

Challenges in Protecting the Wilderness of Antarctica

Tina Tin and Alan D. Hemmings

Abstract—Since 1998, the wilderness values of Antarctica have been among those given legal recognition under the Protocol on Environmental Protection to the Antarctic Treaty. Despite the legal obligation, on-the-ground implementation has attracted little interest. The term “wilderness” and its consequential operational implication, including the designation of Antarctic Specially Protected Areas and the drafting of Environmental Impact Assessments, is still poorly conceptualized in Antarctic Treaty System discourse. Many possible factors underlie the lack of attention to the protection of wilderness in Antarctica. There is the perception that wilderness is in overabundance in Antarctica and hence does not require special protection. Setting areas aside, out of bounds of infrastructure development, may be perceived as threatening to national ambitions and the accepted ideas of freedom of movement. There is no formal definition of either term in the Protocol or elsewhere in Antarctic Treaty System (ATS) instruments, and the concept of wilderness (as other terms in the Protocol) seems often to be cast as too complex or philosophical to be applied in practice. We ask the question of how existing environmental measures within the ATS and non-Antarctic wilderness management tools could be used to achieve on-the-ground protection of the Antarctic wilderness.

Introduction

If wilderness “refers broadly to the most intact, undisturbed, wild natural areas—those last truly wild places that humans do not control and have not developed with roads or other industrial infrastructure” (Kormos 2008)—then, at least until we see real application of the concept to the

world’s oceans and sea-floor, the Antarctic is today its greatest exemplar. On any objective basis, the Antarctic is our least obviously modified area and, in global terms, subject to still low levels of human activity. If we cannot safeguard wilderness in the Antarctic, we shall not do so anywhere. A continent with no indigenous population, relatively few commercial and national interests, and managed collaboratively by 28 countries, the wilderness of Antarctica should theoretically be easier to safeguard than wilderness areas on the other six continents. However, Antarctica’s extreme isolation from human settlements, which has protected its wilderness character, has been progressively eroded over two centuries (Hemmings 2007). When it comes to wilderness, a certain complacency is evident in the Antarctic, despite increasing pressures from scientific research, fishing, tourism, and other commercial interests (Tin and others 2008). Under the fragile international governance regime operating in Antarctica, with its diverse geopolitical interests, cultures, and capabilities, a more robust consideration of wilderness is not easy. This paper seeks to examine the challenges in protecting the wilderness of Antarctica at the end of the first decade of the 21st Century.

The Antarctic

Antarctica is variously bounded, but here it will be taken to mean the entire land and marine area south of 60 degrees south latitude. This excludes a large part of the Southern Ocean and also the subantarctic islands but coincides with the area subject to the 1959 Antarctic Treaty and some subsequent instruments of what is termed the Antarctic Treaty System (ATS), which provides the focus for Antarctic governance (Hemmings 2011). These limitations in coverage offer the advantage of simplifying the complex juridical and conceptual framework within which the concept of wilderness has arisen, and puts the main focus on the land area of Antarctica. This area is governed internationally under the ATS, by a culturally diverse group of 28 countries, using four official languages. The original Antarctic Treaty was signed in 1959 and stipulated the prohibition of military activities and nuclear testing and required Treaty Parties to take measures regarding the preservation and conservation of living resources in Antarctica. Over the next 50 years, the ATS expanded to include the Antarctic Treaty and three other legal instruments. Its latest addition, the Protocol on Environmental Protection to the Antarctic Treaty (signed in 1991, and more commonly referred to as the Madrid Protocol) brought in explicit protection for Antarctica’s wilderness values.

Tina Tin is a freelance environmental consultant and is an advisor to the Antarctic and Southern Ocean Coalition (ASOC), BP 80358, 45163 Olivet, CEDEX 3, France. E-mail: tinatintk@gmail.com.

Alan D. Hemmings is Associate Professor at Gateway Antarctica Centre for Antarctic Studies and Research, University of Canterbury, New Zealand and Research Associate, Institute of Marine and Antarctic Studies, University of Tasmania, Hobart, Australia. He is a resident of Canberra, Australia. E-mail: ahe30184@bigpond.net.au.

Watson, Alan; Murrieta-Saldivar, Joaquin; McBride, Brooke, comps. 2011. Science and stewardship to protect and sustain wilderness values: Ninth World Wilderness Congress symposium; November 6-13, 2009; Meridá, Yucatán, Mexico. Proceedings RMRS-P-64. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 225 p.

Wilderness in the Antarctic Regime

Appearance of Wilderness in the Antarctic Regime

While wilderness was a concept and term easily applicable to the Antarctic, its first formal appearance in the Antarctic regime only occurred in 1988—perhaps ironically as a consequence of the decade-long debate around the acceptability of minerals resource activity in Antarctica—with the adoption of the Convention on the Regulation of Antarctic Mineral Resource Activity (CRAMRA) (<http://www.state.gov/documents/organization/15282.pdf>).

The Preamble to CRAMRA noted the “unique ecological, scientific and *wilderness* value of Antarctica and the importance of Antarctica to the global environment” and Article 2: Objectives and General Principles “acknowledge[d] the special responsibility of the Antarctic Treaty Consultative Parties for the protection of the environment and the need to [*inter alia*] respect Antarctica’s scientific value and aesthetic and *wilderness* qualities” (emphases added). Substantively, Article 4: Principles Concerning Judgements on Antarctic Mineral Resource Activities states that “No Antarctic mineral resource activity shall take place until it is judged, based upon assessment of its possible impacts on the Antarctic environment and on dependent and on associated ecosystems, that the activity in question would not cause [*inter alia*]: degradation of, or substantial risk to, areas of special biological, scientific, historic, aesthetic or *wilderness* significance” (emphasis added) (<http://www.state.gov/documents/organization/15282.pdf>).

CRAMRA was abandoned and in its place a new instrument, the Protocol on Environmental Protection to the Antarctic Treaty, generally referred to as the Madrid Protocol, was adopted in 1991 and entered into force in 1998. It is in, and subsequent to, the Madrid Protocol that wilderness has seen its fullest development in the ATS. But aside from its first use of the term, CRAMRA’s legacy to the Protocol was both a continued lack of clarity about what wilderness was considered to be (let alone a definition) and an invariable coupling of wilderness with another concept, *aesthetics*. Approaching 20 years on from the drafting of the Madrid Protocol, this legacy continues and, we argue, is one of the critical constraints on the full operational realization of the legal duties toward Antarctic wilderness.

Wilderness is now used in the Antarctic system in two rather different ways—as a generalized and essentially political assertion about the overall state of the Antarctic environment and in the narrower technical sense of a particular value to be taken into consideration under the Madrid Protocol (Tin and others 2008).

Wilderness Under the Madrid Protocol

One of the major developments evident in the Madrid Protocol was the expansion of morally considerable issues, with a broadening of both *values* and *activities* beyond the previous focus of the ATS instruments on scientific and directly related activities. Critically, in Article 3: Environmental Principles, wilderness became one of a range of considerations that were to be “fundamental considerations

in the planning and conduct of all activities in the Antarctic Treaty Area.” The difficulty was that this was achieved in a conceptually confused manner, with wilderness not only coupled with aesthetics but ambiguously situated within the further concept of “intrinsic value”:

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 [http://www.antarctica.ac.uk/about_antarctica/geopolitical/treaty/update_1991.php].

Not one of these terms is defined in the Protocol, and within this jumble it is not really clear what understanding of wilderness is intended. The diplomatic joke about the weight of commas is here exemplified. Is wilderness intended to be solely an intrinsic value or is it more? Does the coupling with aesthetic carry inevitable meaning? In a multi-lingual and culturally diverse international system like the ATS, ambiguity hardly helps consistent interpretation. However, the second paragraph of Article 3 at least directs Parties to plan and conduct activities so as to limit adverse impacts and to avoid, *inter alia* “degradation or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance.”

As a framework convention, the substantive technical obligations of the Protocol are placed in updatable Annexes. There are presently six, although only five are in force. Interestingly, wilderness is referred to explicitly in only two of the Annexes, and one of these—Article 3 of Annex III: Waste Disposal and Waste Management—was an interim injunction pending the ending of open burning, which has long been achieved. Under Annex V Article 3—Area Protection and Management—“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” and Parties are enjoined to identify within a systematic environmental-geographical framework, *inter alia*, “areas of outstanding aesthetic and wilderness value” (http://www.antarctica.ac.uk/about_antarctica/geopolitical/treaty/update_1991.php).

Beyond these limited and explicit requirements, wilderness obligations in relation to the Annexes seem to rely on an implied duty traceable back to the Principles (Article 3) in the main body of the Protocol, and, like much else therein, to a resulting integrated environmental management approach. Accordingly, in the application of Annex I: Environmental Impact Assessment (EIA), which is probably the single most important environmental gatekeeper under the Madrid Protocol, consideration of wilderness depends on a voluntary interpretation of what should be addressed for the mid-level EIA termed an Initial Environmental Evaluation and, in the case of the high-level Comprehensive Environmental Evaluation (CEE), on the indirect “consideration of the effects of the proposed activity on the conduct of scientific research *and on other existing uses and values*” (emphasis added) (Annex I Article 3(i)).

The picture here is of not terribly well-resolved obligations toward wilderness, patchily referred to, and often arrived at through implied or indirect routes. These obligations are, however, connected to the two principal operational tools for Antarctic environmental management: Protected Areas and EIA.

Wilderness and the Antarctic Protected Areas System

The Antarctic Protected Areas system emerged within 5 years of the adoption of the Antarctic Treaty. It is one of the earliest manifestations of environmental awareness in Antarctica and is now the management tool with the greatest case-history (Goldsworthy and Hemmings 2008). The current system substantively rests on two area categories (see Goldsworthy and Hemmings 2008 for details): a collaborative management mechanism termed an Antarctic Specially Managed Area (ASMA), of which there are seven with a total area of approximately 44,250 km²; and a more conventional protected area termed an Antarctic Specially Protected Area (ASP), of which there are 71 with a total area of approximately 3,075 km² (Antarctic Protected Areas Database 2009). The Antarctic continent alone is approximately 14,000,000 km² and so a mere 0.02% is presently in ASPAs. While ASMAs may include wilderness areas, wilderness area designations would largely be achieved via ASPAs. However, from the foregoing figures it is clear that no substantial area has yet been designated.

Searching the Antarctic Protected Areas Database (2009) reveals the limited realization of active wilderness protection in the areas so far designated. While a general search throws up many references to “wilderness,” this is an artefact of the mechanism termed a “Measure” whereby Management Plans have been adopted since 2004. The preamble of the Measure includes a variation on the phrasing: “Recognising that this area supports outstanding environmental, scientific, historic, aesthetic or *wilderness* values, or ongoing or planned scientific research, and would benefit from special protection ...” (emphasis added). The majority of Management Plans include no substantive consideration of wilderness.

Only one ASMA (ASMA 2: McMurdo Dry Valleys, Southern Victoria Land) and three ASPAs (ASP 119: Davis Valley and Forlidas Pond, Dufek Massif; ASP 164: Scullin and Muray Monoliths, MacRobertson Land, East Antarctica; and ASP 168: Mount Harding, Grove Mountains, East Antarctica) appear to include explicit reference to wilderness issues in their Management Plans. Even then, the consideration need not be extensive.

The 40-page Management Plan for ASMA 2 makes two references, confined to its first two pages. The description of the area notes that the “...Valleys are also valued for their wilderness quality. They represent a nearly pristine environment largely undisturbed and uncontaminated by humans” and the aims and objectives require “special management” to ensure that its various values including wilderness are protected (http://www.ats.aq/documents/recatt/att208_e.pdf). On this slender basis, the detail in the rest of the Management Plan must be assumed to apply generically to wilderness.

The picture is the same in the ASPA Management Plans. For ASPA 119, the 15-page plan includes two references: in the description of values to be protected and in the section on permit conditions. The latter requires that “the actions permitted will not jeopardize the physical, ecological, scientific or aesthetic and wilderness values of the Area, nor the pristine value of the Area and its potential as a largely undisturbed biological reference site” (http://www.ats.aq/documents/recatt/att208_e.pdf). The 17-page plan for ASPA 164 actually includes a paragraph specifically on “Aesthetic and wilderness values” within the description of values to be protected:

Aesthetic and wilderness values

In addition to the outstanding ecological and scientific values already identified, the Area possesses outstanding aesthetic values in the geomorphology of the two Monoliths and the spectacular nature of the glaciers descending from the Continental plateau that flow around the Monoliths ending in calving glaciers. The near-vertical aspects of both Monoliths dropping to the sea, used by a high number of seabirds for nesting, represent an unique landscape in the Antarctic.

The very large breeding assemblage of undisturbed seabirds in a setting of high aesthetic and wilderness values warrants the highest level of protection [http://www.ats.aq/documents/recatt/Att281_e.pdf].

However, this is the only explicit treatment of wilderness in the Management Plan. The primary focus of the ASPA is protection of important seabird colonies. For ASPA 168, the 18-page Management Plan makes four references to wilderness. The introduction refers to scientifically important glacial-geological features and “rare wildness [sic] and aesthetic values” for which “disorderly human activities would cause perpetual, unrepairable damage.” In the description of values, the aim of the ASPA is “to preserve its scientific, aesthetic and wilderness values”; and a subsection on “Aesthetic and wilderness values” appears as in ASPA 164:

2(ii) Aesthetic and wilderness values

A legacy of the various magnificent landscapes remains in this area, from pool of melted water, icecore moraine, ice-core pyramid to ventifacts. Human beings have visited for many years this area, other area within Grove Mountains region to conduct for a range of scientific activities. It mainly includes scientists and support staff from China, Australia and Russia. In the future, especially during the 2007-2008 IPY, human activities perhaps will increase in this area [http://www.ats.aq/documents/recatt/att386_e.pdf].

Finally, in the section on management activities, roche muttonnees in the area are noted to be “peculiar in shape, have a large number of footprints of ice flow on their surfaces, and possess very high wilderness, aesthetic and scientific values.”

The picture that emerges from this necessarily brief survey is of a very limited explicit attention to wilderness in the present Antarctic protected areas system, one of the key mechanisms of Antarctic environmental management. The

limitations arise in relation to both the number of Management Plans attending to the issue, and the seemingly shallow treatment even in those which do. Of course wilderness protection may be provided incidentally in areas whose plans make no mention of wilderness. But most Management Plans for Antarctic protected areas seem to pay little attention to wilderness—and possibly to other values recognised by the Madrid Protocol that are beyond the scope of this paper.

The small proportion of ASPAs and ASMAs addressing—even perfunctorily—wilderness may be contrasted with the global picture from the World Database on Protected Areas (2009). While this is a partial database (some states do not make their data available), it shows that globally there are 1331 nationally designated and 3 internationally recognised, protected areas “whose designation in whole or part includes protection of wilderness values.”

Wilderness and Antarctic EIA

Under the Madrid Protocol, a three-tier environmental impact assessment (EIA) system is established. The highest level EIA is termed a Comprehensive Environmental Evaluation (CEE) (Hemmings and Kriwoken 2010). Major activities such as station or airstrip construction and the very largest scientific projects are subject to CEE (Hemmings and Kriwoken 2010). Attention to wilderness values is only explicitly required for CEEs. Accordingly, we shall consider wilderness only in the context of CEEs. Many of the CEEs are available at another database maintained by the Antarctic Treaty Secretariat, (Antarctic EIA Database 2009). A total of 19 CEEs have been prepared since 1988. The EIA category of CEE predates the Madrid Protocol, so only the 13 CEEs submitted after its entry into force in 1998 are legally required to be compliant with it.

In addition to the generic obligations towards wilderness found in the main body of the Madrid Protocol, Annex I: Environmental Impact Assessment (http://www.antarctica.ac.uk/about_antarctica/geopolitical/treaty/update_1991.php) establishes specific duties in relation to CEEs that must be taken to relate to wilderness. The CEE “shall include” *inter alia*: the activity, alternatives (including not proceeding), the initial environmental reference state and a prediction about the effect of the activity on the future state, estimation of the nature, extent, duration and intensity of impacts, consideration of the effects on not only the conduct of scientific research but “other existing uses and values,” which is an allusion to the “values” including wilderness established in the Article 3: Environmental Principles of the main body of the Madrid Protocol.

However, an examination of the actual CEEs reveals that, as with the Management Plans for ASMAs and ASPAs, wilderness is only lightly addressed. Even in CEEs that make reference to wilderness value (generally under the rubric “wilderness and aesthetic”), this is generally in the course of noting the obligation. Most do not substantively assess the impact, far less amend the proposed activity to prevent or minimize impact. Bastmeijer and Roura (2008) suggested, on the basis of their review of the case history of actual EIAs and examination of the hortatory EIA guidelines produced by the Committee for Environmental Protection, that wilderness and aesthetics were considered perfunctorily in Antarctic EIA. We concur in relation to the CEEs. As with

the discussion of protected areas, it is likely that wilderness values have sometimes been incidentally secured through other strengths in the CEE process. But at the level of formal consideration in CEEs, wilderness fares poorly.

Antarctic Wilderness and Other Environmental Management Mechanisms

The two previous sections demonstrated that the operational tools for Antarctic environmental management are neither strong nor specific enough to protect Antarctica’s wilderness or prevent its fragmentation. Here, we explore some potential options that could help bring us closer to the goal of achieving on-the-ground protection of wilderness in Antarctica. These options can be roughly divided into two categories:

1. Application or improvement of existing Antarctic environmental management mechanisms; and
2. Borrowing from management tools in use in other parts of the world (of particular relevance to the World Wilderness Congress).

One way of protecting wilderness in Antarctica is to set aside areas under ASPAs or ASMAs, explicitly for the purpose of protecting the wilderness values of the area concerned. Although precedence still has to be set, the ASPA and ASMA mechanisms are theoretically capable of designating large areas for wilderness protection. Wilderness ASPAs could be designated. The ASMA mechanism could be used with zoning provision to provide for a wilderness core area where access is strictly controlled, surrounded by zones permitting varying levels of human activities. While this could set a precedent in the explicit protection of Antarctica’s wilderness values that can have important tangible and symbolic significance, it is likely to be much more difficult to use these mechanisms to achieve the setting aside of an area that can truly encompass the essence of the last wilderness continent on the planet: a wilderness of outstanding size, integrity, and isolation that is difficult to find anywhere else on Earth. This would require protection of a significant portion of the continent to encompass representative ecological and geographical units: a continuum that includes the high, cold polar plateau, the ice-free coastal areas that provide critical habitat, the sea ice zones (which are seasonal zones of high biological activity), as well as the unique atmospheric, subglacial, and underwater environments. Considering that ASMAs and ASPAs combined have set aside only a tiny fraction of Antarctica’s surface area over the past 20 years, significant change in the use of these mechanisms will be necessary if they were to be used to set aside wilderness areas of significant size.

Setting aside land to protect its wilderness values leaves the fate of the land outside the protected area boundary open to question. Is land outside the boundary of a protected area immediately up for grabs for development, as is common practice on the other six continents? The Madrid Protocol provides protection to the wilderness values of *all* of the Antarctic Treaty area. Here, experience from outside Antarctica may be useful. European and North American countries have been increasingly using Strategic Environmental Assessment (SEA) and strategic-level Cumulative Effects

Assessment (CEA) to integrate environmental considerations into policy-making and planning (Therivel and Ross 2007). SEA has been advocated as a tool to manage Antarctic activities in order to meet the long-term conservation goals set down by the Madrid Protocol (ASOC 2002). Strategic-level planning covers a long time span, a large geographical area, and multiple existing and future activities and can be used to decide, in coherence with the long-term vision of the protection of Antarctica's wilderness values, what activities should take place. This is then coupled with an improved version of the existing project-level EIA to determine how each activity should be carried out. An improved project-level EIA would include substantive assessment of the impacts of the proposed activity on wilderness values with the assessment having significant bearing on the final decision of how the activity should be carried out. Key elements of the strategic-level planning would include discussions of the optimal size of the human footprint in Antarctica, whether (semi)permanent tourist facilities should be allowed (Bastmeijer and Roura 2004), and defining acceptable forms of activities in particular environmental settings. These questions also lend themselves well to the application of Limits of Acceptable Change (LAC), a visitor management model that has been adopted for the national parks in the United States and Australia for over two decades. Davis (1999) concluded that LAC lends itself to a general application in Antarctica and could be useful in devising an appropriate visitor management model.

Conceptual Challenges With Antarctic Wilderness

Appropriate management tools aside, fundamental conceptual challenges underlie the difficulty in protecting the wilderness of Antarctica. First, since wilderness management is the management of human activities, it is in conflict with the received ideas of freedom of sovereign states, commercial entities, and individuals to exercise their activities on this continent that belongs to no one and hence, to everyone.

On top of this is added the cultural and linguistic diversity of 28 countries, each of which has a different interpretation, understanding, and value system for the concept of wilderness. For some of the AT countries, wilderness is considered as a rare commodity that is protected domestically under their national legislation, while in others, wilderness is an unused area of little value that should be conquered and utilized. Even among those who support wilderness protection, there are still differences in the interpretation of how much wilderness there is in Antarctica, and how much needs to be protected. The spectrum can span from, to quote Rolston (2002), the desire to "leave this wonderland place sacrosanct," to being satisfied with small, discrete units of protected wilderness, to considering that wilderness in Antarctica is abundant and does not require additional protection. In addition, national government representatives involved in the ATS are trained as lawyers or scientists and do not always have knowledge of, or interest in, wilderness protection or management. Last but not least, the coupling of wilderness with aesthetic and intrinsic values in the Madrid Protocol renders the implementation a complex concept that is even more challenging.

Conclusions

Although wilderness is a considerable value for an ASPA designation, it is important to note that the Madrid Protocol does not employ the International Union for Conservation of Nature (IUCN) protected area categories, nor has it created, even informally, analogous categories. So, with the absence of any definition of the concept within the ATS, it could be instructive to compare the situation in Antarctica with IUCN categories. ASPAs are very similar to IUCN's Ia "strict nature reserves," which are:

... strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring [<http://data.iucn.org/dbtw-wpd/edocs/PAPS-016.pdf>].

Many authors have argued that all of Antarctica should be defined as wilderness unless modified or degraded by human activities from within Antarctica (Bastmeijer and van Hengel 2009; Summerson and Riddle 2000; Codling 1997). This would be analogous to putting the rest of Antarctica, with the exception of ASPAs and areas that are modified by human activities, under IUCN's Ib "wilderness area" which:

... are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition [<http://data.iucn.org/dbtw-wpd/edocs/PAPS-016.pdf>].

While the absence of a clear definition certainly has its downsides, it is also reasonable to ask whether the Ib conception around this definition is a particularly good one in Antarctica. Indeed, there is a wider question about fitting Antarctic protected areas within the IUCN framework given a recent narrowing of its generic definition of what constitutes a protected area (Dudley 2008).¹ In relation to its Ib category, the IUCN "Primary objective" to "protect the long-term ecological integrity of natural areas that are undisturbed by significant human activity, free of modern infrastructure and where natural forces and processes predominate, so that current and future generations have the opportunity to experience such areas" seems appropriate enough. With the "Other objectives," however, things become potentially problematic (<http://data.iucn.org/dbtw-wpd/edocs/PAPS-016.pdf>):

- To provide for public access at levels and of a type which will maintain the wilderness qualities of the area for present and future generations;

¹ A protected area is: "A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values". "... only those areas where the main objective is conserving nature can be considered protected areas; this can include many areas with other goals as well, at the same level, but in the case of conflict, nature conservation will be the priority" (Dudley 2008).

- To enable indigenous communities to maintain their traditional wilderness-based lifestyle and customs, living at low density and using the available resources in ways compatible with the conservation objectives;
- To protect the relevant cultural and spiritual values and non-material benefits to indigenous or non-indigenous populations, such as solitude, respect for sacred sites, respect for ancestors, etc.;
- To allow for low-impact minimally invasive educational and scientific research activities, when such activities cannot be conducted outside the wilderness area.

In an area with (1) no indigenous or even conventionally resident population, (2) powerful commercial interests (fishing, tourism, biological prospecting), (3) contested and entirely unresolved territorial sovereignty issues, and (4) a thin, consensus-based international governance regime, there may be some challenges in Antarctica in ensuring that these elsewhere reasonable secondary objectives are not deployed to stymie effective wilderness protection.

Acknowledgments

We express our thanks to our colleagues in the *Antarctic Wilderness Project*: Kees Bastmeijer, Anne-Isabelle Guyonard, Harry Keys, Ricardo Roura and Rupert Summerson. We also thank Jose Maria Acero and Jose Luis Agraz of the Antarctic Treaty Secretariat in Buenos Aires for assistance in relation to the valuable databases maintained there. Of course, none of these people should be implicated in the positions and interpretations taken here.

References

- Antarctic Protected Areas Database. 2009. Secretariat of the Antarctic Treaty. Buenos Aires. Available at: http://www.ats.aq/devPH/apa/ep_protected.aspx?lang=e [2009, August 28].
- Antarctic EIA Database. 2009. Secretariat of the Antarctic Treaty. Buenos Aires. Available: http://www.ats.aq/devAS/ep_eia_list.aspx?lang=e [2009, August 28].
- [ASOC] Antarctic and Southern Ocean Coalition. 2002. Strategic environmental assessment in Antarctica: a "stepping stone" to Madrid Protocol objectives. Information Paper IP-82. XXV Antarctic Treaty Consultative Meeting.
- Bastmeijer, K.; Roura, R. 2008. Environmental impact assessment in Antarctica. In: Bastmeijer, K; Koivurova, T., eds. Theory and practice of transboundary environmental impact assessment. Leiden, The Netherlands: Martinus Nijhoff: 175-219.
- Bastmeijer, K.; van Hengel, S. 2009. The role of the protected area concept in protecting the world's largest natural reserve: Antarctica. *Utrecht Law Review*. 5(1): 61-79.
- Bastmeijer, C.; Roura, R. 2004. Regulating Antarctic tourism and the precautionary principle. *The American Journal of International Law*. 98(4): 763-781.
- Codling, R. 1997. Concepts of wilderness in the Antarctic. *International Journal of Wilderness*. 3(3): 35-39.
- Davis, P.B. 1999. Beyond guidelines: a model for Antarctic tourism. *Annals of Tourism Research*. 26(3): 516-533.
- Dudley, N. 2008. Guidelines for applying protected area management categories. Gland, Switzerland: International Union for Conservation of Nature.
- Goldsworthy, L.; Hemmings, A.D. 2008. The Antarctic Protected Area approach. In: Hart, S., ed. Shared resources: issues of governance. Gland, Switzerland: International Union for Conservation of Nature: 105-128. Online: http://cmsdata.iucn.org/downloads/eplp_72.pdf.
- Hemmings, A.D. 2011. Environmental Law—Antarctica. In: Bosselman, K.; Fogel, D.; Ruhl, J.B., eds. The encyclopedia of sustainability, Volume 3; The law and politics of sustainability. Great Barrington, MA: Berkshire Publishing: 188-194.
- Hemmings, A.D. 2007. Globalisation's cold genius and the ending of Antarctic isolation. In: Kriwoken, L.K.; Jabour, J.; Hemmings, A.D., eds. Looking south: Australia's Antarctic agenda. Leichhardt, NSW, Australia: Federation Press: 176-190.
- 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. *International Environmental Agreements: Politics, Law and Economics*. 10(3): 187-208.
- Kormos, C.F., ed. 2008. A handbook on international wilderness law and policy. Golden, CO: Fulcrum.
- Rolston H. III, 2002. Environmental ethics in Antarctica. *Environmental Ethics*. 24:115-134.
- Summerson, R.; Riddle, M.J. 2000. Assessing wilderness and aesthetic values in Antarctica. In: Davison, W.; Howard-Williams, C.; Broady, P., eds. Antarctic ecosystems: models for wider understanding. Christchurch, NZ: University of Canterbury: 303-307.
- Therivel, R; Ross, W.A. 2007. Cumulative effects assessment: does scale matter? *Environmental Impact Assessment Review*. 27(5): 365-385.
- Tin, T.; Hemmings, A.D.; Roura, R. 2008. Pressures on the wilderness values of the Antarctic continent. *International Journal of Wilderness*. 14: 7-12.
- World Database on Protected Areas. 2009. Available: <http://www.wdpa.org/Default.aspx> [2009, August 28].