecological modernisation reader: Environmental reform in theory and practice*. London: Routledge. 482–497.
- Parker, J. & McDonough, M. 1999. Environmentalism of African Americans: An analysis of the subculture and barriers theories. *Environment and Behaviour*, 31(2):155–177.
- Picard, C.H. 2003. Post-apartheid perceptions of the Greater St Lucia Wetland Park, South Africa. *Environmental Conservation*, 30(2):182–191.
- Rajecki, D. 1982. *Attitude, themes and advances*. Sunderland: Sinauer Associates.
- Redclift, M & Benton, T. 1994. *Social theory and the global environment*. New York: Routledge.
- Reser, J. & Bentrupperbäumer, J. 2005. What and where are environmental values? Assessing the impacts of current diversity of use of environmental’ and ‘World Heritage’ values. *Journal of Environmental Psychology*, 25:125–146.
- Roberts, J.T. & Hite, A. 2000. *From modernization to globalization: Perspectives on development and social change*. Malden: Blackwell.
- Scott, D. 2011. Achieving low carbon citizenship, in *Towards a low carbon city: Focus on Durban*. Pretoria: Academy of Science of South Africa. 152–163.
- Struwig, J. 2010. South Africans’ attitudes towards the environment, in Roberts, B., Kivilu, M. wa & Davids, Y.D. (eds.). *South African social attitudes: Reflections on the age of hope*. Cape Town: HSRC press. 198–219.
- Turpie, J.K. 2003. The existence value of biodiversity in South Africa: How interest, experience, knowledge, income and perceived level of threat influence local willingness to pay. *Ecological Economics*, 46:199–216.
- Van der Berg, S. 2010. Current poverty and income distribution in the context of South African history. Stellenbosch Economic Working Papers: 22/10 [Online]. Available: www.ekon.sun.ac.za/wpapers/2010/wp222010/wp-22-2010.pdf [2012]
- Van der Watt, S.M.E. 2011. Remote histories? On researching South Africa in the Antarctic and sub-Antarctic. Unpublished paper delivered at the Department of Sociology and Social Anthropology’s New Social Forms Seminar. 27 October, Stellenbosch.
- Wijkman, P.M. 1982. Managing the global commons. *International Organization*, 36(3):511–536.

- Willers, V.A. 1996. Environmental concern in South Africa. Unpublished doctoral dissertation. Pretoria: University of South Africa.
- Willers, V.A. & Van Staden, F. 1998. Environmental concern and environmentally responsible behaviour: Towards a model. *Southern African Journal of Environmental Education*, 18:29–37.
- World Values Survey. 2008. *Values change the world: World Values Survey* [Online]. Available: http://www.worldvaluessurvey.org/wvs/articles/folder_published/article_base_110/files/WVSbrochure5-2008_11.pdf [2011, December 10].

8. Lines in the Ice: Classifying Antarctic Environments

*Fraser Morgan*⁶⁸

Introduction

Over the period 2003 to 2008, an environmental domains analysis produced a classification that divided the Antarctic continent into a number of distinct regions based on the broad physical factors that constrain the prevalence of the flora and fauna within Antarctica. The driving force behind the creation of the classification was to provide an accepted basis for a 'systematic environmental-geographic framework' (SEGF) as outlined in the Protocol on Environmental Protection to the Antarctic Treaty (1991). The classification was designed to provide a data-derived, spatially explicit delineation of environmental variables in Antarctica, to be used primarily for the identification of priority sites for protection. The classification was presented and endorsed by both the Committee for Environmental Protection (CEP) and the Antarctic Treaty Consultative Meeting (ATCM) as a dynamic model to underpin the Antarctic protected area system and assist with the identification of new protected areas (ATCM XXXI - CEP XI 2008). Since then the classification has also been discussed as a potential framework for a range of other uses, such as an environmental monitoring framework, tourism and research impacts assessment, state of the environment reporting, and for defining and shaping policy for the region.

These proposed uses have the potential to turn the classification into a tool that is used for decisions that are beyond its original purpose. Recently, the New Zealand Government funded a finer-scale version of the classification that focuses on the Ross Sea region. With both the new research funding and a wider gamut of potential uses for the classification, the aim of this chapter is to outline the purpose, development, and application of the previous continental scale classification and explore how human values could be incorporated within any the future classification.

The chapter begins by describing the original motivation for the creation of the classification. It then covers previous attempts at classifying Antarctica, the history and details of how the classification is created, and finally how the classification is currently used in Antarctica. The final section explores the ways in which human values shape the creation of the Environmental Domains of Antarctica classification and how these human values could be incorporated directly into future classifications.

⁶⁸ Landcare Research, New Zealand.

Background

Although Antarctica is widely regarded as a pristine environment, sections of the continent are under sustained pressure through human activities such as research, tourism, and the logistics associated with these activities (Waterhouse 2001). Rogan-Finnemore (2008) highlighted that the conservation value of the terrestrial Antarctic and its surrounding islands is being diminished through the anthropogenic introduction of non-native species. Walton (2002, page 113) found that “many potentially valuable data are either not collected systematically or are not easily available to assess the extent and importance of human pressures at a regional level”. Finally, Waterhouse (2001) highlighted that to achieve a more effective level of environmental management for the continent; a regionally-based approach to managing the issues that each region faces is required. Resolving these issues require significant development on both the collection and development of spatial data for the continent, but also an approach to regionalise the continent for more effective environmental management.

As a consequence, the agencies that represent New Zealand in the Committee for Environmental Protection began to focus on Annex V, Article 3(2) of the Protocol on Environmental Protection to the Antarctic Treaty (hereafter Protocol), which states “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 recognised historic value; and
- i) such other areas as may be appropriate to protect the values set out in paragraph 1 above.”

While the term ‘systematic environmental-geographical framework’ (hereafter SEGF) is used within the Protocol, the term was not defined or elaborated any further by the Antarctic Treaty members. In the years between the 1991 adoption of Annex V and when it was officially ratified by all of the member countries and entered into force (2002) there were discussions and attempts to define the SEGF term that were not successful. However after the Annex entered

into force there was a pressing need an SEGF to help in the creation of a comprehensive and representative protected areas network within Antarctica.

Previous Classifications of Antarctica

Historically, the Antarctic region has been divided based on high-level guidelines that have resulted in a classification that is limited in its ability to capture biogeographic variation. Divisions in these early classifications were usually made using fairly broad climatic or biotic features (Peat et al. 2007). One such example divided the Antarctic region into four main sub-regions: Southern Cold Temperate, Sub-Antarctic, Maritime Antarctic, and Continental Antarctic (Holdgate 1970).

Different approaches that began to use some more detailed rules to define the divisions resulted from research into environmental zoning, planning units, and biogeographical definitions within Antarctica (Udvardy 1975; Keage 1987). These approaches incorporated more environmental information in their decision making, although usually focused on one key vector of environmental variation. Keage (1987) provides an example of this where environmental zones and planning units were delineated based on the location of the major ice catchments on the continent. While spatial in nature, the boundaries for these classifications are defined based on the authors' knowledge and belief of what drives the variation in environments in Antarctica.

In addition, the lack of spatially explicit biological information continues to inhibit the development of a biogeographically focused classification (Peat et al. 2007; Hughes & Convey 2012). While difficult, it is important to note that the consequences of inaction with regard to the environmental management of the continent are expected to be significant (Soulé 1991; Hughes & Convey 2012). Consequently, approaches that capture our current understanding of the Antarctic environment should be developed using the knowledge and data that are available now.

While the idea of an environmental classification for Antarctica is not new, the current ability to create a numerically and spatially explicit conservation planning framework that incorporates a range of environmental information at the continental scale has only arisen over the last decade. Environmental domains analyses are one approach formulated with this in mind.

Environmental Domains Analysis

Numerically explicit approaches to environmental classification first appeared in Australia in the late 1980s and early 1990s (Mackey et al. 1988; Belbin 1993; Kirkpatrick & Brown 1994; Faith et al. 2001). Exploiting the increasing availability of Geographic Information Systems, interpolated climate data, high performance computing, and multivariate procedures capable of handling very large amounts of data these approaches provided a new way of visualising terrestrial environments.

New Zealand researchers, aware of these advances, began to explore the development of an environment-based classification as a spatial framework for biodiversity and resource management at both regional and national scales in New Zealand (Leathwick et al. 2003a). The approach, known as an environmental domains analysis (EDA), resulted in a national classification for New Zealand called Land Environments of New Zealand or LENZ (Leathwick et al. 2002, 2003b). Soon after Annex V entered into force in 2002, Antarctica New Zealand and the Department of Conservation engaged Landcare Research to apply the methodology developed for LENZ to the Antarctic continent with the intention that the resulting classification would provide a SEGF for use in the Protocol.

Two main features distinguish classifications that have been derived using an EDA approach from the previous implementations. Numerical data layers are used to describe various fundamental abiotic aspects of Antarctica climate, ice cover and geology. In addition, the use of a computerised classification procedure allows similar environments (including distinctive environments that are otherwise easily overlooked at the continental scale) to be grouped based on environmental character regardless of geographical location.

While the EDA approach aims to minimise the level of subjectivity in delineating the environmental boundaries, the process retains elements of subjectivity. These range from the input data layers selected, the weighting value used in the clustering algorithm, through to the final level of environmental domains in the classification layer. However, the EDA approach minimises the amount of subjectivity when compared to the previous attempts to categorise Antarctica.

Three steps are required to create an EDA: the initial assembly of the geospatial data to be used; a two-stage classification process; and the assessment of the results and creation of the documentation surrounding the classification. Using publicly available data, a number of spatial data layers were created that differentiated the physical environment within Antarctica. For this classification, mean annual air temperature, seasonal air temperature range, mean annual wind speed, estimated solar radiation at the top of the atmosphere, period of year with normal diurnal pattern, slope, land (ice) cover, and geological information were used (Figure 1, Image A). The data layers covered the continent at a uniform one kilometre cell size with the same spatial projection. After the layers were complete, a systematic sample of data points was exported to be analysed in two sequential stages that form the basis of the EDA. Each data point contains a value for each of the underlying spatial data layers that represent the environmental character for the point (such as mean annual temperature, slope). Each point is placed in a database that maps the point within a multi-dimensional space based on these environmental values (Figure 1, Image B). At this stage, the data are now ready for use and the classification can commence.

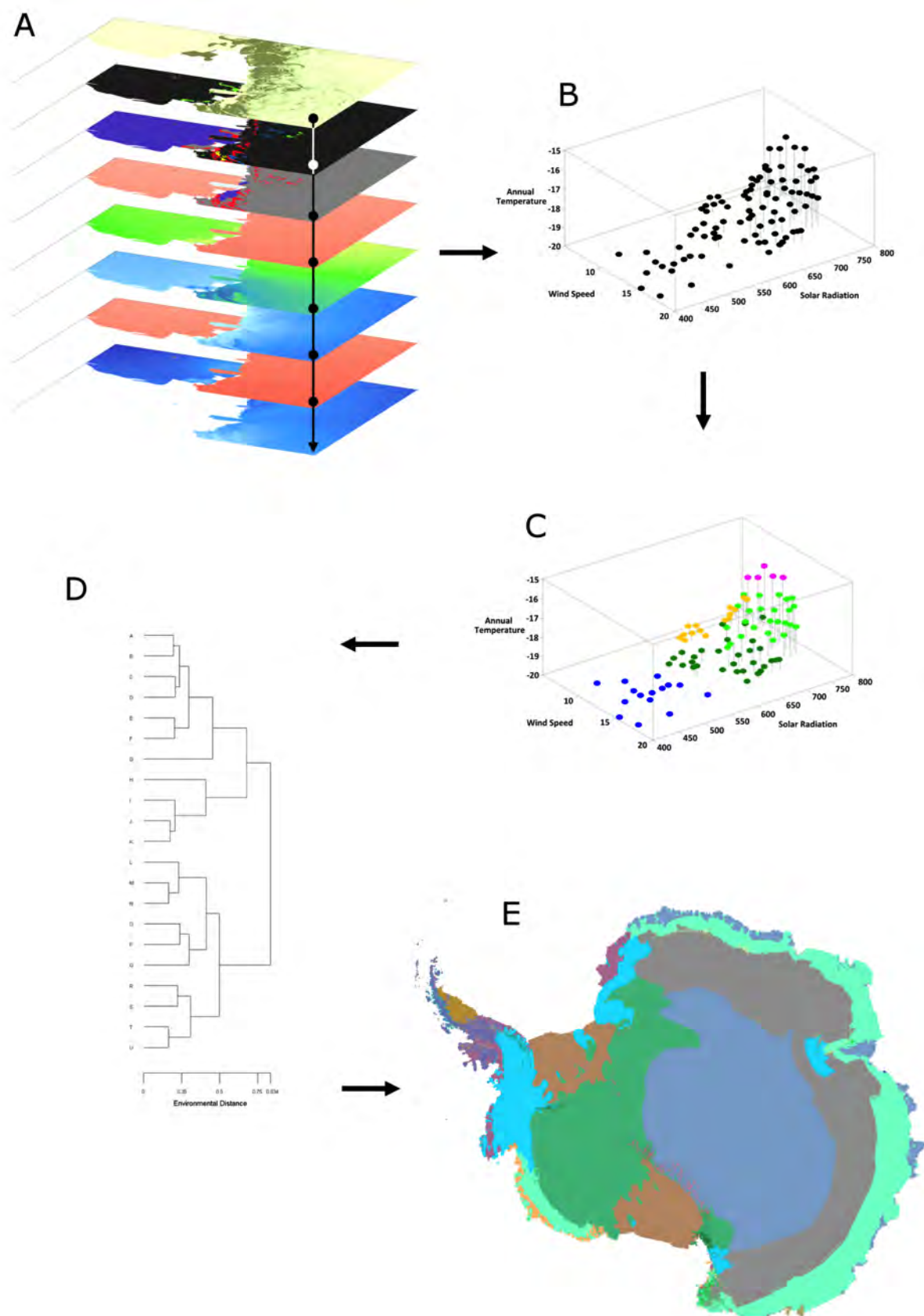


Figure 1: Visual representation of the two-stage environmental domains analysis

The first stage of the two-stage classification process consists of a non-hierarchical classification to group together these points based on how similar they are from an environmental character perspective (Fig, Image C). This process initially uses the Gower Metric (Gower 1971), a range-standardised distance measure. It measures the level of environmental similarity between all of the points. Each point is then clustered into a group of points based on the concept of environmental distance. Based on a fixed limit in the software used (PATN – Belbin 1995), 400 environmental domains were generated. For each of these domains, a centroid value is created which acts as a surrogate for each point within the domain.

Appreciating the conceptual difference between geographic and environmental space is crucial to understanding how Antarctic environments are created. On a conventional map, locations within 'geographic space' can be defined by coordinates such as latitude and longitude. Geographic distances between these points can be measured using simple geometric calculations, and these can be used to define groups of adjacent locations. However, 'environmental space' is defined only by the environmental variables used in the classification process. The environmental distance between locations can then be measured based on the similarity of the environmental variables. Consequently, different areas can have very similar environments, even though they are not close together geographically and vice versa.

The second stage of the classification process uses a hierarchical classification to define the level of similarity between each of the environmental domains. This is achieved by quantifying and describing the similarities between the centroids of all the domains (Fig, Image D). This process repeats until there is a single environmental domain that encompasses all the points. At this stage the classification process has been completed, but still requires a number of steps to produce a useable geospatial classification.

The first of these steps is to export the environmental centroids back into geographic space for display and analysis. Using the location of each of the original data points and the environmental domain that was classified for each point in the first stage of the classification process, a geospatial data layer can be generated that shows the location of each of the 400 environmental domains. Using the results generated in the second stage of the classification process, the classification can be visualised from one environmental domain that covers the entire continent through to the 400 generated from the first stage of the process.

To suit the purposes of a SEGF mandate, there was a need to standardise the classification to a level that consists of a set number of environments. Based on the research team's experience with LENZ, the quality of the input data, and knowing that the classification was for management purposes, the 400 environments created in the non-hierarchical classification were condensed to 21 unique environments to create a layer that is now identified as the Environmental Domains of Antarctica classification (Fig, Image E). After standardising the number of environments, documentation that describes the geographical location and environmental attributes for each environment was organised.

The use of this computerised classification procedure allows similar environments, including distinctive environments otherwise easily overlooked at the continental scale, to be grouped

based on their environmental character regardless of their geographical location. The resulting classification is currently being used (by New Zealand and by other Antarctic Treaty members) for a range of activities, such as protected areas management, environmental monitoring, and tourism impacts management.

Data Layers Used in the EDA

Ideally, for biodiversity prediction and protection, the EDA should use data that have both a functional relationship and demonstrable statistical correlation with biotic distributions. For Antarctica, the paucity of life across much of the continent, and the relative lack of quantitative information about relationships between biotic distribution and the environment, prevented such an approach. As a consequence, the data layers in the EDA used publicly available, continental-scale information that was identified (based on expert opinion) to shape environmental variation across the continent. The eight data layers used in the classification was, mean annual air temperature, seasonal air temperature range, mean annual wind speed, estimated solar radiation at top of atmosphere, period of year with normal diurnal pattern, slope (with square root transformation), land & ice cover, and geology. The descriptions below provide a basic overview on the creation of each layer. Morgan et al. (2007) contains a more detailed review of the creation of each of the layers.

The surface describing mean annual air temperature was derived by spatial interpolation from the air temperature records of 106 irregularly distributed meteorological stations across Antarctica. The resulting temperature model was a function of geographic location and altitude and was used to generate a spatial layer that represented the monthly average of the daily average air temperature. Using the monthly averages, a mean annual air temperature layer was generated for use in the analysis.

Seasonal air temperature range was calculated as the difference in mean air temperature between the coldest (August), and warmest (January) months. These layers were generated in the creation of the mean annual air temperature layer described above. The seasonal range in air temperature was generally greatest at higher elevations and at inland areas, where there is little moderation of air temperature, which occurs at more coastal locations (Legates & Willmott 1990).

The surface describing mean annual wind speed was derived by spatial interpolation from the wind speed records of 75 irregularly distributed meteorological stations across Antarctica that captured wind speed. The layer used the stations' location (easting, northing) along with the elevation of the station as predictor variables.

This surface was included because differences in the potential solar radiation will affect ablation, including melting of ice and snow. Because the number of available climate stations for which comprehensive solar radiation measurements was minimal, a layer generated from the measured solar radiation data was infeasible. Consequently, a layer was calculated that was based on the monthly solar radiation inputs using standard solar geometry equations. It should

be noted that this layer does not take into account the effects of topography, elevation or cloud on the solar radiation experienced at the earth's surface, i.e. values are those expected in the upper atmosphere; radiation at the earth's surface can be expected to be approximately 50% lower (Brock 1981). While this simplification is undesirable, it provided the most efficient approach to including solar radiation in the EDA.

With sunlight or lack of it a key environmental factor in Antarctica, a surface was included that describes variation in the length of the period for which there is a diurnal pattern of light and dark. The units of the layer are in days, and if the sun fully sets and rises within a day, the day is considered to have a diurnal pattern. This layer is interpolated directly off the latitude and longitude and does not take elevation into account. As a basic rule of thumb, the closer to the pole, the lower the number of days that have a regular day–night pattern. This directly correlates to the number of days that have continuous daylight and darkness.

The slope layer used in the analysis was created from a one-kilometre digital elevation model sourced from the National Snow and Ice Data Centre in Boulder, Colorado (Liu et al. 2001). The digital elevation model was converted into a slope layer using the Spatial Analyst extension in ArcGIS 9.2 (ESRI 2007). A square root transformation was applied to the slope layer to ensure that small changes in slope on flatter sites were not overlooked when compared with a change of the same magnitude on steeper terrain.

This layer was created from the landform data sourced from the Antarctic Digital Database (ADD) website (ADD Consortium 2000). The ADD data were used to differentiate five types of landforms – Snow and Ice (including glaciers), Ice Free, Ice Shelf, Ice Tongue, and Rumble (An intersection between ice sheets and ice shelves where significant crevasse patterns occur, although the latter very rarely appears within the ADD). To create a combined layer, two ADD datasets were used, the 'Coast' polygon layer, which differentiated ice shelves, ice tongues, rumples and the 'Rock' polygon layer, which delineated the ice-free areas. All terrestrial areas that were not identified within these layers were noted as 'Snow and Ice'.

The geological data set was created through the digitisation of an Antarctic wide geological map (American Geographical Society 1971). For digitising, rock types were grouped into the four main geological groups identified on the map – sedimentary/meta-sedimentary, intrusive igneous, igneous metamorphic basement complex, and volcanic. While the Geologic Map of Antarctica identified geology throughout most of the continent, confidence in the mapped values was higher in areas that were identified as ice-free (because of the ability to undertake soil/geological sampling). Consequently, the digitised information was restricted to the areas that were identified as within the Antarctic Digital Database's 'ice free' layer. Since this layer has been clipped to areas of ice-free terrain there is a distinct correlation between these two attributes (i.e. if a location has no geological information it cannot be ice free and vice versa). This approach fulfils the requirement to represent ice free areas in as much detail as could be achieved at the continental scale.

Environmental Domains of Antarctica Classification

The process outlined above produced a classification containing 21 distinct environmental domains that cover the continent and off-shore islands. For simplicity and readability, an environmental domain will hereafter be identified as an Environment. The resulting classification can be seen in Figure 2 where each colour represents a different Environment. Detailed descriptions for each Environment (including the extent and associated environmental attributes) can be found in Morgan et al. (2007). The following 21 Environments were given descriptive labels associated to both their geographical position and landform:

- A. Antarctic Peninsula northern geologic
- B. Antarctic Peninsula mid-northern latitudes geologic
- C. Antarctic Peninsula southern geologic
- D. East Antarctic coastal geologic
- E. Antarctic Peninsula and Alexander Island main ice fields and glaciers
- F. Larsen Ice Shelf
- G. Antarctic Peninsula offshore island geologic
- H. East Antarctic low latitude glacier tongues
- I. East Antarctic ice shelves
- J. Southern latitude coastal fringe ice shelves and floating glaciers
- K. Northern latitude ice shelves
- L. Continental coastal-zone ice sheet
- M. Continental mid-latitude sloping ice
- N. East Antarctic inland ice sheet
- O. West Antarctic ice sheet
- P. Ross and Ronne-Filchner ice shelves
- Q. East Antarctic high interior ice sheet
- R. Transantarctic Mountains geologic
- S. McMurdo – South Victoria Land geologic
- T. Inland continental geologic
- U. North Victoria Land geologic

For reference, the sizes of the Environments are extremely varied – from 3.7 million square kilometres (Environment Q) down to a comparatively small 966 square kilometres (Environment G). The average Environment size is just over 650,000 square kilometres.

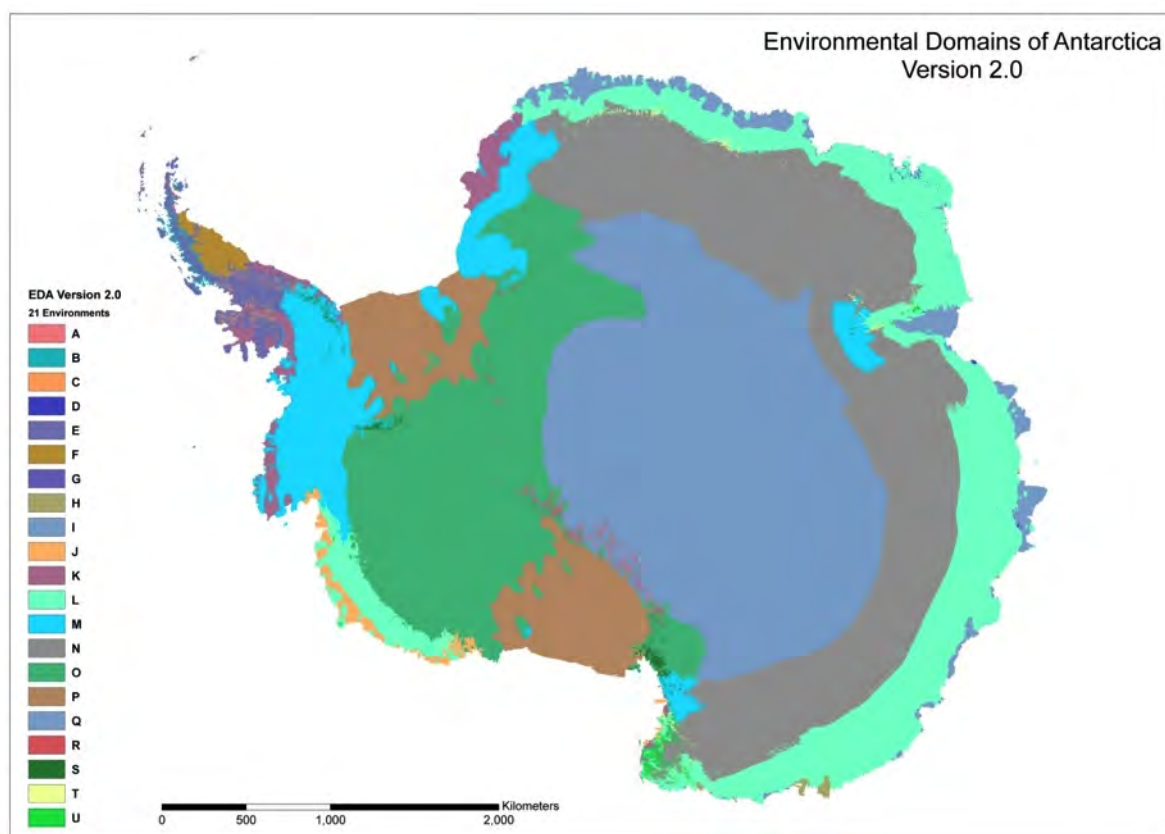


Figure 2: Environmental Domains of Antarctica (Version 2.0)

The classification should be viewed as a dynamic model that can meet the ‘systematic environmental geographic framework’ term and achieve some of the key purposes described in Annex V of the Protocol. It is important to note that the classification cannot achieve all of the purposes outlined in Annex V because the current approach using abiotic environmental layers cannot capture examples outstanding aesthetic and wilderness value nor sites or monuments or recognised historic value.

Heterogeneity of the classification

One of the benefits of an environmental domains analysis is the hierarchical nature of the resulting classification. It could be expected that each of the 21 Environments are equally dissimilar from each other, but this is not the case. The dendrogram (Figure 3) produced within the second stage of the classification process highlights how similar each Environment is based on the environmental distance. The structure of the dendrogram shows the order in which the classification has progressively combined similar Environments to form larger groups. How closely related the environments are can be seen where each environment joins on the dendrogram. The closer each vertical line joining the Environments is to the left-hand side of the dendrogram, the smaller the environmental distance between them. For example, at this level of classification, Environments T and U are separated by the smallest environmental distance, followed closely by Environments M and N.

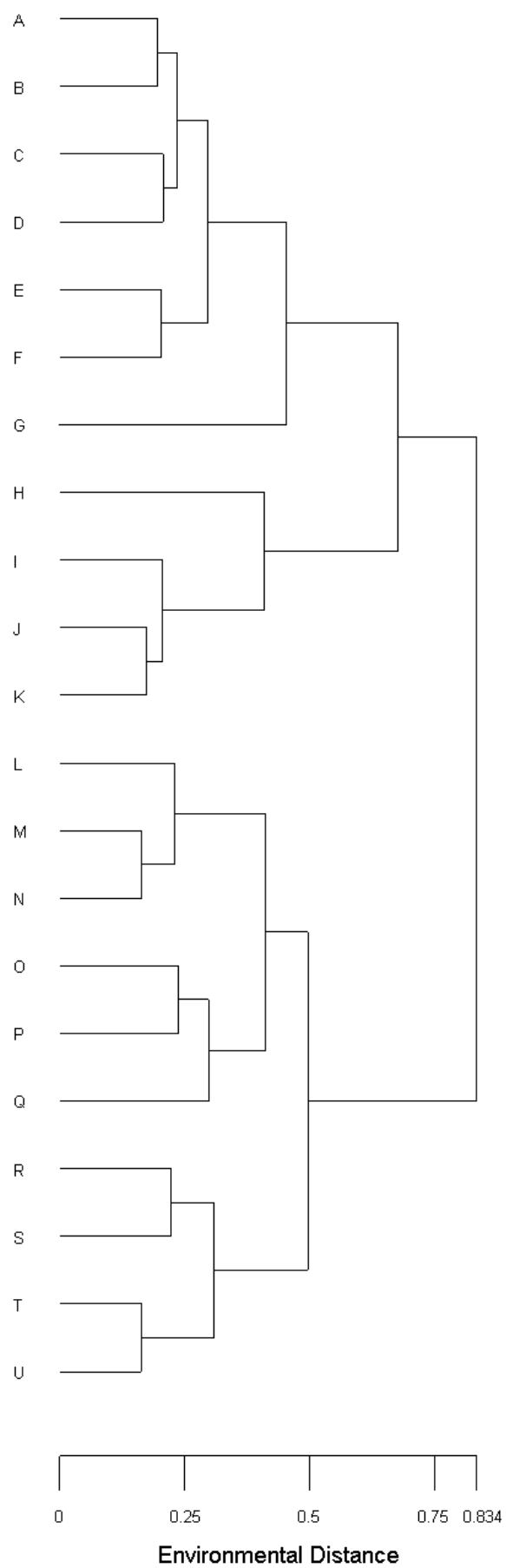


Figure 3: Dendrogram showing the similarity between the 21 classified environments

An example of this heterogeneous nature of the classification can be seen in the top seven domains within the dendrogram. Environments A (Antarctic Peninsula northern geologic) and B (Antarctic Peninsula mid-northern latitudes geologic) are closely related. Joining these two Environments is a group consisting of Environment C (Antarctic Peninsula southern geologic) and D (East Antarctic coastal geologic). This aggregated group of environments almost completely covers the Antarctic Peninsula. The next two Environments to combine into this group are Environment E (Antarctic Peninsula and Alexander Island main) and F (Larsen Ice Shelf). These two Environments contain more ice (both sheet and shelf) than the previous Environments, but because the climate attributes are so similar they combine into this large group focused around the Antarctic Peninsula. Finally, Environment G (Antarctic Peninsula offshore islands) can be seen to be loosely joined to this large group but can also be seen as a distinct outlier when compared with the preceding six Environments, undeniably unique compared with the other Environments. All of the Environments within this aggregated group are more similar to each other compared to any of the other fourteen environments.

Current Uses of the Classification

The current uses of the classification can be divided into two categories: Protocol mandated use and other complementary uses identified by the Committee for Environmental Protection (CEP) and Antarctic Treaty countries. For these complementary uses, users have recognised the utility of the classification for a broader range of environmental management applications outside of the Protocol mandated use. Unlike the CEP mandated use, the application of the classification in relation with the complementary uses is defined by each Antarctic Treaty member country individually. Consequently, the complementary uses are not as wide-spread in their application. The adoption of these complementary uses is expected to increase with the development of contextual, spatially explicit information that can be compared with the classification.

Protocol Mandated Use:

Protected Areas Management

Once completed, the classification was presented to the CEP as a data-derived, spatially explicit delineation of environmental variables in Antarctica that could be used for a range of uses including the identification of priority sites for protection (ATCM XXXI - CEP XI 2008). A review was undertaken by the Scientific Committee for Antarctic Research (SCAR) to quantify the success that the classification has in capturing the biodiversity for the continent. This review found that the classification “provides a useful, important measure of environmental variation across Antarctica that, in terms of its ice-free domains, can be considered essential as a first order assessment of likely systematic variation in biodiversity” (SCAR 2010, p. 8). Consequently, the CEP and ATCM concurred that the classification be used consistently and in conjunction

with other tools agreed within the Antarctic Treaty System as a “dynamic model for the identification of areas that could be designated as Antarctic Specially Protected Areas” (ATCM XXXIV - CEP XIV 2011, p. 2). Rather than assessing sites on their individual merits in isolation of other factors the CEP promotes the usage of the classification to identify how the protected area complements the Antarctic protected areas system as a whole. The CEP has mandated that all new ASPAs and ASMAs and all changes to existing ASPA and ASMA management plans require the identification of the Environment in which they are/would be located to enable a holistic and strategic designation of ASPAs across the continent.

Complementary Uses:

Monitoring

The international Antarctic community has encouraged the establishment of a network of terrestrial monitoring sites across Antarctica (Frenot et al. 2005). SCAR promoted this network in a recent review titled “Antarctica climate change and the environment” (Turner et al. 2009). It is proposed by the CEP that the classification could provide a sound basis to help in the positioning of this network of monitoring sites across the continent. In defining these monitoring sites, the classification would need to be used in conjunction with a range of other spatial information sources, such as biodiversity data.

Non-Native Species Management

There is significant pressure within the international Antarctic community to reduce the risks of non-native species invasions in Antarctica (Hughes & Convey 2012). Consequently Antarctic Treaty members are concerned about the artificial transfer of native species between sites in Antarctica. Some members propose the synthesis of the spatial classification; spatially explicit biological information; and sites of visitation, to highlight movements between areas that are environmentally similar to minimise the prevalence of human-mediated dispersal throughout Antarctica. For example, Antarctica New Zealand is proposing to use the classification to help identify Environments that are most susceptible to invasion within the Ross Sea region to enable policy to be developed to reduce the risk of invasion.

Tourism Management

Finally, there is a need to quantify the increasing level of tourism impacts in Antarctica in line with their environmental effects. Most Antarctic Treaty members have accurate data on where tourists are going and in what numbers, but lack contextual knowledge on the environmental characteristics of the regularly visited locations to examine the spatial scale of the tourism impacts. The classification provides a framework to enable the members to categorise and understand the environmental characteristics, spatial scale and types of Environments visited by tourists. This would enable the members to assess the types of Environments that are being

impacted from such frequent visitation and produce policy that would minimise the impacts on vulnerable Environments. While this use is currently possible with the continental classification, it will be more applicable when the finer-scale version of the classification is produced for the Ross Sea region because of the small spatial scale of the tourism movements.

Interpretation of the Classification from a Human Values Perspective

When developing the classification, understanding how human values effect the development and use of the classification was not an active research area for the science team. It is now acknowledged that the classification can shape both human values of Antarctica and future Antarctic policy. Human values have a role in the creation of the Environmental Domains of Antarctica classification through some of the choices that were made, but they also have a role in shaping how a classification is interpreted and used, and in how successful the classification is at meeting the original 'systematic environmental-geographic-framework' requirement for protected area network development.

Finally, the term 'human values' is diverse, so in relation to the remainder of this chapter they are aligned with three values that are defined in the Protocol and an additional value. The three values defined by the Protocol can be summarised as wilderness, aesthetic and scientific in relation to the terrestrial Antarctic landscape. These values encompass a positive moral approach to the on-going environmental protection of the continent. A fourth value, political, overlays these values because the on-going environmental management of the continent is shaped by agencies that represent a countries political will.

Current Classification

When a user views the Environmental Domains of Antarctica, they are presented with an Antarctic landscape that has been divided into 21 separate Environments. The creation of these Environments defines a spatial boundary between Environments. These Environments provide a spatial area where the user can assign their own values, values that can come from a range of personal, aesthetic, political, and scientific perspectives.

While the spatial extents of each Environment can contribute to the validation or shaping of the 'value' that humans have for a location, they also form the basis for building appropriate policy based around the Environment that can further shape the human value of a landscape. A key intention for the use of an environmental domains approach was that it minimised the amount of subjectivity inherent in the previous attempts at classifying the Antarctic landscape. Removing this subjectivity should enable an environmental classification that is not shaped by our existing value structures for the region and provides a clear and open framework where policy can be defined by the varied environmental perspectives found in the Antarctic Treaty process. Such policy is usually defined at a state or treaty level, and combines multiple human values along with a range of national and geopolitical perspectives (Hemmings 2011).

It was expected that this approach would meet the requirements of the ‘systematic environmental-geographic framework’ term, that was poorly defined in the Protocol and open to interpretation as to how it was to be applied. Based on the response to the Environmental Domains of Antarctica classification (ATCM XXXI - CEP XI 2008; SCAR 2010), the classification now constitutes the basis for the CEP’s understanding of the systematic environmental-geographic framework term within the Protocol (ATCM XXXIV - CEP XIV 2011) consequently achieving the primary goal of the research.

Future Classifications

Building on the success of the Environmental Domains of Antarctica classification and its endorsement and adoption by the CEP, ATCM and SCAR (ATCM XXXI - CEP XI 2008; SCAR 2010; ATCM XXXIV - CEP XIV 2011), a new research programme has been funded by New Zealand’s Ministry for Science and Innovation that aims to incorporate new knowledge on soil, climate, and biological diversity and abundance into an environmental domains analysis that focuses on the Ross Sea region. This new research programme now allows for the research team to explore the ways in which human values could be accounted for in a new environmental classification and how the team could include them if deemed appropriate.

At a recent workshop on the linkages between environmental management and value systems in Antarctica, the author posed a question – should an environmental classification of Antarctica account for human values? The rationale for the question is that while the main outcome for the new classification would still be environmental in nature, it is inevitable that the classification will be used for other purposes and, as such, needs to account for the diversity of human values within Antarctica. Prior to the workshop, the author’s view was that, if human values were to be accounted for within the classification, three approaches appeared possible: Direct (creating an input layer that incorporates human values such as Landscape Character); Indirect (using the EDA method to focus classification on certain locations deemed ‘important’ from a human values perspective, such as the ice-free regions of the continent); and Informational (better understanding of how human values might shape the use and application of the classification).

Based on the outcomes of the discussions at the workshop, the most appropriate option of the three for future classifications is ‘Informational’. This would entail providing a more comprehensive range of information on and about the classification; examples of how the classification should be used; and the development of user guidelines around the initial ‘intended’ uses and other additional uses over time. A direct approach was also discussed, but for an environmentally-focused classification, it was deemed erroneous to include a layer that included attributes such as landscape values and human impact sites. If included, the resulting environments would be shaped on how humans value the environmental character of the landscape rather than on their non-anthropogenic intrinsic values and, as such, their inherent environmental distinctiveness.

In the future, an approach similar to the environmental domains approach could be used to define and capture a human perspective of the Antarctic landscape. A classification of this type would be possible through the inclusion of a variety of human value layers, such as geopolitical boundaries, landscape values, and human impact sites (bases, science event locations, and landing sites for tourists), alongside a set of existing layers. These human value layers would be included with the other geospatial data layers at the initial stages of the EDA process (Fig, Image A). The inclusion of these human value layers would fundamentally alter the existing approach which evaluates all areas of Antarctica equally. The spatial nature of human activities and values within Antarctica are not as equitable. These activities, such as tourism and science, are primarily constrained by the ice free areas of the continent but for differing reasons. Including layers that focused on these activities would weigh the resulting classification towards these areas. Such an approach would be an interesting investigation not only into the ability of a domains approach to visualise the human perspective of the landscape but also into the spatial nature of human values in the Antarctic.

Conclusion

Human values play a significant role in the classification of Antarctica and even more so when examining the role of environmental management within the region. While a number of classifications have been developed for Antarctica to assist with environmental planning and management, the approaches usually only investigate one vector of environmental variation; are limited in their spatial explicitness, and the boundaries are defined based on the authors' knowledge and belief of what drives the variation in environments in Antarctica.

To resolve these issues, an EDA approach was adopted that provides a numerically and spatially explicit framework that is able to meet the SEGF mandate and goals outlined in Article 3(2) Annex V of the Protocol. The approach was used to create a continental scale classification that has enhanced the environmental management of the region. While the Environmental Domains of Antarctica classification has been adopted by the CEP and ATCM, it will benefit from further scientific review, a greater understanding of the uses proposed for the classification, the refinement of the environmental layers used to define the analysis, and a greater consideration of the level of classification detail required for different management purposes.

New research focused on developing an environmental domains classification for the Ross Sea region has allowed New Zealand to review these issues while also examining how human values affect the creation of an environmental classification and how they shape the way in which the new classification would be used. The outcomes from the workshop on linkages between environmental management and value systems in Antarctica highlighted the importance of providing quality user information for the classification. Adopting an informational approach through the development of a range of user guidelines to guarantee that the classification is used correctly will ensure that the resulting classification will continue to support the SEGF mandate and a conservation planning framework in the future.

Acknowledgements

This chapter was written with the support of the Ministry for Science and Innovation (Programme C09X1001 – Environmental domains analysis for the Ross Sea region). The author wishes to acknowledge the support of Antarctica New Zealand, the Ministry of Foreign Affairs and Trade, the Ministry for the Environment and the Department of Conservation, who together funded original work on the Environmental Domains of Antarctica.

The author acknowledges the following organisations that made available data for use in the Environmental Domains of Antarctica classification: British Antarctic Survey; University of Wisconsin-Madison; SCAR READER Project; The McMurdo Dry Valleys Long-Term Ecological Research programme; The United States Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center; Antarctic Digital Database: VALMAP – University of New Hampshire. Antarctic Atlas – United States Antarctic Resource Center, United States Geological Survey; The Australian Antarctic Data Centre, Australian Antarctic Division; Arctic and Antarctic Research Institute, Federal Service for Hydrometeorology and Environmental Monitoring of Russian Federation (Roshydromet); the Committee for Environmental Protection; and the Scientific Committee on Antarctic Research.

Finally, the author wishes to acknowledge both the team who have worked on this research (Malcolm McLeod, Gary Barker, Robbie Price and Craig Briggs) and the comments and review of this chapter by Neil Gilbert (Antarctica New Zealand), Harry Keys (Department of Conservation), Jackie Aislabie, Phil Novis, Robert Gibb, Janice Willoughby, and Anne Austin (Landcare Research). Finally the author wishes to thank the two anonymous reviewers whose comments have improved the final product. Errors and omissions which remain are, of course, the responsibility of the author.

References

- ADD Consortium 2000. *Antarctic Digital Database, Version 4.1*. Scientific Committee on Antarctic Research, Cambridge. [Online] Available: <http://www.add.scar.org> [5 February 2012]
- American Geographical Society 1971. Geologic Map of Antarctica, Scale 1:5 000 000. American Geographical Society.
- ATCM XXXI - CEP XI 2008. *Final Report of the Thirty-first Antarctic Treaty Consultative Meeting & Eleventh Committee on Environmental Protection Meeting*. Kyiv, Ukraine: Secretariat of the Antarctic Treaty.
- ATCM XXXIV - CEP XIV 2011. Resolution 2. *Thirty-fourth Antarctic Treaty Consultative Meeting - Fourteenth Committee on Environmental Protection Meeting*. Buenos Aires, Argentina
- Belbin, L. 1993. Environmental representativeness: Regional partitioning and reserve selection. *Biological Conservation*, 66, 223-230.

- Belbin, L. 1995. *PATN Pattern Analysis Package: Technical Reference*. Australia: Division of Wildlife and Ecology, CSIRO.
- Brock, T. D. 1981. Calculating solar radiation for ecological studies. *Ecological Modelling*, 14, 1-19.
- ESRI 20007. *ArcGIS Desktop, Release 9.2*. Redlands, CA: Environmental Systems Research Institute.
- Faith, D., Nix, H., Margules, C., Hutchinson, M., Walker, P., West, J., Stein, J., Kesteven, J., Allison, A. & Natera, G. 2001. The BioRap biodiversity assessment and planning study for Papua New Guinea. *Pacific Conservation Biology*, 6, 325-343.
- Frenot, Y., Chown, S. L., Whinam, J., Selkirk, P., Convey, P., Skotnicki, M. & Bergstrom, D. 2005. Biological invasions in the Antarctic: extent, impacts and implications. *Biological Reviews*, 80, 45-72.
- Gower, J. C. 1971. A General Coefficient of Similarity and some of its properties. *Biometrics*, 27, 857-871.
- Hemmings, A. D. 2011. Environmental Mangement as a Diplomatic Method: Advancing Strategic National Values in Antarctica. *Exploring Linkages between Environmental Management and Value Systems: The Case of Antarctica*. University of Canterbury, Christchurch, New Zealand.
- Holdgate, M. W. 1970. *Antarctic ecology*, London: Academic Press.
- Hughes, K. A. & Convey, P. 2012. Determining the native/non-native status of newly discovered terrestrial and freshwater species in Antarctica - Current knowledge, methodology and management action. *Journal of Environmental Management*, 52-66.
- Keage, P. 1987. Environmental zones and planning units – a basis for an Antarctic terrestrial protected area network. In: Dingwell, P. (ed.) *Conserving the natural heritage of the Antarctic realm*. Gland: IUCN.
- Kirkpatrick, J. B. & Brown, M. J. 1994. A comparison of direct and environmental domain approaches to planning reservation of forest higher plant communities and species in Tasmania. *Conservation Biology*, 8, 217-224.
- Leathwick, J. R., Morgan, F., Wilson, G., Rutledge, D., McLeod, M. & Johnston, K. 2002. *Land Environments of New Zealand: a technical guide*. Auckland, Ministry for the Environment; Manaaki Whenua Landcare Research.
- Leathwick, J. R., Overton, J. M. & McLeod, M. 2003a. An environmental domain classification of New Zealand and its use as a tool for biodiversity management. *Conservation Biology*, 17, 1612-1623.
- Leathwick, J. R., Wilson, G., Rutledge, D., Wardle, P., Morgan, F., Johnston, K., McLeod, M. & Kirkpatrick, R. 2003b. *Land Environments of New Zealand*. Auckland, David Bateman ; Landcare Research ; Ministry for the Environment.

- Legates, D. R. & Willmott, C. J. 1990. Mean seasonal and spatial variability in global surface air temperature. *Theoretical and Applied Climatology*, 41, 11-21.
- Mackey, B. G., Nix, H. A., Hutchinson, M. F., Macmahon, J. P. & Fleming, P. M. 1988. Assessing representativeness of places for conservation reservation and heritage listing. *Environmental Management*, 12, 501-514.
- Morgan, F., Barker, G., Briggs, C., Price, R. & Keys, H. 2007. Environmental domains of Antarctica: Version 2.0 final report. Landcare Research New Zealand Contract Report: LC0708/055.
- Peat, H. J., Clarke, A. & Convey, P. 2007. Diversity and biogeography of the Antarctic flora. *Journal of Biogeography*, 34, 132-146.
- Rogan-Finnemore, M. (ed.) 2008. *Non-Native Species in the Antarctic*, Christchurch, New Zealand: Gateway Antarctica.
- SCAR 2010. Biodiversity-based Evaluation of the Environmental Domains Analysis. *Thirty-third Antarctic Treaty Consultative Meeting - Thirteenth Committee on Environmental Protection Meeting*. Punta del Este, Uruguay: Secretariat of the Antarctic Treaty.
- Soulé, M.E. 1991. Conservation: tactics for a constant crisis. *Science*, 253, 744-750.
- Turner, J., Bindschadler, R., Convey, P., di Prisco, G., Fahrbach, E., Gutt, J., Hodgson, D., Mayewski, P. & Summerhayes, C. (eds.) 2009. *Antarctic climate change and the environment*. Cambridge, UK: SCAR.
- Udvardy, M. 1975. A classification of the biogeographical provinces of the world. *Occasional Paper 18*. Gland: IUCN.
- Walton, D. W. H. 2002. How do we know that the Antarctic environment is fine? *Antarctic Science*, 14, 113-113.
- Waterhouse, E. (ed.) 2001. *Ross Sea region 2001. A State of the Environment report for the Ross Sea region of Antarctica*, Christchurch: New Zealand Antarctic Institute.

9. Exploiting the Southern Ocean: Rational Use or Reversion to Tragedy of the Commons?

David Ainley⁶⁹ and Cassandra Brooks⁷⁰

The tragedy of the commons, first described by Garrett Hardin in 1968, arises in situations where multiple individuals, acting independently in their own self-interest, deplete shared limited or finite resources, even when it is evident to all that it isn't in anyone's long-term interest to do so. While some regions exist where communities have learned to conserve (e.g. Johannes, 1981; Menzies, 2006; Berkes, 2008), often throughout human history, particularly when dealing with large international spaces, Hardin's analysis has shown humans to be incurable of their self-interest mentality. First on land and then at sea, humans started with the "low-hanging fruit" or those biotic resources easiest to obtain and consume (Longhurst, 2010; Swartz et al., 2010). Humans were first documented consuming marine resources, in this case shellfish, along the shores of southern Africa 164,000 years ago (C. Marean *in* Koerth-Baker, 2009). The first evidence of fish extirpation, an estuarine-fresh water catfish, comes from a 90,000 year-old midden in coastal Congo. With catfish gone, these peoples readily moved on to exploit other species (Yellen et al., 1995). It is possible that some communities only started consuming marine resources once their land-based food sources were overexploited or diminished from climate change, as was the case in the above shellfish example. In the ocean, humans began with the nearshore, shallow-water species, which were easy to obtain and equally easy to deplete (Pauly et al., 2005). As industrial fishing evolved and technology advanced, and to keep up with an escalating human population hungry for fish, exploitation moved into ever deeper and more remote waters (Figure 1). Finally, humans reached the Southern Ocean, then into coastal Antarctica's Ross Sea, the most remote body of water on Earth (Hutchings and Reynolds, 2004; Morato et al., 2006; Pauly et al., 2005; Swartz et al., 2010).

Antarctica is a true global commons, being the only continent without a native human population. Yet humans have long been interested in Antarctica for its value to international science and as the last wilderness frontier for explorers for more than a century (Fogg, 1992). With this rich history, and shared concern that Antarctica could become the scene or object of international discord, 12 countries signed the Antarctic Treaty in 1959, formally recognizing Antarctica's great international value as a region that should be protected from self interest and devoted to peace and science. Among other things, the Treaty prohibits military operations, nuclear testing, and disposal of nuclear waste, provides for on-site inspection to ensure compliance with its provisions, and requires advance notice of the timing, composition and purpose of all expeditions to and in Antarctica. Throughout this article, we refer to "value" as meaning the importance or preciousness of something. In the case of Antarctica, these

⁶⁹ H.T. Harvey & Associates, Los Gatos, California, USA.

⁷⁰ Stanford University, Stanford, California, USA.

values include, but are not limited to, importance to science, intrinsic elements (environmental and wilderness space) and historic exploration - all of which are foundations of the Antarctic Treaty.

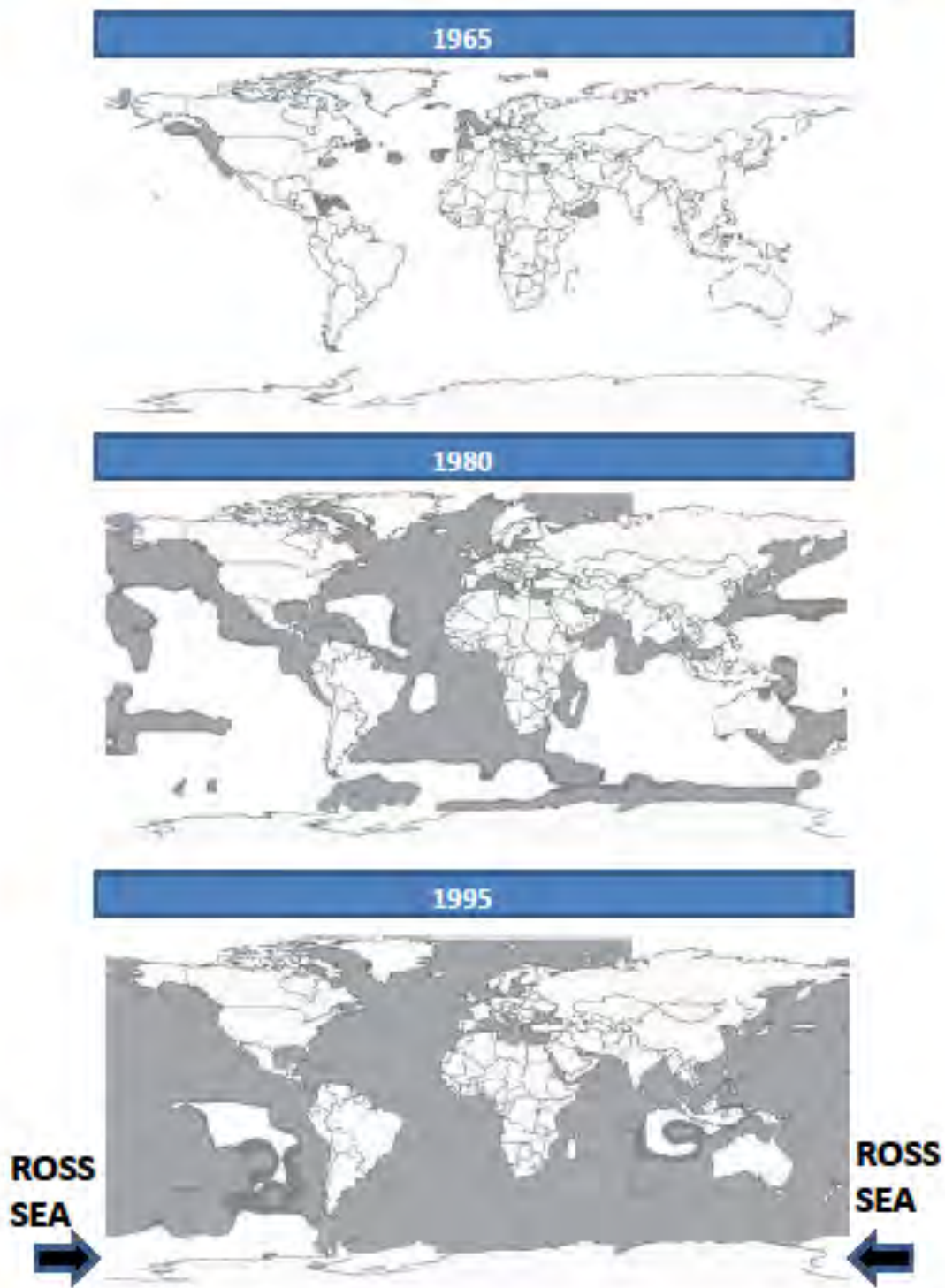


Figure 1: Year of maximum catch. Dark shading indicates major exploitation during the year shown (1965, 1980, 1995); light shading indicates that maximum catch has already been achieved; white colour indicates no or as-of-yet minimal exploitation (Sea Around Us Project, 2005). As the map is centred on the 0° meridian, the Ross Sea, which is split by the 180° meridian, is separated artificially into two parts.

In further recognition of Antarctica's unique values, the Treaty Parties have since adopted a variety of measures to protect them, most notably the 1964 *Agreed Measures for the Conservation of Antarctic Fauna and Flora* and the *Madrid Protocol on Environmental Protection*, which was added in 1991. Among other things, the Protocol prohibits mineral exploration and development for at least 50 years, provides for the establishment of specially protected areas and specially managed areas to conserve the unique wilderness, aesthetic, scientific and other values of the area, and established the Committee on Environmental Protection (CEP) to advise the Treaty Parties of actions needed to meet its intent and provisions. These and related measures have to date saved the Antarctic continent from the "tragedy of the commons" suffered by the renewable resources and natural systems on the other six continents. The Treaty Parties, the CEP, NGOs (e.g., ASOC, 2009a, 2011), and the Antarctic scientific community continue to work to ensure that the human footprint on Antarctica remains relatively and absolutely small. As a consequence, the Antarctic continent is effectively a World Park, one of the most marvelous achievements of humanity, perhaps proving that we can indeed escape Hardin's tragedy when we wish to do so.

The Antarctic Treaty applies to the lands and ice shelves south of 60° South Latitude, but not the high seas within that area. Nor did the Treaty have any language or specific measures that dealt with the exploitation of living resources. Overharvesting and declines in North Atlantic Harp Seal (*Pagophilus groenlandicus*) populations in the late 1950s and early 1960s (Mansfield, 1970) led in 1964 to a private Norwegian sealing expedition to determine if some of the market demand for Harp Seal skins could be met by harvesting pack ice seals in the Antarctic (Øritsland, 1970). Unregulated, market-driven hunting in the 1790s and early 1800s had already caused the near extinction of Antarctic Fur Seals (*Arctocephalus gazella*) and Southern Elephant Seals (*Mirounga leonina*). Fearing the same would happen to Antarctica's other seal species, the Scientific Committee on Antarctic Research (SCAR), an organization established in 1957 to promote science in the Antarctic, called the attention of the Antarctic Treaty Parties to the impending exploitation. To avoid continuing the "tragedy of the commons" (baleen whales had also been decimated by the 1960s), the Committee recommended that the Treaty Parties take steps to ensure the sustainability of any Antarctic seal hunting that might occur. The Parties established a free-standing regulatory agreement, the Convention for the Conservation of Antarctic Seals, which entered into force in 1978. Incredibly, this was the first international agreement providing for the regulation of commercial harvesting of a marine living resource before an industry developed. Part of the regulation enacted included the closing of a few areas entirely to any sealing to protect scientifically valuable breeding populations. For example, this agreement protected populations of Weddell Seals (*Leptonychotes weddellii*) in the Ross Sea, whose demography had been studied since the 1950s, but exploitation was initiated by New Zealand to feed sled dogs, just as explorers had done during the heroic expeditions of the past (Ainley, 2010)).

Having known full well that industrial activities in the Antarctic during the past had decimated elephant seals, fur seals, King Penguins (*Aptenodytes patagonica*), several whale species and

several demersal fish (Kock, 1992; Constable, 2000; Croxall and Nicol, 2004), similar concerns regarding the development of a fishery for Antarctic Krill (*Euphausia superba*), an important forage species in the Antarctic marine ecosystem, led to further action by SCAR. The organization held a workshop in 1976 to identify and determine the research needed to resolve uncertainties concerning the biology and ecology of krill and related species in the Southern Ocean (BIOMASS, 1977). SCAR also called to the attention of the Antarctic Treaty Parties the need to regulate the fishery to ensure that it did not have significant adverse effects on the target krill stocks, on krill dependent species, or their ecosystems. In response, the Treaty Parties initiated negotiation of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), which subsequently entered into force in 1982. The Convention applies to all marine organisms that are part of the ecosystem in the Southern Ocean from the Antarctic northward to the Antarctic Convergence or Polar Front. This area extends beyond the area covered in the Antarctic Treaty to the northern boundary of Antarctic seas (Polar Front or Antarctic Convergence). The Treaty Parties further established a regulatory commission and scientific advisory body – the Commission and the Scientific Committee for the Conservation of Antarctic Marine Living Resources, respectively – and specified their responsibilities for meeting the intent and provisions of the Convention. Substantive decisions of the Commission require the consensus of all members.

The intention of the Convention, with the realization that some treaty nations were fully intent to continue exploitation, was to ensure that any fishing that occurs in the Convention area does not cause depletion of the target stocks or have significant adverse effects on dependent and associated species or the ecosystems of which they all are component parts. The Convention states that:

“ARTICLE II

1. The objective of this Convention is the conservation of Antarctic marine living resources.
2. For the purposes of this Convention, the term ‘conservation’ includes rational use.”

The contrasting language of this Article, “conservation” juxtaposed with “rational use”, demonstrates the competing priorities of those parties that negotiated the Convention (Stokke, 1996). Perhaps due to these competing interests, CCAMLR’s execution and definition of rational use has evolved over the course of its existence, as we detail below.

Quite rationally, upon its coming into force, CCAMLR immediately closed regions where demersal fish stocks had become economically extinct owing to fishing before the Convention was conceived, particularly in the Scotia Sea, waters bordering the Antarctic Peninsula and over the Kerguelen Plateau. Many of these stocks, even today, have yet to recover (CCAMLR, 2010), suggesting that these cold-water-adapted species are incredibly vulnerable to overexploitation and further indicate how little we know about Antarctic marine systems and species. All of this brings into the discussion another important provision in the Convention, yet to be addressed in any meaningful way by its members:

“ARTICLE II

3(c). prevention of changes or minimisation of the risk of changes in the marine ecosystem which are not potentially reversible over two or three decades, taking into account the state of available knowledge of the direct and indirect impact of harvesting, the effect of the introduction of alien species, the effects of associated activities on the marine ecosystem and of the effects of environmental changes, with the aim of making possible the sustained conservation of Antarctic marine living resources.”

CCAMLR has been quite successful in exercising “rational use” with respect to Antarctic krill, providing harvest rules that acknowledge the vital role krill play in the diets of many predators in the Southern Ocean (Constable et al., 2000; Constable, 2011).

For example, in 1985, within just a few years of coming into force, CCAMLR initiated its Ecosystem Monitoring Program (CEMP; Croxall and Nicol, 2004) with the goal of detecting any effects of the krill fishery on selected krill predators such as seabirds and seals. This program, which is based on input from CCAMLR’s Scientific Committee, constitutes recognition that the fishery must be managed on scales that take into account the presence and needs of regional predator populations. Indeed, indicating continued diligence in the incorporation of “rational use” into its management, CCAMLR recently enacted a Conservation Measure (51-07; CCAMLR 2010) that shifts the krill take away from areas important to predators when the regional allowable take exceeds specified trigger levels (15-45% depending on the area). While further work is needed to verify these levels, this procedure is revolutionary as it truly attempts to employ “ecosystem-based fisheries management” in very specific terms. Recognizing the value of CEMP, as a means to monitor ocean resources, CCAMLR has expressed the importance of protecting CEMP sites (penguin and seal breeding localities) from any land-based impacts (Conservation Measure 91-01). In stark contrast, finfish have not been managed with the greater effects on the ecosystem in mind. The requirement to minimize the risk of ecosystem changes that are not reversible in “two to three decades” has largely been ignored by CCAMLR. Owing to the industry’s and fishing nations’ increased desperation to find new fish stocks (e.g. Swartz et al., 2010), and the huge profits to be made in doing so, CCAMLR’s concept of “rational use” as applied to finfish has evolved simply to “use”. Today CCAMLR’s strategy for finfish, particularly the very lucrative toothfish (*Dissostichus spp.*) fisheries, closely resembles the traditional single species maximum sustainable yield (MSY) fisheries management that CCAMLR had tried to avoid as indicated by the language in its charter. In fact, the MSY strategy is expressly stated by Constable et al. (2000) in their review of CCAMLR management “harvest rules”: reduction of spawning biomass of toothfish to 50% of pre-fished levels, with the assumption that this will increase yield and have no ecosystem effects. The arguments against single-species MSY, and examples of how and why it has failed, are too numerous to recount here (Longhurst, 2010).

In 1996, as an example of reverting to the concept of “use” under the CCAMLR harvest rules, New Zealand initiated a longline fishery for Antarctic Toothfish (*D. mawsoni*) in the Ross Sea, a species never before fished and in the last unaltered global commons (Ainley, 2002; 2004;

2010). A number of CCAMLR delegations opposed the unilateral action due to the lack of information on the distribution, abundance, productivity, and life history of the species. In mind was the fact that more often than not, fisheries have crashed when full-scale harvesting proceeded before understanding life history traits and ecological associations of the fish species, especially deep-sea, demersal species, which typically have life-history characteristics making them very sensitive to adult mortality (Cheung et al. 2007), e.g. Orange Roughy (*Hoplostethus atlanticus*) off southeast Australia (Smith et al., 1995) and rockfish (*Sebastes*) species of the California Current (Ainley & Blight, 2009, and references therein). Indeed, deep-sea fisheries around the globe have proved virtually impossible to monitor and manage successfully. As noted most recently by Norse et al. (2011: 307), “deep-sea fisheries more closely resemble mining operations that serially eliminate fishable populations and move on.”

Subsequent development and expansion of the Ross Sea toothfish fishery was inevitable, due in part, to the unwritten rule-of-thumb: You can’t understand the species without a fishery (expressed D. Miller using other words in Hutchison, 2004: 16). Rational use had thus become a politically expedient and misused concept. Owing to the expense of scientific research, thus far, virtually all data used to manage the fishery have been fishery dependent, with stock and allowable catch estimates based largely on elegant, mathematically balanced models with guesses used for many inputs. Indeed, some important parameters in stock models are averages taken from other, warmer water species, despite full knowledge that temperature is a major factor affecting movements, growth and reproductive patterns and other life history processes in fish (e.g. Myers et al., 1995; 1999). Even so, CCAMLR views the results of its stock models, with no means for independent verification, as “precautionary”.

More than 15 years after its initiation, the Ross Sea toothfish fishery remains classified by CCAMLR as “exploratory” because of the paucity of data available about the species’ life history and demographics that are needed for management at a level analogous to well-managed fisheries elsewhere. This approach to harvesting the species is a rationalization, rather than rational use, ignoring the species’ sensitivity to fishing mortality and its central role as predator and prey (depending on life stage) in the ecosystem. Toothfish are a major fish predator, but are also the prey of Weddell Seals, Sperm and Killer Whales (*Physeter macrocephalus*, *Orcinus orca*), and Colossal Squid (*Mesonychoteuthis hamiltoni*; Pinkerton et al., 2010). Amazingly, despite CCAMLR’s success with the krill fishery, no CEMP program exists to monitor any potential impacts on dependent and related species by this or any toothfish fishery within their responsibility. The fishery nevertheless has carried on despite the consensus within the marine ecological community outside of CCAMLR that we still don’t know much about the Antarctic Toothfish and its ecosystem, and surely not enough to effectively or sustainably manage this fishery (Blight et al., 2010).

Having fully exploited and depleted most of the economically valuable fishery resources in other parts of the world’s oceans, national and industrial fishing companies were now willing to travel thousands of kilometres, through ice-choked, stormy seas, to set longlines in this most remote stretch of the ocean. It became worth the cost of time, fuel, gear, vessels, and lives (i.e. the sinking of a Korean vessel in 2010 and another catching fire in 2011, with loss of many lives,

and the “rescuing” of several disabled vessels previously and since), because Antarctic Toothfish, sold as “Chilean sea bass”, commands a very high market price. It is sold at ~NZ\$70/kg (approximately USD\$25/lb), affordable only by wealthy consumers, primarily in the United States and Europe. The “exploratory” fishery has expanded, currently to 15- 20 vessels from a dozen nations in an Olympic-style mode, taking >3000 tonnes annually of these long-lived, late to mature, deep-dwelling fish, which have limited capacity to reproduce.

Quite soberingly, the opening and expansion of the Ross Sea toothfish fishery, a little known action, facilitated the completion of humanity’s sequential consumption of all the “low hanging fruit” it had encountered as it spread and dominated the globe (Pauly et al., 2005). Humans were now extracting an ecologically important species from one of the few remaining unexploited stretches of ocean remaining on Planet Earth (Figure 1). Until recently, the Ross Sea was considered the least anthropogenically affected stretch of ocean on the globe (Halpern et al., 2008), and perhaps in relative terms it still is. The Ross Sea, largely protected by remoteness (being thousands of kilometers to nearest port) but also an inhospitable environment, remained largely free from major industrial fishing or whaling until the initiation of the toothfish fishery in 1996. Of the whaling that did occur, first for blue whales (*Balaenoptera musculus*) in the 1920s and then Antarctic minke whales (*B. bonaerensis*) in the 1970s, the minke population has recovered and the blue whale shows initial signs of doing so (Ainley, 2010). The Ross Sea has experienced no wide-spread pollution, no plastic patches, no red tides, fish kills nor dead zones, no jellyfish invasions, and no apparent introductions of alien species, all of which plague or have plagued other oceans including the northern reaches of the Southern Ocean. As stated on several occasions (Ainley, 2002; 2004), due to its relatively pristine nature, the Ross Sea acts as a reference for other areas of the Southern Ocean.

“Rational use” is an interesting precept of conservation, first expressed in the 1940s by hunter and renowned conservationist, Aldo Leopold. The term implies that humans cannot continue to exploit renewable resources at will and expect them to last. It further cautions that we be more thoughtful and deliberate in conserving our natural assets and treasures. This concept has guided conservation efforts on land, including the establishment of nature reserves and national parks. To date roughly 12% of Earth’s land is contained within protected areas, with more added annually (United Nations, 2010: 56). Few debate the value of these achievements. In addition to that 12% is the entire Antarctic continent (14 million km²), which today essentially is a fully protected “World Park” because “rational use” was viewed at the broadest scale of human existence. What could be more rational than setting aside a large area of Earth, including the ocean portion, for the sake of peace, science and future generations?

The secret to successful “rational use,” as known and practiced by land-use managers, lies not just in “precautionary management” but also in attention to the concept and issue of scale. Biological communities and ecosystems that include key, wide-ranging species require large areas --- some as expansive as millions of square kilometres --- to achieve effective protection. This is clearly recognized in the boundary definitions of some national parks and reserves, like the vast Kruger National Park in South Africa and the Arctic National Wildlife Refuge in Alaska. These areas are some of the few places left in the world that support healthy populations of

apex- and meso-predators, animals which though few in number, exercise their influence over vast areas of unbroken space to complete their life cycles (Wirsing & Ripple, 2011). Sound science has shown that the ocean's ecological processes and organisms also operate over multiple scales, many of them vast (Levin et al., 2009). Within that vein of knowledge, the Ross Sea toothfish, the ecological equivalent of sharks in warmer waters, purportedly moves thousands of kilometres between spawning and post-spawning-recovery areas (Hanchet et al., 2008). Such a pattern adds considerable and likely unsolvable problems to management and protection at small spatial scales.

Marine reserves of any size are exceedingly rare, owing to the tragedy of the commons that continues to rule the high seas as evidenced by the excessive illegal, unregulated, unreported (IUU) fishing that occurs widely, including the Southern Ocean (Hutchinson, 2004; Østerblom et al., 2010). In contrast to Earth's land, less than 2% of the world ocean is in reserves (Toropova et al., 2010: 29). The Southern Ocean constitutes about 12% of the world ocean, yet less than 1% is formally protected in marine reserves, despite the disastrous history of Southern Ocean exploitation, the still depleted populations of cetaceans and some fish, and the inclusion of the following in the CCAMLR charter:

"ARTICLE IX

2. The conservation measures referred to in paragraph 1(f) above include the following:

(g) the designation of the opening and closing of areas, regions or sub-regions for purposes of scientific study or conservation, including special areas for protection and scientific study;"

While marine reserves clearly reside within CCAMLR's management toolbox, they have not yet been utilized.

Looking at Figure 1, keeping in mind the large geographic scale and knowing that so little of the ocean has been protected in reserves, we can easily and legitimately apply the lessons learned on land and rationally move forward in protecting the remaining intact ocean ecosystems we have left. A number of conservation organizations, including the International Union for Conservation of Nature, have proposed that certain ocean gems should be designated marine protected areas. One of these, the crown jewel, is the Ross Sea (Ainley et al., 2010; ASOC, 2009b; 2010), the last ocean on Earth where an intact, open ocean ecosystem still exists with all its flora and fauna still present. Including the waters beneath the Ross Ice Shelf, the Ross Sea is only 3.2% of the Southern Ocean, about 0.4% of the world ocean; a small area to set aside, with such profound implications for science, biodiversity and honouring the Antarctic Treaty.

We know so little about how ocean ecosystems work, and yet we appear to be on our way to irrevocably altering all of them, forgoing the Antarctic Treaty's devotion to science, before we have a chance to find out. We can continue our irrational exploitation to its dismal end, a process begun many thousands of years ago, or we can choose to forge a new path. In keeping with the bold, historic creation of the Antarctic Treaty, we can forgo the tragedy of the commons and make rational choices for the greater human good. We can use the enlightened reasoning of the 21st century to designate the Ross Sea a marine park and no-take reserve,

taking its place alongside the other great parks and reserves of the world that we have rationally opted to create. There is value, isn't there, in having at least one major oceanic wilderness that teems with life on this planet for all time, devoted to peace and science?

Acknowledgements

Preparation of this paper, in part, was supported by NSF Grant ANT-0944411, though the views do not necessarily reflect those of NSF.

References

- Ainley, D.G. 2002. The Ross Sea, Antarctica: Where all ecosystem processes still remain for study, but maybe not for long. *Marine Ornithology*, 31: 55-62.
- Ainley, D.G. 2004. Acquiring a 'base datum of normality' for a marine ecosystem: the Ross Sea, Antarctica. CCAMLR document WG-EMM-04/20, Hobart.
- Ainley, D. G. 2010. A history of the exploitation of the Ross Sea, Antarctica. *Polar Record*, 46: 233–243.
- Ainley, D. G., Ballard, G. & Weller, J. 2010. ROSS SEA BIOREGIONALIZATION, Part I: Validation of the 2007 CCAMLR Bioregionalization Workshop Results Towards Including the Ross Sea in a Representative Network of Marine Protected Areas in the Southern Ocean. CCAMLR document WG-EMM- 10/11, Hobart.
- Ainley D. G. & Blight, K. L. 2009. Ecological repercussions of historical fish extraction from the southern ocean. *Fish and Fisheries*, 10: 13-38.
- ASOC (Antarctic and Southern Ocean Coalition). 2009a. Impacts of local human activities on the Antarctic environment: a review. Information Paper, ATCM 32, CEP 12/6b, Baltimore MD.
- ASOC. 2009b. A Ross Sea MPA: preservation for science. Information Paper, ATCM 32, CEP 12, Baltimore MD.
- ASOC. 2010. The case for inclusion of the Ross Sea continental shelf and slope in a Southern Ocean network of marine reserves. Information Paper, ATCM 33, CEP 13/7e, Punta del Este, Uruguay.
- ASOC. 2011. Evolution of footprint through time: capturing spatial and temporal dimensions of human activities and their outputs. Information Paper, ATCM 34, CEP 14/7e, Buenos Aires, Argentina.
- Berkes, F. 2008. *Sacred Ecology*. 2nd (Ed.) New York: Taylor & Francis.

- BIOMASS (Biological Investigations of Antarctic Marine Systems and Stocks). 1977. Vol. 1, Research proposals, Vol 2, Selected contributions to the 1976 Woods Hole Conference on Living Resources of the Southern Ocean. Scott Polar Research Institute, Cambridge, UK.
- Blight, L.K., Ainley, D.G., Ackley, S.F., Ballard, G., Ballerini, T., Brownell, R.L. Jr., Cheng, C.-H.C., Chiantore, M., Costa, D., Coulter, M.C., Dayton, P., Devries, A.L., Dunbar, R., Earle, S., Eastman, J.T., Emslie, S.D., Evans, C.W., Garrott, R.A., Kim, S., Kooyman, G., Lescroël, A., Lizotte, M., Massaro, M., Olmastroni, S., Ponganis, P., Russell, J., Siniff, D.B., Smith, W.O., Jr., Stewart, B.S., Stirling, I., Willis, J., Wilson, P.R. & Woehler, E.J. 2010. Fishing for data in the Ross Sea. *Science*, 330: 1316.
- CCAMLR. 2010. Conservation Measures 32-02, 32-04, 32-07, 51-07, 91-01; http://www.ccamlr.org/pu/e/e_pubs/cm/09-10/toc.htm.
- Cheung, W.W.L., Watson, R., Morato, T., Pitcher, T.J. & Pauly, D. 2007. Intrinsic vulnerability in the global fish catch. *Marine Ecology Progress Series*, 333: 1-12.
- Constable, A. J., de la Mare, W. K., Agnew, D. J., Everson, I. & Miller, D. 2000. Managing fisheries to conserve the Antarctic marine ecosystem: practical implementation of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). *ICES Journal of Marine Science*, 57: 778-791.
- Croxall, J. P. & Nicol, S. 2004. Management of Southern Ocean Fisheries: global forces and future sustainability. *Antarctic Science*, 16(4): 569-584.
- Fogg, G. E. 1992. *The History of Antarctic Science*. Cambridge: Cambridge University Press.
- Halpern, B. S., Walbridge, S., Selkoe, K. A., Kappel, C. V., Micheli, F., D'Agrosa, C., et al. 2008. A global map of human impact on marine ecosystems. *Science*, 319: 948-951.
- Hanchet, S. M., Rickard, G.J., Fenaughty, J.M., Dunn A. & Williams, M. J. H. (2008) Hypothetical life cycle for Antarctic toothfish (*Dissostichus mawsoni*) in the Ross Sea region. *CCAMLR Science*, 15:35–53.
- Hardin, G. 1968. The Tragedy of the Commons. *Science*, 162: 1243-1248.
- Hutchings, J. A. & Reynolds, J. D. 2004. Marine Fish Populations Collapses: Consequences for Recovery and Extinction Risk. *Bioscience*, 54(4): 297-309.
- Hutchison, K. 2004. Fighting over fish. *Antarctic Sun*, February 2004.
- Johannes, R. E. 1981. *Words of the Lagoon: Fishing and Marine Lore in the Palau District of Micronesia*. Berkeley: University of California Press.
- Kock, K. H. 1992. Antarctic Fish and Fisheries. New York: Cambridge University Press.
- Levin, P. S., Fogarty, M. J., Murawski, S. A. & Fluharty, D. 2009. Integrated Ecosystem Assessments: Developing the scientific basis for Ecosystem-Based Management of the ocean. *PLoS Biology*, 7: 23-28.

- Longhurst, A. 2010. *Mismanagement of Marine Fisheries*. Cambridge: Cambridge University Press.
- Mansfield, A.W. 1970. Population dynamic and exploitation of some Arctic seals, in *Antarctic Ecology, Proceedings of the 1968 SCAR Biology Symposium, Vol. 1.*, edited by M. W. Holdgate. London: Academic Press: 429-446.
- Marean, C. in Koerth-Baker 2009, <http://boingboing.net/2009/12/16/how-shellfish-saved.html>.
- Menzies, C. 2006. *Traditional Ecological Knowledge and Natural Resource Management*. Lincoln: University of Nebraska Press.
- Myers, R. A., Bowen, K. G. & Barrowman, N. J. 1995. Summary of worldwide spawner and recruitment data. Canadian Technical Report of Fisheries and Aquatic Sciences 2024.
- Myers, R. A., Bowen, K. G. & Barrowman, N. J. 1999. Maximum reproductive rate of fish at low population sizes. *Canadian Journal of Fisheries and Aquatic Sciences*, 56: 2404-2419.
- Morato, T., Watson, R., Pitcher, T., and Pauly, D. 2006. Fishing down the deep. *Fish and Fisheries*, 7: 24-34.
- Norse, E. A., Brooke, S., Cheung, W. W. L., Clark, M. R., Ekeland, I., Froese, R., et al. 2011. Sustainability of deep-sea fisheries. *Marine Policy*, 36: 307-320.
- Øritsland, T. 1970. Sealing and seal research in the South-West Atlantic pack ice, Sept.-Oct.1964, in *Antarctic Ecology, Proceedings of the 1968 SCAR Biology Symposium, Vol. 1*, edited by M. W. Holdgate. London: Academic Press: 367-376.
- Österblom H., Sumaila U. R., Bodin Ö., Hentati Sundberg J. & Press A. J. 2010. Adapting to regional enforcement: fishing down the governance index. *PLoS ONE*, 5(9): e12832. doi:10.1371/journal.pone.0012832
- Pauly, D., Watson, R. & Alder, J. 2005. Global trends in world fisheries: impacts on marine ecosystems and food security. *Philosophical Transactions of the Royal Society B*, 360: 5–12.
- Pinkerton, M., Bradford-Grieve, J. & Hanchet, S. 2010. A balanced model of the food web of the Ross Sea, Antarctica. *CCAMLR Science*, 17: 1–31.
- Sea Around Us Project. 2005: Sea Around Us database. [online] Available at <http://www.searoundus.org>.
- Smith, D. C., Fenton, G. E., Robertson, S. G. & Short, S. A. 1995. Age determination and growth of orange roughy (*Hoplostethus atlanticus*): a comparison of annulus counts with radiometric ageing. *Canadian Journal of Fish and Aquatic Science*, 52:391-401
- Stokke, O. S. 1996. The effectiveness of CCAMLR, in *Governing the Antarctic: the Effectiveness and Legitimacy of the Antarctic Treaty System*, edited by Stokke, O. S. & Vidas, D. Cambridge: Cambridge University Press: 120-151.

- Swartz, W., Sala, E., Tracey, S., Watson, R. & Pauly, D. 2010. The spatial expansion and ecological footprint of fisheries (1950 to Present). *PLoS ONE*, 5(12): e15143. doi:10.1371/journal.pone.0015143.
- Toropova, C., Meliane, I., Laffoley, D., Matthews, E. & Spalding, M. (eds.) 2010. *Global Ocean Protection: Present Status and Future Possibilities*. Brest, France: Agence des aires marines protégées, Gland, Switzerland, Washington, DC and New York, USA: IUCN WCPA, Cambridge: UNEP-WCMC, Arlington, USA: TNC, Tokyo, Japan: UNU, New York, USA: WCS.
- United Nations. 2010. *The Millennium Development Goals Report*. New York: United Nations Department of Economic and Social Affairs.
- Wirsing, A. J & Ripple, W. J. 2010. A comparison of shark and wolf research reveals similar behavioral responses by prey. *Frontiers in Ecology and the Environment*, 9: 335-341.
- Yellen, J. E., Brooks, A. S., Cornelissen, E., Mehlman, M. J. & Stewart, K. 1995. A middle stone-age worked bone industry from Katanda, Upper Semliki Valley, Zaire. *Science*, 268: 553–556.

10. Concluding Remarks: Towards Interdisciplinary Study of Antarctic Values

Alan D. Hemmings⁷¹ and Daniela Liggett⁷²

The Challenges of a Values-Orientated Enquiry

The foundational project that SCAR's Social Sciences Action Group (SSAG) set itself, with the investigation of *Antarctic Values*, is an inherently challenging and complex field of enquiry, for at least two reasons. Firstly, because intellectual enquiry into values anywhere in the world has not historically been confined within one or even a few academic disciplines, in contrast to more traditional foci for Antarctic research. Secondly, because the everyday use of the word "values" and the understandings inherent in its precepts and predicates naturally leads into a diffuse set of understandings of what it is "really about". The elucidation of a unitary understanding of what Antarctic values are is an unrealistic goal. *Documenting* – to use one of the terms favoured in the SSAG planning statements (see e.g. SSAG, 2012) – and understanding values will be an exercise in plurality. Without prejudice to our colleagues in traditional Antarctic research areas, it is perhaps not quite as straightforward to cohere an academic group around Antarctic Values as it might be around (say) Antarctic Geophysics, internally textured and complex as that intellectual focus is. There are researchers who identify themselves as 'geophysicists', in a way that there are not ordinarily 'valueists' (although that assertion will surely flush out claims to the contrary), and there are not only established methodologies, but methodologies with traditions of application in the context of Antarctica.

The community of scholars who engage with 'values' through SSAG are drawn from diverse academic disciplines and backgrounds, and there is little established Antarctic work on values to draw upon. Each of us also tends to view the usages, conventions and methodologies of our particular social sciences or humanities focal area as 'correct' and those of our colleagues as potentially mistaken. So long as this is not taken entirely seriously, it is perhaps an encouraging indication that this is a normal academic community. A further complexity is that, as with some other intellectual enquiries, one "must expect to be affected by what should be the object of [the] study" (Billig, 1995: 37). The pervasiveness of unexamined personal norms around "values" challenges each of us. Whereas most people do not feel the need (let alone believe they have the professional competence) to express views in relation to geophysics, everyone has values, knows this, and believes their personal valuations to be morally significant. Indeed,

⁷¹ Adjunct Associate Professor, Gateway Antarctica Centre for Antarctic Studies and Research, University of Canterbury, Christchurch New Zealand. Resident in Australia. Email: ahe30184@bigpond.net.au

⁷² Lecturer, Gateway Antarctica Centre for Antarctic Studies and Research, University of Canterbury, Christchurch New Zealand.

not to believe this would be intellectually incoherent. The challenges of demonstrating academic respectability to a discourse around Antarctic values are thus considerable.

Howsoever a new line of enquiry unfolds, one has to start somewhere, recognising that the foundational phase may lead into cul-de-sacs as well as ramps on to exciting new highways. A preliminary, and entirely contingent, SSAG values-typology is shown in Figure 1. The priority is to stimulate each other, and particularly to stimulate new colleagues to engage, dispute and propose, so that a diverse and intellectually rigorous to framing and discourse emerges. Part of the charm of this project resides precisely in its challenges, complexities and fluidity.



Figure 1: Provisional SSAG values typology (from SSAG, 2012).

The Workshop

The workshop for which these are the proceedings focussed on a subset of the Antarctic values project, namely the "linkages between environmental management and value systems". This has, as we hope is evident from the papers presented here, still seen a diverse range of insights. Indeed, aside from the class "Economic", the papers variously speak to the five of the six

provisional SSAG values typologies (Figure 1, above). Sitting outside these, and providing a valuable methodological context, is the opening paper of the collection: 'Value Theory for an Antarctic Case Study', by Sira Engelbertz, Daniela Liggett and Gary Steel. Rupert Summerson's 'Defining Wilderness and Aesthetic Values of Antarctica' plainly sits within the "Aesthetic" class, but also speaks to the "Political" class through its grounding in the formal obligations in relation to wilderness and aesthetic values in the Madrid Protocol of the Antarctic Treaty System (ATS). Similarly, Julia Jabour's "The Utility of Official Antarctic Inspections: Symbolism without Sanction?" and Alan Hemmings' "'Environmental Management' as Diplomatic Method: The Advancement of Strategic National Interest in Antarctica" are directed to the place of values within the political system of the ATS. These papers also address the realities around the operationalisation of environmental duties in Antarctica. The historically central place of values in the "Scientific" class is reflected in Fraser Morgan's paper, "Lines in the Ice: Classifying Antarctic Environments" and "Exploiting the Southern Ocean: Rational Use or Reversion to Tragedy of the Commons?" by David Ainley and Cassandra Brooks – but again, their papers burst the bounds of simple categorisation and also address, in the latter case very critically, compliance with declaratory commitments to formally entrenched Antarctic values. Juan Francisco Salazar in "Perceptions and Opinions of Antarctic Values in Chile" and Sean Beckett and Heidi Prozesky in "Hegemonic Definitions from the 'North': Environmental Concern as a Western Construct and its Applicability to the South African and Antarctic Context" take us into the realm of values in a "Societal" context. They do so, moreover, in the context of non-Anglo perceptions, from Chile and South Africa respectively.

Gaps and the Future

These are fascinating studies. However, some obvious gaps in coverage are evident. The workshop benefitted from a further presentation, by Elizabeth Leane, entitled "Taking Snow to Antarctica: The 'Two Cultures' and Disciplinary Values in the Far South", which unfortunately could not be made available for these proceedings. This brought a literary-take to the question of Antarctic values, which is unfortunately otherwise not represented in the present volume. Similarly absent in these proceedings are legal, historical and tourism-orientated analyses and, as noted above, an economic analysis of Antarctic values. We have hopes that these disciplinary gaps are closable, given the scholars already engaged with SSAG and/or SCAR's History Expert Group. But the typology is merely provisional, and colleagues will surely identify other disciplines whose interests in, and attention to, Antarctic values are not yet recognised therein. A function of this publication is to stimulate their engagement.

We can expect that studies in the already opened areas of work, and those others that we hope will commence, will develop along familiar (if not, hopefully, pedestrian!) disciplinary pathways. A stage-2 challenge might then be the integration of studies from several disciplines to enable a more textured understanding – and, frankly, a more operationally useable contextualisation of values *in* Antarctica and *at* the various fora (nationally and internationally) where Antarctic futures are litigated. Intellectual engagement with Antarctic values has a rich field before it.

References

Billig, M. 1995. *Banal Nationalism*. London: Sage.

SSAG. 2012. Values in Antarctica (VIA): Human Connections to a Continent. Scientific Committee on Antarctic Research. <http://www.scar.org/researchgroups/via/>.