



The spatial distribution of Antarctica's protected areas: A product of pragmatism, geopolitics or conservation need?



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ABSTRACT

Globally, few protected areas exist in areas beyond the jurisdiction of a single state. However, for over 50 years the Antarctic protected areas system has operated in a region governed through multi-national agreement by consensus. We examined the Antarctic Treaty System to determine how protected area designation under a multi-party framework may evolve. The protected areas system, now legislated through the Protocol on Environmental Protection to the Antarctic Treaty and the Convention on the Conservation of Marine Living Resources, remains largely unsystematic and underdeveloped. Since the Antarctic Treaty entered into force in 1961, the original signatory Parties – and Parties with territorial claims in particular – have dominated work towards the designation of protected areas in the region. The distribution of protected areas proposed by individual Parties has largely reflected the location of Parties' research stations which, in turn, is influenced by national geopolitical factors. Recently non-claimant Parties have become more involved in area protection, with a concurrent increase in areas proposed by two or more Parties. However, overall, the rate of protected area designation has almost halved in the past 10 years. We explore scenarios for the future development of Antarctic protected areas and suggest that the early engagement of Parties in collaborative area protection may strengthen the protected areas system and help safeguard the continent's values for the future. Furthermore, we suggest that the development of Antarctica's protected areas system may hold valuable insights for area protection in other regions under multi-Party governance, or areas beyond national jurisdiction such as the high seas or outer space.

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1. Introduction

Designation of most protected areas occurs within sovereign territory and under the jurisdiction of a single state (UNEP-WCMC, 2016). However, Antarctica is globally unique in that the region is governed through consensus under the Antarctic Treaty (to which currently 53 states are party and which applies to the area south of latitude 60°S), and protected area designation must take into consideration the views of the 29 Consultative Parties to the Treaty (see: http://www.ats.aq/index_e.htm). The Antarctic protected areas system represents one of the few long standing conservation systems in an area where decisions are made by consensus by multiple states (Bastmeijer and van Hengel, 2009), with 2016 marking the 50th anniversary of the designation of Antarctica's first protected area (1966) and the 25th anniversary of the agreement of the Protocol on Environmental Protection to the

Antarctic Treaty (1991). The pattern of the system's evolution and the degree of involvement by states may hold valuable insights for area protection in other regions under multi-party governance, or areas beyond national jurisdiction, such as the high seas (Grant, 2005) or outer space (Al-Rodhan, 2012).

1.1. Threats and protection

Of Antarctica's 14,000,000 km² area, only 0.18% (c. 25,200 km²) is ice-free and available for colonisation by terrestrial life. Much of this ground is at high latitude or high altitude and in these locations microorganisms dominate (bacteria, fungi, algae and lichens). At coastal locations, ice-free ground may support visible populations of cryptogams and micro-invertebrates, but Antarctica's native insects and vascular plant species are restricted to the climatically less extreme northern Antarctic Peninsula region (Smith, 1984; Fretwell et al., 2010). Recent research has revealed substantial biodiversity (particularly in microbial groups) and distinct biogeographic regions (Terauds et al., 2012; Terauds and Lee, 2016; Chown et al., 2015; Hughes et al., 2016a). The coastal

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areas also support breeding population of seals, penguins and flying birds, which rely upon the biologically rich and more productive marine environment for food. High levels of primary production in the Southern Ocean support a very large biomass of krill, which is a major food source for land-breeding marine predators as well as cetaceans, fish and squid. There is also a high diversity of life on the Antarctic seafloor (Clarke and Johnston, 2003), including slow growing, habitat-forming taxa such as sponges and corals.

Antarctica is under increasing threat from global environmental impacts, such as atmospheric pollution and climate change (Bargagli, 2008; Turner et al., 2009, 2014), and local impacts associated with a growing and expanding tourist and national science operator presence in the region, such as habitat destruction, pollution, wildlife disturbance and non-native species introductions (Tin et al., 2009; Bender et al., 2016). The footprint of the tourism industry and scientific activity by some Parties continues to expand (Hughes et al., 2011; Convey et al., 2012; Tin et al., 2014), while cumulative impacts may have a negative effect on scientific and conservation values (Hughes et al., 2013, 2015, 2016b). Antarctic marine living resources have been exploited for over 200 years, beginning with sealing in the early 19th century (Tin et al., 2009; Grant et al., 2012). The whaling industry peaked in the 1930s, and unregulated fishing for species such as rock cod in the 1960s and 70s resulted in heavily depleted stocks. Fishing for krill began in the 1970s, and concerns from the Antarctic Treaty Parties about the potential over-exploitation of this key species resulted in the establishment of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) by international convention in 1982. CCAMLR currently regulates legal fisheries for krill, toothfish and mackerel icefish. However, illegal, unregulated and unreported (IUU) fishing also continues to occur in the Southern Ocean, particularly for the valuable Antarctic and Patagonian toothfish (Österblom et al., 2015). Environmental impacts from fishing (and particularly by IUU vessels which do not adhere to CCAMLR regulations) include by-catch of non-target species, incidental mortality of seabirds and marine mammals, and damage to benthic habitats from longline fishing gear. In addition to the risk of depleting harvested stocks themselves, there may be associated impacts on predators that are dependent on the same stocks.

Some commentators have suggested that the Antarctic Treaty System may not be dynamic enough to respond adequately to emerging conservation issues (Chown et al., 2012; Convey et al., 2012; Tin et al., 2014) and the Antarctic protected areas system has not escaped criticism (Shaw et al., 2014). Although the whole of

Antarctica is protected, recent research has shown that large areas of Antarctica remain devoid of specially protected areas and the system remains under-developed, unsystematic and inconsistently applied by Parties (Shaw et al., 2014; Hughes et al., 2013, 2015, 2016a; Pertierra and Hughes, 2013). Shaw et al. (2014) showed that only c. 1.5% of Antarctica's ice-free ground is within a designated specially protected area and many of these sites are located closer to sites of high human activity than would be expected by chance, leaving them vulnerable to impacts. Furthermore, almost all of the Southern Ocean beyond national jurisdiction is devoid of any protected areas (Grant et al., 2012; Hughes et al., 2016a; Brooks, 2013).

1.2. Governance of Antarctica

The arrival of the first sealers in 1819/20 brought a recognition of the potential of Antarctica for commercial exploitation of marine species and, in turn, this led to territorial ambitions by nations over much of the continent (see Table 1) (Headland, 2009). By 1942, only a sector of continent in the region of Marie Byrd Land (90°W to 150°W) remained unclaimed, with the territories claimed by the United Kingdom, Chile and Argentina in the Peninsula region overlapping and leading to international dispute (Saul and Stephens, 2015). Other undisputed sectors were claimed by Norway, France, Australia and New Zealand. When the Antarctic Treaty was signed in 1959, the seven claimant Parties represented a majority within the original group of 12 signatory Parties (Jacobsson, 2011). Of the remaining five Parties, the United States and Russia maintain that their earlier activities within the Treaty area gave them a basis for making territorial claims in the future, should they deem this appropriate (Scully, 2011). Nevertheless, Article IV of the Treaty put all existing territorial claims in abeyance and put a halt to new territorial claims. During the early years of the Treaty, the original 12 signatory Parties, and the claimant states in particular, dominated the governance of Antarctica including the development of the Antarctic protected areas system. This pattern and level of engagement has largely persisted despite a further 17 states becoming Consultative Parties to the Antarctic Treaty, many of whom play only a minor role in the continent's governance compared with the original signatories (Dudeny and Walton, 2012).

1.3. The development of the protected areas system in Antarctica

The development of area protection within Antarctica started when the 'Agreed Measures for the Conservation of Antarctic Fauna

Table 1
Territorial claims within the Antarctic Treaty area.

Treaty Party	Territory name	Boundaries	Claim date
United Kingdom ¹	British Antarctic Territory (Overseas Territory of the United Kingdom)	20°W to 80°W; 60°S	1908
New Zealand	Ross Dependency (Dependency of New Zealand)	150°W to 160°E; 60°S	1923
France	Adélie Land (District of French Southern and Antarctic Lands)	142°2'E to 136°11'E; 60°S	1924
Norway	Peter I Island Dronning Maud Land (Dependency of Norway)	Peter I Island: 68°50'S 90°35'W Dronning Maud Land: 20°W to 45°E (latitudinal limits not defined)	Peter I Island: 1929 Dronning Maud Land: 1939
Australia	Australian Antarctic Territory (External Territory of Australia)	165°E to 45°E; 60°S (excluding Adélie Land: 142°2'E to 136°11'E)	1933
Chile ¹	Chilean Antarctic Territory (Commune of Antártica Chilena Province)	53°W to 90°W; 60°S	1940
Argentina ¹	Argentine Antarctica (Argentine Antarctic Sector)	25°W to 74°W; 60°S	1942
Unclaimed Sector	–	90°W to 150°W	–

¹overlapping territorial claims.

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