ISSN 2451-7755

Esteban Barrera Oro ∞ Nighat Amin ∞ Cristina Montalbán ∞ Gabriela Roldán

Claire Christian ∞ Howard Weir ∞ Matías Sodor

Journal of Antarctic Affairs

Volume II - September 2015

Journal of Antarctic Affairs

The Journal of Antarctic Affairs is the academic magazine of the Antarctic and Southern Ocean Coalition (ASOC) and Agenda Antártica, which aims to publish and disseminate the most prominent and influential research in relation to Antarctica. The Journal publishes articles, reviews and official documents in English and Spanish twice a year. The purpose of the journal is also to stimulate research that contributes to environmental protection of Antarctica and the Southern Ocean.

The ideas expressed in the texts published here are the sole responsibility of their authors and do not necessarily reflect the viewpoint of the Journal of Antarctic Affairs. The Editorial Board invites all interested persons to submit their contributions to this forum, but reserves the right to publish the submissions received. Reproduction of the contents is allowed, provided that the source is mentioned and two copies are sent to the Editorial Board.

AGENDA ANTÁRTICA

Agenda Antártica is a non-governmental organization (NGO) based in Buenos Aires that works for environmental conservation of the Antarctic continent and the Southern Ocean, the promotion of research in Antarctica and the preservation of peace in the southern region. Agenda Antártica was founded in 2012 and is constantly developing research, outreach and advocacy at national, regional and international forums through publications, seminars, social networking and promotion of telecommunications. For more information about Agenda Antártica, visit: www.agendaantartica.org

ANTARCTIC AND SOUTHERN OCEAN COALITION (ASOC)

The Antarctic and Southern Ocean Coalition (ASOC) was founded in 1978 by five environmental organizations in the US, UK, Australia and New Zealand, promoting a World Park vision for protecting Antarctica and the Southern Ocean. ASOC has worked since 1978 to ensure that the Antarctic Continent, its surrounding islands and the great Southern Ocean survive as the world's last unspoiled wilderness, a global commons for the heritage of future generations. ASOC is an invited observer to the meetings of the Antarctic Treaty and CCAMLR. The Secretariat of the ASOC, which includes 21 organizations in 11 countries, is based in Washington, D.C. For more information about ASOC, visit: www.asoc.org

Cover Photo *Photographer: Ron Naveen - Title: Adélie penguin in Admiralty Bay, Antarctic Peninsula.*

Journal of Antarctic Affairs

Bilingual publication

Volume II

September 2015 / Year I

Editorial Agenda Antártica / ASOC

Managing Editor: Juan José Lucci
Advisory Editor: Rodolfo Werner

Translator: Nicole Simonelli
Graphic Designer: María Belén Alonso

ISSN 2451-7755

Editorial Board of the Journal

Journal of Antarctic Affairs

Agenda Antártica
Antarctic and Southern Ocean Coalition (ASOC)
Argentine Office: Laprida 2150 7º "A", Buenos Aires, Argentina (1425)
USA Office: 1320 19th St. NW, Fifth Floor, Washington, DC 20036

Journal of Antarctic Affairs

Table of contents

Message from the Managing Editor

Dear readers:

Welcome once more to the Journal of Antarctic Affairs. This second volume not only contains articles about environmental protection and public policy recommendations, but also includes papers covering other important research fields such as history, geopolitics, fisheries management, and renewable energies.

The first article of this edition addresses one of the most important environmental challenges for the Antarctic at present: the fishing industry in the seas that surround the white continent. While the Patagonian toothfish and krill often garner the most attention in this area, Argentine biologist Esteban Barrera Oro brings to light precisely what is happening to the finfish fishery in the waters surrounding the Antarctic Peninsula and the South Shetland Islands.

The development of renewable and clean energy continues to gather momentum on a global level, to such an extent that it has become a priority issue area in the majority of political agendas around the world. Antarctica, a continent that historically was stocked up with and run on hydrocarbons, has not been the exception to this trend. The re-equipment of research bases across the continent with solar panels and wind turbines is an example of what has happened in the past decade. To learn more about this issue, the article by Nighat Amin, of the International Polar Foundation of Belgium, presents an account of the creation of the Belgian base Princess Elisabeth, the first "zero-emission" Antarctic base.

Uruguayan historian Cristina Montalbán presents an unpublished work on the life of the most famous Antarctic explorer, Sir Ernest Shackleton. Although there exist numerous books, movies, and documentaries about his life and particularly his famous expedition in 1916, no one has ever reported on his death and less still, his funeral. Montalbán reports in detail on the last hours of the Antarctic hero's life, his funeral, and how the city of Montevideo fortuitously organized this ceremony in his honor.

The study of geopolitics has always been present in Antarctica, for it is no less than a single territory devoid of fully exercised sovereignty, but full of innumerable resources. Gabriela Roldán of the University of Canterbury carried out a comparative study of the gates of entry to Antarctica, and highlights the importance and facilities of each.

Claire Christian and Howard Weir analyze the new approach to fisheries management being discussed currently, Balanced Harvesting, detailing the main benefits and criticisms it has received and comparing it with current fishing management. The article also contextualizes this new concept for the management of fisheries in the Antarctic theater.

In the reviews section of the journal, Matías Sodor examines "Under Antarctica," a chapter of the American documentary series Nature. This documentary has become a classic for those interested in the southern continent, particularly for those who dream of exploring the world that hides beneath the icy waters surrounding the Antarctic.

Finally, in this second volume, we inaugurated the inclusion of a section dedicated to the dissemination of information papers submitted by the Antarctic and Southern Ocean Coalition (ASOC) at the Antarctic Treaty Consultative Meeting (ATCM) and to the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). Published in this edition are documents presented at the XXXVIIII ATCM that took place in the city of Sofia, Bulgaria, between June 1 and June 10, 2015. On this occasion, ASOC presented six information papers to the States Party with recommendations on how to preserve the Antarctic environment. These documents focused on the following categories: climate change, the assessment of cumulative impacts, tourism in Antarctica, the expansion of the Antarctic Specially Protected Area (ASPA) system and the regulation of maritime navigation in southern waters.

Again, many thanks to all of the authors, donors, translators, Editorial Board members, and the scientific advisor of the journal, Dr. Rodolfo Werner.

Juan José Lucci

*

ASOC Prologue

This second edition of the Journal of Antarctic Affairs underscores both the need for this wonderful new journal and the power of global collaboration to protect Antarctica and the Southern Ocean. While the Antarctic Treaty System has served as a beacon of hope for the world, with global powers agreeing to protect the last great wilderness as a place of peace and security in 1959 even as the Cold War raged, without civil society's engagement this could have been a paper treaty.

Individuals and organizations actively contributed to stop a minerals regime being discussed for Antarctica, turning the momentum into one for environmental protection. As a result of this The Madrid Protocol (also known as the Environmental Protocol was agreed in 1991 and ratified in 1998. The Madrid Protocol, not only placed the emphasis on conservation, but was crafted so that it will continue after a review in 2048, unless a consensus of countries (very unlikely) overturns it.

Indeed, the story of Antarctica is one of eternal vigilance. CCAMLR's conservation mandate and promise to create Marine Protected Areas (MPAs) by 2012 has met strong headwinds. Despite four years of intense work, including a special MPA session in Bremerhaven, Germany in July 2013, CCAMLR has been only able tocreate one MPA in the South Orkney Islands. ASOC, working with its companion the Antarctic Ocean Alliance continues to work towards the creation of a comprehensive series of MPAs, forming a protective network throughout the Southern Ocean. Yet just a few countries block the first two proposals in East Antarctica and the Ross Sea—despite years of scientific and political efforts to get the process started.

Around the world, MPAs and no-take marine reserves have become the cutting edge of marine managers working to protect and restore wild fish populations that have been decimated by the modern methods of fishing that sweep oceans, harvesting fish species to the point of extinction and wasting tons of other marine creatures as "worthless" by-catch. Even the Southern Ocean has seen the destruction and depletion of species and it is time to say no more. MPAs and no take zones are not the only answer, but they are one of the best ways to protect the marine populations.

Whaling provides another example of how ephemeral treaties and even legal proceedings can be. Within months of the International Court of Justice ruling against the false framing of scientific fishing to rule against taking whales in the Southern Ocean Sanctuary, methods of evading the legal and moral repudiation of killing whales are being devised. Articles in this Journal and others highlight the problem and suggest actions civil society must take to prevent a renewal of false science that permits the slaughter of marine mammals, especially whales.

Perhaps the most important work ahead is expanding the scientific knowledge of krill, the foundation of Antarctica's food chain. Today, scientific estimates vary widely about the health and amount of krill populations in and around the Southern Ocean. With the need to better understand the ways to protect and sustain krill, the Antarctic and Southern Ocean Coalition has joined with other NGOs like the World Wildlife Fund to form a unique partnership with Aker Biomarine to award hundreds of thousands of dollars to scientists studying and elucidating both the science and the health of krill populations. While there can be and are opinions on all sides of this issue, there can be little doubt that supporting highly regarded science to better understand the health of krill and the southern ocean ecosystem is essential. The groups have come together to create the

Antarctic Wildlife Research Fund (AWR) which has quickly taken a leadership role in expanding our knowledge of krill and the Southern Ocean.

The Journal also provides articles and papers exploring the link between climate change and Antarctica and the Southern Ocean. The importance of exploring not simply the impacts (the melting of the Antarctica's western ice slope has been widely reported), but also the role the region plays (and could play at a higher level) in mitigating the effects of climate change could not be more important. Antarctica is "ground zero" for climate change and attention must be paid. If the US and USSR could join others in creating the ATS in 1959, why not join together in 2016 to demonstrate the will and willingness to meet the challenges of today – confronting not only climate change but the havoc it is creating in Antarctica and the world.

Mark Epstein

*

IMPACT OF THE FINFISH FISHERY IN THE SOUTH SHETLAND ISLANDS/ANTARCTIC PENINSULA REGION

Esteban R. Barrera-Oro

Abstract

Besides krill, finfish is at present the only living resource commercially exploited in the Southern Ocean. Following seals and baleen whales prior to the 1970s, demersal fish stocks were depleted off the South Shetland Islands by intensive industrial fishing during the late 1970s to early 1980s, being the notothenioid species Champsocephalus gunnari and Notothenia rossii the main target species and Gobionotothen gibberifrons mainly taken as by-catch. The impact of the offshore fishery also reached the juvenile stocks of the last two species in inshore waters. More than three decades after the end of the fishery, the inshore population of N. rossii is still in the process of recovery while that of G. gibberifrons remains in low condition. Not surprinsingly, the stock of Notothenia coriiceps, a species with similar ecological habits nearshore that was not fished commercially, increased. Since 1982, the Antarctic marine resources have been managed by CCAMLR. Presently (2015), the commercial fishery in the Atlantic sector is restricted mainly to the patagonian toothfish Dissostichus eleginoides and in less intensity to C. gunnari, around South Georgia, Shag Rocks, and in small proportion the South Sandwich Islands. The South Orkney Islands and South Shetland Islands/Antarctic Peninsula areas have remained closed to any finfishing since 1990. Since then, a high number of nations have entered into the fishery in all circumantarctic areas, mainly attracted by the high commercial value of the two Dissostichus species, the second, the Antarctic toothfish D. mawsoni. The diminution of certain fish populations appears to have affected other components of the food web. The decrease in the abundance in inshore waters of the South Shetland Islands of G. gibberifrons and N. rossii, which were probably two former important fish preys of the Antarctic Shag Phalacrocorax bransfieldensis, may have influenced to some extent a declining trend in the number of breeding pairs observed in the 1990s at two colonies at Nelson Island, in that archipelago. Conversely, in the shallow water communities of the lower Scotia Arc, N. coriiceps is at present by far, in terms of abundance and biomass, the most successful species, and is an important prey of shags.

Keywords

Fishery depletion, Notothenioidei, Antarctic ecosystem, Inshore fish

Commercial exploitation

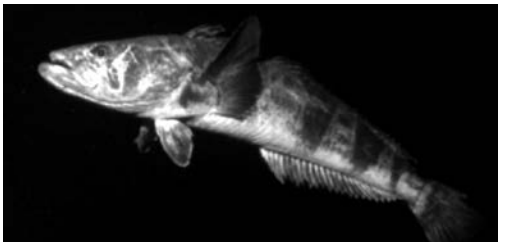
The Antarctic fish fauna is unique in being dominated in terms of diversity (45%) and biomass (95%) by an endemic coastal demersal group, the suborder Notothenioidei, which includes six families and can be found as deep as 1200-1500 m. There is a lower diversity of Antarctic fish species on the continental shelves (139 spp.) in comparison with other cold-water seas (> 350 spp. in the North Atlantic). However, although the diversity of the notothenioids is limited compared with the large size of the ecosystem, there is no other fish group in the world with such diversification and dominance in a continental shelf habitat (Eastman 1995).

Besides krill, finfish is at present the only living resource industrially exploited in the Southern Ocean. The commercial exploitation of finfish started at the end of the 1960s, just as decades of sealing and whaling were ending. The fishery was developed basically in offshore waters around South Georgia, South Orkney and South Shetland Islands in the Atlantic sector, and around Kerguelen Islands in the Indian sector. Later on, mainly in the 1990s, the fishery expanded to the Ross Sea in the Pacific sector.

The Antarctic notothenioids are characterized by slow growth and low fecundity, which make them particularly susceptible to overexploitation (Kock 1992). In the seasonal Pack Ice Zone of the Southern Ocean and the islands north of it the species diversity and biomass of fish, chiefly notothenioid species, are greater from 100 to 300 m in depth (Tiedtke and Kock 1989).

Notothenia rossii

Champsocephalus gunnari



Disssostichus spp.

Fig. 1. *Main Antarctic fish species exploited in the commercial fishery.*

Thus, commercial vessels operated mostly in the depth range mentioned and down to 450 m using bottom trawls. The fishery has been of a multispecies kind, being the marbled rockcod Notothenia rossii and the mackerel icefish Champsocephalus gunnari the main target species *(Fig. 1)*, of which a maximum of 400,000 and 125,000 tons, respectively, were caught in the 1970/71 season around South Georgia (Kock 1992), after which, not surprisingly, these stocks collapsed. A considerable by-catch of other species has also been taken, at least in bottom trawls. In the Atlantic and Indic sectors historically, up to the end of the 1980s, the countries responsible for the bulk of the commercial catches were the former Soviet Union (about 80%), Poland, the former German Democratic Republic, France (EEZ Kerguelen) and Bulgaria *(Fig. 2)*. Since then, from the 1990s up

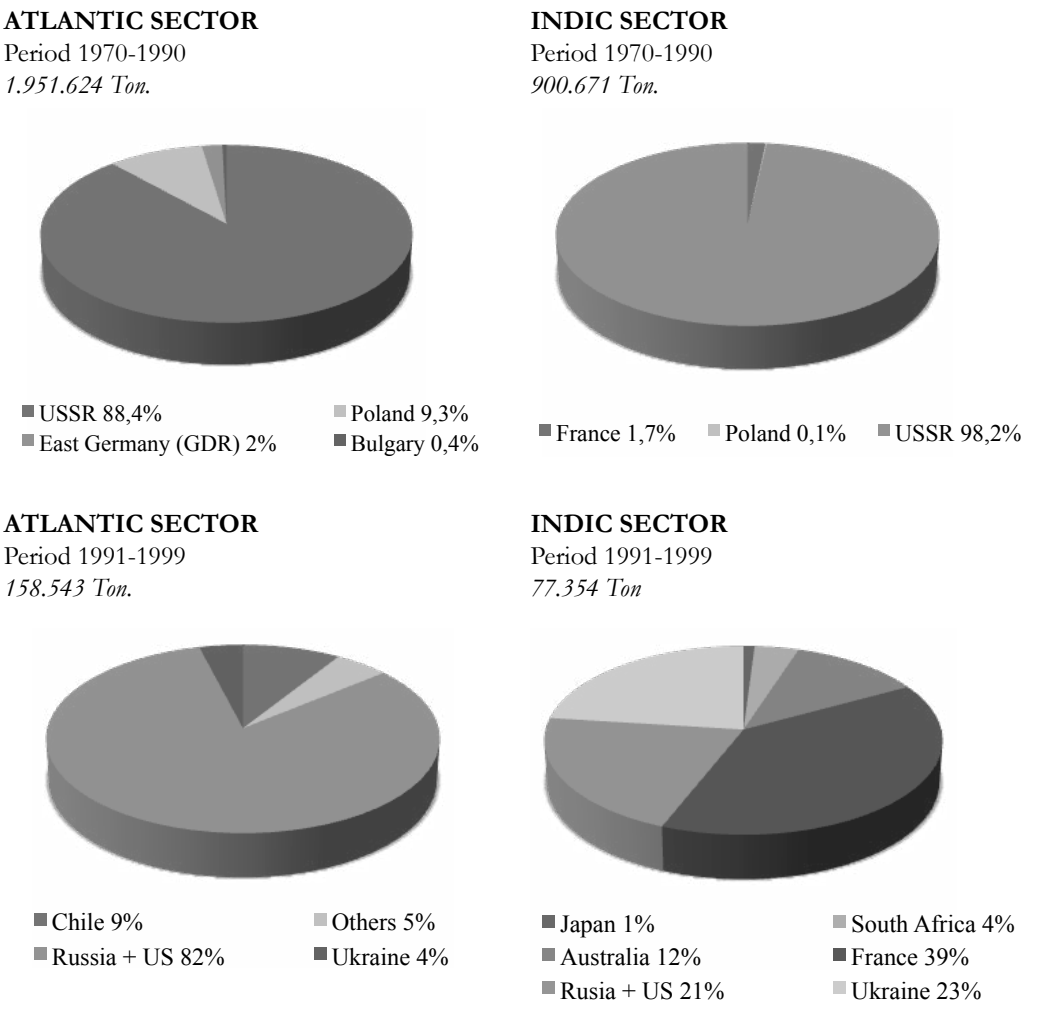
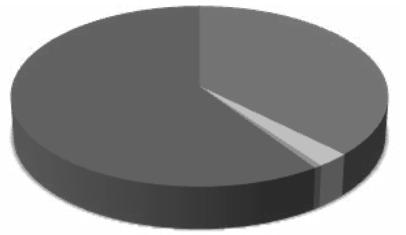


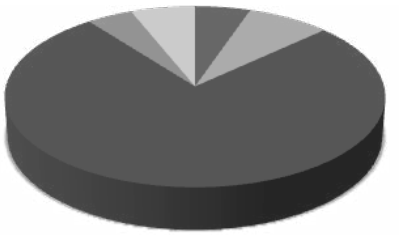
Fig. 2. *Total catches of fish by country in the Atlantic and Indic sectors in periods 1970-1990 (reproduced from Kock 1992) and 1991-1999.*

ATLANTIC SECTOR
31.917 Ton.



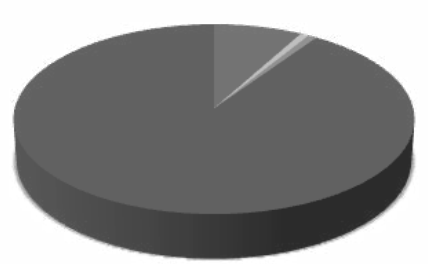
C. gunnari 11.951
Granadiers 813
Others 193
D. eleginoides 18.960

INDIC SECTOR
55.794 Ton.



C. gunnari 2.929
Granadiers 4395
Others 13
D. eleginoides 42.620
Rays 2.431
D. mawsoni 3.406

PACIFIC SECTOR
17.290 Ton.



Granadiers 1.378
Others 131
Rays 135
D. mawsoni 15.646

Fig. 3. *Catches of species by area in period 2004-2008 showing the evolution of the fishery to the Pacific sector in the last decades.*

to the present time, a considerably high number of nations have entered into the fishery in all circumantarctic areas, mainly interested in the commercial exploitation of the two Dissostichus species, the patagonian toothfish D. eleginoides and the Antarctic toothfish D. mawsoni *(Figs. 3 and 4)* . In 1984 the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) introduced the first conservation measures (around South Georgia) and since then, the fishery has become progressively more restricted due to the implementation of a series of additional measures (Kock 1992).

Commercial fishing in the South Shetland Islands/western Antarctic Peninsula started in 1978/79. Since then, a total of 87,139 tons of finfish were caught until 1989/90 (Kock 1992) *(Fig. 5)*. Heavy fishing was carried out on the northern coasts of the northennmost island, Elephant Island, in

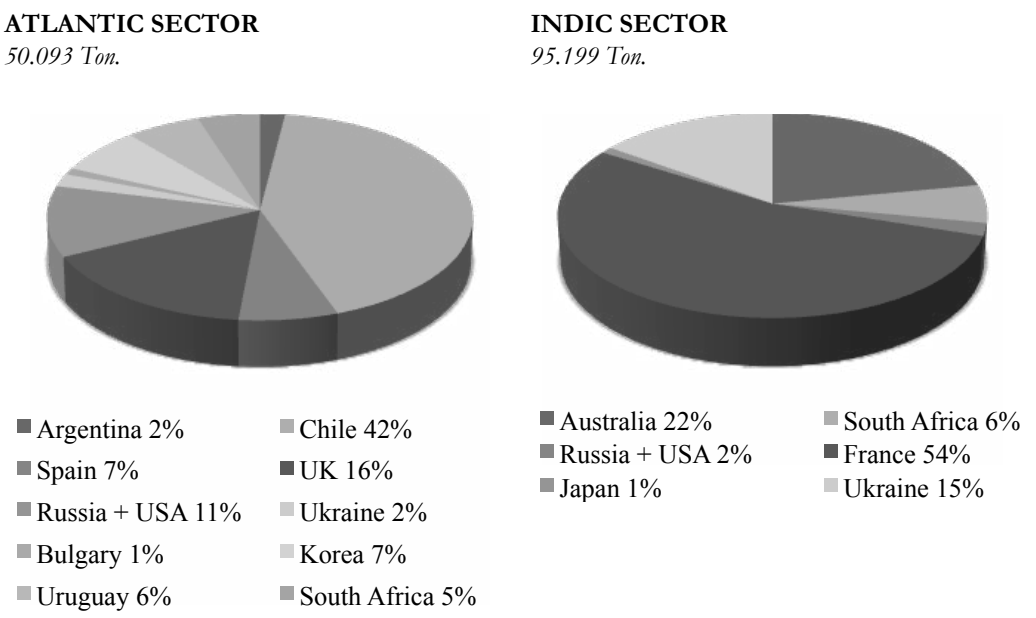


Fig. 4. *Catches of Dissostichus eleginoides in the Atlantic and Indic sectors in period 1991-2003 denoting the participation of new countries in the commercial fishery.*

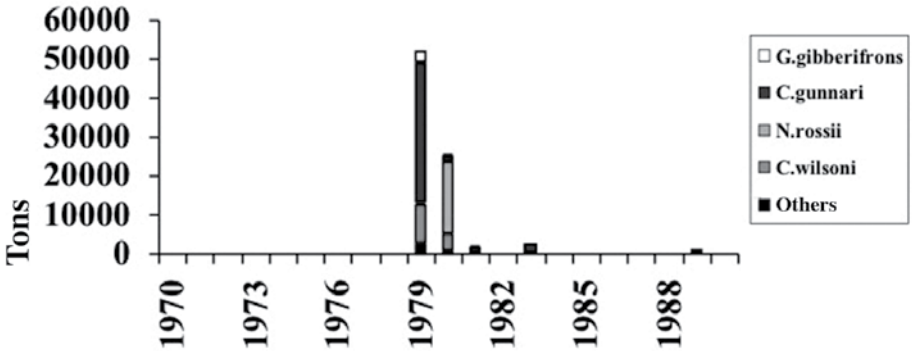


Fig. 5. *Catches by species in the South Shetland Islands/Antarctic Peninsula in period 1978-1990 (reproduced from Kock 1992).*

the period 1977-1980, but catches from the north of Livingston and King George/25 de Mayo Islands and from Joinville-D'Urville Islands in the tip of the Antarctic Peninsula have been also reported (CCAMLR 1986). Champsocephalus gunnari and N. rossii were the main targeted species, constituting 47.5% and 22.1% of the total catch, whereas the humped rockcod Gobionotothen gibberifrons was to some extent also taken in a directed fishery and as by-catch (4200 t) (Kock 1992). As a consequence of the fishing operations in the Atlantic sector of the Southern Ocean the stocks of many species were seriously depleted. For example, until 1992, the stock size of N. rossii at South Georgia was estimated to be less than 5% of the original stock size in 1969.

At the present time (2015), the fishery in the Atlantic sector is restricted to two species around South Georgia, Shag Rocks, and in small proportion the South Sandwich Islands. The main target species is the toothfish D.eleginoides, for which a TAC (Total Allowable Catch) was set in 1990/91 for the first time and the amounts taken in the last 20 years were in the range of 2400-7900 tons. To emphasize the importance of this fishery in the Southern Ocean, the TACs of Dissostichus species established and completed from 1997 to the present time ranged between 10000 and 17000 tons, including the Atlantic, Indic and Pacific sectors. This resource has been caught with long-lines by ships of several countries (Fig. 4). In the Atlantic sector, a small fishery (TAC=1000 t) was re-opened for the ice fish C. gunnari (semipelagic trawls) in the 1995/96 season, after a ban of one year. Since then, annual TACs between 1,548 and 4,600 tons have been established, although in the last five seasons the actual catches were substantially lower the upper limit of this range (i.e. in 2009/10-2010/11, less than 10 t). The South Orkney Islands and South Shetland Islands/Antarctic Peninsula areas (FAO Statistical Subareas 48.2 and 48.1, respectively) have remained closed to any finfishing since the 1990/91 season (CCAMLR 1990).

Other Antarctic marine resources that have been commercialized are krill Euphausia superba, spider-crab Paralomis spinosissima and squid Martialia hyadesi, but it is believed that the direct impact of these fisheries on the ecosystem has been much less than that of the finfish fishery.

Since the beginning of the krill fishery in 1970 until present day, some 7 million tons in the Atlantic sector have been caught (area 48), using pelagic trawls (mid-water) and pumping methods. However, this crustacean is not at risk of overexploitation, due to the fact that from the 4 million annual tons of permitted capture, only about 150 million tons have actually been extracted. The problem of this fishery is that changes within it can affect various predators dependent on krill, such as birds and mammals. For example, it is known that in years of krill scarcity, the reproductive success of predator colonies has been affected. CCAMLR established a trigger level of 620,000 tons for area 48, as an additional preventive measure. Currently, in addition to ignoring the total biomass of krill in the Southern Ocean, it is not known what percentage of this biomass can be fished without threatening the health of the populations dependent on this resource. In the first two decades of the fishery, the major fishing nations were Japan, the former Soviet Union and Ukraine, but just as it occurred with the exploitation of fish, there are actually many more countries involved (Fig. 6).

Of the crab population, 932 tons have been extracted in the area of the South Georgia Islands between 1992-2003, using traps. The principal fishing country was the United States (Fig. 7). Of the squid population, only 210 tons in the Atlantic sector were extracted between 1988-2002, using

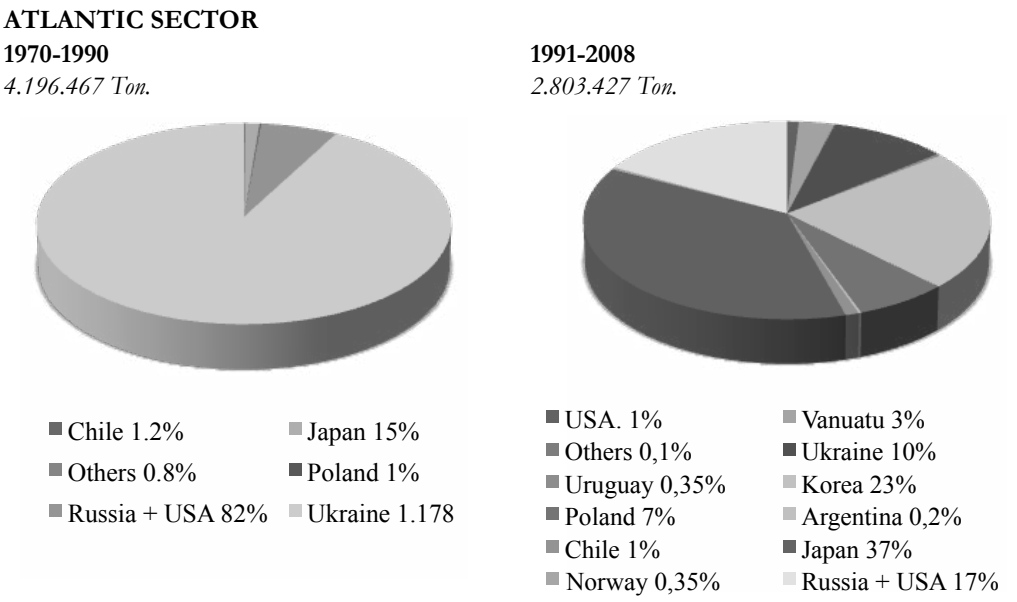


Fig. 6. *Total catches of krill in the Atlantic sector in two periods, denoting the incorporation of new countries in the commercial fishery in the last two decades.*

jiggers. The fishing countries were the Republic of Korea, Poland and, to a lesser extent, the United Kingdom (Fig. 7).

One of the problems of the commercial finfish fishery in Antarctica, in addition to overexploitation, is the lack of compliance or transgressions of the conservation measures adopted by CCAMLR and above all, the existence of illegal fishing that is difficult to control. It is estimated that for the entire Convention Area, the annual catch volume of illegal fishing has been, at least until the last decade, equivalent to the volume of fish obtained legally each year.

Impact of the offshore fishery on inshore fish and dependent species

Young specimens of N. rossii and G. gibberifrons, though exploited offshore, also inhabit nearshore waters; major changes in the offshore (reproductive) stock may be reflected in the inshore populations through recruitment processes. This phenomenon was studied in sites of the South Shetland Islands over a total period of three decades from 1983 mainly at Potter Cove, King George Island/Isla 25 de Mayo and also at Harmony Cove, Nelson Island and Moon Bay, Livingston Island, with samples obtained by trammel nets (Barrera-Oro et al. 2000, Marschoff et al. 2012). Associated with these species, the black rockcod Notothenia coriiceps is a species that was not commercially fished but has ecological habits in the fjords similar to the exploited species (Fig. 8). In summary, these three demersal notothenioids spend at least part of their life cycles in inshore waters (<120 m deep) and also occur in offshore waters at depths down to 200-550 m (Barrera-Oro 2002).

ATLANTIC SECTOR

Squid 1988-2010
210 Ton.

Crab 1992-2010
973 Ton.

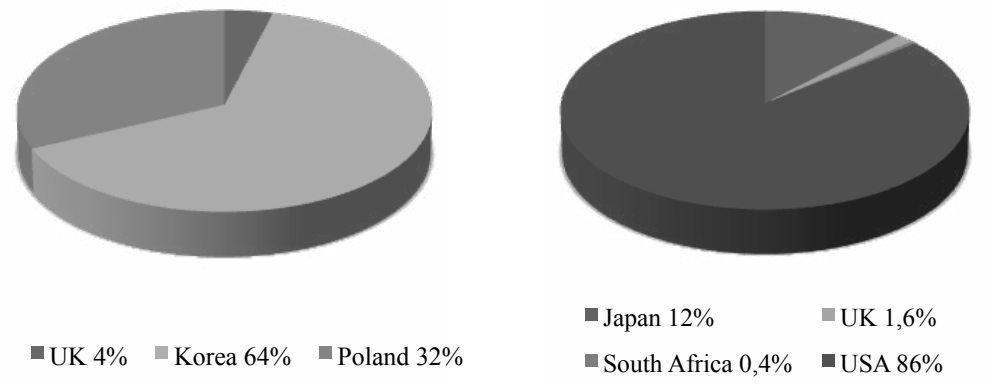


Fig. 7. *Total catches of squid Martialia hyadesi and crab Paralomis spinosissima by country in the periods of these commercial fisheries in the Atlantic sector.*

Other conventional gear used to catch demersal fish for research purposes in inshore, shallow waters at depths down to 110-120 m (littoral, coves, shallow fjords), have been small trawlers (less common), hooks and lines and traps. Trawling has been scarcely used due to the lack of appropriate bottoms. Trammel/gill nets have shown to be the best gear, their advantages are capture of a higher quantity of fish in a short time, no damage to benthos, negligible by-catch of benthic organisms and easy operation from rubber boats. As it is a passive sampling device, catches depend solely on fish activity which is assumed to reflect population size. Therefore, changes in population size are expected to be reflected by proportional changes in catches. In the period 1983-1990, a sharp decline in the abundance of juvenile N. rossii and G. gibberifrons was found, whereas the stock of N. coriiceps remained stable. This paralleled what was happening to the overall stock of the first two species; subsequent sampling to 2007 showed that the inshore populations of the exploited species remained in poor condition, whereas to date, the relative abundance of N. rossii is in the process of recovery but is still far of the levels observed in the early 1980s, while that of G. gibberifrons remains low (Kock 1992, Barrera-Oro et al. 2000, Marschoff et al. 2012). This decrease is consistent with historical information from offshore bottom trawl surveys (Jones et al. 2003, Kock et al. 2007) and was attributed to a reduction in recruitment due to the decline of the offshore populations, subsequent to overfishing in the late 1970s and early 1980s.

Monitoring of pre-recruit fish by means of trammel nets was previously applied in the Morbihan Gulf, Kerguelen Islands, Indic sector (Duhamel 1990). It was reported a reduction in juvenile N. rossii inshore catches as being caused by the depletion of the offshore reproductive stock due to the operation of the commercial fishery. Further monitoring showed a continuous recovery of the juvenile stock from 1984 to 1988, after the closure of the fishery, unlike the long delay in the

NOTOTHENIA CORIICEPS

Fig. 8. *Notothenia coriiceps, the dominant fish species in inshore waters of the Southern Scotia Arc and western Antarctic Peninsula.*

beginning of this process observed in the South Shetland Islands.

The diminution of certain fish populations appears to have affected other components of the food web. It is well known that prey availability influences the foraging strategy, breeding output and population parameters of their predators (Montevecchi 1993). In Antarctic inshore waters shags (Phalacrocorax sp., Fig. 9) occupy the trophic niche of main predators of demersal fish and play an important ecological role as regulators of populations of particular fish prey that have marked site fidelity (Casaux and Barrera-Oro 2006). Shags feed heavily on notothenioids nearshore, as indicated by otoliths in the pellets that they cast daily, whereas benthic organisms such as polychaetes, gastropods, bivalves, cephalopods and crustaceans are known to be secondary diet components (Fig. 9).

Not surprisingly, among the prey species caught with nets inshore at the South Shetlands, only N. rossii and G. gibberifrons have been absent or scarcely represented in shag's pellets. Moreover, at the onset of the 1980s in waters around the South Orkney Islands, a fishing ground also affected by the commercial fishery, N. rossii was a frequent prey of shags (Shaw 1984), but one decade after, this fish species was not represented in the diet of this bird in that area (Casaux et al. 1997). In the South Shetlands, the absence of otoliths from the two exploited species contrasts with the high occurrence of those from N. coriiceps. These results are consistent with the high incidence of G. gibberifrons in the diet of shags and in trammel-net catches at the Danco Coast, western Antarctic Peninsula, reflecting higher availability of this fish in an area remote from the main historical fishing grounds of the South Shetland Islands (Elephant Island and north of Livingston/King George Islands) and the Antarctic Peninsula (Joinville-D'Urville Islands) (Casaux et al. 2002, Casaux and Barrera-Oro 2006).

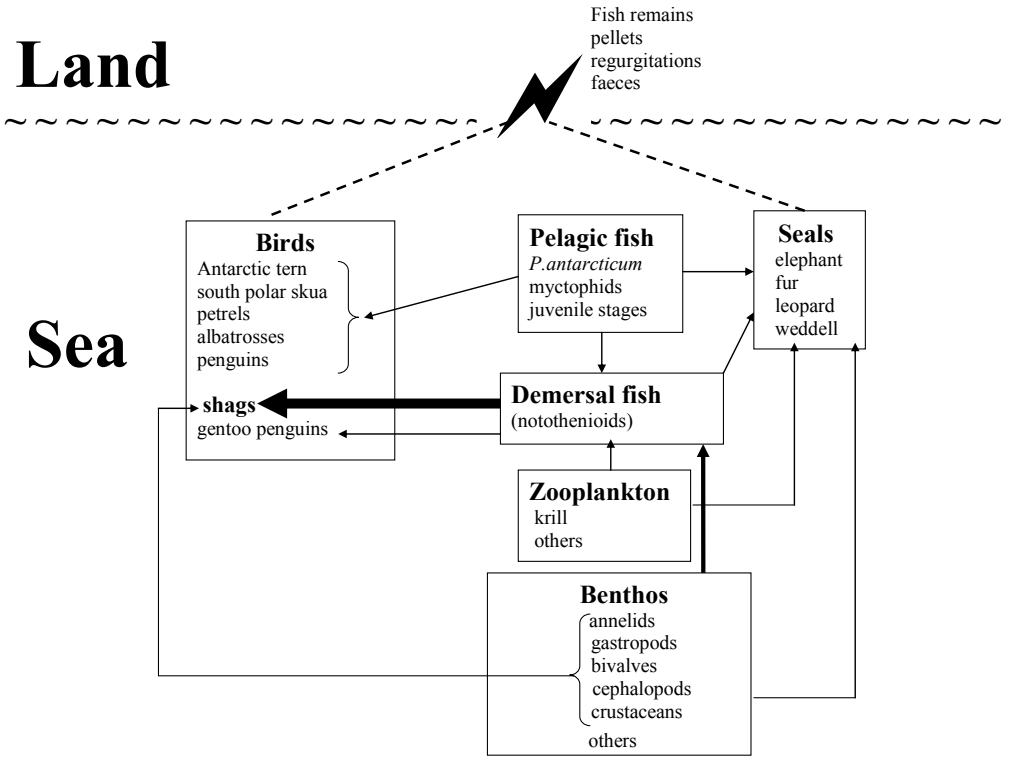


Fig. 9. *Diagram indicating the position of shags and other high predators in the Antarctic marine food web (taken from Casaux and Barrera-Oro 2006).*

A steady declining trend in the number of breeding pairs of shags was reported for several colonies in the southern Scotia Arc region (summarized in Ainley and Blight 2009). In addition, at Marion Island, in the sub-Antarctic Indian Ocean, a decrease in colony size of Crozet shags Palacrocorax marionensis has been similarly reported as being caused by an altered availability of food, which was reflected by a changed dominance in nototheniid prey in the diet (Crawford et al. 2003). Industrial fishing for demersal species was heavy in these waters as well (Kock 1992). This phenomenon in the South Shetland Islands was studied at two colonies of the Antarctic Shag Phalacrocorax bransfieldensis located in Duthoit Point and Harmony Point, in Nelson Island, from a long term data series of 23 years (Casaux and Barrera-Oro 2012). The reported decrease in the abundance in inshore waters of the South Shetland Islands of G. gibberifrons and N. rossii, which were probably two former important fish preys of the Antarctic Shag, may have influenced to some extent the declining trend in the number of breeding pairs of this bird, observed in the colonies studied in that archipelago. These findings also reflect the sensitivity of shags' reproductive and behavioral parameters to changes in fish populations.

The above examples show that substantive changes in one level of the food web can be traced

to changes in other components, supporting the hypothesis of Ainley and Blight (2009) that the structure of the Antarctic marine ecosystem has entered its current state due not just to changed climate, weather and sea ice, but equally to extractions of seals and whales (as suggested by many researchers) as well as of fish in the 1970-80s.

Impact of inshore catches on local populations

It is to be noted that the fishing vessels did not operate in inshore waters because of the many uncharted, subsea rocks present and also because no large exploitable fish concentrations occur in such zones. However, the abundance of fish in fjords and bays has been exploited by man for local consumption. Historical information indicates that before industrial exploitation in the onset of the 20th century at South Georgia the quantities of N. rossii in nearshore waters were so large that many thousands of fish were caught for consumption at various whaling stations (compiled in Kock 1992).

In the South Shetland Islands and western Antarctic Peninsula N. coriiceps is a neritic species of interesting size for local human consumption. This nototheniid is the dominant fish in number and biomass in nearshore waters of the Scotia Sea, including the western Antarctic Peninsula (Barrera-Oro 2002). It has proliferated markedly in the last three decades, parallelly with the decrease in the N. rossii and G. gibberifrons populations, this last process caused by the commercial exploitation. As the three species have similar ecological habits in fjords and bays, it is probable that during this period N. coriiceps encountered progressively less interspecific competition and consequently expanded its trophic and habitat niches. The status of the inshore populations of the formerly commercially important N. rossii and G. gibberifrons is still limited, as it was reflected in sampling data obtained from nets and shags. Besides, mostly the juvenile stages of these two species would be taken inshore, which might affect their recruitment offshore. The Scotia Sea ice fish Chaenocephalus aceratus is large in size, but it is relatively abundant only below 90-100 m depth.

It was experimentally demonstrated that the meat of N. coriiceps is good for human consumption, basically due to its high proteic and mineral value, low content of fluor and lipids and good conservation quality (Casaux et al. 1995). Notothenia coriiceps, from the catches taken by scientific programms, has been, in fact, consumed at the Argentine permanent scientific station "Carlini" (formely "Jubany"), placed in the shore of Potter Cove, in King George Island/ Isla 25 de Mayo. Although this species was intensively taken year round (around 400 kg) at Potter Cove mostly between 1983 and 1989 for scientific purposes, a great proportion of the specimens was also regularly eaten by the station members (about 12 and 70 people in winter and summer, respectively). The population of N. coriiceps within the cove, far from being reduced, increased in that period. A strong site fidelity is known for the species (Barrera-Oro and Casaux 1996, North 1996) and intense sampling for research has produced local effects only (Casaux and Barrera-Oro 2002). In the South Shetland Islands/Antarctic Peninsula at least 33 scientific/logistic stations or shelters which belong to 15 nations are settled (76% in the South Shetland Islands) and 15 of them are open permanently. It is likely that mainly N. coriiceps have been used in some of these bases for local consumption as well.

References

-Ainley, D. & Blight, L. (2009). "Ecological repercussions of historical fish extraction from the Southern Ocean". Fish and Fisheries 10, 13–38.

-Barrera-Oro, E. (2002). "Review: The role of fish in the Antarctic marine food web: differences between inshore and offshore waters in the southern Scotia Arc and west Antarctic Peninsula". Antarctic Science 14 (4), 293–309.

-Barrera-Oro, E. & Casaux, R. (1996). "Validation of age determination in Notothenia coriiceps by means of a tag/recapture experiment at Potter Cove, South Shetland Islands". Archive of Fishery and Marine Research, 43 (3): 205-216.

-Barrera-Oro, E., Marschoff, E. & Casaux, R. (2000). "Trends in relative abundance of fjord Notothenia rossii, Gobionotothen gibberifrons and Notothenia coriiceps observed in Potter Cove, South Shetland Islands, after the commercial fishing in the area". CCAMLR Science, Vol. 7: 43-52.

-Casaux, R. & Barrera-Oro, E. (1993). "The diet of the Blue-eyed Shag, Phalacrocorax atriceps bransfieldensis at the West Antarctic Peninsula". Antarctic Science, 5, 335-338.

-Casaux, R. & Barrera-Oro, E. (2002). "Effect of a shore-based sampling programme on Notothenia coriiceps populations". Antarctic Science 14 (3), 221-224.

-Casaux, R.. & Barrera-Oro, E. (2006). "Review: Shags in Antarctica: their feeding behaviour and ecological role in the marine food web". Antarctic Science 18 (1), 3-14.

-Casaux, R. & Barrera-Oro, E. (2012). "Linking fish and shags population trends". Document WG-FSA 12/05, CCAMLR, Hobart, Australia: 12 pp.

-Casaux, R., Mazzotta, A. & Márquez, M. (1995). "Seasonal changes in protein and total mineral contents of muscle tissue in Notothenia neglecta". Oebalia, 21: 137-143.

-Casaux, R., Coria, N. & Barrera-Oro, E. (1997). "Fish in the diet of the Antarctic shag, Phalacrocorax bransfieldensis at Laurie Island, South Orkney Islands". Polar Biology, 18: 219-222.

-Casaux, R., Baroni, A. & Barrera-Oro, E. (2002). "Fish in the diet of the Antarctic shag at four colonies on the Danco coast, Antarctic Peninsula". Antarctic Science 14 (1), 32-36.

-CCAMLR (1986). "Draft summary of catch and effort statistics". Sci. Comm. Conserv. Antarct. Mar. Liv. Res. No. V/BG/8, 1-64.

-CCAMLR (1990). "CCAMLR, Report of the Ninth Meeting of the Commission", Hobart, Australia, 22 October-2 November 1990. 123 pp. CCAMLR.

-Crawford, R., Cooper, J., Dyer, B., Wolfaardt, A., Tshingana, D., Spencer, K., Petersen, S., Nel, J., Keith, D., Holness, C., Hanise, B., Greyling, M. & du Toit, M. (2003). "Population, breeding, diet and conservation of Crozet shag Phalacrocorax [atriceps] melanogenis at Marion Island, 1994/95 to 2002/03". African Journal of Marine Science. 25: 427–440.

-Duhamel, G. (1990). "Supplementary data on exploited stocks in Division 58.5.1 (Kerguelen)". In: Selected Scientific Papers, 1989 (SC-CAMLR-SSP/6). CCAMLR, Hobart, Australia: 147-161.

-Eastman, J. (1995). "The evolution of Antarctic fishes: questions for consideration and avenues for research". Cybium, 19 (4), 371-389.

-Jones, C., Kock, K.H., Ashford, J., Devries, A., Detrich, K., Hanchet, S., Near, T., Turk, T., Wilhelms, S. (2003). "Standing stock, biology, diet and spatial distribution of demersal finfish from the 2003 US AMLR bottom trawl survey of the South Shetland Islands (Subarea 48.1)". Document WG-FSA-03/38. CCAMLR, Hobart, Australia.

Kock, K.H. (1992). "Antarctic fish and fisheries". Cambridge, New York: Cambridge University Press. 359 pp.

Kock, K.H., Appel, J., Busch, M., Klimpel, S., Holst, M., Pietschok, D., Pshenichnov, L., Riehl, R., Schöling, S. (2007). "Composition and standing stock estimates of finfish from the Polarstern bottom trawl survey around

Elephant island and the South Shetland Islands (subarea 48.1, 19 December 2006 to 3 January 2007)". Document WG-FSA-07/22. CCAMLR, Hobart, Australia.
-Marschoff, E., Barrera-Oro, E., Alescio, N. & Ainley, D. (2012). "Slow recovery of previously depleted demersal fish at the South Shetland Islands, 1983-2010". Fisheries Research 125–126:206–213.
-Montevecchi, W. (1993). "Birds as indicators of change in marine prey stocks". In: Furness, R, Greenwood J (eds.). Birds as monitors of environmental change. Chapman and Hall, U. K.: 217-266.
-North, A. (1996). "Locomotory activity and behaviour of the Antarctic teleost Notothenia coriiceps". Marine Biology 126: 125-132.
-Tiedtke, J.E. & Kock, K.H. (1989). "Structure and composition of the fish fauna around Elephant Island". Archiv für Fischereiwissenschaft, 39 (1), 143-169.

*

THE PRINCESS ELISABETH ANTARCTICA- TESTING THE LIMITS

Nighat F.D. Johnson-Amin

Abstract

The Princess Elisabeth Station was inaugurated on the February 15, 2009, and became the first "Zero Emissions" research station in Antarctica. It brought to the Antarctic continent an important touch of modernity, but more than that it demonstrated that environmental protection did not just entail paying lip service to the good intentions embodied in international agreements, it meant delivering an outcome that could revolutionise the way that operations were carried out in this unrelentingly hostile environment.

Keywords

Princess Elisabeth Station, Antarctica, Zero Emissions.

The International Polar Year 2007-2009

The construction of the Princess Elisabeth Antarctica (PEA) was carried out during the International Polar Year 2007-2009, as a symbolic gesture to mark a symbolic event . The intention was to adhere as closely as possible to the Antarctic Treaty System's environmental philosophy and objectives. While the primary texts themselves give little guidance, much work has been done at Treaty Meetings to try to clarify the intent behind them, and adhering to the principle of "do no harm" appears to be a sound basis for operating.

To begin, an exploration of existing technological solutions was required to demonstrate how observance of the Protocol could be modernised according to the "state-of-the-art" of the day . During the spate of station building of the International Geophysical year 1957-58, the Belgians had constructed the Roi Baudouin Station, which was abandoned to its fate as the moving glacier enveloped it. In the 1950s, the speed of the moving ice streams was not really appreciated, and it was only through trial and error that these issues could be addressed. What would a new station do differently to capture the spirit of a new age?

For a start, the tools available are far superior to anything available to the hardy scientific explorers of the 1950s. In particular, the communication and navigation possibilities far exceed anything that could have been imagined at the time. Technological advances in building materials, logistics possibilities and energy, water treatment and communications choices have made it possible to deliver a state of the art facility, in the middle of a wilderness covering more than four hundred thousand square kilometres of uninhabited land. The PEA is equipped with a smart energy grid fed by renewable energies, and a space age water treatment system, which dramatically reduces the environmental impact of the activities, and the costs of operations. In addition, broadband satellite connections permit remote management of the facility.

The aim of the IPF was to deliver a modern station, which demonstrated respect for the spirit and the letter of the law, or in this case the Protocol. The station was built in a part of the Antarctic which was poorly served in terms of station infrastructure, and provided access to important new research, in areas which contain several interesting features, including geological formations dating to the period of the formation of Gondwana, meteorite fields, lakes containing cyanobacteria and ice streams running from the plateau to the coast. The PEA is thus able to deliver on the technological challenge whilst providing an infrastructure for research in an area of scientific interest.

.

The IPF's science support activities were also extended to include information for the general public and policy makers in regard to the relevance of polar research in addressing fundamental questions, such as those raised by climate change and its attendant environmental ramifications.

In April 2009, at the end of the International Polar Year, proceedings were held in the US State Department in Washington, to mark the run up to the fiftieth anniversary of the Antarctic Treaty, the United States being the Depositary State of the Treaty. At the thirty-second annual meeting of the Consultative Parties to the Treaty (the ATCM XXXII), held in Baltimore during the same period, the International Polar Foundation presented the PEA station at the

Plenary session of the Consultative Parties. At the end of the session, the Russian delegation congratulated the Belgians, and suggested that the "Belgian model" was perhaps the way to follow for future operations in Antarctica.

But what exactly was the "Belgian model"? Attempts to get to the root of the question came up against a wall of tergiversation. It being maintained in some quarters that the role of the private sector might be poorly considered by certain Treaty Parties, the traditional grey areas of Antarctic regulatory practices kicked in, and the question was relegated to a damp corner of an unlit archive to languish, until such a time that it was thrust once again to the forefront by events.

The "Belgian model" in the eyes of the World had delivered a game changing result, and deserved to be better understood in order to investigate how this might apply to the existing environmental management practices in the Antarctic as a whole. It was primarily born out of the International Polar Foundation's desire to raise the profile of the important research that was being carried out in Antarctica. In order to deliver this project, civil society banded together with industry and government to create the conditions necessary for its realisation, including the financial conditions. In addition to the purely financial support, many companies contributed manpower and technical know-how necessary to conceive of and build the facilities and systems.

Driving Change

Historically the attitude of Belgium to Antarctic affairs has been one of an intermittent and slightly idiosyncratic nature. Blink and you risked missing them altogether in the vastness. This intermittent interest can be explained by the fact that frequently it was due to the drive and insistence of individuals that Antarctica came into the national story at all. A few passionate individuals formed, financed and carried out the first expeditions. In both cases, the aim was largely the pursuit of scientific endeavours.

In 1897-98, Adrien de Gerlache carried out the first Belgian expedition, forced into overwintering off the Antarctic continent, when his ship was caught in the ice. His was also the first international scientific expedition to the Antarctic. He had onboard his ship, the Belgica, such polar luminaries as Dr Frederick Cook, and a young Roald Amundsen.

Then, in the first half of the twentieth century, while other nations were racing to the pole, or flying over the continent prior to staking out claims, the Belgians lived through two bloody wars fought over their lands, and an even bloodier recession. Culturally, the population was focussed on more pressing needs than the financing of foreign adventures. Antarctica was allowed to lapse back into the collective subconscious.

With the arrival of the International Geophysical Year (IGY) in 1957, Belgian interest in Antarctica was reactivated amongst the scientific community and the resolve was formed to return with a scientific expedition. So it was then that the Roi Baudouin station was built on the coast of Queen Maud Land. Financed by private partners, such as the industrialist Ernest Solvay, the expedition managed to collect a wealth of data over a wide geographical area. After the IGY57-58, national

interest evaporated. The scientific community tried valiantly to carry on, but the State had no appetite for costly research on the other side of the World, and despite signing the Antarctic Treaty in December 1959, after a few years the intention to ensure the viability of future operations was absent. Once again, there were more pressing questions to handle slightly closer to home.

In July 1961, the H.E. Mr. Willy Stevens, leader of the Belgian Delegation to the ATCM made an interesting contribution to the meeting of the Parties held in Canberra . He stated:

"Belgium is well aware that it has a part to play here. It has no territorial ambitions. The Belgians are an industrious people, and their prosperity is proof of their courage and energy. Belgium has at all times, and in various fields of activity, lent its assistance in formulating principles for international cooperation. We can hardly be suspected of ulterior motives in regard to Antarctica. Our activities in this region have been concerned only with scientific research. As you are perhaps aware, the first men to spend a winter within the Antarctic Circle were Belgians".

He added with great prescience:

"The success of the various recent Belgian Expeditions at Roi Baudouin Base is evidence of the value of Belgian collaboration in the scientific exploration of Antarctica. This collaboration may be counted on to the limit of our resources; and if my country can make its voice heard at this present Meeting, it will be the voice of reason, of mutual understanding, of reassurance and of loyal and generous co-operation".

Despite continuing since the 1960s to participate in the meetings of the Consultative Parties, Belgium did not have infinite resources for Antarctic activities. The Belgian scientists admirably persisted with their Antarctic "folie", and even when the Roi Baudoin station was lost to the ice, they carried on working with the Dutch and the South African Expeditions to try to keep the flame alive in the face of their dwindling means.

In 1985, there was again a flurry of short-lived interest when the Antarctic Treaty Consultative Parties met in Brussels, and new funds were made available for scientists, but again the thorny question of expensive infrastructure on a far-flung field of ice was adroitly avoided. It was arguable whether or not the Consultative Parties were required to operate research stations.

In 2004, having been in contact with the veterans of the IGY57-58, and working with other Antarctic die-hards like the glaciologist Prof. Hugo Decleir, the International Polar Foundation proposed to the Belgian government that the IPY 2007-08 was a good time to return to operations in Antarctica. The decision was taken to finance a feasibility study to allow the question to be explored, and it was thus that the first Belgian Expedition to return to the Antarctic after a gap of several decades was again a privately directed expedition.

The pressure on smaller countries to support expensive infrastructure that has no commercial raison d'être is always going to be difficult. Unless the science being carried out is vital to key societal challenges, it becomes difficult to justify the expenditure to a recalcitrant domestic public, especially in times of economic hardship. In order to make the building of a new station for research more palatable, it has to combine other qualities, such as the demonstration of engineering excellence. If

then further, the cost of the investment can be removed from the public purse, and the operational costs can be reduced through the use of "free" energy, the whole proposition suddenly becomes more attractive.

Such an outcome could only have been delivered by a civil society organisation, which has the creativity, flexibility and speed of response. State structures are bogged down by burdensome procedures and long response times. With modernisation has come specialisation, and in particular technical specialisation. Training operational staff has begun to take on major proportions, particularly where there is a prototype to manage. In addition, while it is far from being a commercially viable proposition to operate an expensive infrastructure in the Antarctic, technical companies are nevertheless willing to use the extreme nature of the continent as a test bed for various technologies. Bringing together the strands of competences and technologies is easier for a civil society organisation, which has no commercial interests and is therefore an acceptable interface between the public and the private sectors.

To avoid the new adventure ending as the previous Belgian forays into the Antarctic, the IPF sought the bulk of the financing from the private sector and working as a private operator built the Princess Elisabeth Antarctica. Once the station was built and the new systems were installed, the station was to be shared with the State, so that operations could benefit from regular and guaranteed funding. The main condition of donation stipulated that the station, being an advanced technological prototype, could only be managed by the entity that had designed, financed and built it, namely the IPF. Furthermore, if at any time the State were to tire of the financial burden, the station would have to be offered back to the IPF, so that another partner could be sought to carry on with financing the operations.

This plan worked well in theory, but in practice, the arrangement was doomed to failure from the outset. A Secretariat was created as a management body whose role it was to oversee the partnership between the State and the IPF. This novel structure was remorselessly attacked, and dismembered by the very people who had been designated to ensuring that it continued to function. The position of privileged partner that was accorded to the IPF was abandoned almost as soon as the ink was dry.

The System

Much ink, in general, has flowed on the subject of the continent of Antarctica, and most of it extols the superlative nature of the place, its whiteness, its coldness, its extreme climate, its fourteen thousand square kilometres. A veritable Olympian, one sees, in the ranks of the continents.

The continent is managed by the Antarctic Treaty System, which consists of the Treaty and its Protocol and Conventions. Consultative Parties to the Treaty are nation States, as are the non-Consultative Parties. The Treaty has suspended all territorial claims and as such, in principle, Antarctica could be considered as part of the global commons, for the pure and simple reason that it is arguably the only land territory of the Earth belongs to no one: the terra nullius, or no man's land. Even the Antarctic Treaty Parties must acquiesce to this simple and incontrovertible truth. This raises thorny questions on States' jurisdiction in Antarctica, which has been repeatedly examined

in the Treaty Meetings. This is one of the grey areas under which the access to the Continent for non-signatory Parties cannot be limited.

When the original signatories signed a suspension of sovereignty in 1959, it was for the undeniably simple reason that fighting over Antarctica would be sheer insanity, costly and unproductive. So Antarctica became a continent dedicated to science and to peace, ironically because of its hostility to man. The main winner of the day was the scientific community, as science became the central preoccupation of the countries present on the continent.

The legal regime in Antarctica is low on the register of public preoccupations, and has remained thus, because of the very muted and opaque nature of the constructs. This is a state of affairs that most Antarctic Treaty Consultative Parties probably prefer. A United Nations type management style has been quietly but firmly resisted, particularly as this would create problems in creating the viable national administrative regimes to support the various territorial claims that would be reactivated when the Treaty expires. The "Question of Antarctica" which was raised with persistent regularity at the United Nations was quietly and firmly quashed, when the chief promoter of the proposition to have Antarctica declared the common heritage of mankind, Malaysia, acceded to the Treaty and abandoned this line.

The Final Report of the XII meeting of the Antarctic Treaty Consultative Parties, held in Canberra in September 1983, where Malaysia, Brazil and a few other developing nations (non–signatories) were invited to attend, the Consultative Parties announced that re-negotiating the Treaty would introduce uncertainty and instability into the question of management of the Antarctic, which of course must continue to be preserved for the benefit of all under the United Nations Charter. In the course of time, many countries acceded to the Antarctic Treaty System, although it is open to question whether or not they had the means or the scientific interest to carry out operations in this forbidding and desolate place.

"…….the growing number of states participating in the ATS is testament to its vitality, and it has weathered efforts by some states in the General Assembly to replace the ATS it with a more universal arrangement that would truly vest the Antarctic continent in humanity as a whole. In the long term, the persisting uncertainty about the final status of sovereign territorial, maritime and continental shelf claims will present the greatest challenge to Antarctic stability. The ATS embodies an uneasy truce and cannot indefinitely defer disputes over sovereign title (and thus sovereign rights to exploit Antarctica's riches). The time will come when it may be necessary to reconsider sovereign claims and to desire an alternative legal architecture for securing Antarctica's future ".

While, in the minds of the general public the concept of Antarctica as belonging to all of humanity is firmly entrenched, the Antarctic Treaty Parties with territorial claims have a vested interest in maintaining their stewardship, and of gradually limiting access. Demonstrating continuity in administration of a geographical area, whether through post offices, or the capacity to provide services and infrastructure, is one way to validate future claims under the international law principle of Uti possidetis. And in some cases the stakes may be high.

In a 2012 Standard Note presented to the House of Commons (UK), the question of claims on the

extended continental shelf was addressed. This paper quotes from the Foreign and Commonwealth Office country profile of Antarctica that the United Kingdom was the first country to make territorial claims to a part of Antarctica, in 1908, by Letters Patent.

The Note also mentions the US Environmental Information Administration report that states *"Antarctica's Ross and Weddell Seas are thought to have resources of up to a billion barrels of oil, an amount roughly equivalent to that of Alaska's estimated reserves".*

Jurisdictional Creep

Under the Treaty provisions, States have jurisdiction over their own nationals or organisations, operating out of their territory. Apparently, this has encouraged the phenomenon referred to as "forum shopping" where legal entities, wishing to operate in Antarctica, will select as a base a country that is most likely to permit the activity under consideration. Several States Party to the Treaty have attempted to find a way to limit this room for manoeuvre, left open by the Treaty provisions on national sovereignty.

In order to safeguard future claims, claimant States Party have had to resort to new measures to deal with the inability of the ATS to address question of jurisdiction over non-State parties, and to impose gradual restrictions on access to the Continent.

Annex VI to the Madrid Protocol, adopted in 2005, on Liability Arising from Environmental emergencies (also known as "the Liability Annex"), is considered as a first step towards instituting a "full liability regime".

Under Art. 2(b) of the Liability Annex, an environmental emergency is defined as follows:

"Environmental emergency" means any accidental event that has occurred, having taken place after the entry into force of this Annex, and that results in or imminently threatens to result in, any significant and harmful impact on the Antarctic environment;"

This provision excludes any possible challenge to States coming from the obligation to remove waste from the continent. Accidental emergencies also preclude any threat of contamination from existing environmental waste on the continent being considered as an emergency, whereas if warming in certain parts of the continent continue, existing biological waste dumps are likely to create a situation, which has to be dealt with rapidly.

Additionally, a number of vague indefinable terms leave open to subjective interpretation what is intended, despite the fact that this is a strict liability offence. In this case an accidental event has to occur. By what measure is "significance judged? Also, by virtue of the strict liability clause, the operator is responsible for an accident regardless of the causation, and intent. Force majeure is not a factor that would limit liability, except in the case of a natural disaster "of an exceptional character". What is a natural disaster of an unexceptional character?

For those interested in the difficulty of defining environmental terms refer to the reissued Working Paper submitted by New Zealand on behalf of the CEP intercessional contact group at the ATCM XXXVII.

The UK in its 2013 "Antarctic Act" has enacted Annex VI provisions into law, and is among the first ten ATCPs to do so. But the UK but has also gone further in this respect by introducing criminal sanctions for violation of the provisions of the Act, and has extended the application of the provisions and the sanctions to non-nationals employed by "UK connected" expeditions. Obviously, civil liability for failure to respond to an environmental emergency is not extended Crown employees , but the Crown is still liable to pay for remedying the environmental damage. The armed forces will be exempt from the application of these provisions, as will any persons who commit the offences as defined under the Act, who are employed by other State actors.

Furthermore, all British led expeditions have to obtain adequate insurance cover to mitigate the costs of the clean up of an environmental emergency risk , and failure to do so is an offense. But it is stated that the Crown and its servants are exempt from this requirement, as the Crown is its own insurer. Meanwhile, private entities would be confronted with the task of ensuring against an uninsurable risk, of an undefined "environmental emergency". As failure to insure adequately, is an offense, effectively no entity or individual, who is not on Crown business, would be able to carry out any activities in the Antarctic, as adequate levels of insurance would be hard to establish.

Explanatory Notes to the 2013 Act mention that under the 1994 Antarctica Act, where an "… individual scientist is a national of a State which is not a Party to the Protocol, it may not currently be possible for that individual to be covered by a permit at all." The 2013 Act will remedy that by enabling the Secretary of State to permit non-UK nationals on British expeditions having a scientific or educational objective.

Other Consultative Parties have also begun to transpose the enabling legislation into national law, but by April 2015 only ten out of twenty-eight ATCPs had actually notified their approval of the measure. At the ATCM XXXVIII, a Draft Decision was proposed on the establishment of a time frame for negotiating a "comprehensive liability regime".

For a non-claimant nation to enact laws, which would create any kind of proto-sovereignty over an area of operations, would be considered against Article IV of the Antarctic Treaty, which limits any attempts at creeping extensions of sovereignty. So it will be interesting to see how they will approach this exercise.

In 2014, at the ATCM XXXVII, Belgium tabled an Information Paper entitled "The Exercise of National Jurisdiction on Assets in Antarctica", following a dispute over the rights to the property of the Princess Elisabeth Station. In it the Belgian State appeals to the ATCPs to assist in creating a register of property, which will help to fill a legal void that has permitted the IPF to claim the ownership of the Princess Elisabeth Station.

"While the idea of private entities or persons acting in Antarctica was barely considered at the time of the drafting

of the Treaty, the status of private infrastructure or equipment in that area was simply ignored. Today, this absence of provision dealing with private properties in Antarctica may be considered as a legal void. With the globalization and the freedom of trade throughout the world, the connection between legal entities and "goods" (property) on the one hand and States on the other hand has become tenuous. 'Ownership' is not a key word anymore, it has been replaced by other notions, such as 'right of use'. International cooperation has taken new legal or economic forms. 'Partnership' makes private actors and stakeholders the new counterparts of governments".

This was an arrangement freely entered into by the Belgian State in 2010, but it has become inconvenient, and a remedy was sought from among other ATCPs without any attempt being made for dialogue with the private sector partner.

In response to the Belgian request, the French delegation proposed the following recommendations in the Final report of the Intercessional Contact Group (ICG) on the exercise of jurisdiction in the Antarctic Treaty area:

- to publish **on a password-secured page** of the Secretariat's website a list of all national contact points on the question of the exercise of jurisdiction in Antarctica (and of their replacement if unavailable) and to request that the Secretariat keep the list updated;

- to **hold an informal meeting at each ATCM** so as to monitor the progress made and the trends in regard to the exercise of jurisdiction in Antarctica (for instance, to survey the number of breaches on record, the number of cases pending, the problems remaining etc.); and

- to deal with **the specific issue of infrastructure development** as a distinct and thematic question, in the context of the exercise .

It should be noted that France has expressed an interest in operating the Princess Elisabeth Station for Belgium, in place of the IPF. Also, that the PEA Station is in territory which is claimed by Norway. In the event that France and Belgium were to decide to expropriate the IPF and to run this infrastructure jointly, it would create new and interesting conundrums concerning sovereignty, and jurisdiction.

Management by Consensus

The soft law provisions of the Antarctic Treaty System (consisting of the Treaty, its Protocol (its Annexes) and its Conventions), allow for subjective interpretation, in what is referred to in non-legal parlance as "wiggle room". Annex VI of the Protocol is no different, but the interpretation that States may make of the provisions will lead to an unequal application of conditions under the national implementing legislation.

This subjective interpretation possibility applies equally to the application of the provisions relating to the protection of the environment. While Contracting Parties all espouse the principles of reducing environmental impact, the practice on the ground may be some way off from the environmental impact reduction that should be practised if modern methods of environmental management were

to be adopted. Take for example the Protocol of Madrid Art. 3(1), which states that:

"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".

These provisions contain several concepts (such as "wilderness value" and "intrinsic value") which defy definition, and are thus protection of them remain hazy concepts which are unenforceable. Art. 1 paras (a) to (g), which define the terms contained in the Protocol do not even attempt to define these terms. It is left to the later creativity of committees to fashion a contorted explanation of what was initially intended.

MP1991, Annex III Article 1(2) states that:

"The amount of wastes produced or disposed of in the Antarctic Treaty Area, shall be reduced as far as practicable so as to minimise impact on the Antarctic environment and to minimise interference with the natural values of Antarctica, with scientific research, and with other uses of Antarctica which are consistent with the Antarctic Treaty".

In this case, terms such as "natural values" are introduced. Again, these are indefinable. Does this Article imply that disposal on the continent is an acceptable practice? And what does "as far as practicable" imply in reality? What size of waste dump is permissible? Annex III, Art. 4 (2) states that sewage "shall, to the maximum extent practicable, not be disposed of on to sea ice…," but Art 4(3) allows the practice of pumping raw sewage into the ocean. Surely, it is time to address these issues in a more coherent way. If Antarctica is to remain pristine, there exist solutions to this kind of problem and these should be applied. There is no longer any excuse to maintain 20th Century attitudes to the question of environmental management.

The grey areas in soft law provisions are designed to be vague enough to allow for many practices to go unchallenged. States Parties set the rules and frequently exempt themselves and their servants from the effects of the rules. Treaty institutions, like the CEP, expected to be regulating these aspects, will be hampered by wording such as that cited above.

In 2004, two researchers from the British Antarctic Survey and the Plymouth Hospitals NHS Trust published a paper which noted that spore forming bacteria (Bacillus and clostridium spp) were viable in the Antarctic, as global warming was exposing previously dumped waste matter, and that "Previous faecal waste disposal on land may now start to produce detectable environmental pollution, as well as potential health and scientific problems".

In January 2012, a group of scientists from Universities in Sweden and in Chile published a paper on an investigation on the presence of antibiotic resistant E. Coli near research stations on the Peninsula. The human origin of these bacteria was clearly indicated. They stated that:

"The Antarctic Continent is the last comparative pristine ecosystem with a small human population restricted to

research bases, primarily located on the Antarctic Peninsula. Human activities are regulated by the Antarctic Treaty to reduce interference with the unique wildlife and the impact of human associated microorganisms should be minimal. However, contrary to this intention, human-associated pathogens have been identified in Antarctic wildlife."

The presence of Escherichia Coli in the local wildlife should surely be considered an environmental emergency? Especially as the wildlife in question are the penguin colonies in the proximity of stations. While the Antarctic Treaty Parties have made much of the "Aliens in Antarctica" restrictions, the concept has not been extended to the micro-organisms that we carry in our gut.

Delivering Change

The Antarctic Treaty permits non-State actors to be present in Antarctica, and through the unique characteristics of civil society, being at once neither commercially oriented, nor subject to the crippling restrictions applicable to State operators, the IPF was able to deliver a strategy for environmental management that points the way towards necessary and overdue modernisation of the Antarctic Treaty.

In 2004, when the International Polar Foundation began the project to construct the first Zero Emissions Research Station in Antarctica, the IPF fundamentally believed that they were depositing an action for the common good, that this act would be a demonstration of the Common Heritage Principle, where ordinary people of many nations and races would contribute to the fight against the despoliation of our unique little blue green Planet. The station would be a gift, not only to the people of Belgium, but to the whole of humanity. With time it has become apparent that there are many issues related to the governance of the Antarctic, which are not apparent to the neophyte approaching the issues of Treaty legal regimes for the first time.

Today, it is clear that there are national prerogatives that will be activated when any Party feels that its interests are being challenged by a non-State operator, no matter how well intentioned.

From the beginning, relations with the competent authorities of the State of operation, and other States Party were not easy. The institutions of State do not take kindly to usurpation of prerogatives. Attempts to be allowed to sit in on Antarctic Treaty Meetings, or even meetings relating to environmental management, or logistics were rebuffed. The fact that the IPF was building an advanced station prototype for the advancement of science was considered with suspicion. It was made clear that the legal responsibility for the venture was to be borne in its entirety by the IPF.

From 2006 to 2010, the IPF turned to friendly State operators in the area of operations in order to acquire the logistical and operational know-how. The culture of international collaboration in Antarctica stood the IPF in good stead and allowed the project to avoid costly errors that normally accompany the first tentative efforts at managing complex operations in the extreme. Reinforced by the intimate in-house expertise of the geographical area of operations, it was also easier for the IPF to carry out the field logistics than would have been the case for any other operator.

The IPF managed to accomplish something truly game changing in the Antarctic. The delivery of

a high tech, prototype station that was more respectful of the provisions of the Madrid Protocol than any station on Antarctica. The Treaty inspections began even before the station had officially begun to operate. It must have been due to curiosity, but in the first five years there had already been six inspections.

The presence of the Princess Elisabeth Station with its low operational cost, and low environmental impact has raised the question of modernising Antarctic operations. This applies not only to the introduction of "smart" energy systems, but also to the treatment of wastewater.

The modernisation should not stop there. It is time to reject the Cold War mentality and the management tools of a by-gone age, and to radically alter the coordination between countries. Without an injection of much needed energy into the System, it risks collapsing under the weight of its own inertia.

The exchange of information is required and encouraged, but the delivery is outdated. The development of joint tools for management of diverse aspects (such as harmonised training systems, and adoption of safety procedures, or air strip information, or telemedicine protocols between stations) are hampered by lack of investment not only in the actual tools and technologies, but in any credible joint coordination. Even web sites containing joint operational information are not encouraged.

Any action that might erode the possibility of a claimant state to be able to demonstrate the validity of its claim under international law, at some ulterior date, is viewed with suspicion.

Who is best placed to deliver the change that has to take place in the Antarctic in a time of shrinking budgets and burgeoning regulatory injunctions? Is it the States Party to the Treaty? Is it the States of the United Nations, under the Common Heritage Principles? Is it commercial operators, with inflexible bottom lines, or is it civil society and non-governmental bodies driven neither by the administrative fervour of public sector operatives, nor by the profit mind-set?

Financing research activity in Antarctica

In delivering such a high performance piece of infrastructure, the IPF was confronted with a major dilemma. How would the operations for such a facility be financed? Belgium lacked and still lacks many of the fundamental "polar" competences which a long standing polar operator would have, such as e.g. a research institute dedicated to the specifically Polar (Arctic and Antarctic) research. The pre-2009 Belgian model also lacked other elements such as a single funding body dedicated to research. The Federal State has one funding agency for research referred to as the Science Policy Office. In the absence of any other element of a unified Polar research strategy, the Policy Office was responsible for the funding and coordination of the broad research that was carried out within several institutes and university departments. Research was, and is, also funded by other regional bodies, by the European Union, and a few private foundations. But the guaranteed funding of national infrastructure and research posts dedicated to creating a body of competences in polar related research has been significantly absent. The strategy has, in general, consisted of an ad

hoc approach in support of research for "sustainable development". Consequently, a number of researchers have sought to pursue their polar careers elsewhere.

Due to the difficulty in reaching the continent, and putting in place life-support systems, all research being carried out in the Antarctic is likely to be a higher cost endeavour than research carried out in inhabited countries. It proved difficult to establish the benchmarks for real costs of science support operations in any one country.

The bigger and more invested States possess their own ice-breakers, aircraft and research institutes, and costs are opaque, frequently falling under several ministerial budgets, including military budgets. It becomes virtually impossible to establish what is the real cost of operations in support of research. If costs were to be divided per each individual researcher what would be the actual real World cost of research projects?

IPF was again confronted by this question when an audit of its operations was carried out by Ernst & Young in 2011. It became apparent that the amount of funding available for a non-State operator who is only interested in science, is going to be miniscule compared with what is available for States that have vast means, and numbers of personnel at their disposal. Despite delivering a modern station infrastructure at 20% of the price of other constructions currently in build on Antarctica, and running operations that are exemplary for their low cost and avoidance of environmental impact, the IPF found itself increasingly under attack from a public administration that wished to acquire the know-how of the IPF in order to rid themselves of a troublesome non-State actor.

The generalised management models for Antarctic operations in support of science fall into a few overlapping categories:

• Funding by a State party to the Treaty, for Antarctic operations, research institutes, logistics, personnel etc., and expedition personnel all employed by the centralised State operator e.g. the military or air force (Chile & Argentina);

• Funding by State institutions or State owned Funds, for Antarctic operations, research institutes, logistics, expedition personnel, supplies, logistics and services, with centralised control of operations by one of the participating institutes (e.g. AWI and the Helmholtz Foundation), (AARI , and RAE), (NIPR , JARE);

• Funding by State entity for several research institutes, and not-for-profit non-governmental bodies carry out the centralised function of managing operations on behalf of the State, where some of the personnel can also be volunteers (e.g. IPEV).

• Funding by a centralised State body for research, and operations, distinctly. The State entity contracts out management of operations to a third party private contractor (e.g. US NSF OPP and the companies Raytheon and/or Lockheed).

The recurring theme is that operations are usually financed by States. The Belgian public-private model could financially undercut all these models, and the auditors stated as much. The Belgian model was evidently not much used by other parties active in the Antarctic.

Belgium also lacked the historical continuity of operations, the experience of managing such infrastructure and any significant investment in Antarctic research activities, (which was one of the conditions highlighted by Dudeney & Walton in support of their contentious premise that Consultative status ought to be lifted from Treaty Parties that did not have any proof of supporting significant activities in Antarctic field research).

"For over 50 years the Antarctic has been governed through the Antarctic Treaty, an international agreement now between 49 nations of whom 28 Consultative Parties (CPs) undertake the management role. Ostensibly, these Parties have qualified for their position on scientific grounds, though diplomacy also plays a major role. This paper uses counts of policy papers and science publications to assess the political and scientific outputs of all CPs over the last 18 years. We show that a subset of the original 12 Treaty signatories, consisting of the seven claimant nations, the USA and Russia, not only set the political agenda for the continent but also provide most of the science, with those CPs producing the most science generally having the greatest political influence. None of the later signatories to the Treaty appear to play a major role in managing Antarctica compared with this group, with half of all CPs collectively producing only 7% of the policy papers. Although acceptance as a CP requires demonstration of a substantial scientific programme, the Treaty has no formal mechanism to review whether a CP continues to meet this criterion. As a first step to addressing this deficiency, we encourage the CPs collectively to resolve to hold regular international peer reviews of their individual science programmes and to make the results available to the other CPs.

The focus on international collaborative research that is a central tenet of the Antarctic Treaty philosophy has, therefore, been extremely helpful to the research communities of small countries, seeking to keep alive key polar competences. Frequently, a small country will not have the size of population or the research budget necessary to reach the threshold for obtaining the critical mass necessary for a self-perpetuating community.

While it is a key obligation incumbent on the administration, the public service mandate of research can only be effectively executed where there are the financial means to realise the necessary actions, whereas, the effective threshold for Antarctic research is much higher than for other fields, due to the high logistics costs. This means that any small country wishing to be active in this field will have two options: firstly, to ally itself with a larger country, or at least one that has greater means, and secondly, to attempt to deliver solutions that will work to reduce costs for all parties.

The first solution is of course going to be precarious. Relying on the goodwill of a partner country will work only where there is a unity of purpose, (i.e. shared research project) or where there are significant means allied with a public service objective extending to the international community (such as the funding of researchers by AWI and the Helmholtz Foundation).

Optimisation of research budgets through shared logistics has now become a standard feature of platforms such as the Dronning Maud Land Air Network (DROMLAN) which has successfully reduced costs via the use of shared logistics. A further reduction became possible by the subsidising of the air link by the carriage of private visitors, whether mountaineers or other private expeditions.

This was not a development that was welcomed by the scientific community, but with budget cuts putting the question of optimal use of financial means into sharp focus, the presence of a few dozen non-scientific visitors was considered to be a minor problem.

The Antarctic Treaty, in 1959, did not overtly address the question of the status of "visitors" as much activity in the past could have been considered as non-governmental, and in an area of terra nullius, or even res nullius, it would have been difficult to justify such an approach. The question has, however, been repeatedly addressed in recent years in the Annual Meetings of Consultative Parties (ATCMs), and shall continue to be examined in the future.

Effectiveness of the Management and Implementation of the ATS

In any event, after more than fifty years of operation, the Antarctic Treaty regime or system has had a mixed press with some claiming it to be extremely effective in its management strategies, and others wishing to open it up to the international community for management by the UN.

"From the perspective of international law and politics, Antarctica has provided an arena for one of the most ambitious (and some would suggest successful) experiments in regional governance."

The same writer goes on to describe some of the challenges facing the ATS:

"There is also renewed debate about living and non-living resources in Antarctica. A 'cold rush' for oil, gas and minerals has not yet eventuated, despite the proliferation of extended continental shelf submissions by the Antarctic claimant states. But there are certainly risks of mineral exploitation disguised as scientific research, and growing interest in bio-prospecting for commercial purposes". But *"So far there is no serious evidence that tensions arising from these issues threaten to unravel the half-century consensus on the Antarctic regime.*

Other writers share this view:

"…Antarctica's legal and regulatory arrangements have constantly and effectively adapted to meet new challenges, evolving into an increasingly sophisticated, inclusive, dynamic and responsive governance regime".

The regulatory arrangements may function, but does this apply equally to the more technical management aspects? With the speed of technological advances delivering new methods and means for environmental impact reductions, is there not a need to examine whether or not the environmental management arrangements could be improved and modernised?

It could be maintained, that the Antarctic, the last truly wild place on this planet, is a place unsuited

to management by non-specialists. If low impact operations are required, then States have to allow people who can actually deliver on this aspect to continue to function.

References

1. The International Geophysical Year (the IGY 57-58) was also accompanied by frenetic station building
2. In should be explained that at the time, while the Treaty and its Protocol aimed to introduce strict environmental protection regimes, in practice, the respect of these regimes is still dominated by a type of approach that dates back to the 1950s.
3. ATCM1_ip008_e, Canberra 10th July 1961.
4. Antarctica in International Law Edited by Ben Saul, Professor of International Law, University of Sydney and Tim Stephens, Associate Professor in Law, University of Sydney.
5. Antarctica: the Treaty System and territorial claims, SN/1A/5040 , 18th July 2012
6. ATCM37 SP11 - Reissue WP27 CEP XVI: Repair or Remediation of Environmental Damage: Report of the CEP intersessional contact group
7. Antarctica Act, 2013, Part 1, Section 2(4).
8. Ibid Section 6 (1) & (4)
9. ATCM38 - Agenda Item 9, WP 36 submitted by New Zealand, the Netherlands, Finland and Sweden on Annex VI Next Steps
10. idem – Attachment A to WP 36 submitted by New Zealand, the Netherlands, Finland and Sweden on Annex VI Next Steps
11. ATCM37_ip80_e
12. Long term survival of human faecal micro-organisms on the Antarctic Peninsula, Kevin Hughes, Simon Nobbs, Antarctic Science 16 (3): 293-297 (2004) DOI: 10.1017/S0954 10200400210X
13. Human-associated Extended Spectrum beta-Lactamase (ESBL) in the Antarctic, Jorge hernandez et al, Applied Environmental Microbiology, 2012 doi :10.1128/AEM.7320.11
14. Alfred Wegener Institute, Bremerhaven.
15. Arctic and Antarctic Research Institute, St Petersburg.
16. Russian Antarctic Expeditions.
17. National Institute of Polar Research, Tokyo.
18. Japanese Antarctic Research Expeditions.
19. Institut Paul Emile Victor, Brest.
20. National Science Foundation Office of Polar Programmes.
21. Dudeny & Walton, Polar research, Vol. 31(2012), Leadership in politics and science within the Antarctic Treaty.
22. ATCM XXXV, Hobart 2012, IP72
23. Institutional Developments within the Antarctic Treaty System Author(s): Karen Scoti
Source: The International and Comparative Law Quarterly, Vol. 52, No. 2 (Apr., 2003), pp. 473-487
Published by: Cambridge University Press on behalf of the British Institute of International and Comparative Law

24. Antarctica in International Law Edited by Ben Saul, Professor of International Law, University of Sydney and Tim Stephens, Associate Professor in Law, University of Sydney.

*

SHACKLETON: THE LAST VOYAGE

Cristina Montalbán

Abstract

In the early hours of January 5, 1921, shortly after the Quest arrived in South Georgia, the explorer Ernest Shackleton suffered an atheroma, which caused his death.

His autopsy was carried out the following day, extracting his internal organs and injecting formalin in anticipation for the procedure of embalming to be completed in Montevideo, which would allow for his body to arrive in England in good condition. On January 19th the remains- accompanied by Dr. Leonard Hussey- embarked on Professor Gruvel, reaching Montevideo ten days later. Coincidentally, the Captain Rupert Elichiribehety- who in June of 1916 had commanded the expedition to attempt the rescue of the men of the Endurance- was one of those who boarded the ship to receive the remains.

On the 30th, the embalming process was completed at the Military Hospital, it being already known the final decision of Lady Shackleton to have the body returned to South Georgia as a symbol of inspiration to other Antarctic explorers. The Government of Uruguay determined to pay him Minister Honors on their embarkation day—the 15th of February. The last journey was fulfilled in the whaler, Woodville. Prior to setting sail though was a touching ceremony in the English Temple. From there, the carriage with the body advanced towards the port escorted by senior officials, troops, and a crowd that recognized the human values of the dead, in unanimous homage to the charismatic polar hero.

This article forms a guideline for a rather touching, but not well-known, story that links the Eastern Republic of Uruguay with this exploratory figure.

Keywords

Shackleton, death, Montevideo, embalmment, South Georgia.

The Expedition

On September 17, 1921, a large audience said farewell to the Quest as it set sail from St. Katharine's pier in London—underneath the Tower Bridge. Then began the expedition that Shackleton had arranged with the support of the Institute of Agricultural Research—whose director, Mr. John Quiller Rowet, was also a friend and classmate from Shackleton's student days.

The Shackleton-Rowett expedition had a series of goals that consisted of circumnavigating the Antarctic continent, mapping more than 3,000 kilometers of coasts, performing oceanographic, meteorological, and geological research, establishing the existence and position of sub-Antarctic islands, and using—for the first time in history—a plane for exploration.

Nineteen men participated in the mission, seven of which had already participated in the Endurance expedition; Dr. Alexander Macklin, surgeon and biologist, Dr. Leonard Hussey, meteorologist, the commanders Frank Worsley and Frank Wild, Dr. James McIlroy, the Chief Engineer Lieutenant Alfred Kerr, and Chef Charles Green. Among the new members were the geologist Viber Douglas, meteorologist D. Erikson, Pilot Mayor Carr, the photographer J. Mason, course official G. Jefferey, the naturalist George Wilkins, second engineer Smith, J. Dell the electrician, and the Boy Scouts Watts, Mooney, and Marr.

The ship that carried out the campaign, previously known as Foca I, had been renamed by Lady Shackleton to Quest. The vessel, launched in Norway in 1917, had been tested in Arctic Sea conditions and had also been subjected to complete conditioning for the mission. Its structure of oak and spruce was reinforced with steel in the hull and bow, work was carried out on its machines to better adapt to navigation in ice, a five kilowatt generator was added for wireless communication, and a Lalley oil machine for internal lighting was installed. The capacity of the ship's coal bunkers were expanded and seven oil tanks were adopted into the vessel. Spaces were arranged for deposits of supplies and equipment, pumps for food service and bathrooms were included, and a small seaplane named Airo resided on the vessel to be used in the polar exploration, as previously stated.

Other spaces dedicated to housing were added to the ship as well. A "deck house" was constructed and was divided into four quarters (which would come to be occupied by Shackleton himself, Dr. Macklin, Captain Hussey, Commanders Wild and Worsley, and Lieutenant Kerr). The rest of the crew stayed in a general cabin located below the stern deck.

It is known that changes were also made in the bow's structure in order to accommodate laboratories—biological and photo—as well as the cabin of the expedition's naturalist, George Wilkins.

The journey

In spite of all the changes made to the ship, shortly after starting the Quest experienced some problems with its machines, which led to the expedition stopping in Rio de Janeiro to carry out the necessary repairs. At the same time, Shackleton was experiencing different symptoms that would come to be identified as arthritis and lower back pain.

In reality, his physique was taking its toll due to his continued activity, his above concerns, and general wear and tear suffered on a daily basis on the ship. Dr. Macklin, who had been on other expeditions with Shackleton, previously noted symptoms indicating heart disease, but with his customary stubbornness, the explorer ignored the doctor's advice and warnings. Dr. Macklin stated that Shackleton not only refused to rest and adhere to the necessary treatments, but also smoked, ate, and drank too much.

It was clear that his attempt to minimize the gravity of his ongoing ailments was based on his refusal to accept—or fear—that his state of health could get in the way of the expedition's objectives.

It was this trend of destruction that he suffered under during the stay in Rio, when Shackleton experienced severe back pain. As on other occasions, he downplayed his unrest and insisted that the pain would pass, all the while dismissing the suggestions made to him by the physicians attending him.

On December 18th, Shackleton sent a letter from Rio to John Rowett, which would come to be their last communication. A newspaper in London published the letter. In it, Shackleton announced that work had culminated on Quest, which from the time of its launching, already left nothing to be desired.

The expedition set sail from there to South Georgia, suffering—along the route—a severe storm, which led the explorer to comment that in all his years of experience as a seaman, he had not experienced such long and persistent bad weather.

On January 4th, the expedition arrived in South Georgia. Shackleton invited Worsely to the command bridge, recalling the laborious route they followed in 1916, when they had arrived there in search of help for their comrades who remained on Elephant Island.

He wrote in his diary: "Finally we are anchored in Grytviken. How familiar the coast seemed to us: we saw places that we had traveled with so much effort after the trip in the boat…the familiar smell of dead whale is all-pervasive. It is a strange and curious place… in the darkness I see a distant star, flashing over the bay, like a jewel…"

Shackleton and Worsley visited the whaling station where several old acquaintances, commissioning carbon and provisions, welcomed them prior to refueling for their departure to the ice barrier where the first stage of the journey would be carried out by land at Enderby.

At approximately 9 am, they returned aboard, and after dinner, "the boss" showing his good humor of habit, retired to rest in his cabin.

The sudden death

Around 2 am on January 5th, the explorer called on Dr. Macklin, plagued by a sharp pain in his back. He then requested a medication that would relieve the pain, ensuring that in a few minutes he would be back to normal. The doctor, after covering him with another blanket and suggesting to him that

he should take things more slowly, listened to what would be Shackleton's last words; "You always want to give up something. What do you want to give up now?" Noting that the symptoms were severe, Macklin decided to go find Dr. Hussey and Dr. McIlroy, but when they returned to his side only a few minutes later, they found they could be of no use because Shackleton had died.

It was 2:50 am and the sudden death surprised every crewmate, causing great sadness and effect.

It was in the morning that the authorities of South Georgia certified the death. The body of the explorer was still in the blue and white pajamas that Shackleton had worn to bed that night. The autopsy was carried out with available materials. In order to preserve the body, the internal organs were removed and the cadaver was injected with formalin.

After placing the body in a sort of canvas shroud made by the electrician of the expedition—an old sailor named Dell—the remains were locked up tightly in a box of galvanized zinc, settling then in a coffin of rustic wood made by the Norwegian whalers on the island.

The mortuary box was on board until January 15th, until it was landed on the 16th and taken to the Anglican Church of South Georgia, where it remained until the 19th. British and Norwegian flags on the island were raised at half-mast. It should be noted that a funeral service was impossible to perform on the island due to the fact that the Rector was out visiting another whaling station.

On January 19th, the body of Shackleton embarked on Professor Gruvel, a ship under the Norwegian flag under the command of Captain C. Jacobsen, who was the only one in South Georgia shipping barrels of oil.

The mortal remains would be accompanied by Dr. Leonard Hussey—the second doctor of the expedition—who carried a note signed by Commander Wild which stipulated that the cited had been chosen for the task of accompanying Shackleton on his last voyage due to his satisfactory conduct and work in the expedition, as well as for the appreciation he bore for Shackleton himself. The instructions stated that during the passage to England, there would be a stop in Montevideo where the body would finish being embalmed and a good oak coffin would be commissioned. Finally, a flower crown, which would be paid for by the crewmembers, would be bought to represent their presence at the funeral.

Sailing to Montevideo took ten days, during which the Professor Gruvel was caught in the path of a very strong storm and became partially damaged when water entered the cellars—a disadvantage that they crew would overcome.

The arrival of the remains in Montevideo

On the morning of January 29th, the Professor Gruvel, coming from South Georgia, anchored in the outer Montevideo Harbor. The commanding officer on board informed the maritime authorities that the body of the English explorer was onboard; a fact that was made immediately known to the Captain General of the Port, Coronel Guillermo Lyons.

The shocking news had not been known—said Dr. Hussey later—because the radio station of the Quest had been destroyed during the storm that took place after leaving the port of Rio de Janeiro. Additionally, the auxiliary station had only enough power to communicate with the Falkland Islands, from where it could relay the radiogram informing the English Government of the death. Coincidentally, the radio of the Professor Gruvel was also out of service.

Immediately after arriving on dry ground, Dr. Hussey went to the British Legation where he was received by the Secretary of the Minister, who after informing the chargé d'affaires, Mr. Edward Hope de Vere, arranged that Mayor Thomas of the Salvation Army and Director of the Mariners Home would provide the necessary support for the landing of the remains—procedures that were to be met as soon as possible because the Professor Gruvel had to continue on its voyage.

Mayor Thomas made contact with the agents of the Quest—Wilson Sons & Co. Ltd.—but as soon as the port authorities got the news of the arrival of the explorer's body to the Uruguayan Government, steps were taken to make all of the arrangements rapidly.

President Brum immediately dispatched the Introducer of Ambassadors, Mr. Fermín Carlos Yéregui, to give condolences to Mr. Hope de Vere and to inform him the President's willingness to collaborate in necessary funeral plans, which was greatly appreciated by the diplomat.

Immediately, the representatives of the maritime authority, Assistant J. Jauréguy, and a man by the name of Dr. Bonasso, put the ship in free conversation. While the boards of some media—such as El Plata announced the news, at 5:30 pm, the chargé d'affaires of England, Mr. Hope de Vere, the Deputy Director of the Navy CC Roberto Elichiribehety, Assistant Captain Teodoro Ferreira, Mr. Fermín Carlos Yéregui, some members of the British colony, and journalists from El Plata and La Nación embarked on the tugboat Lavalleja. Those listed above were joined by an endowment of the Deposit of Sailors headed by Lieutenant D'Angelo.

The coffin, on which Shackleton's countrymen placed offerings of flowers, was in a compartment of the cellar, from where he was led to Lavalleja by eight sailors.

The tugboat, flying its flag at half-mast, docked at 6:00 pm in the official jetty at the Maciel Pier.

The remains were lowered to the ground covered by the flag of England, and moved first to the General Captaincy of Ports in a van escorted by marine forces. As he was being transported, a large crowd filled the dock and accompanied the coffin with the utmost respect.

Dr. Hussey then gave journalists a copy of the medical certificate of death where Dr. Macklin stated that he had attended to Shackleton during his last illness and determined that the cause of death was atheroma, adding that previously he had not been exposed to any infectious or contagious diseases. His report concluded by expressing the concern for the conditions that the body would arrive to England under, which had led to an initial procedure of embalming to be completed in Montevideo.

In the Military Hospital

From the Captaincy the body was taken to the Military Hospital where, after being received by the medical practitioners on duty, it stayed—with an honor guard—in an interior room of the hospital's side building.

On January 30th at 10:30 am, the coffin was opened. The intention was for the body to be embalmed (in the case its state would allow for it, considering the time that had passed since the time of death). In the case of not being able to realize the procedure, it was foreseen to leave it in a cold-storage room in the morgue.

Present to bear witness to the act was the Director of Military Health Dr. Augusto Turenne, the Director of the Hospital Dr. Eduardo Blanco Acevedo, Mayor Leopoldo Lecour and Reynaud Secretary of the Hospital, Mayor Lucas Ibarbouru, two of the twelve Red Cross nurses that staffed the hospital, several hospital doctors, fellow explorer Dr. Hussey, the English Vice Counsel Mr. Eric Arthur Cleugh, Captain Thomas, and a representative of the British press in Montevideo.

The doctor leading the embalming procedure was surgeon Dr. E. Toscano, who was assisted by Juan Antonio Romeu, a practitioner.

On having removed the body from the thick canvas in which it was wrapped, it was found that the cadaver was in an excellent state of conservation making the embalming process much simpler than it had been previously thought. In accordance with the long journey and with the order that the body was to arrive in London in good conditions, the remains were injected with several doses of formalin, the chest and abdominal cavities were completely filled with cottons and gauze impregnated with the same substance, and the cadaver was bandaged in order to support the compresses.

In a simple and emotional ceremony, before closing again the box filled with zinc, one of the nurses placed a bouquet of flowers on the chest of Shackleton, in which bishops and nard were mixed. At the completion of the procedure the coffin was covered once more with the British flag and the remains were left with the military guard.

A change of plans

Up to that moment, it had been planned that the remains would be left in deposit in the British Cemetery, embarking for England on February 11th on the steamship Andes.

However, these plans would not be carried out. The chargé d'affaires of Great Britain and Ireland, Mr. Edward Hope de Vere, officially communicated to the Ministry of Foreign Affairs that on February 3rd, Lady Shackleton had informed him of her decision to send the remains of her husband back to South Georgia, where he would be buried as an example of selflessness, sacrifice, and inspiration for explorers of all Nations.

On having taken this decision, explained Mr. Hope de Vere, Lady Shackleton had left aside her

personal feelings and was convinced that the best homage would be that the explorer was laid to rest at the entrance to the distant region whose mysteries he had helped to unveil and, considering also—despite it never being explicitly expressed—that this would have been her late husband's wish.

Based on Lady Shackleton's wishes, the first arrangement to board the remains on a ship towards Britain was cancelled. Immediately after, the Uruguayan Government offered the date of July 18th, on which students from the Naval Academy would transport the body of Shackleton to South Georgia.

After completing the formalities of communication to the authorities, the British chargé d'affaires thanked the Minister of Foreign Affairs for his proposal—after which it was reported that Mr. Hope de Vere declined the offer on the grounds that the vessel responsible for conducting the trip would not be appropriate for the difficult navigation of the southern seas. Therefore, it was decided to entrust such as mission to Woodville, a whaling vessel that was in the port of Montevideo to load coal and supplies at the time.

Official Honors

It is important to note that immediately after hearing the news of Shackleton's death, the Uruguayan government was prepared to pay him the highest honors.

At first it had been determined that the honors for the deceased would be in accordance to his role as an official of the British Navy, but on February 3rd, the President of the Republic sent a message to the General Assembly with a proposal in which he suggested Minister honors on the day that Shackleton's remains would be shipped.

In general terms, the message of the President highlighted the courage, energy, selflessness, and tenacity of Shackleton, applied to the conquests of science with total dedication, while it underlined the heroism and the enthusiasm that had been recorded in the symbolic names of the ships that had ventured into the unknown. It was also noted that the prominent explorer was not only one of the glories of England but also of humanity, and that he should be given the honor that was rightfully due to him while on Uruguayan soil.

This project was approved unanimously in both chambers of government, thus sanctioning the corresponding decree of the President.

On recognizing the homage decreed by the Uruguayan Government, the chargé d'affaires of England and Ireland sent two messages to the Secretary of State, which made his satisfaction with such demonstrations of honor known. In addition to these official communications, Mr. Hope de Vere also expressed his appreciation in a telegram to the Marquis Curzon of Kedleston—the Secretary Principal of State of His Majesty for Foreign Affairs.

Similarly, the correspondences expressed appreciation for the shown signs of sympathy, as well as for the respectful and effective manner with which the landing and other subsequent arrangements had been carried out. He also highlighted his deep gratitude for the courtesy shown by President

Brum and other members of the Uruguayan Government. On this sad occasion, the courtesy shown agreed, "with the noble traditions of the Eastern Republic of Uruguay and the close friendship of long duration that exists between the inhabitants of Uruguay and Great Britain."

In the English Temple

On Tuesday, February 14th, the remains of the explorer were privately transferred from the Military Hospital to the English Temple. Mr. Carlos Shaw, Father Blount, his assistant, Father Brady, and the head of the Anglican Temple of San Juan in Buenos Aires—who traveled to Montevideo on behalf of the English community in the Argentine city, greeted the remains at the temple. The coffin was placed in the passage to the altar where it remained through the night without a guard. White ribbons had been placed by sisters of the church, while nurses laid down flowers on the British flag that enshrouded the casket.

In accordance with the due honors, from the dawn of Wednesday the 15th, all flags in the State were raised at half-mast, and at Fort General Artigas the flag was raised every 30 minutes—a tribute that would be repeated until the remains embarked from dry land.

At 9 am, the service in the Temple began. Moments before, delegates from English associations, Mr. Edward Hope de Vere, Mr. Fermín Carlos Yerégui, Dr. Hussey, CF Charles Backhouse, the Naval Attaché to the British Legation, and a small group of prominent people from the resident English community arrived at the Church of the Holy Trinity.

At that time, several residents from the French community arrived on behalf of their colony present in Uruguay at the Temple.

Around the coffin, a handful of members from the English Club accompanied the remains. At the bottom of the central nave glowed a few candles, which illuminated a small crucifix. On both sides of the altar stood the pastors, with Father Blount and Father Brady occupying the seats of honor.

The Minister of Foreign Affairs then placed a bronze wreath with oak leaves and an inscription that read, "Uruguay in tribute to Sir Ernest Shackleton," on the coffin. Next to the wreath was a plate, which was given on behalf of the King by Mr. Hope de Vere and other members of the British Legation's staff.

It was at this point that the temple opened to the public and reached the full capacity of the church in just a few minutes.

Among the many tributes placed next to the coffin was a simple crown of flowers, whose dedication was to, "the head of the boys." This particular tribute had a great load of emotion tied to it. It was the crown that Dr. Hussey placed on behalf of the members of the expedition who had lost their valiant leader.

Mr. Norman Armour, the chargé d'affaires of the United States of America, laid a wreath of white

flowers that symbolized ice and snow.

Mr. Levis Nicol, the representative of La Ligue Maritime et Coloniale in Buenos Aires placed a bronze palm leaf on the coffin to represent the grief caused by the physical disappearance of the explorer, who had at one time been a guest of the prestigious institution in Paris.

The British Association of Uruguay, the Association of Services of Uruguay, the four English Masonic Lodges in Montevideo, and the Association of the French Merchant Navy joined in the public condolences with flowers and bronze.

After the start of ceremony, the President of Uruguay arrived accompanied by Chief of Police General Juan Pintos and other government officials.

Mr. Hope de Vere and representatives of the Anglican Church received the President at the entrance of the Temple.

President Brum remained a few moments in front of the coffin paying his respects, continuing from there to his seat of honor among the other attendees.

The service ended at 10 am with a clarion call from next to the carriage that would transfer the remains to port.

The coffin was taken out of the Temple by ten knights of the community, covered by the flags of Great Britain and Uruguay, which were placed on behalf of King George V and the Uruguayan Government. The carriage of the 1st artillery unit, pulled by six horses, was followed by attendees of the service who carried the wreaths of flowers given in honor of Shackleton.

At 9:45 am, troops from the 1st and 4th Artillery Regiments, the 4th Calvary, and 1st, 3rd, 4th, and 8th Infantry Battalions formed a line on the left side of the avenue from the corner of 33rd Street and 25 de Mayo, past Columbus Street until 25 de Agosto, and continuing through to the dock where the Sailors Battalion stood in front of the Woodville.

A section of the Blandengues Regiment, which solemnly guarded the coffin, was deployed on the right side of the street.

The funeral procession progressed along the route outlined by the various troop regiments.

The large crowd in the procession included civil servants, members of the diplomatic corps, political figures, and various delegations—including the Association of Civil Employees of Uruguay, representatives from the National Association of Argentine Fishing, and the Argentine Scientific Association of Natural Sciences.

The simplicity of the coffin stood in stark contrast with the imposing context of the route to the port. Not only was Shackleton accompanied by the orderly troops, but he was also honored by a

crowd that followed the remains in the streets and even from the windows of private homes, from which many women threw bouquets of flowers to the procession.

The procession to Woodville: the ceremony prior to departure

The column was lead by Mr. Hope de Vere, high staff of the British Legation and Consulate, the Minister of War and Navy, the Chief Commanding Officer of the Army, the executive board of the English Club, and delegates from several British associations. At the corner of 25 de Mayo, they were joined by the Dr. Buero, the Minister of Foreign Affairs, and General Bouquet of the Navy. Upon arrival at the port, seamen troops presented their arms and joined the Blandegues Regiment.

Before the remains embarked on their journey, the authorities stopped in the column and the Uruguayan Minister of Foreign Affairs spoke on behalf of the Uruguayan Government. His synthetic yet heartfelt speech highlighted the tribute and honors that the Uruguayan Government bestowed upon Shackleton and paid respects to the explorer he described as heroic, wise, and "one of the purest glories of Great Britain." He stressed that his memory, linked to this land, would serve to reaffirm the mutual friendship between the two nations and greeted the people on behalf of President Brum to this "solemn step" towards the final resting place of the remains. His words culminated with him expressing his best wishes to the expedition that had been under the command of Shackleton at his time of death, and urged them to carry forward the great work that Shackleton had begun as, "eminent citizens of England, the world's undisputed citizens."

Mr. Hope de Vere responded with a quite extensive speech, in which he thanked—on behalf of his Government—the President of Uruguay and the Uruguayan people for their tributes, trying to find words to express the recognition of all Britons of the honors rendered to their compatriot.

It was during this speech that he also made a retrospective of the past missions that Shackleton had carried out, highlighting the support provided in 1916 by the Governments of Uruguay and Chile, as well as the hospitality received in those places and Buenos Aires, of which the deceased had kept fond memories. He also mentioned Shackleton's services as Commander of the troops that operated north of Russia, as well as his last voyage in which the assistance provided by the Government of Brazil and its people was not forgotten.

He referred particularly to the "exquisite courtesy" of the Uruguayan Government in their offer to transport the remains to South Georgia on a warship belonging to the country, in spite of the danger that existed in the seas at those latitudes. He made it clear that this offer would never be forgotten by the English Government or by British people all throughout the world. Neither the simple coffin made by the Norwegian whalers, "compatriots of the great Amundsen, friend and advisor of Shackleton," nor the many offerings from the various institutions represented at the funeral would be forgotten either, according to Mr. Hope de Vere.

After reiterating his gratitude, which was reflected by Lady Shackleton and Shackleton's crewmembers,

Mr. Hope de Vere recognized the deceased as the most important messenger of friendship to South America from Great Britain.

In his conclusion, Mr. Hope de Vere noted that the work of Shackleton had come to an end and he would now go to rest at the gates of Antarctica, waiting for his successors and the discoveries they will inevitably make for the benefit of humanity and science.

Once the funeral formalities were completed at 11 am, the coffin—covered by a large number of wreathes—was lowered into the cellars of the Woodville.

The ship then dropped its moorings while being dismissed by shots fired from the Hill Fort.

The ship was then towed to the outer harbor where once the Chadwick Weir House finished its enlistment operations, the vessel would set sail.

Dr. Hussey took complete advantage of his stay; boarding the Woodville on Thursday the 16th at 10 pm. Accompanying him onboard was Mr. Walter Pepper, Agent of Expeditions in Montevideo and representative of The Sunday Morning.

Before his departure, Dr. Hussey expressed his gratitude for the support given to him during the various tasks entrusted to him, the honors given to the explorer, and for the hospitality that he had received from the Uruguayan government, people, and colleagues.

In the early hours of the 17th, the Woodville began sailing towards South Georgia, being escorted by the cruiser Uruguay until the English Bank. The Uruguayan ship stopped at that point and in a solemn and emotional farewell, honored the explorer with a regulatory ordinance salvo. Then, the sails were raised and the vessel left the wind to the British flag.

Conclusion

The death of Shackleton caused a big stir throughout the world, particularly in Montevideo where in addition to the feelings of grief for the deceased explorer, authorities, countrymen, and civilians were involved in the process of his funeral.

Since the arrival of the Professor Gruvel in port—the moment in which the news broke—there was a lot of media coverage, as we would say today. The pages of the press—which were disseminated on a large scale—reported everyday on the details of the explorer's death with major headlines, photos, and extensive columns. These morning and evening newspapers, which were written in a format different from today, have turned yellow and brittle with time. It is these newspapers that have acted as the main sources for this article.

From them we found out that in addition to another test of transcendence and the interest generated by the tragic story, that during the funeral procession there were strategically located film devices recording scenes from the day.

We were fortunate in that some of these recordings had been preserved and were at our disposal for the writing of this article as well.

In both the news reports and film recordings, it is reinforced that the connotation accompanying the death of Shackleton was the closing of the "heroic stage" of Antarctic history. Shackleton was a reference for those times, in which the hazy knowledge of the continent resulted in extreme efforts and the redoubling of risks. Adventure, thirst for knowledge, challenge, and spirit encouraged his explorations. Each expedition represented an investment of his economic resources, time, and energy, which in turn resulted in pride and recognition of his achievements through awards, his bestowment of knighthood, fame, and unlimited loyalty from his men.

His charisma as a leader remained in those who shared his passion for Antarctica—a continent that he had strengthened ties, appreciation, and reciprocal links with. The famous quote by Raymond Priestly, who had reached the "three greats of the South Pole," rightly highlights the most commendable values of each one. This criterion coincides entirely with the facet of Shackleton's deep humanity, of his responsibility for the lives of his partners. His unanimous recognition was reflected in the acceptance of his gift of command. Shackleton was "the boss," a term which expressed his admiration for loyalty, perseverance, fortitude, and rebellion that had shone through in each expedition, particularly the one that led to the difficult rescue of the crew of the Endurance.

It was this rather dramatic expedition of Endurance that closely linked him to Uruguay, the first country to answer his call for help. Shackleton appreciated the attitude of solidarity that was displayed by the Government of Uruguay—particularly when Lieutenant Elichiribehety and officers of the Fisheries Institute supported the decision to realize the mission regardless of the risks.

This opinion coincided with his own, made—without a doubt—more difficult to determine when, being already so close to the objective, his experience overcame his desires and, calibrating the danger of the ice, he made the final responsible decision to return. The affinity of his courage and respect for life was mutually valued between him and his crew. After having managed to drop off his men, he visited Montevideo to express his thanks, thus leaving the Uruguayan people with a sense of profound admiration and collective honor for the explorer.

Incidentally, it was in Montevideo that the tributes of honor were organized for the deceased polar hero.

Taking the decision to rest in South Georgia, with the same haste that in 1916 the expedition of the Fisheries Institute was prepared, it was offered that a Uruguayan vessel would comply with the transfer of the remains, as a renewed expression of willingness and solidarity.

The intense grief that struck after Shackleton's death joined all wills together. Montevideo joined as one to preserve his body and honor his spirit in such a reverent and sincere manner. There at the gates of Antarctica where only death could stop him in the e nd, his tomb stands as a memorial to his scientific achievements and, above all, his human values—which would come to define his life.

Fig. 1. *Shackleton and Wild -http://www.juliesummers.co.uk/shackleton.php*

Fig. 2. *"The coffin coming out of the Professor Gruvel." In: "Ayer llegaron a Montevideo los restos del explorador Shackleton…"- "El Plata"- January 30, 1922- Pg 8- Cols. 1-2 -*

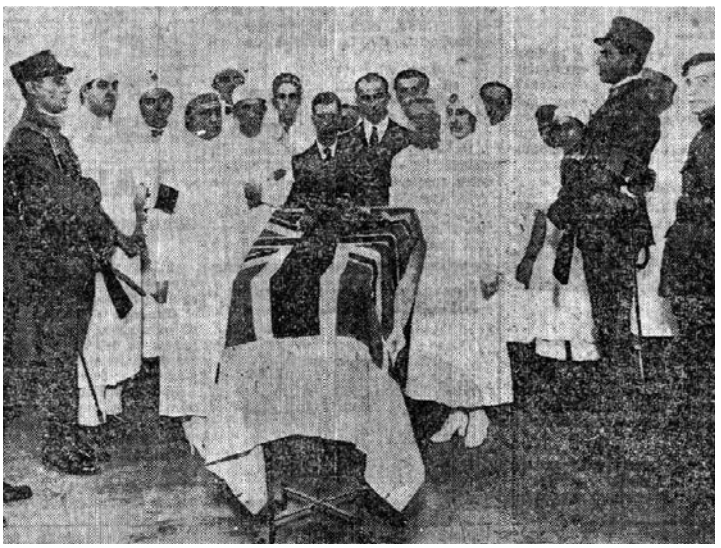


Fig. 3. *In the Military Hospital immediately after the embalmment." In: "Sir Ernest Shackleton´s "Inevitable Hour"." The Sunday Morning. "La Mañana". January 31, 1922- Cols. 3,4,5*

Fig. 4. *A stunning perspective of the great procession that accompanies the remains to the docks. In "Hoy fue tributada una solemne despedida a los restos de Sir Ernesto Shackleton. In El Plata"- February 15, 1922- Pg. 10- Col. 2-3-4 .*

Fig. 4. *The tomb of Shackleton in South Georgia.*
http://elrincondenanuk.blogspot.com/2014/03/ernest-shackleton-la-lucha-por-la.html

References

-Quevedo Paiva, Adolfo. "Historia de la Antártida". –Asociación Polar "Pingüinera Antártica Argentina" Ed. Argentinidad. Buenos Aires. 2012.
-Quevedo Paiva, Adolfo- "Páginas Antárticas"- Asociación "Pingüinera Antártica Argentina". Edivén S.R.L. Buenos Aires, 2007

Newspaper Archive

El Día

-"Shackleton. Los restos del gran explorador son desembarcados en tierra uruguaya. Conversando con el médico de la expedición Mr. Hussey". "El Día"- Monday, January 30, 1922- Pg 6. Cols. 2,3,4,5.
-"Los restos de Shackleton. Se procedió ayer en el Hospital Militar al embalsamamiento del cadáver". "El Día"- Tuesday, January 13, 1922- Pg 6. Cols. 1,2.
- "Shackleton". "El Día"- Thursday, February 16, 1922- Pg. 5. Col. 1,2,3.

El Plata

-""Semblante del día. Shackleton". "Ayer llegaron a Montevideo los restos del explorador Shackleton. Nuestra entrevista con el doctor Hussey, uno de los médicos que le acompañaban. Detalles de los últimos momentos del ilustre hombre de ciencia y valeroso marino. La muerte se produjo en South Georgia el 5 del corriente. Desembarco de los restos y homenajes que se le tributan."- "El Plata"- January 30, 1922- Pg 1-Cols. 1,2. ; Pgs. 8,9. (complete)
-"La última expedición de Shackleton. Algunos detalles interesantes." – "El Plata"- January 31, 1922- Pg. 9-Cols. 5,6,7.
-"Apropósito de la muerte de Shackleton. Homenaje de la Asociación de Empleados Civiles de la Nación". "El Plata"- February 1,1922- Pg. 8 Col. 2.
-"Homenajes a Shackleton"- "El Plata"- February 2, 1922- Pg 8. Col. 3.
- "Shackleton. La Presidencia propone le sean rendidos honores de Ministro. Será Sepultado en la región austral. Así lo ha resuelto su esposa. " "El Plata"- February 3, 1922- Pg. 8. Cols. 6,7,8.
-"Los restos del explorador sir Shackleton serán embarcados el miércoles. El vapor Woodvile los conducirá para South Georgia. Mañana quedarán terminados los detalles de los honores oficiales que se rendirán." "El Plata"- February 13, 1922- Pg 8-Cols. 1,2.
-"Mañana serán embarcados los restos del explorador Shackleton. Ultimos detalles sobre las ceremonias á realizarse. Las tropas formarán desde el Club Inglés hasta el Muelle Maciel." "El Plata"- February 14, 1922- Pg 10- Cols. 1,2,3,4.
-"Hoy fue tributada una solemne despedida a los restos de Sir Ernesto Shackleton. Las ceremonias oficiales revistieron una imponencia extraordinaria. En el momento del embarque en el "Woodville" se cambiaron conceptuosos discursos." "El Plata"- February 15, 1922- Pg.10. Cols.1,2,3,4.

La Tribuna Popular

-"El más famoso explorador ha muerto. Inesperado arribo de los restos de Shackleton. Porqué se mantenía en secreto la dolorosa nueva." "La Tribuna Popular"- January 30, - Pg. 1 Cols. 1,2,3.
-"Shackleton. Dolor que produce la muerte del héroe."- "La Tribuna Popular"- January 31, 1922- Pg. 6. Cols. 4,5.

-"Shackleton. Honores Oficiales."- "La Tribuna Popular"- February 2, 1922- Pg.1. Col. 6
-"Shackleton. Los homenajes oficiales. Mensaje del Ejecutivo al Parlamento." "La Tribuna Popular"- February 4, 1922- Pg. 2. Cols. 5,6.
-"Shackleton. Honores de Ministro. Resolución del Parlamento. Homenaje nacionalista." "La Tribuna Popular"- February 7, 1922- Pg. 2. Cols. 5,6.
-"Shackleton. El Senado autoriza los honores de Ministro." "La Tribuna Popular"- February 8, 1922- Pg. 8. Col. 5.
-"Shackleton". "La Tribuna Popular"- February 10, 1922- Pg. 2. Col. 5.
-"Shackleton. Pasado mañana serán embarcados sus restos." "La Tribuna Popular"- February 13, 1922- Pg. 6. Col. 3.
-"Los restos de Shackleton. Ceremonia a realizarse". "La Tribuna Popular"- February 14, 1922- Pg.2. Cols. 5,6.
-"Sir Ernest Shackleton. Hoy serán embarcados para South Georgia los restos del héroe". "La Tribuna Popular"- February 15, 1922- Pg.1. Cols. 5,6.

La Mañana

-"Sir Ernest Shackleton´s. "Inevitable Hour"- "The Sunday Morning. Number 201 –(Supplement). Montevideo, Tuesday January 31st. 1922- Reproduced in "La Mañana"- January 31, 1922 - Pg. 9 (Complete)
-"Homenaje a Shackleton. Se le rendirán honores de Ministro. Mensaje del Ejecutivo". "La Mañana". February 4, 1922- Pg1- Cols. 6,7.
-"The Sunday Morning, Montevideo Week By Week." N° 202- Saturday February 4th, 1922- Pg. 3- Reproduced in "La Mañana". February 4, 1922- Pág.11. Col.3.
-"En pro de la familia de Shackleton". "La Mañana" . February 5, 1922- Pg. 1 Col. 4.
- "The Sunday Morning".N° 203- (Supplement) Montevideo, Tuesday February 7th. 1922. One Page. Reproduced in: "La Mañana" – February 7, 1922- Pg. 9. Col. 3.
-"Los restos de Shackleton. Serán sepultados en South Georgia". "La Mañana"- February 9, 1922- Pg. 1. Col. 4.
-"The Sunday Morning". Special Supplement. Montevideo Friday February 10th. 1922- Reproduced in "La Mañana". February 10, 1922- Pg. 5. Col. 5,6.
-"Los restos de Shackleton. Serán embarcados el miércoles". February 11, 1922- Pg. 1. Col. 3.
-"The Sunday Morning. Montevideo Week by Week- N° 204. Montevideo, Saturday 11th, 1922. Reproduce in "La Mañana". February 11, 1922- Pg. 11. Cols. 3,4.
-"Los restos de Shackleton"- February 12, 1922- Pg.1. Col. 5.
-"Los restos de Shacklelton. Ceremonias a realizarse". February 14, 1922- Pg.1- Cols. 4,5
-"Los restos de Shackleton. Hoy serán embarcados para South Georgia". "La Mañana"- February 15,- Pg. 3. Cols. 2,3,4,5,6.
-"Los restos de Shackleton. La ceremonia de ayer". "La Mañana"- February 16, 1922- Pg. 9. Cols. 1,2,3.
-"The Sunday Morning. Weekly Journal for the English Speaking Communities of Uruguay". Montevideo, Saturday February 18th, 1922. Number 206. Pg.1- Reproduced in : "La Mañana"- February 18, 1922- Pg. 3. Cols. 3,4,5.

El Telegrafo

-"El explorador Sir Ernesto Shackleton. Su fallecimiento en South Georgia. Transporte de sus restos". –"El Telégrafo"- January 19, 1922- Pg. 1 Cols. 2,3,4.
-"La muerte del explorador Shackleton. Examen y embalsamiento del cadáver". "El Telégrafo" –January 30, 1922- Pg. 4 Cols. 2,3,4.
-"Shackleton. Homenaje de la Asociación de Empleados Civiles de la Nación."-"El Telégrafo- February 1, 1922-

Pg. 3 Cols. 2,3.
-"Homenaje a la Memoria de Shackleton. Se le decretará honores de Ministro. Mensaje del Presidente a la Asamblea"."El Telégrafo"- February 3, 1922- Pg. 3 Cols. 2,3,4.
- "Shackleton. Representación científica Argentina." "El Telégrafo"- February 6, 1922- Pg. 3 Col. 1
-"Shackleton- Sir Ernesto Shackleton. Hoy fueron trasladados sus restos a Sud Georgia. Sentido Homenaje que le tributan el gobierno y pueblo uruguayos. " "El Telégrafo"- February 15, 1922- Pg. 1 Cols. 2,3,4; Pgs. 8,9 (complete)
-"Nuestro último homenaje a Sir Ernesto Shackleton . El "Uruguay" escoltó hoy, gallarda y dignamente al "Woodville". "El Telégrafo"- February 17, 1922- Pg. 3 Cols. 2,3,4.
-"Buried Shackleton´s Body"- The New York Times. May 8, 1922.
-Revista "Caras y Caretas"- Buenos Aires- February 4, 1922- N°1218
-Revista "Caras y Caretas"- Buenos Aires- February 25, 1922-N°1221

Notes

i. In some articles it is detailed where the Dougherty and Tuankai Islands are located. St. Peter and St. Paul rocks would be studied (which how they were found in the Equatorial line is still unknown). They would come to the islands form South Trinidad where, in 1901, a petrified forest had been discovered. One would also arrive at Tristán Da Cunha and islet of Gough, which rises more than 1,000 meters above sea level. Plans to try to determine the possible existence of a point of contact between the continents, which separate the Atlantic, were made. Additional plans were made to search the Atlantic for the treasure of Captain Kidd, to located a lake in the Southern Ocean, and to the know the methods of navigation that the native peoples of the Pacific Ocean were using hundreds of years before Columbus crossed the Atlantic Ocean. This information was found in: "El Plata"- January 31, 1922- Pg. 9. Col. 6, http://www.bbc.uk/history/historic figures/schackleton ernest.html, and in Quevedo Paiva, Adolfo. "Historia de la Antártida". –Asociación Polar "Pinguinera Antártica Argentina"Ed. Argentinidad. Buenos Aires. 2012. Pgs.181-182

ii. We have respected the spelling of the surname "Macklin," given that it appears so even when written by Shackleton, and in spite of the fact that we have found it written Mac Lean in documents such as Shackleton's death certificate.

iii. Fragment of Shackleton's diary cit. in Quevedo Paiva, Adolfo. "Historia de la Antártida". Pg. 183.

iv. Cit. in Quevedo Paiva, Adolfo. "Historia de la Antártida". Pg. 183.

v. The Minister of Great Britain was visited by a crowd that was there to express its sympathies.

vi. Hussey had been appointed by Second Commander Wild to join his boss on this last trip, make the delivery of the remains to the British Government, and to buy a crown of flowers to represent the crew at Shackleton's funeral.

vii. The death certificate said, "I, Alexander Mac Lean, hereby certify that I attended to Lord Ernest Shackleton during his last illness and that to the best of my knowledge the cause of his death was artheroma (sic)… and that before his death he had not been exposed to infectious or contagious disease. Also the body has been injected with formalin for its preservation and has been put into a box of galvanized zinc and hermetically sealed. –Signed Alexander H. Mac Lean, expedition doctor." "El Plata"- January 30, 1922- Pg. 9 Col. 4.
viii. The English article emphasizes that the Red Cross nurses had received training in a nursing school founded by

Dr. Nery to train Uruguayan nurses for the British lines. "The Sunday Morning"- N° 201- January 31, 1922- Cit. in "La Mañana" January 31, 1922- Pg. 9 Col. 5

ix. The Woodville weighed 1,569 tons and had a crew of 38 men.

x. Thank you notes of Mr. Edward Hope de Vere to the Minister of Foreign Relations. "El Plata"- February 13,1922- Pg. 8- Col. 2- "La Mañana"- February 14, 1922- Pg.1-Col. 4

xi. It was an exception that there had been no custody of members of the commonwealth during the night, as he had subsequently assured.

xii. The service included hymn numbers 225, 288, and 401.

xiii. "El Día"- Thursday February 16,1922- Pg. 5, col 1,2,3. –"El Plata"- February 15, 1922- Pg. 10- Cols. 2-3- "La Mañana"- February 16, 1922- Pg. 3- cols. 2-3.

xiv. "El Plata"- February 15, 1922- Pg. 10- Cols.3-4- "La Mañana"- February 16, 1922 -Pg. 3- Cols. 3,4.

xv. Dr. Hussey stayed at the Alhambra Hotel as a guest of the Uruguayan Government. During his stay, in his character as a doctor of Kings College of London and assistant surgeon on Shackleton's expedition. Rowet was accompanied by Dr. Sanguinetti. The Vice President of the National Commistion of Public Assistance gve a tour of the school of medicine as well as several hospitals in Montevideo (amongt those were the Maciel Hospital and the British Hospital). Subsequently, under the guidance of Dr. Nery, the Director of the School of Nursing, they paid a visit to the Maternity Hsopital and school, which Dr. Hussey stated was the most complete and modern of its kind that he had seen in the world. When boarding the Woodville, Dr. Hussey said that he did not have the words to express how well he had been treated in Montevideo. Moreover, he expressed his wish to return before the end of the year, either with the Quest or not. He in fact did so—it appearing in the news that he was in the city on May 7, 1922.

xvi. The crusier, Uruguay, set sail at 6:25 at the command of Lietenant Juan Battione.

xvii. The only person knighted for his achievement in Antarctic exploration before Shackleton was James Weddel.

*

A DOOR TO THE ICE?: THE SIGNIFICANCE OF THE ANTARCTIC GATEWAY CITIES TODAY

Gabriela Roldán

Abstract

Antarctic gateway cities facilitate the access to Antarctica for most of the governmental and non-governmental activities taken place below 60º South. Antarctic operators choose the best suited Antarctic gateway city based on their reputation, geographic position, infrastructure and expertise in Antarctic logistics. A strong set of policies, economic investment and place promotion take place in positioning a city with the highly sought-after brand Antarctica.

In this article, I discuss the concept of a gateway city beyond the function of an entry and exit door. I propose a role further than the Antarctic business in offer. As concern grows over the rise of human activities in Antarctica and its potential environmental risks, the Antarctic gateway cities could hold a form of authority to monitor, assess and enforce Antarctic legislation on all subjects traveling to Antarctica despite the nature of their travels.

Keywords

Antarctic gateway city, Antarctic connections, port state control, city branding.

Introduction

Antarctica holds a unique fascination for humans. For centuries, the motivations that has drawn man to Antarctica have been many, from political and personal ambitions to the romantic concept of visiting the last pure wilderness. However, the remoteness of Antarctica and its hostile Antarctic environment have been deterrents for many people wishing to reach the White Continent. Although technological advances have facilitated travel to some of the most inhospitable environments in the world, the challenging nature of Antarctica and the Southern Ocean continue to be the allure as well as the restricting factor of getting there.

Consequently, traveling to Antarctica has many challenges: logistical, geographical, financial and personal. Most people traveling South will do so using the infrastructure available at a city with polar connections. Currently, access to Antarctica is dominated by five cities located on the periphery of the Southern Continent. These cities are known as 'Antarctic Gateway Cities', a title and a role whose significance varies between these towns. The five cities frequently identified as Antarctic gateway cities are: Cape Town (South Africa), Christchurch (New Zealand), Hobart (Australia), Punta Arenas (Chile) and Ushuaia (Argentina). It should be noted that in literature concerning Antarctic Tourism in particular, the town of Stanley (Falkland Islands/ Islas Malvinas) is also considered an Antarctic gateway city (Bertram, Muir, & Stonehouse, 2007). However, for the purpose of this article, Stanley will not be included in this review as its current association with Antarctica is relatively minor and largely restricted to tourism.

The aforementioned cities see the largest volume of people traveling to the Antarctic by air and sea. Their geographical proximity to Antarctica, the infrastructure developed to satisfy local urban growth and their connections with the South make these cities the most appealing to launch a polar expedition. However, the Antarctic gateway cities were not built as a hub for Antarctic travels per se, and some scholars argue that the concept of 'gateway city' has been misused in regards to the function that some of these cities serve for Antarctic operations (Hall, 2014)

Although the concept of 'gateway city' will be further reviewed in this article, it is important to note that a definition for an Antarctic Gateway Port has been proposed as: 'a coastal or island port, able due to its proximity to the Antarctic to benefit from, and control access to, Antarctic and Southern Ocean resources, including fishing, tourism and scientific support' (Bertram et al., 2007, p. 124).

The aim of this article is to present a review of the current status of the Antarctic gateway cities with regard to their functionality in providing access to Antarctica in the role as a polar gateway city.

The concept of 'Gateway City': a brief discussion

Geographers are well acquainted with the term 'gateway', which refers to a city or an area that provides an entrance into, and consequently an exit out of a larger region of particular interest, such as a productive area (Burghardt, 1971). The concept of the term "gateway" indicates that there is interest in accessing an area, and there is an entrance or way to it. The scholarly work done by Burghardt (1971) proposes that a gateway city has a unique position as the entrance to a hinterland,

connecting this tributary area and the outside world: 'the city is in command of the connections between the tributary area and the outside world' (p. 269, 1971). Burghardt's hypothesis postulates the idea that a gateway city often develops between two areas of diverse productivity as a pioneer frontier, it is the entrance to a productive region. There is a benefit in accessing and developing a productive area and those who wish to enter this area, or forsake the tributary region will pass through the gateway city. Therefore, the function of a gateway is fundamentally connected with the transport of people and goods from the hinterland (or tributary area) to the productive region. To serve this purpose the gateway should be located on the periphery of the area of interest. Burghardt (1971) also indicates that gateway city development has to be dynamic and aware of the requirements of the productive region. Rapid growth could absorb the gateway turning it merely into a service area, or could create large central places that will compete against it and ultimately, dominate over it. If growth in the tributary region is static, the gateway will continue its dominance as a transportational nodal point but, as the central place becomes less attractive, the role of the gateway will become redundant.

Bertram et al (2007) focused their study on the development of Antarctic Tourism, which is largely a shipborne activity. Therefore, the most suitable definition of a gateway used in their approach is of an Antarctic Gateway Port. As seen in the introduction of this paper, the authors define an Antarctic Gateway Port by its capacity as a functional commercial port and its geographical location close to the Southern Ocean. According to Bertram et al, the Antarctic Gateway Port should include: '(i) managers who maintain political and scientific interests in Antarctica, (ii) good deep-water facilities for refuelling and re-provisioning ships; (iii) an international airport close by; and (iv) local infrastructure developed to facilitate exchanges of commodities and people' (2007, p. 124). In the concept of Antarctic Gateway Port, the functionality as a marine transportation hub and its proximity to the productive area (i.e. Antarctica) are present. However, other elements have been incorporated to the notion of gateway: the political and scientific interests in the Antarctic; the requirement for further infrastructure, for instance aerial connections, which are not exclusive to the needs of the area of interest but which have been established to supply the local demand. There is also a political and economic significance given to the Antarctic Gateway Port: it is no longer simply a transportational hub, or an entrance to and an exit from a larger region. The gateway has developed as a central place with strong connections to an international region that is seen as the productive area: the Antarctic.

In regards to Polar Gateways, Hall (August, 2014) indicates that the concept appears frequently in literature focused in Polar Tourism. However, a further analysis of the concept of polar gateway is required for a better categorization of the current Antarctic gateway cities. For Hall (2014), the term gateway is used without precision, limited to the function as an entrance and lacking examination of the linkages between gateway and mobility, connectivity and accessibility. Hall (2014) challenges the idea that the current Antarctic gateway cities may not be proper gateways in the true sense of the concept, and questions whether these should be considered competing minor hubs.

The importance of the proper categorization of polar gateway becomes relevant when considering the interconnections between its function and the hinterland (i.e. Antarctica) and the economic and political activity that derives from these. Antarctic gateway cities should no longer be seen solely

as the door to the Antarctic, as this limits its role to a transportation hub. Instead, I propose that a dynamic role of the Antarctic gateway cities should encompass:

• the economic activity it derives from accessibility to Antarctica, whether it is to provide logistic support to National Antarctic Programmes (NAP) or commercial activities in the Antarctic;
• the impact on the local and international community derived from competition for local resources and infrastructure;
• the advantageous position over other potential competitor gateways;
• the network of scientific knowledge that is established in, or travels through the city;
• the place-branding as a polar specialist place;
• the heritage, cultural, historic and social connections with the Antarctic;
• the education and outreach programmes that reach the local community;
• the establishment of National Agencies with Antarctic interests (i.e. science research, defence, policy making);
• the authority to act as port state controller and perform independent assessment to all human activities proposed to take place in Antarctica before the subject leaves the gateway city.

The above list is not exhaustive, nor has it been composed in order of merit or relevance. It is intended merely as a starting point for discussion and scholarly study of the relevance of the role of an Antarctic gateway city.

Finally, consideration should be given to the meaning of 'gateway' in other languages. For this purpose, English and Spanish have been selected as these are the most spoken languages in the aforesaid Antarctic gateway cities. In Spanish, for instance, the word gateway is often translated as puerta de entrada (the entry door). Once again, the concept of gateway is simplified as an entry way. However, considerable attention should be paid to the word puerta (door) as it implies access, admission, the right of entry. Simultaneously, this entry way may feasibly be closed, deny access, be unlocked, or be obstructed by something or someone. If so, the gateway city is exercising authority over the access into the hinterland, the latter being interpreted as Antarctica. This view poses the question concerning the extent of the control that the Antarctic gateway cities have over the access to Antarctica and the Southern Ocean.

The issue of Antarctic port states' control has been addressed by others in regards to the regulation of Antarctic tourism vessels (ASOC, 2003; Orrego Vicuña, 2000). Moreover, Swanson et al (2014) discussed the need for implementing standard regulations of tourist vessels among the Antarctic gateway cities. The main concerns are over the rise of tourism activities and visitors in the Antarctic, the degree of responsibility of tourism vessels with flags of convenience from non-Antarctic Treaty Parties, and the actual incidents and accidents that have occurred to Antarctic tourism vessels, which could result in actual and potential risks to the environment and to humans (Liggett et al, 2011). All of this validates the argument over Antarctic port states control.

Conversely, there is little discussion over the need to apply standard regulations regarding the large number of people involved in other Antarctic-related operations of a commercial and non-commercial nature such as fishing and science programmes, even though these activities

also occur mostly from the Antarctic gateway cities and potentially have the same environmental risks as Antarctic tourism. The management and protection of the Antarctic and the Southern Ocean is a complex matter, and so is the management of the safe access to and from the region of large numbers of people and equipment. International agreements such as the 'Protocol of Environmental Protection to the Antarctic' (Madrid Protocol) are in place to protect the Antarctic environment and its associated ecosystems within the scope of the Antarctic Treaty System (ATS). The Madrid Protocol was signed in 1991 and entered into force legally following ratification by all Antarctic Parties. The Madrid Protocol, like all regulations within the ATS, requires legal and practical implementation by the countries. Antarctic countries need to pass national implementing legislation to complete the ratification process of this regulation. Although all Antarctic Consultative Parties have implemented national legislation of the Madrid Protocol which affect their citizens in the Antarctic, some Antarctic non-Consultative Parties have not done so. Thirty-seven out of fifty-two Antarctic Treaty Parties have national implementation legislation of the Madrid Protocol, fifteen other non-Consultative countries have not done so yet (ATS, 2015). The lack of national law to implement the Madrid Protocol in these countries (i.e. Austria, Denmark, Malaysia) could potentially create risks to the Antarctic environment comparable to those of vessels with flag of convenience from Non-Antarctic Parties.

The above mentioned regulations work within the umbrella of the ATS, which requires Antarctic Parties to implement the measures agreed upon at the annual Antarctic Treaty Consultative Meetings (ATCM) and introduce legislation in their own countries that are binding their nationals when visiting Antarctica. The Antarctic Treaty States are not required to implement the measures but simply are recommended to do so, which weakens the enforcement of the measures adopted in consensus in the ATCM. Some countries implement legislation faster than others; other countries are more selective in the implementation and interpretation of the measures agreed on to suit their Antarctic policies. The practicalities of the different approaches to enabling Antarctic legislation within the Antarctic States is varied and can take several years to be in force.

Whether the implementation and enforcement of the legislation of the ATS is effective or not is the subject for a different discussion. The argument posed in this article is to reflect on the need for standard regulations to control access to Antarctica from the Antarctic gateway cities, independent of the activity taking place or the number of people involved. According to the Antarctic Treaty, the ATS legislation framework applies to the area 'south of 60º South Latitude, including all ice shelves' (Art VI, 1959), which excludes the area where the Antarctic gateway cities are geographically placed. In this regard, the Antarctic gateway cities could have the role of monitoring, independently assessing and enforcing Antarctic legislation that transcends their national legal structure but applies to all nationals and internationals before the subject reaches Antarctica. This may be seen as a utopic point to raise as, for instance, it is unlikely that a National Antarctic Programme would accept to be assessed, or allow its access to Antarctica to be determined by an official from an Antarctic gateway city. But if the argument over Antarctic port state control is based on the need to implement standard regulations on vessels sailing to Antarctica, built on the responsibility (or lack thereof) of the flags of convenience from non-Antarctic Parties, there is much to discuss about the responsibility of Antarctic States that are not yet legally bound to the Madrid Protocol. The latter countries may be smaller players in Antarctic politics and science arenas but nevertheless

have agreed to the ATS by signing the Antarctic Treaty. If the concern is over the rise of human activities in the region that pose great risks to the environment, tourism should not be the only activity contemplated here in need of standard regulations and the discussion should encompass all human activity in the Antarctic. However, before addressing the issue of Antarctic port state control or the application of standard regulations for all Antarctic-bound vessels, a critical examination over the existent legislation, resources and competence at the Antarctic gateway cities should happen beforehand (Swanson et al, 2014).

The brand "Antarctica" and the Gateway Cities

All five Antarctic gateway cities claim to have strong connections to the Antarctic, whether these are historical, cultural, political or commercial. The Antarctic connection is an important element of the identity of these cities. Some of the factors influencing this connection include geographical proximity to Antarctica, governmental and economic policies created towards the development of infrastructure for Antarctic operations, and the network of international collaborations for cooperative research and logistical support acquired over the years of human exploration in Antarctica.

Politically, having an active Antarctic gateway city within the country offers a logistical advantage over the rest of the Antarctic States. It enables a country to become the host of other Antarctic countries and their National Programmes and commercial ventures (i.e. tourism and fishing). Also, the Antarctic activities that take place in the gateway city support the sovereignty claim that four of five countries of the aforementioned cities have in the White Continent. South Africa is the only country that hosts a gateway city but has not made a territorial claim in Antarctica.

The national and local governments recognise the value of being associated to Antarctica and showcase the polar status of their city. For instance, the South American Antarctic gateway cities profile the Antarctic connection in the name of the province or region: Ushuaia (Argentina) is the capital city of the province of Tierra del Fuego, Antartida e Islas del Atlantico Sur (Tierra del Fuego, Antarctica and Islands of the South Atlantic). Punta Arenas (Chile) is the administrative capital for the XIIth 'Region de Magallanes y Antartica Chilena' (Magellan and Chilean Antarctic Region). In the case of the Australasian cities, Christchurch is portrayed to its visitors as 'the aerial gateway to Antarctica' (Christchurch City Council, 2015). The government of Tasmania (Australia) advertises the benefits of operating through Hobart, considered the 'gateway to East Antarctica and the Southern Ocean' (Tasmanian Government, 2015). Finally, Cape Town, compared with the other gateway cities, has a subtle and more regional approach to its Antarctic connection as 'South Africa's gateway to Antarctica' (City of Cape Town, 2011).

The association with Antarctica is an attractive brand for these cities (Hall, 2000). The idea of being close to or associated with Antarctica suggests white wilderness, a place clean and pure, an image so appealing that local governments cannot resist embracing it for their cities, regardless of the level of strength of their Antarctic connections. Antarctica portrays its adventurous and pristine environment, iciness, penguins, and its status as a last frontier. Although very few will ever get to see the place (Leane, 2011). Antarctica has a strong presence in people's minds: images

have been shaped by stories of explorers and modern adventurers, untamed wildlife has been portrayed in documentaries and films. This struggle for survival has appeared in photography, fiction and non-fiction literature.

As cultural globalization advances internationally integrating people from different places and cultures, there is more pressure for cities to have a good reputation and an image that attracts business and contributes to regional development while enticing positive attention from the international media and governments. Almost every place in the world has a reputation, good or bad, and in many cases this reputation follows stereotypes. A perceived idea or a personal impression of a place is imprinted in people's minds. This perceived impression or reputation is the brand image, which sums all tangible and intangible elements about the place that the consumer has in their memory (Anholt, 2007). This brand image may or may not be the message that the city's officials want to send. To look after their branding the local government and the prime stakeholders will have to work together cohesively in a branding strategy. For Anholt, branding 'is the process of designing, planning and communicating the name and the identity, in order to build or manage a reputation' (p. 4, 2007). Branding is not to be confused with slogans or logos; there is a strategy and planning behind branding, a long-term commitment and behavioural change for those involved in the process. If the branding of a place does not consider the city's identity and the brand image is not embraced by the community, the branding has little meaning and will not survive the long-term plan. Therefore, a coordinated approach integrating all public and private stakeholders is required to communicate the proper message about the city. In return for this continuing commitment to a brand, stakeholders aim to create a competitive advantage over other cities to attract investments and specialized business, to promote tourism, bring economic benefits for the region, create a skilled workforce, improve education, and stimulate growth in a safe and politically stable place.

For Anholt (2007) place promotion and place competition are important components of the branding campaign. The former employs publicity and marketing tools to impose certain images of a location to a target audience. Place competition is aimed to find the unique benefits that the location offers and attempts to engage the target audience, emphasizing what differentiates itself from the competition.

When travelers arrive to Ushuaia, for instance, they are greeted at the airport and the port with signs indicating they have arrived to 'el Fin del Mundo' (the end of the world) (personal obs., 2015). Ushuaia is also known as the southernmost city in the world, a designation that is closely related to the city's strategic importance during the international boundary conflict of the Beagle Channel (1977) rather than an exotic tourism destination. The introduction of a special trade free-zone (1980s) attracted internal and external migration that reinforced Ushuaia's position as an Argentine border town. The success of the free-trade economic policies, in contrast with the economy of the rest of the country, brought great benefits and growth to Tierra del Fuego, establishing Ushuaia as the administrative capital of the province (Elzinga, 2013). During the 1980s and for the next three decades, the population of Ushuaia rocketed, dwarfing its competitor Puerto Williams (Navarino Island, Chile), a small Chilean Navy town located on the south margin of the Beagle Channel and geographically placed further south than Ushuaia. A Tierra del Fuego government-led branding campaign in the 1990s advanced the concept of 'further south' and turned it into 'southernmost' to

attract tourism (Roldan, 2011). The characteristic of being a southernmost city is unique among all cities in the world, and more specifically among the cluster of Antarctic gateway cities, as it implies being the closest to Antarctica. Ushuaia's geographic advantage, the development of infrastructure, the availability of skilled workforce and businesses to supply the demand of tourism has made this southern town the 'most popular gateway for Antarctic Tourism' since mid-1990s to today (InFueTur, 2015).

In contrast, the nearby city of Punta Arenas has a long-standing association with Antarctica. Punta Arenas was a well-known port for communication, coal, lumber and re-provisioning for sealers and whalers throughout the 1800s, as well as the last port of call for Polar Explorers that ventured South in the late 1800s (Elzinga, 2013). Famous explorers such as Adrien de Gerlache (Belgica expedition 1897-1899), Otto Nordenskjold (Swedish Magellan expedition 1895-1897), Jean Baptist Charcot (French Antarctic Expedition 1903-1905) and Robert F. Scott (Discovery Expedition 1901-1904) recorded their visits to the vibrant city of Punta Arenas during their Antarctic travels. Perhaps the most significant event in the history of Punta Arenas' Antarctic connection was the participation of a local navy officer in the rescue of the marooned men of Ernest Shackleton's Endurance Expedition (1914-1916) (INACH, 2013). Locally known as Piloto Pardo, Luis Pardo Villalon has the status of a hero in this Chilean town. The opening of the Panama Canal in 1914 made Punta Arenas redundant for ships navigating between the Atlantic and Pacific Oceans, as vessels no longer had to sail through the treacherous seas of the straits of Magellan and around Cape Horn. Punta Arenas' economy turned to sheep farming and oil exploration mostly, interrupting its Antarctic activities until the middle of the 20th century when the Chilean Government established a Naval Base and incorporated the Chilean Antarctic claimed sector to the XIIth Region of Magallanes y Antartica Chilena (Elzinga, 2013).

Punta Arenas' development as an Antarctic gateway city was gradual but consistent with the Chilean National Antarctic policy. By the beginning of the 21st century, the Chilean Government was proactive in strengthening their position as an Antarctic State, prioritising the geopolitical significance of Punta Arenas as the administrative power for their southernmost region which included the Antarctic claimed area (Roldan, 2011). Among the many political decisions made at the time to consolidate Chile's Antarctic interests, one of great significance was moving the premises of the Chilean Antarctic Programme (Instituto Nacional Antartico Chileno – INACH) to Punta Arenas. Although this was a disputed decision among those involved with Chile's Antarctic logistics and science programme, it proved to be beneficial to accomplish the country's Antarctic goals. Today, Punta Arenas concentrates most of Chile's Antarctic-related activities. These include the managing of the national research programme and logistic operations and facilitating access to the Antarctic Peninsula for other Antarctic National Programmes. Punta Arenas has also developed a strong air-link with Antarctica that serves governmental and commercial expeditions such as Antarctic tourism, and it offers professional local services to supply the demand of Antarctic tourism, governmental logistics and operations (Roldan, 2011).

However, the role of Punta Arena as Chile's Antarctic gateway city is still tied to their past military governments. The Armed Forces have a strong presence in the Antarctic stations and continue to provide most of the access to Antarctica by sea and air. A local business, Aerovias DAP, has been

offering flights to the Antarctic Peninsula for science programmes, tourism and private expeditions for over twenty years. Despite of being a private commercial enterprise, DAP operations are reliant on the capabilities and operability of the Chilean Armed Forces Base and airstrip at King George Is (South Shetland Is, Antarctica) (Roldan, 2011). Punta Arenas' administrative function as the head of the Chilean Antarctic Territory and the strong military presence on it precludes the many advantages that this city offers as a modern Antarctic gateway city. The local government determination to assert governance over the Antarctic Peninsula hinders the reputation and progress that Punta Arenas has achieved as a provider of Antarctic logistics and associated businesses. Geographic proximity, historic links of a bygone era and political interests have prevailed in place of a robust branding to promote this city as South America's most comprehensive Antarctic gateway.

Place competition has been a significant aspect of the New Zealand government's plans for developing Christchurch's capabilities as an Antarctic gateway city (Hall, 2000). The local government advertises Christchurch's historic connections with the British expeditions of the Heroic Era of Antarctic Exploration as part of the Antarctic legacy of Cantabrians (Christchurch City Council, 2013). A walking trail brochure with a map of the central city invites visitors to explore the places of Antarctic significance, even though many of these historic buildings were damaged, destroyed or are under repairs after the multiple earthquakes that the city suffered in 2010-11. Although Christchurch is promoted as 'the aerial gateway to Antarctica' (Christchurch City Council, 2015), the point of distinction over the other Antarctic gateway cities with aerial links is the International Antarctic Centre (IAC). This purpose-built facility hosts National Antarctic Programmes and their logistic operation needs, including administration offices, personnel, cargo, storage, Antarctic passenger terminal, transfer of Antarctic passengers, access to international airport airstrip and airport security. The development of the IAC as a campus for multinational Antarctic business allowed Christchurch to house not only New Zealand's Antarctic programme but to play host and provide access to other Antarctic partners. Such is the case for the United State Antarctic Program (USAP), the Italian National Programme (PNRA) and the Korean Polar Research Institute (KOPRI) which operate regularly through Christchurch (Christchurch City Council, 2015). The internationality of the IAC campus does not stop with the aforementioned countries but rather implies that other Antarctic nations can also operate from here and access Antarctica through this gateway.

In addition, the IAC hosts a visitor's centre and tourism attraction that offers fun and educational 'Antarctic experiences' (Roldan, 2011). This year-round busy campus is the visual reference for locals and visitors to Christchurch's modern-day connections with Antarctica; a common scene during the spring and summer months is to see the military planes at the airport's tarmac and those Antarctic-bound passengers (I.e. scientists, base personnel) gathering at IAC wearing their polar clothing while waiting for their flight to take off. The IAC summarizes the combined efforts from the New Zealand and local Governments, and the regional stakeholders to position Christchurch as a leading gateway city in the 1990s (Prior, 1997), effectively capitalizing Christchurch's aerial capacity to connect with Antarctica. This aerial capacity can be rivalled with limitations by Punta Arenas (Chile) and Cape Town (South Africa). However, the access from the South American gateway city is a combined private-military effort to the Antarctic Peninsula only and Cape Town's aerial logistics is developed by a private enterprise to satisfy the demands of their clients (Roldan, 2011).

A DOOR TO THE ICE?

Hobart is the financial and administrative capital of Tasmania, Australia's smallest state. Hobart is in many ways similar to Christchurch in regards to its Antarctic connections. From a historic perspective, in the 1800s its port was frequently visited by Southern Ocean sealing and whaling fleets for re-provisioning, and in the 1900s Antarctic explorers passed through Hobart on their departure or arrival from Antarctica (Bertram et al., 2007). In the 1990s, the Australian federal government took advantage of Tasmania's historic association with the South and developed an aggressive regional policy promoting Hobart as the gateway to Antarctica (Hall, 2000). The aim was to attract business and to create international Antarctic partnerships, favouring regional development and targeting unemployment. The government efforts were joined by public and private stakeholders, creating in Hobart a unique Antarctic hub for science, policy, businesses, industry, education and research (Hall, 2000). Today Hobart has the largest cluster of Antarctic-related organizations compared to the other Antarctic gateway cities, housing the Australian Antarctic Program (AAD) and international collaborators such as the French Polar Institute. Specialized institutes such as the Antarctic Climate & Ecosystems Cooperative Research Centre (ACE CRC), the Institute of Marine and Antarctic Studies (IMAS) and University of Tasmania (UTAS) offer an array of opportunities for Antarctic science and education. Hobart hosts the Commission for the Conservation of Marine Living Resources (CCAMLR), an international Antarctic body that meets annually in Tasmania (Antarctic Tasmania, 2011). The city of Hobart embraces its Antarctic links with public displays of sculptures, a Sub-Antarctic plants display at the Botanical Gardens and a permanent exhibition at the Tasmanian Museum and Art Gallery (personal obs., 2014).

Although Hobart has much to offer to the national and international Antarctic community regarding expertise, reputation and Antarctic logistics, its only access to Antarctica was by ship as Australia lacked a reliable air-link to the South until 2007 (Roldan 2011). Sea-borne activities demanded from the Tasmanian Government an innovative place promotion plan: Hobart was positioned as the 'gateway to East Antarctica, the Southern Ocean and Sub-Antarctic Macquarie Is' (Antarctic Tasmania, 2014). The city's Antarctic branding opened opportunities for those countries interested in accessing East Antarctica, as well as optimizing a potential for Antarctic tourism also attracted to the uniqueness of Macquarie Is. Lately, the Tasmanian Government-led agency, Antarctic Tasmania, dedicated to promote the Antarctic connection has been focused in an ambitious plan for developing the State of Tasmania, not just Hobart, as the gateway to Antarctica (Antarctic Tasmania, 2014). This regional approach may change the way other Antarctic gateway cities promote their capabilities in the near future.

Though considered by its peers as one of the five Antarctic gateway cities in the world, Cape Town is the least recognized of all. This is the most distant city from the Antarctic continent, but it has had Antarctic links for longer than modern Capetonians perceive today (personal obs. 2009). South Africa's early involvement in Antarctica was through the sealing and whaling industry in the 19th and 20th centuries, where the ports of Durban and Cape Town provided re-provisioning and coal, skilled labour and business to the Norwegian and British whaling fleets (Van der Watt & Swart, 2014). Weather forecasting for the South Atlantic and Southern Oceans became a critical service that South Africa provided not only to its agricultural-based economy but also to the Commonwealth parties and its business associates for the first half of the 20th century. This weather information was especially important during the two Great Wars (Van der Watt & Swart, 2014). Although South

Africa was an original signatory country of the Antarctic Treaty in 1959, the nearly five decades of apartheid regime enforced by the governing party impaired the country's partaking in decision-making at Antarctic international forums (Dodds, 1997). South Africa is the only country in the African continent that has signed the Antarctic Treaty, and it is the only country that hosts an Antarctic gateway city; even though it has made no claims to Antarctic territory. The historical and political reasons for South Africa's seeming indifference towards Antarctica and possession of the land until 1959 will not be analysed here as these deserve a robust discussion.

Since 1959, South Africa has operated a well-respected National Antarctic Program (SANAP) which is based in Cape Town at the modern Victoria & Albert Waterfront (Roldan, 2011). This wharfing facility for cruise ships also attracts visitors to the city to its upmarket shopping areas, entertainment and dining options, luxury hotels and tour operators. SANAP has modern buildings that provide office space for other National Antarctic Programs that are wish to access Queen Maud Land (Antarctica) or to the Sub-Antarctic Prince Edward Islands. SANAP operates its own Antarctic vessel, SA Agulhas II, from a prominent and exclusive wharfing zone at the Victoria Waterfront, giving the national research programme a high profile exposure in a popular public area of the city (personal obs., 2009). Antarctica can be reached by sea and air from Cape Town: the Victoria Waterfront operable throughout the year for Antarctic ships and a private company operates the air-link. The Antarctic Logistics Centre International (ALCI) has been operating flights from Cape Town to Antarctica since 2001 for a consortium of eleven Antarctic countries known as the Dronning Maud Land Air Network (DROMLAN) (Roldan, 2011). ALCI's air-link supports scientific research parties, adventure tourism and private expeditions (Boekstein, 2014). Although sea-borne tourism from Cape Town is unlikely to parallel the South American gateway cities in popularity, the flights connecting the city with Antarctica have favoured less popular but more exclusive styles of Antarctic Tourism. Tour operators such as The Antarctic Company (TAC) and White Desert (WDL) operate land-based activities such as skiing, hiking, climbing and camping in remote areas of Antarctica (Boekstein, 2014).

Even though Cape Town offers modern infrastructure for sea and air links with Antarctica, along with local facilities and services, skilled workforce and regional industries to supply the Antarctic logistics demands, there is no formal plan to develop it as a competitive Antarctic gateway city. Unlike the rest of the Antarctic gateway cities, the government of South Africa does not have a comprehensive Antarctic policy that supports Cape Town's growth in Antarctic business. There has been some isolated attempts from the City of Cape Town Government to promote its Antarctic links and capabilities, but as Anholt (2007) has emphasized before, the branding of a place demands a coordinated approach from all stakeholders involved and a long-term commitment and behavioural change to embrace the new image and reputation of the place. South Africans and Capetonians are still to identify their community connections with the Antarctic.

Conclusions

Five cities are identified as Antarctic gateway cities, these are: Cape Town (South Africa), Christchurch (New Zealand), Hobart (Australia), Punta Arenas (Chile) and Ushuaia (Argentina). All these cities

have Antarctic connections that transcend the political interests of their host countries in the South. Before the Antarctic link, these cities were developed as gateways to their hinterland and as commercial ports, (i.e. Cape Town, Christchurch, Hobart and Punta Arenas), or as a strategic geopolitical town in an area of disputed international boundaries (Ushuaia).

The concept of a gateway city has been analysed further than the simple idea of a place being the entry or exit point to a hinterland. It encompasses a complex relationship between areas of diverse productivity and the interest for people and goods to access these different areas through a transportational and services nodal point: the gateway city. The gateway city is in control of the connections between the different areas that flow through it.

More specifically in regards to the concept of the Antarctic gateway city, the definition should no longer be reduced to a transportation hub. I argue that the role of Antarctic gateway cities should include the Antarctic political and scientific interests of the host country, plans for the development of proper infrastructure to facilitate access to the productive area (Antarctica), and a systematic growth of the services and skilled workforce to supply the demands of Antarctic business. In addition, a gateway city should consider the impact on the local community as a result of its Antarctic association, and having education and outreach programmes that can further engage the community. The issue of Antarctic port state control continues to be discussed by scholars as well as in Antarctic international forums, mostly in regards to the need of implementing standard regulations over Antarctic tourism vessels with flags of convenience from non-Antarctic Treaty Parties. Although this is an important issue considering the growing trend of Antarctic Tourism, I argue the possibility of monitoring, assessing and enforcing Antarctic legislation to all subjects traveling to Antarctica despite of the nature of their travels (governmental and non-governmental activities). If the goal is to minimize and manage the environmental damaged caused by human activities in Antarctica, then tourism should not be the only activity under scrutiny. Operations of National Antarctic Programmes and other governmental activities should also meet the same standards. The authority to control access to Antarctica in order to manage environmental risks is a role that may become increasingly important in gateway cities in the near future.

The Antarctic gateway cities have made efforts to develop an image and a reputation that will enhance their Antarctic connections. Marketing tools of branding, place promotion and place competition are employed to associate a city with a unique and almost irresistible brand: Antarctica. The brand Antarctica sells images of purity, wilderness, adventure, white ice. These images are entrenched in people's minds creating a parallel reputation on a place with strong Antarctic connections. The process of branding an Antarctic gateway city is a complex and long-term commitment, and will only be successful if all stakeholders (government and private) are supported by a strong set of policies to develop the place and its uniqueness in regards with the Antarctic.

According to Prior (1997), geographic proximity, proven experience and reputation are the compelling parts needed for the development of an Antarctic gateway city. Yet, it has been argued here that a political interest to promote the city's Antarctic capabilities and a coordinated plan of action supported by all actors involved will be more effective in becoming a prevalent Antarctic gateway city par excellence.

References

-Anholt, S. (2007). Competitive Identity: the new brand management for nations, cities and regions. Basingstoke: Palgrave Macmillan.
-Antarctic Tasmania, G. (2011). Developing Tasmania's Antarctic Sector: a vibrant industry in a global market. Tasmania: Tasmanian Government.
-Antarctic Tasmania, G. (2014, 8 October 2014). Tasmania Gateway to Antarctica. Retrieved 30 October 2014, from http://www.antarctictasmania.com/home
-ASOC. (2003). Port State Control: an update on International Law approaches to regulate vessels engaged in Antarctic non-governmental activities XXVI Antarctic Treaty Consultative Meeting(IP 044).
-ATS. (1959). Antarctic Treaty System. Washington, D.C.: Retrieved from http://www.ats.aq/documents/ats/treaty_original.pdf.
-ATS. (2015). Antarctic Treaty Secretariat. Antarctic Treaty Parties. Retrieved 30 June 2015, from http://www.ats.aq/devAS/ats_parties.aspx?lang=e
-Bertram, E., Muir, S., & Stonehouse, B. (2007). Gateway ports in the development of Antarctic Tourism. In B. Stonehouse & J. M. Snyder (Eds.), Prospects for Polar Tourism (pp. 123-146). Wallingford: CABI.
-Boekstein, M. (2014). Cape Town as Africa's Gateway for Tourism to Antarctica - Development Potential and Need for Regulation. African Journal of Hospitality, Tourism and Leisure, 3(2), 1-9.
-Burghardt, A. F. (1971). A Hypothesis about Gateway Cities. Annals of the Association of American Geographers, 61(2), 269-285.
-Christchurch City Council, C. (2013). Antarctic Heritage Connections. Retrieved 7 September 2013, from http://christchurch.org.nz/publications/AntarcticConnectionBrochureWeb.pdf
-Christchurch City Council, C. (2015). From Christchurch to Antarctica. Antarctic Relations. Retrieved 1 September 2015, 2015, from http://www.ccc.govt.nz/culture-and-community/civic-and-international-relations/antarctic-relations/from-christchurch-to-antarctica/
-Dodds, K. (1997). Geopolitics in Antarctica: views from the Southern Oceanic Rim. New York: John Wiley.
Elzinga, A. (2013). Punta Arenas and Ushuaia: early explorers and the politics of memory in constructing Antarctic gateway cities. The Polar journal, 3(1), 227-256. doi: 10.1080/2154896x.2013.770681
-Hall, C. M. (2000). The tourist and economic significance of Antarctic travel in Australian and New Zealand Antarctic gateway cities. Tourism and Hospitality Research(2), 157-169.
-Hall, C. M. (2014). Gateway Cities: Issues & Challenges. Paper presented at the IPTRN IV Conference "Polar tourism Gateways: Past, Present and Future" Christchurch.
-INACH. (2013). Traces of Antarctica around Punta Arenas and the Straits of Magellan. In C. A. Institute (Ed.), (1st ed., pp. 62). Punta Arenas.
-InFueTur. (2015). Antartida: evolucion del turismo antartico. Retrieved 2 July 2015, from http://www.tierradelfuego.org.ar/antartida/evolucion_turistica
-Leane, E. (2011). Introduction. In R. J. Crane, E. Leane & M. Williams (Eds.), Imagining Antarctica: Cultural Perspectives on the Southern Continent. Hobart: Quintus Publishing.
-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. doi: 10.1016/j.tourman.2010.03.005
-Orrego Vicuña, F. (2000). Port-state jurisdiction in Antarctica: A New Approach to Inspection, Control and Enforcement. In D. Vidas (Ed.), Implementing the Environmental Protection Regime for the Antarctic (pp. pp.45-69). Heidelberg and New York: Springer.

-Prior, S. (1997). Antarctica: view from a gateway (Vol. 5/97). Wellington: Centre for Strategic Studies, Victoria University of Wellington.
-Roldan, G. (2011). 'Fit for the Ice': Analysing the infrastructure in Antarctic Gateway Cities. Postgraduate Certificate in Antarctic Studies. Retrieved 2 July 2013, from http://www.anta.canterbury.ac.nz/documents/PCAS_13/PCAS_13_Roldan%20Gateway%20cities.pdf
-Swanson, J., Liggett, D., & Roldan, G. (2014). Conceptualizing and enhancing the argument for port state control in the Antarctic gateway states. Paper presented at the IPTRN IV 'Polar Tourism Gateways: Past, Present and Future', Christchurch.
-Tasmanian Government. (2015). Tasmania Gateway of Opportunities. Access to Antarctic and Southern Ocean. -Retrieved 7 September 2015, from http://cg.tas.gov.au/home/investment_attraction/why_invest_in_tasmania/access_to_markets
-Town, C. o. C. (2011). Cape Town: Gateway to Antarctica. Retrieved 30 May 2015, from http://www.capetown.gov.za/en/AntarcticGateway/Pages/default.aspx
-Van der Watt, L.-M., & Swart, S. (2014). Falling off the Map: South Africa, Antarctica and Empire, c. 1919-1959. The Journal of Imperial and Commonwealth History, 1-25. doi: 10.1080/03086534.2014.982409

*

BALANCED HARVESTING – AN EMERGING CONCEPT IN FISHERIES MANAGEMENT

Claire Christian and Howard Weir

ABSTRACT

Over the past few decades, many fish populations have declined while pressure to increase catches has grown. In response, a number of alternatives to traditional fisheries management have emerged, with the goal of maintaining ecosystem health while still allowing fishing. One such strategy is called balanced harvesting (BH), which advocates fishing a wider range of species and sizes of fish. BH proponents claim that their methods will reduce impacts on marine ecosystems while resulting in comparable or even higher catches. However, critics have noted a number of problems with BH that indicate it would not achieve these aims. Additionally, even proponents concede that BH would likely produce lower value harvests dominated by small forage fish. Within an Antarctic context, BH, as an apparently ecosystem-based approach, might seem attractive to those seeking to increase catch limits. However, we conclude that BH is also unlikely to work in Antarctica for a number of reasons, including the many scientific uncertainties relating to marine species and the requirements to catch species with potentially minimal market value. Instead of seeking alternatives to standard fisheries management practices, a more promising approach is to implement proven strategies, such as reducing fishing levels and mitigating bycatch and habitat damage to ensure healthy environments and sustained catches for the long term.

KEYWORDS

Balanced harvesting, fisheries, marine environment, ecosystem management, Antarctica

Introduction

Over the past few decades, we have learned a lot about the declining state of global fish stocks. This knowledge has prompted many re-examinations of the central assumptions of fisheries management, as well as calls for new approaches such as ecosystem-based fisheries management (EBFM), marine spatial planning (MSP) or marine protected areas (MPAs). Another new approach, balanced harvesting (BH), has received somewhat less attention than the others, but has received some support from high-profile scientists and was the subject of a workshop co-hosted by the International Union for the Conservation of Nature (IUCN). The scientists supporting balanced harvesting (BH) make the intriguing claim that we can fish at the same or greater levels while having a reduced impact on marine ecosystems. Moreover, because in theory BH provides ecosystem protection, it could challenge other ecosystem-based approaches to management.

Fishery managers have not implemented BH in many places. Nevertheless, two groups of scientists have recently published detailed critiques of the concept, indicating that it is to some extent being taken seriously (Burgess et al. 2015; Froese et al. 2015). It is therefore important to understand this idea and the potential environmental impacts it might have. Some countries have been open about their desire to expand fishing in places like the Southern Ocean (Neslen 2013.; Niiler 2015), so there could be pressure to increase catch limits and open up new fishing grounds. Balanced harvesting principles could be appealing to those seeking to justify such changes.

Currently, responsibility for managing the Southern Ocean around Antarctica falls to the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), an international organization formed in 1982 with the goal of conserving Antarctic marine ecosystems. CCAMLR uses an ecosystem-based, precautionary approach to management. This approach is mandated by Article II of the convention or treaty that established CCAMLR. There are currently 25 signatories to this convention, which requires that:

(a) prevention of decrease in the size of any harvested population to levels below those which ensure its stable recruitment. For this purpose its size should not be allowed to fall below a level close to that which ensures the greatest net annual increment;

(b) maintenance of the ecological relationships between harvested, dependent and related populations of Antarctic marine living resources and the restoration of depleted populations to the levels defined in sub-paragraph (a) above; and

(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.[CITE]

Balanced harvesting claims to be able to accomplish similar goals. The basic concept of BH is to fish

all species in proportion to their reproductive rates and their role in the food chain, thereby keeping the ecosystem in balance while still catching enough fish for human consumption . However, critics have charged that there is little evidence indicating that it can do so. They have additionally noted that implementation might involve harvesting of species not currently targeted, such as whales, seals and seabirds(Froese et al. 2015). This has troubling implications for the Antarctic with its iconic penguin, whale and seal species, many of which are dependent on krill, a low trophic level (LTL) species.

"Traditional" fisheries management

One of the main critiques of traditional fisheries science is that it is overly focused on individual species without considering the full ecosystem. For the purposes of this article, "traditional" fisheries science refers to the concepts and principles for fisheries science that emerged in the post-World War II period. The basic assumptions of traditional fisheries science focus on the biology of the target species, which is used to guide the development of management regulations, including catch limits. Understanding the role of a species in the broader ecosystem and incorporating that into management was thus not always prioritized. However, these deficiencies were recognized early on, even by proponents, who warned that catch limits generated by this science were likely too high for most species (Larkin 1977 quoting Gulland 1969). Significant attention has since been paid to reforming fisheries science and management to protect ecosystems and the marine environment more effectively. But implementing new policies has been slow, and many fish stocks and bycatch species are still in decline.

To fully understand the challenges of BH and other efforts to reform fisheries management, we will quickly review the basics of traditional fisheries science. Perhaps the most famous is maximum sustainable yield (MSY). MSY is the level of catch that fisheries science determines could be taken annually without harming the ability of the population to reproduce its numbers. MSY was for a time a revolutionary concept. It is almost a cliché in environmental circles to note that for centuries, few believed humans had the capacity to influence fish populations. The sea was thought to be inexhaustible, despite evidence to the contrary. In the early twentieth century as fishing technology improved, scientists and managers began to realize that fishing was in fact having a serious impact, and that catches needed to be controlled (Finley 2011). Scientists began studying fish population dynamics and biology and used the results to develop mathematical equations and models that could help managers calculate MSY and thus avoid overfishing.

One key conclusion of this research was that fish populations produce a certain amount of "surplus" every year. Under this surplus production model, harvesting a certain number of adult fish will have minimal long-term impact, because removing them from the ecosystem will merely clear the way for more juvenile fish to survive to maturity and reproduction. By studying the biology of targeted species, data can be gathered and plugged into mathematical models to produce a series of indicators to guide management. Other indicators include fishing mortality, or F, which refers to the proportion of the mortality in a population caused specifically by fishing.

This scientific approach to fishing was an important step towards ending the dangerous unregulated exploitation that threatened to collapse many of the world's fisheries. Even so, the approach clearly

had some drawbacks. Fish are part of ecosystems, and MSY may not account for the complex interactions as predator and prey that a species might have in its particular food web, or as one of several species in the same area that are being fished. Hence even proponents of this new mathematical approach to management warned against using MSY as a goal. But in practice few recognized that "maximum" meant just that – the outer limit of what could be harvested safely – and that lower than MSY catches would better protect fish populations and the environment.

Over the next several decades, the limitations of MSY became increasingly clear. Yet it had become thoroughly entrenched in management, an idea which was more of a religious belief or policy goal than it was sound science (Larkin 1977; Finley 2011). Calls for new management systems or even modifications to the MSY regime have proved difficult to implement successfully even though many commercial stocks are in decline. Balanced harvesting was conceived as a way forward.

Balanced harvesting – an overview

Balanced harvesting originates from the idea that the oceans can support a much higher rate of sustainable harvest if, instead of the selective fishing currently favored, a broader array of species are targeted (Zhou 2012). The ecosystem remains intact, meaning that the basic relationships between species remain unchanged. Selective fishing in this context relates to the preference in most regions of the world for fishing only some of the species in a particular area, often because only certain species are profitable. In theory, by fishing unselectively across all species at a moderate rate, the structure of the ecosystem is less impacted, and fishing natural ecosystem predation dynamics. Under a traditional fisheries management regime, for example, species A might be fished while species B and C, predators of species A, might not be fished at all because they are not commercially valuable. There will thus be a significant impact on species A from the combined impact of fishing and predation, and the population may begin to decline. Implementation of BH principles would result in fishing a smaller proportion of species A but beginning to fish species B and C as well. The predation pressure on Species A is reduced, yet by fishing new species B and C, overall catches will not decrease.

Nevertheless, this unselective fishing must be carefully managed. As the name suggests, the goal of BH is to fish in such a manner that the ecosystem remains intact and the relationships between species within it remain unchanged. To do this, all ecosystem components must be harvested at levels that maintain the relationships between species that would occur in an intact ecosystem otherwise the ecological relationships between species could shift or even be severed (Garcia et al. 2012). Depending on the region, a truly balanced harvest would include far more than just fish and invertebrates as many birds and marine mammals make up important components of the marine ecosystem as well. Another outcome of BH is that catches of small forage fish will increase, something that would need to be reconciled with consumer habits (Jacobsen et al. 2014). These species are typically considered low-value by the standards of most world markets making BH a less viable proposition from a financial standpoint.

So far, balanced harvesting remains a largely untested proposition, with its proponents relying on computer and mathematical models to demonstrate its potential effectiveness. These models showed

that theoretically, BH could lead to increases in overall yields while preserving ecosystem structure. As a result, empirical evidence for balanced fishing has been gathered by studying unregulated fisheries on some African lakes. These fisheries were unselective and focused primarily on small species yet, according to the proponents of BH, the indiscriminate fishing had little effect on the structure of the fish communities found there (Jacobsen 2014).

Critiques of balanced harvesting

Balanced harvesting presents itself as a clear solution with few downsides, but there have been some recent critiques that cast doubt on its ability to be implemented. BH requires extensive knowledge of the target ecosystem so that species can be fished in proportion to their productivity and so that ecosystem functions can be maintained (Froese 2015). Single species fisheries have had difficulties in attaining the level of knowledge to manage just one species, let alone all of the species in an ecosystem. As it stands, implementing a BH scheme would require a much higher degree of knowledge than currently exists and enacting the regulatory policies and changes to fishing gear are well beyond what is currently possible (Froese 2015).

Also problematic is the lack of empirical evidence supporting balanced harvesting. Advocates of the strategy point to several inland fisheries in Africa where, despite a lack or regulation and a focus on forage fish, the structure of the ecosystem remained intact (Garcia et al. 2012). Setting aside the fact that small inland fisheries (enclosed systems) are unlikely to be a good analog for large marine fisheries (unenclosed systems), the African fisheries used as evidence of BH's viability were actually in a state of collapse, having been overexploited by unselective nets in the years prior (Froese 2015). Furthermore, fish biomass was depleted by an astonishing 80%, and while this may not be a representative case, Burgess et al. (2015) note that new research has found that fish play a role in deepwater carbon storage. Increasing the overall yields taken from an ecosystem could reduce the sequestration of carbon and the availability of nutrients to benthic organisms. Balanced harvesting could therefore produce a situation in which ecosystem structure is technically maintained, but causes damage to other important marine ecosystem services. BH proponents clearly need to examine these kinds of unintended consequences further.

Although BH proponents claim that fishing practices like taking older fish and being selective about which species are harvested causes populations to decline over time, many scientists point out that fisheries that caught mostly large, older fish were sustainable for centuries. To use a well-known example, the infamous collapse of the North Sea cod (Gadus morhua) fisheries in the 20th century occurred only once the fishing level became unsustainable and began targeting smaller individuals. Until then, the cod fishery, a selective unbalanced fishery, had been viable for centuries without reducing the average size of the catch (Froese 2015). The key was that fishing mortality was kept at a lower level, allowing the population to replace individuals lost to fishing.

This problem leads to another risky element of the BH approach: fishing for juveniles, which is often prohibited under traditional fisheries management because it harms the population's reproductive capacity. BH assumes that appropriate management measures could prevent this because fishing of juveniles will be balanced by fishing of their predators, leaving approximately the same number to

reach maturity as would be found in an unfished system (Froese et al. 2015). Unfortunately, there is little evidence to support this, and much greater evidence to support that fishing only mature adults at reduced levels helps many depleted populations to recover and rebuild (Froese et al. 2015). Yet again, the problem is not the way that fishing is distributed in an ecosystem, it is that too many fish are being removed.

Consumer habits are another barrier for BH. Currently, consumers in the global north prefer fish that are higher on the food chain, like tuna, cod, salmon, or toothfish and are willing to pay more for these species. In a BH model, a smaller number of these high value species would be harvested, meaning the market for forage fish would need to expand. If consumers could not be convinced to directly consume these species, it is likely they would be used for fishmeal for aquaculture of high value species (Jacobsen 2014). The feasibility and environmental friendliness of such a scheme would depend greatly on the economic realities of conducting BH in remote locations while reducing the GHG emissions associated with the increased fuel use (Burgess 2015). Otherwise, procuring this fishmeal could become too costly both in a financial and environmental sense.

In sum, BH raises a number of concerns. Not only are its basic assumptions contrary to the available evidence on how fish populations and ecosystems respond to fishing (Froese et al. 2015), but the changes in fishing practices it requires might entail higher costs, making fishing unprofitable (Burgess et al. 2015). Thus, additional analysis and testing must occur before BH principles are incorporated into fisheries management. Or, we could simply implement the proven strategy of reducing fishing mortality.

Balanced harvesting in an Antarctic context

Some BH skeptics concede that it might work in some locations (Burgess et al. 2015). Its call to fish more lower trophic level species might resonate with those seeking to increase krill (Euphausia superba) catches in the Southern Ocean, for example. Also, the Southern Ocean's relatively short food chain might simplify the calculations needed to evenly distribute fishing impact across the ecosystem. In Antarctica, many species are primarily reliant on krill (Euphausia superba), so there are fewer trophic interactions to understand and incorporate into a management strategy. Nevertheless, Antarctic food webs, while perhaps less complicated than that of a coral reef, can vary spatially and temporally depending on prevailing conditions and whether krill, salps or copepods are the primary species of zooplankton acting as the base of the food chain (Murphy et al. 2012).

Additionally, the requirements of BH to harvest non-traditional species as part of maintaining a balance will not fit in well with the current protection of Antarctic species such as seabirds and marine mammals. Were these restrictions lifted, it is still unlikely that people would be eager to consume penguins, or that commercial fishing companies would be eager to travel to Antarctica to hunt them. Given the high costs associated with operating in such a remote location, few might be willing to even expand efforts to include other fish species, which are unlikely to attract the same high prices as toothfish (Dissostichus eleginoides and Dissostichus mawsoni).

Economic and environmental considerations aside, there are still many question marks hanging over the lifecycles of various Antarctic species and their role within the greater ecosystems of the Southern Ocean. Scientists are still trying to understand the lifecycle of toothfish, and the impacts

of climate change on Antarctic krill. Even less is known about many species not currently fished. By necessity, a BH scheme requires a robust understanding of all components of an ecosystem so that any change to a species within the ecosystem can be predicted.

While the goal of BH is laudable- to increase fishing yields while preserving ecosystems- it does not seem to be a promising alternative to current methods for protecting the marine environment. Unfortunately "moderate harvesting of resilient species for human consumption, with least possible impact on stocks and ecosystems, is still the most promising approach for sustainable use of the living ocean" (Froese et al. 2015), even though this often entails making difficult alterations to current practices. Proponents of BH want to help solve the problem of declining fisheries yields in the face of global population increases, due to presumed future food security issues.

BH and other solutions to future food security problems are often premised on the idea that growing populations will want more animal protein and that the market must meet this demand. This assumption misses two key points. The world already produces enough food to feed everyone, yet hunger and malnutrition persist. Distribution of food and financial resources may therefore ultimately matter more than sheer quantity. Increasing supply thus will not necessarily solve such problems. Moreover, we should not necessarily accept that current animal protein consumption patterns in wealthy nations must be replicated throughout the world. Rather than trying, under a BH approach, to convince people to eat new species of fish, we could reduce the demand for meat and fish (Burgess 2015). Though a challenging task, this would likely improve human health and help shrink the carbon footprint of the food supply (Burgess 2015).

BH is an appealing, but incredibly risky idea. If a BH scheme is poorly managed, it has the potential to do far greater harm than the current methods of managed selective harvest. On the other hand, reducing catches on fish populations and allowing them to rebuild is much less likely to result in significant environmental harm. Rather than reinventing the wheel on fisheries management, we must instead undertake the difficult but necessary work of understanding marine ecosystems, and developing appropriate regulations to protect targeted species and their ecosystems. CCAMLR has pioneered this approach in the Southern Ocean. As pressure to increase catches of Antarctic marine species builds, CCAMLR would do well to remember its past successes and remain firmly on the proven course of precautionary, ecosystem-based management.

References

-Burgess, M.G., 2015. Could "balanced harvesting" really feed the world and save the oceans? Available at: https://theconversation.com/could-balanced-harvesting-really-feed-the-world-and-save-the-oceans-44444 [Accessed August 30, 2015].

-Burgess, M.G. et al., 2015. Remaining questions in the case for balanced harvesting. Fish and Fisheries, p.n/a–n/a. Available at: http://doi.wiley.com/10.1111/faf.12123.

-Finley, C., 2011. All the Fish in the Sea, Chicago: University of Chicago Press.

-Froese, R. et al., 2015. A critique of the balanced harvesting approach to fishing. ICES Journal of Marine Science: Journal du Conseil, p.fsv122. Available at: http://icesjms.oxfordjournals.org/lookup/doi/10.1093/icesjms/fsv122.

-Garcia, S.M. et al., 2012. Reconsidering the Consequences of Selective Fisheries. Science, 335(6072), pp.1045–1047.
-Jacobsen, N.S., Gislason, H. & Andersen, K.H., 2014. The consequences of balanced harvesting of fish communities. Proceedings. Biological sciences / The Royal Society, 281(1775), p.20132701. Available at: http://www.ncbi.nlm.nih.gov/pubmed/24307676.
-Larkin, P.A., 1977. An Epitaph for the Concept of Maximum Sustained Yield. Transactions of the American Fisheries Society, 106(1), pp.1–11. Available at: http://dx.doi.org/10.1577/1548-8659(1977)106<1:AEFTCO>2.0.CO;2.
-Murphy, E.J., 2012. Spatial and Temporal Operation of the Scotia Sea Ecosystem. In A. D. Rogers et al., eds. Antarctic Ecosystems; An Extreme Environment in a Changing World. Chichester, UK: John Wiley & Sons, Ltd, pp. 160–212. Available at: http://doi.wiley.com/10.1002/9781444347241.
-Neslen, A., 2013. Russian "fishing interests" threaten bid for Antarctic conservation area | EurActiv. Available at http://www.euractiv.com/science-policymaking/vote-world-largest-protected-mar-news-529309 [Accessed August 30, 2015].
-Niiler, E., 2015. China's Krill Push Threatens Penguins and Whales : Discovery News. Available at: http://news.discovery.com/animals/chinas-krill-push-threatens-penguins-and-whales-150416.htm [Accessed August 30, 2015].

*

UNDER THE ANTARCTICA

Matías Sodor

There are few places in the world as isolated and inaccessible as Antarctica. But even there, there is a place even more difficult to access. They are the icy waters of the Antarctic Ocean. And further more, the world that lies beneath the frozen ice.

There lies a unique ecosystem that has little to do with the immense frosted surface landscape of the continent. The frozen ice over the sea covers a unique scene inhabited by species that are capable of surviving months of darkness and isolation in the icy water.

"Under Antarctic Ice" is an invitation to discover the world that is hidden beneath the frozen sea of Antarctica. The documentary recounts the experience of a team of divers, photographers and cameramen who traveled to McMurdo Base to explore the depths of the Antarctic Ocean.

"Under Antarctic Ice" is part of the series "Nature", made by the public television station, PBS, in the United States. The series has been on air for 34 consecutive years and has covered some of the most incredible aspects of the natural world throughout its lengthy history. From the top of the Himalayas to the deserts of our planet, the program examines some of the most amazing animal species in the world. This particular chapter of the series earned more than one award, and is one of the few television programs that have earned each one of the Emmy awards it was nominated for.

This chapter, originally aired in 2003, also offers an overview of the McMurdo Base, which is the largest settlement in Antarctica. It is capable of receiving up to 1,000 people during the summer months.

In the age of HD cinema, LED televisions and retina display screens, a documentary that is older than ten years already feels dated and old. However, the images of this chapter in the series successfully meet the demands of frequent documentary watchers in this day and age. But still, there is no cinematic medium that can accurately depict a close encounter with a Weddell seal or the incredible marine species that live under the ice of Antarctica.

Under the Antarctica

At the hand of the documentary director, Norbert Woo, it is possible to meet some of the most amazing sea spiders in the world, unearth the survival secrets of seals and view the huge variety of sea stars that inhabit the sea floor.

But perhaps the most interesting parts of this documentary are the Antarctic diving scenes, and all that exists under the water when the camera is immersed in the deep. Due to the location and the risks of diving in frozen water, this chapter covers some of the trials and tribulations that the team experienced in order to complete the job at hand. In fact, this nature documentary even stops to show the medical care of one of the team members affected by health problems.

"Under Antarctic Ice" is the product of two years of work made by a team of photographers and cameramen working for the National Science Foundation of the United States. In the credits even hides another luxury; the documentary is narrated by actress Hilary Swank, two time winner of the Academy Award for Best Actress.

In the Internet era, this film is undoubtedly a good way to enjoy a universe that is out of reach and unknown for many.

*

CUMULATIVE IMPACT ASSESSMENT

ASOC

ABSTRACT

This paper briefly reviews some of the discussions on cumulative impact assessment based on relevant documents submitted to the ATCM/CEP, and takes an environmentally-focused approach to cumulative impact assessment to suggest further action by ATCPs and CEP. Recognising the conceptual progress on cumulative impacts made so far, and the ongoing discussions on guidelines for EIA that may include further consideration of cumulative impact assessment, ASOC recommends that Parties: review earlier recommendations on cumulative impact assessment documents listed here; complete the review of EIA guidelines so that it adequately considers cumulative impacts, taking into account early considerations as required; carry out some case studies of cumulative impacts at particular sites; and augment and improve the consideration of cumulative impacts in the implementation of Annex I

KEYWORDS

ATCM, CPE, Cumulative Impact.

CUMULATIVE IMPACT ASSESSMENT

Introduction

The ATCM and its CEP have discussed cumulative impact issues a number of times, including through intersessional work and papers addressing specific aspects of cumulative impacts (Table 1). The ATCM and CEP have also agreed on a number of instruments that touch on the issue of cumulative impacts (Table 2), including those related to visitation of particular sites by large numbers of tourists, and the location of research stations.

Some of the more technical discussions on cumulative impacts have addressed issues of mitigation and management (UNEP 1996, 1997, 1998, 1999), assessment methodologies (New Zealand 2006), and data collection (France 2008, UK 2010). Cumulative impacts have also been examined in particular contexts, such as tourism (IAATO 2001, 2003; Jatko and Hofman 2002; New Zealand 2012), the concentration of facilities (Germany and UK 1999) and Strategic Environmental Assessment (ASOC 2000, 2001, 2002). Cumulative impacts have also been discussed from a range of perspectives in the academic literature (e.g. Bastmeijer and Roura 2004, Tin et al 2008, Lynch et al 2010, Roura and Hemmings 2011). More recently, the issue of cumulative impacts has been discussed in the CEP Forum 2014-2015 in the context of a review of guidelines for EIA, which is ongoing.

Overall, there has been some progress concerning understanding concepts of cumulative impacts as they apply to Antarctica, but less progress in terms of carrying out environmental impact assessments that adequately consider the cumulative effects of multiple activities that overlap in time and space. This is in part due to methodological issues, and in part due to the availability of relevant data. The ICG on the development of EIA guidelines is addressing these matters, which may eventually lead to progress on how cumulative impacts are actually dealt with in EIAs.

This paper briefly reviews some of the discussions on cumulative impact assessment based on relevant documents submitted to the ATCM/CEP, and takes an environmentally-focused approach to cumulative impact assessment to suggest further action by ATCPs and CEP.

Overview of submissions to ATCM/CEP on cumulative impact assessment

Since 1996 twelve Working Papers or Information Papers have been submitted to the ATCM/CEP specifically addressing issues of cumulative impacts. These will be briefly discussed here.

Between 1996 and 1999 IUCN submitted a series of information papers on cumulative impacts mitigation and management, reflecting on a workshop held in Washington DC in September 1996. The workshop produced 21 recommendations on various aspects of cumulative impacts, of which two were relevant to EIA:

1. Consideration of cumulative impacts should include all relevant past, present and reasonably foreseeable activities.
2. Wherever obligations regarding environmental impact are identified, it should be taken that this includes cumulative impacts.

Some of the possibilities of better assessing cumulative impacts included a greater focus on

cumulative impacts by regulatory authorities, and the use of joint EIAs, programmatic EIAs, or environmental audits.

From June 7-9, 2000 IAATO jointly hosted with the U.S. Environmental Protection Agency and the U.S National Science Foundation a workshop entitled "Assessment of the Possible Cumulative Environmental Impacts of Commercial Ship Based Tourism in the Antarctic Peninsula Area." With respect to examining potential impacts from tourism, the workshop report highlighted the importance of identifying the kinds of cumulative impacts potentially resulting from multiple visits and, if feasible, listing and ranking the relative importance site characteristics most likely to determine the nature and severity of cumulative effects (Jatko and Hoffman 2002). The workshop report also identified potential cumulative impacts from shipborne tourism on a range of site variables including landscape, terrestrial flora and fauna, and the marine environment.

In 2001 IAATO submitted a paper briefly addressing the collection of baseline data, site integrity, tourist numbers, and results of the workshop on cumulative impacts mentioned above.

Between 2002 and 2003 a two-year ICG moderated by the US discussed these TOR:

• Present an annotated summary of past and continuing studies and reports that are examining cumulative environmental impacts pertinent to the Protocol, including, for example, those examining tourism, national programmes, and non-governmental expeditions; and
• Consider and advise on how future studies on human impacts could be coordinated

At the conclusion of the ICG two specific suggestions were put forward:

1. Parties should maintain information on visits to areas similar to that maintained in site visit reports for tourist activities to provide a complete data set of visits and activities to areas of concern.
2. Development and maintenance of a database or databases with information on site visitation and other relevant data should be encouraged. The information in the databases should be readily accessible.

In a later paper, IAATO (2003) discussed cumulative impacts in the context of site guidelines. According to IAATO:

Tourism to date has no significant environmental impact on any of the sites or the Antarctic ecosystem. Rather the contrary, all landing sites show very little sign of human impact considering the overall numbers of tourists that have visited the Antarctic.

The paper did not cover cumulative impact assessment issues, but urged Antarctic Treaty Parties who have responsibility for permitting or assessing tour companies that are not members of IAATO, through Advance Notification and the required environmental impact assessments, to implement the use of the IAATO guidelines and to encourage commercial tour operators to become members of IAATO.

New Zealand (2006) discussed methodologies for assessing cumulative impacts. Based on a literature review, it identified three broad methods to assess cumulative impacts. These methods

describe or model cause and effect relationships; analyse trends in effects and/or environmental change over time; or identify areas of sensitivity, value or past losses. The paper also identified a range of techniques to apply these methods, such as surveys, matrixes, networks and/or systems diagrams, and overlay mapping and/or GIS to incorporate local environmental information with potential impacts. It concluded that no single approach could be regarded as being definitive and that a combination of these techniques would likely to prove more useful. It further noted any methodology would rely on the data available to support it. The availability of data for cumulative impact assessment would often be the most challenging aspect.

In order to overcome some of the difficulties of gathering data, France (2008) proposed to establish a mechanism for centralizing tourism and non-governmental activity authorization declarations and requests that will allow the States' competent authorities to be aware of files submitted and their status, in real time, before October 1st, the deadline for exchanging pre-season information and will, in effect, allow them to take into account the cumulative environmental impacts at a given site. This proposal was not accepted by the ATCM (Final Report XXXI ATCM, paragraphs 204-210). While several Parties welcomed the proposal, objections included concerns about the feasibility of the proposal given different domestic regimes; the need to consider the cumulative impacts of tourism jointly with the total cumulative impacts resulting from all human activities; and the existence of various tools available to the ATCM to reduce the possible cumulative impact associated with tourism, including earlier work addressing cumulative environmental impacts, site guidelines, and monitoring programmes.

In 2009, the United States examined as a case study of foot-traffic impacts to the McMurdo Dry Valleys. The Dry Valleys are of great scientific interest, on account of their uniqueness. It was assumed that this cold desert environment would be non-resilient and highly susceptible to changes. The paper concluded that two live nematodes - S. lindsayae and Eudorylaimus sp. - were reduced by 52% and 76%, over 10 years respectively, in areas of high trampling as to compare with areas of low trampling. It was concluded that even the relatively low disturbance on the area (50-80 walks a year) can impact the nematode population (Ayres et al. 2008; United States 2009).

In 2010, a working paper by the UK described a method to estimate the spatial extent and chronology of national operator activities in Antarctica using science and mapping databases. The activities of the United Kingdom within the Antarctic Peninsula region are shown as an example. Based on this work, the UK recommended that the CEP:

(i) endorses the use of existing systems in the collation of information relating to the location of past science, survey and logistic activities, thus giving a holistic perspective of human impact across Antarctica which could be used to inform future environmental policy and management, and (ii) examines other methods to determine human activity at a regional/continent-wide scale.

This paper resulted in a lively discussion (Final Report CEP XIII, paragraphs 230-245) concerning issues of human footprint. The CEP agreed that it would consider where the issue of human footprint should sit on its agenda at its next meeting.

Overall, previous work on cumulative impact assessment in Antarctica, as discussed in documents

submitted to the ATCM/CEP, has focused on particular and sometimes disparate aspects of cumulative impacts. The exception to this was the IUCN work that was more broad-based. Although these documents do not constitute a unified body of work, most of them have identified limitations in assessment methods and data collection as some of the main barriers to assess cumulative impacts.

It should be noted that the practice of cumulative impact assessment under Annex I (i.e. EIAs submitted for particular activities that also consider cumulative impacts) has not been reviewed in any detail for the preparation of this document, which focuses mostly on theoretical aspects of impact assessment. However, a broad-brush evaluation based on the examination of many CEEs and IEEs over the years suggest that in many EIAs the assessment of cumulative impacts, when it exists, is rather cursory.

Consideration of cumulative impacts in the EIA guidelines review

Issues of assessment methods and data collection were partly discussed in the ongoing review of EIA guidelines. ASOC's contribution there, with respect to cumulative impact assessment, included the following:

• In terms of methods, EIAs for individual activities may fail to identify the cumulative impacts that result from other past, present, or foreseeable future overlapping activities occurring in the same area (see example in Figure 1). In practice, cumulative impact assessment would require a repetition of the EIA process (section 3 of the guidelines) for all the past, present and reasonable foreseeable future activities in the area, and an identification of all the possible interactions between the activities, their environmental "aspect" or "element", and resulting impacts. This is obviously complex.

• In terms of data collection, one way forward to progress cumulative impact assessment would be to analyze information from the Antarctic Treaty Secretariat EIA database in order to assess what activities have been carried out in a particular area in the past and what the assessment of the impact of those activities has been. Some of those earlier EIA analyses could be incorporated into the EIA. For areas where there are ongoing activities the analysis could include an overall evaluation, plus a more detailed analysis of activities within a reasonable period of time in e.g. the past five years or in the following year or two. It should be noted that this analysis would capture activities that have merited carrying out an IEE or CCE, not those that merited PEEs that are not listed in the ATS EIA database. The EIES might provide additional information about activities in a particular location, including about some activities subject to PEE only.

As to what activities to consider in cumulative impact assessment:

• Activities in Antarctica would typically be related to scientific research and, research-related logistics, and tourism. Activities to be considered would be those that have an overlapping footprint with the proposed activities e.g. if it is a base, the footprint of the base itself, including huts and other infrastructure, and also research locations that might reasonably be accessed from the base.

• Some areas may also be affected by fishing in coastal or near-coastal areas, potentially having an impact on features also affected by proposed activities (such as land-based predators). This would

be difficult to implement for sensitivities resulting from the relation between the ATCM/CEP and CCAMLR, but for some locations there cannot be a full assessment of cumulative impacts if those activities are not considered too. For instance, assessing the cumulative impact of a new activity at Admiralty Bay should consider events of krill fishing in the area some years ago.

• Some particular events may need to be considered too. In the example of Admiralty Bay above a cumulative impact assessment should also consider the fire that destroyed Brazil's Ferraz station in 2012, even though this was not an "activity" in the sense that it was planned.

Overall, the assessment of cumulative impacts would need to address, among others, some of these questions:

• What activities have taken, take or are likely to take place at the area of the proposed activity?
• What are the likely pathways or processes of accumulation for the assessed impacts of the proposed activity?
• What effects may result from the proposed activity that may contribute to cumulative impacts? Is there a temporal or spatial overlap (or a combination) with other activities in the area that might result in particular impacts? What are the likely cumulative impacts that could occur in this area?

Concluding remarks

Cumulative impacts are a cross cutting issue that affects a range of ATCM and CEP agenda items, including shipborne and land based tourism, the establishment and operation of research stations, concepts of footprint and wilderness, and multi-year strategic planning. It could be argued that cumulative impacts affect directly or indirectly much of the agenda of the CEP and also, to a certain extent, the ATCM agenda. Consequently, cumulative impacts have been the subject of several ATCM instruments as well as discussions of the ATCM and CEP.

In terms of the content of ATCM/CEP discussions, the work of IUCN and some ICGs have taken a broader view of cumulative impacts, while other contributions, while relevant in their own right, have jumped thematically, focusing on a broad range of aspects of cumulative impacts. There are has been apparently contradicting conclusions such as e.g. IAATO (2001) suggesting that tourism has resulted in no cumulative environmental impact, and a study in the Dry Valleys (Ayres 2008) indicating that about 50-80 passes have a negative effect on nematodes. This suggests further theoretical work complemented with some real-life, less abstract examples could help bridge this knowledge gap.

Recognising the conceptual progress on cumulative impacts made so far, and the ongoing discussions on guidelines for EIA that may include further consideration of cumulative impact assessment, ASOC recommends that Parties:

• Review earlier recommendations on cumulative impact assessment as outlined in the various documents listed here;
• Complete the review of EIA guidelines so that it adequately considers cumulative impacts, taking into account early considerations as required;

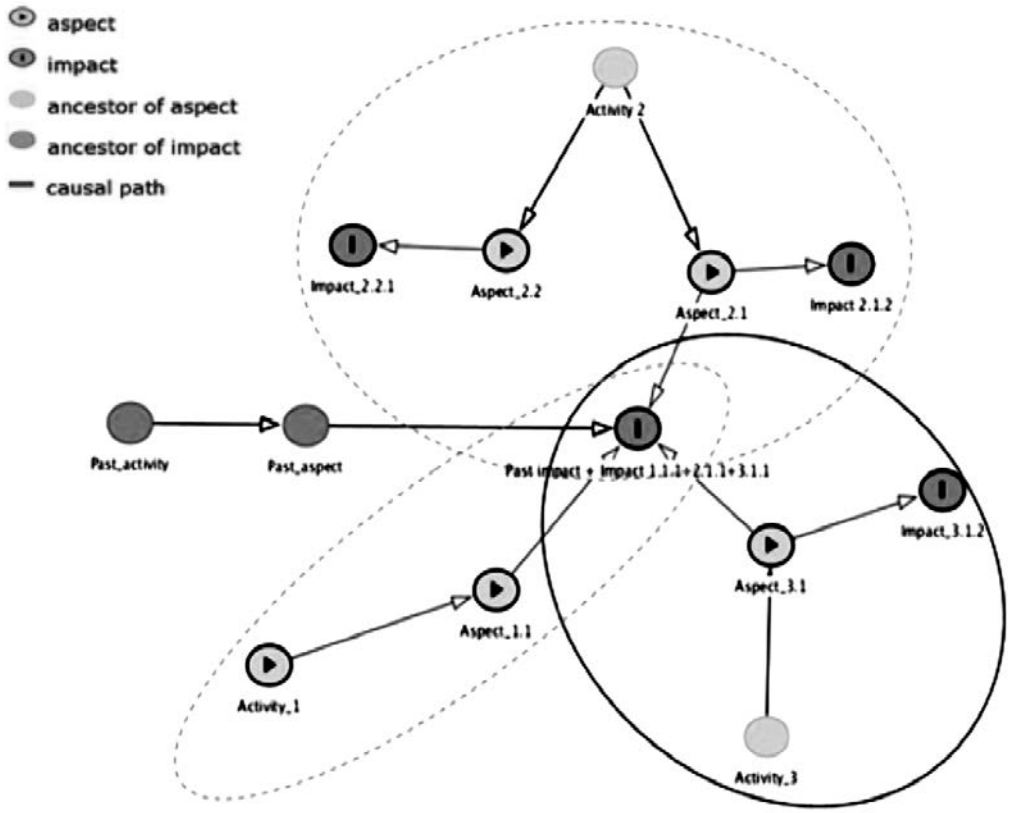
Year	ATCM	Paper	Title	Author	Activity	Cumulative impact topic
1996	ATCM XX	IP085	IUCN International workshop on cumulative environmental impacts in Antarctica: minimisation and management	IUCN	All	Minimisation and management
1997	ATCM XXI	IP061	Cumulative environmental impacts in Antarctica: minimisation and management	IUCN	All	Minimisation and management
1998	ATCM XXI	IP093	Cumulative environmental impacts in Antarctica: minimisation and management full report	IUCN	All	Minimisation and management
1999	ATCM XXII	IP030	Cumulative Environmental Impacts in Antarctica: Minimisation and Management	IUCN	All	Minimisation and management
2001	ATCM XXIV	IP052	Issues Relating to Cumulative Environmental Impacts Of Tourist Activities	IAATO	Tourism	Data collection, management
2002	ATCM XXV	IP048	Progress Report from the Intersessional Contact Group on Cumulative Impacts	United States	All (ICG)	Various
2003	ATCM XXVI	WP006	Final Report from the Intersessional Contact Group on Cumulative Environmental Impacts	United States	All (ICG)	Various
2003	ATCM XXVI	IP072	IAATO Site Specific Guidelines 2003 in the Antarctic Peninsula Further Addressing Potential Cumulative Impacts	IAATO	Tourism	Guidelines
2006	ATCM XXIX	IP080	Methodologies for Assessing Cumulative Impacts: A Progress Report	New Zealand	All	CIA methods
2008	ATCM XXXI	WP034	A Mechanism for Centralizing Tourism and Non-governmental Activity Declarations and Authorization Requests Suitable for Taking Cumulative Impacts into Account	France	Tourism	Data collection - activity declarations
2009	ATCM XXXII	IP015	Cumulative impacts from walking in the Dry Valleys	United States	NAPs	Scientific monitoring of impacts
2010	ATCM XXXIII	WP023	Assessing cumulative environmental impacts: identifying the distribution and concentration of national operator activities in Antarctica	UK	NAPs	Data collection - mapping databases

Table 1. *Key documents submitted to the ATCM/CEP addressing aspects of cumulative impacts*

ATCM/CEP	Year	No.	Subject
ATCM XIII Brussels	1985	6	Consultation between program operators on siting of stations
ATCM XXIII - CEP II Lima	1999	R5	Liability Annex deliberations
ATCM XXIII - CEP II Lima	1999	R6	Non-consultative parties and the Environmental Protocol
ATCM XXVI - CEP VI Madrid	2003	D5	Expert Meeting on tourism
ATCM XXVIII - CEP VIII Stockholm	2005	R4	Revised EIA guidelines
ATCM XXX - CEP X New Delhi	2007	R5	Long-term effects of tourism

Table 2. *Instruments adopted by the ATCM referring to cumulative impacts*

• Carry out some case studies of cumulative impacts at particular sites; and
• Augment and improve the consideration of cumulative impacts in the implementation of Annex I.



An example of cumulative impacts resulting from multiple activities and single activity EIAs

References

-Lead author: R. M. Roura with reviews by Jessica O'Reilly and Lyn Goldsworthy.
-(See Table 1 for ATCM/CEP documents focused on cumulative impacts).
-ASOC (2000): Antarctic Strategic Environmental Assessment: Application to the Growing Antarctic Tourism -Industry SATCM XII/IP010.
-ASOC (2001): Strategic needs and decision-making in Antarctica ATCM XXIV/IP054
-ASOC (2002): Strategic Environmental Assessment in Antarctica: a 'stepping stone' to Madrid Protocol objectives -ATCM XXV/IP082.

-Ayres, E., Nkem, J.N., Wall, D.H., Adams, B.J., Barrett, J.E., Broos, E.J., Parsons, A.N., Powers, L.E., Simmons, B.L., & Virginia, R.A. (2008). Effects of Human Trampling on Populations of Soil Fauna in the McMurdo Dry Valleys, Antarctica. Conservation Biology, 22(6). 1544-1551.

-Bastmeijer K and Roura, RM (2004): Regulating Antarctic tourism and the precautionary principle. The American Journal of International Law 98:4, 763-781.

-Germany and United Kingdom (1999): Report of a joint inspection under Article VII of the Antarctic Treaty Inspection Programme: January, 1999. ATCM XXIII/WP023.

-Hofman R and Jatko J (2000): Assessment of the possible cumulative environmental impacts of commercial ship-based tourism in the Antarctic Peninsula area. Proceedings of a Workshop Held in La Jolla, California, 7-9 June 2000. Arlington, Virginia, USA: National Science Foundation.

-Lynch, H.J. K. Crosbie, W.F. Fagan and R. Naveen (2010): Spatial patterns of tour ship traffic in the Antarctic Peninsula region. Antarctic Science / Volume 22 / Issue 02 / April 2010, pp 123-130 DOI: http://dx.doi.org/10.1017/S0954102009990654.

-New Zealand (2012a): Environmental Aspects and Impacts of Tourism and Non-governmental Activities in Antarctica. XXXV ATCM WP022

-New Zealand (2012b): Environmental Aspects and Impacts of Tourism and Non-governmental Activities in Antarctica. XXXV ATCM IP033 and attachments.

-Roura, RM and Hemmings AD (2011): "Realising Strategic Environmental Assessment in Antarctica." Journal of Environmental Policy Management and Policy. 13(3) 483-514. DOI No: 10.1142/S1464333211003973.

Tin T, Z.L. Fleming, K.A. Hughes, D.G. Ainley, P. Convey, C.A. Moreno, S. Pfeiffer, J. Scotta and I. Snapea (2008): Impacts of local human activities on the Antarctic environment. Antarctic Science / Volume 21 / Issue 01 / February 2009, pp 3-33 DOI: http://dx.doi.org/10.1017/S0954102009001722

Notes

1. ASOC participated actively in the 2014-2015 ICG reviewing guidelines for EIA. Some of ASOC's contribution to that ICG concerning the assessment of cumulative impacts are reproduced here.

2. Some of the topics addressed in this workshop, including potential impacts from tourism, were subsequently revisited in the CEP Tourism Study (New Zealand, 2012).

3. This is the terminology used in the ICG to refer to a combination of the outputs/exposures linking an activity and the environment

*

ANTARCTIC TOURISM AND PROTECTED AREAS

ASOC

ABSTRACT

There is a clear connection between area protection and tourism regulation in Antarctica, even though this connection has not been used to its full extent to regulate tourism. This document discusses the interface between protected areas, in a broad sense, and the regulation and management of tourism. It also discusses how area protection may be used with respect to potential vectors of tourism expansion, particularly the use of airstrips and dedicated land based tourism facilities. Overall, tourism dynamics and current tourism developments suggest that tourism regulation should be examined from a regional focus. This would require "zooming out" spatial management instruments rather than solely "zooming in" into specific sites managed by guidelines. Recognising the dynamic of Antarctic tourism, ASOC recommend that Parties consider using strategically ASPAs and ASMAs to regulate current and potential future tourism, and makes specific recommendations detailed in the document.

KEYWORDS

Tourism, Antarctica, Antarctic Specially Protected Areas.

Introduction

The development of a protected area regime is one of the obligations of the Protocol and its Annexes that has received more attention by the ATCM and CEP, though further work is required to establish a representative network of protected areas in the Antarctic Treaty area. The ATCM and CEP have also given considerable attention to Antarctic tourism; although some regulation and management instruments have been adopted these have not resulted yet in the establishment of a comprehensive regulatory regime for this activity. There is a clear connection between area protection and tourism regulation, even though this connection has not been used to its full extent to regulate tourism.

In this document we discuss the interface between protected areas, in a broad sense, and the regulation and management of tourism. We also discuss how area protection may be used with respect to potential vectors of tourism expansion, particularly the use of airstrips and dedicated land-based tourism facilities.

Spatial protection mechanisms in the Antarctic Treaty Area

The basic function of spatial protection in natural areas is to maintain the values of those areas by regulating components of human presence that may affect negatively those values. Regulations may include management conditions, restrictions or prohibitions of access, activities, and individual behaviour. A complementary approach consists of directing activities towards particular areas, and consequently away from other areas where protection is enhanced. To be meaningful and effective, regulations in protected areas need to be stronger than regulations outside those areas.

In practice, the management plans of Antarctic protected areas categorise types of activities and forms of individual behaviour, and prohibits, restricts or manages those differentially. Some activities and forms of behaviour are allowed in certain areas while others are not, and access to or movement within an area may be regulated too. When zoning regulations are in use, the same basic concept applies to specific zones inside protected areas. There are very few protected areas in Antarctica where no visitors of any kind are allowed, and relatively few where no tourism is allowed.

The set of protected area instruments currently used in the Antarctic Treaty area include Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Area (ASMAs), some of which derive from early area protection instruments; Seal Reserves under the Convention for the Conservation of Antarctic Seals (CCAS), and Marine Protected Areas under the Convention for the Conservation of Antarctic Marine Living Resources (CAMLR Convention). Other area-based instruments or tools include spatial restrictions concerning the disposal of sewage in coastal waters (Netherlands 2014), zoning, and site guidelines. Some areas protection instruments have never been used or are no longer used, such as Areas of Special Tourism Interest (ASTIs) and sites protected under the CCAMLR Ecosystem Monitoring Program (CEMP). These various instruments influence tourism in different degrees (Table 1). Plainly, ASPAs and ASMAs are the area-based tools more relevant to tourism regulation and management, complemented by zoning and site guidelines.

According to the Protocol's Annex V, any area, including any marine area, may be designated as an ASPA or an ASMA, which are the building blocks of the Protocol's protected area regime. Currently, this regime consists of 72 ASPAs and seven ASMAs that have been designated by the ATCM. Activities in ASPAs and ASMAs may be prohibited, restricted or managed, in accordance with management plans adopted under the provisions of Annex V of the Protocol. Reviews of Management Plans shall be initiated at least every five years, and the Plan shall be updated as necessary. Management Plans may be amended or revoked in accordance with the designation procedures of Annex V, Art. 6(1). Any amendments need to be approved by the Antarctic Treaty Consultative Meeting (ATCM), which makes decisions by consensus. The designation of ASMAs shall be for an indefinite period unless the Management Plan provides otherwise. Currently all ASMAs and the vast majority of ASPAs have been designated for an indefinite period.

ASPAs access requires a permit. These are usually granted only to scientists and science support personnel, environmental managers, and (in some instances) educators. However, most ASPAs protecting historic sites allow tourism, and in those instances tourists are the dominant category of visitor (Hughes et al 2013).

ASMAs have been recognised as "especially relevant and likely one of the best tools in the management of tourism" (Valencia, 2000). ASMAs place some conditions on the conduct of tourism activities, such as for instance the location of anchoring and landing sites. The strongest area protection in ASMAs usually derives from the ASPAs located within the ASMA, while tourism is generally managed with site-specific guidelines.

As noted in the CEP tourism study (New Zealand, 2012a:5):
There are a number of management options available to the ATCM including hard (ASPA and ASMA designations) as well as soft measures such as site-specific and generic guidance material. The utility of these tools and other management options (e.g. seasonal and site-specific management) requires further consideration. Evidence for the application of one or a combination of such approaches will need to take account of limited data, monitoring and research.

At present, designated ASMAs vary substantially in terms of, inter alia, surface area, environmental setting, values protected, and the type and level of activities conducted within. All of the current ASMAs have significant natural values, but tourism levels in each of the ASMAs ranges from limited to significant. This diversity highlights the flexibility of ASMAs as an instrument for area protection, and the potential to expand its use beyond current applications. New applications may include, inter alia, the use of ASMAs to:

• Cover larger areas than those used so far, including for the management of tourism at a sub-regional level;
• Anticipate and prevent cumulative impacts and the degradation or loss of quality of the environment (and hence its scientific quality) from the effects of past, present, and future activities;
• Anticipate and prevent conflicts of use between different activities types; and
• In combination with other spatial management instruments, protect sensitive locations within the

ASMA (as well as to manage the range of activities conducted in the ASMA).

Despite this potential, at present, the most favoured way to manage tourism (and as a de facto proxy for regulation) is through the use of site guidelines, which have an emphasis on the behaviour that is expected at particular locations according to site-specific factors. Site guidelines combine conditions and restrictions on behaviour with elements of area protection. These guidelines have a useful role; however, unlike ASPAs and ASMAs, they are not legally binding, and have usually been established only after a site has become a regular tourism destination.

Anticipating tourism developments and area protection needs

Antarctic tourism is inherently dynamic (e.g. Roura 2010, 2012; Lamers 2012), and characterized by several interrelated factors, including:

• Growth in numbers: More companies, more ships, more tourists (peak to date in the mid-2000s).
• Geographic expansion and concentration: New locations, either along the coast (now in a diminishing number, as in some areas already most feasible sites have been visited) or inland (connected to land based tourism). An expansion trend is combined with a concentration at certain locations that have been consolidated as tourism destinations.
• Diversification of activities: Tourism is now less about seeing unique Antarctic features (although these remain an important element of the tourism experience) and more about conducting a growing range of activities in Antarctica.
• Diversification of means of access: Shipborne tourism is the dominant means to access the Antarctic, but there are a range of shipping options as well as fly-sail and airborne tourism.
• Expanding customer base: New products catering to new market segments. These include backpackers looking for last minute deals; time-poor millionaires embarking in exclusive brief expeditions, which come at a cost; and to people interested in particular activities and experiences (e.g. marathons, diving).

Tourism dynamics have obvious spatial implications - more people access more places in an increasing range of modalities to engage in a growing number of activities. Tourism developments have an effect on area protection needs, particularly in coastal areas where tourism activity focuses, and also in some inland areas where and airstrips and base camps are used as staging points to access other locations. At present, most ASPAs are located nearby research stations, reflecting that ASPAs are generally created to protect areas from some threat of human interference or impact. The rationale appears to be that in the absence of field research or tourism visits to a remote location there may be little reason for its designation as a protected area. However, this approach to protected area development does not take into consideration future science or tourism activities which are occurring increasingly occurring at more remote locations (Convey et al., 2012; Hughes et al. 2013). One of the less understood aspects of tourism is its interaction with stations run by National Antarctic Programs. Currently, to our knowledge, there is (or there has been) some level of support to tourism from the airstrips at Teniente Marsh in Fildes Peninsula (such as fly-sail tourism) and at Novolazarevskaya Station. A tourism facility is located near the latter (Russian Federation 2012).
Several new National Antarctic Program facilities have been developed in recent years, including

research stations and airstrips. These facilities are used exclusively to support science, however not all of the EIAs for those facilities explicitly rule out their future use for tourism. In the case of new airstrips, for instance, some EIAs note explicitly that the facilities will not be made available for tourism, while other EIAs recognize that by opening a runway in a previously fairly inaccessible area there would be a potential of opening the area to non-governmental visitors and to a higher level of private expeditions, and considerations about these potential developments would have to be done separately from the EIAs. It is not suggested here that any of these current or recently established facilities would actually be used to support tourism, but rather that the potential exists.

Another factor is the relative expansion of land-based tourism camps, which are used as staging points to access other locations. Aside the Novolazarevskaya Base camp mentioned above there are at least two other facilities, one in the Union Glacier and the other at "Whichaway Camp". Activities at the latter, which is situated in Queen Maud Land, a 5 hour flight from Cape Town (its precise location is not shown in the company's website) have been advertised as follows:

• Have exclusive access to a 6,000 strong Emperor Penguin colony with their newly-hatched chicks.
• Fly into unexplored mountains and with our World Record breaking polar explorers guiding you every step of the way, summit a mountain no one has ever climbed before!
• Become the first tourists to ever fly out to the ice barrier on the edge of Dronning Maud Land and witness thousands of iridescent icebergs.

These activities have obvious implications regarding direct, indirect and cumulative environmental impacts, and impacts on wilderness and wilderness values. It would be important that Parties permitting those activities assess the need for the establishment of ASPAs in the areas where the activities take place. Parties that permit or process EIAs for these activities would be in the best position to determine what locations may require such assessment.

The CEP Tourism Study (attachment to New Zealand 201b:75) noted that:

It is not inconceivable that protected area and managed area designations could be used to regulate visitation to certain areas of Antarctica. The "hotspots" of activity identified in this ...may also provide opportunities for additional tourism management options on a more regional (rather than site-specific) scale, perhaps using ASMA designations, and the development of regional environmental impact assessments as suggested by Kriwoken and Rootes (2000)(see Recommendation 5 above).
Overall, tourism dynamics and current tourism developments suggest that tourism regulation should be examined from a regional focus. This would require "zooming out" spatial management instruments rather than solely "zooming in" into specific sites managed by guidelines.

Concluding remarks

ASOC has made a series of recommendations regarding the regulation and management of Antarctic tourism, based on strategic analysis (ASOC 2010, 2011, 2012). ASOC has recommended, inter alia, that Parties should use specially protected and managed areas (ASPAs and ASMAs) proactively as strategic tourism management tools. These uses would be particularly relevant to anticipate tourism

Area-based instrument	Established by	What they do	Influences tourism?
CCAS Seal Reserves.	1972 Convention on the Conservation of Antarctic Seals	Sealing is prohibited within Seal Reserves. Legally binding.	No.
Areas of Special Tourist Interest (ASTIs)	1975 ATCM Recommendation VIII-9	Direct tourism landing to particular sites to the exclusion of other sites.	Not in practise. No ASTIs were ever designated and the Recommendation is no longer current.
CCAMLR MPAs	1980 Convention on the Conservation of Antarctic Marine Living Resources	Scientific and commercial fishing within MPAs is regulated. This may include no take areas where no fishing is allowed. Legally binding.	Unlikely. None of the current CCAMLR MPA proposals restrict the passage of ships in any way. Shipping restrictions on future proposals is unlikely because of UNCLOS regulations.
12nm sewage disposal restriction	1991 Protocol of Environmental Protection to the Antarctic Treaty - Annex IV, Art. 6 (1)(a)	Sewage disposal is not allowed. Legally binding.	Yes. This is a general restriction that applies to all vessels, except those covered by the previsions of Annex IV (7) and (11).
Antarctic Specially Protected Areas (ASPAs)	1991 Protocol of Environmental Protection to the Antarctic Treaty - Annex V	Protects a range of values. Legally binding.	Yes, albeit this does not always imply that tourism is not allowed in some ASPAs. Tourist access to ASPAs protecting historic sites is allowed under permit.
Antarctic Specially Managed Areas (ASMAs)	1991 Protocol of Environmental Protection to the Antarctic Treaty -Annex V	Manages activities within certain areas. Legally binding.	Yes, although this varies among ASMAs.
Historic Sites and Monuments (HSMs)	1991 Protocol of Environmental Protection to the Antarctic Treaty - Annex V	Manages sites and monuments of recognised historic value.	Yes - generic conditions, restrictions and prohibitions apply to tourism.
CEMP sites	CCAMLR Conservation Measure 91-01	Establishes a procedure for according protection to CCAMLR Ecosystem Monitoring Program (CEMP) sites.	Not at present but theoretically possible. Current CEMP sites are either unprotected or protected through ASPAs and ASMAs. Under Annex V of the Protocol CCAMLR could propose ASPAs or ASMAs to e.g. protect CEMP sites.
Zoning	Management plans for ASPAs and ASMAs adopted by the ATCM	Zoning is used in ASPAs, ASMAs, and in some site guidelines for, inter alia	Depends on the case. Different zones have different purposes and some place conditions or restrictions on tourism activity.
Site guidelines	ATCM Resolutions	Condition or restrict activities and behaviour. May or may not contain boundaries (lines) or zones (areas) where different conditions or restrictions apply. Legally not binding.	Yes. Most site guidelines are established to manage tourism.

Table 1. *Area-based instruments in the Antarctic Treaty System and their influence on tourism*

developments. Through the use of protected areas, tourism could be concentrated, diverted or dispersed as required, whenever possible in anticipation of tourism developments. The idea is not to exclude tourism arbitrarily from particular sites, but to protect fundamental values that may not be compatible with regular tourism.

In particular, ASPAs can be designated to protect sites that meet the criteria of Annex V, Art. 3(2) of the Protocol, many of which require no or minimum human interference, before they become established tourism destinations. ASMAs can be designated to assist in the planning and coordination of contemporary or future activities including tourism, prevent conflicts, and minimise cumulative impacts. In this context it would be important that the intersection of tourism activities with research stations and associated infrastructure (like airstrips) is taken into consideration. Potential tourism uses of current or planned facilities should be a factor for consideration in the designation of future protected areas. Whilst it would seem very unlikely that current or new airstrips will be used to support tourism in coming years, this might change in the longer term.

Recognising the dynamic of Antarctic tourism, ASOC recommend that Parties consider using strategically ASPAs and ASMAs to regulate current and potential future tourism, and in particular:

• Examine from a regional perspective the intersection of current tourism activities with protected and managed areas.
• Examine area protection and management needs in the proximity of land based tourism facilities or in areas that may in the future be used for tourism (such as near airstrips).
• Provide clear statements about tourism policies at their facilities, including bases and airstrips in currently little-visited areas.
• Generally, consider the spatial expansion of tourism in the process of developing a representative network of protected areas.

References

-Lead author: R. M. Roura with reviews by Jessica O'Reilly and Lyn Goldsworthy.
-ASOC (2010): Making tangible progress on a strategic vision for Antarctic tourism, ATCM XXXIII, IP080.
-ASOC (2011): Antarctic tourism – what next? Key issues to address with binding rules, ATCM XXXIV, IP084.
-ASOC (2012): Key issues for a strategic approach to review tourism policies, ATCM XXXV, IP055.
Convey, P., Hughes, K.A., Tina, T., 2012. Continental governance and environmental management mechanisms under the Antarctic Treaty System: sufficient for the biodiversity challenges of this century? Biodiversity 13, 1–15.
-France (2006): Establishment of "areas of special tourist interest". XXIX ATCM, WP18.
Hughes KA, L.R. Pertierra, D.W.H. Walton (2013): Area protection in Antarctica: How can conservation and scientific research goals be managed compatibly? Environmental Science & Policy 31:120–132. doi:10.1016/j.envsci.2013.03.012
-Kriwoken, L.K. and Rootes, D. (2000): Tourism on ice: environmental impact assessment of Antarctic tourism. Impact Assessment and Project Appraisal 18(2): 138-150.
Lamers M. and Gelter H. (2012): Diversification of Antarctic tourism: the case of a scuba diving expedition. Polar Record 48: 280-290.

-New Zealand (2012a): Environmental aspects and impacts of tourism and non-governmental activities in Antarctica. XXXV ATCM WP022

-New Zealand (2012b): Environmental aspects and impacts of tourism and non-governmental activities in Antarctica. XXXV ATCM IP033 and attachments.

-Roura, RM (2010): Cultural heritage tourism in Antarctica and Svalbard: Patterns, impacts, and policies. In: M. Hall and J. Saarinen (eds.): Tourism and change in the Polar Regions: Climate, environment and experiences. London and New York: Routledge, pp 180-203.

-Roura R.M. (2012): Being there: Examining the behaviour of Antarctic tourists through their blogs. Polar Research 31, 10905. http://dx.doi.org/10.3402/polar.v31i0.10905 .

-Russian Federation (2012): Activity of the international air program DROMLAN and its interaction with non-governmental activity in the Antarctic ATCM XXXV - CEP XV/IP072

-Valencia J. (ed.) (2000): Second Antarctic Protected Area workshop. Workshop Report Lima , Perú 22 - 23 May, 1999. Chile: Ministerio de Relaciones Exteriores Instituto Antártico Chileno Santiago, http://ats.aq/documents/cep/second_protected_workshop_e.pdf

*

Expanding Antarctica's Protected Areas System

ASOC

ABSTRACT

Article 3, Annex V of the Environment Protocol states that Parties shall create protected areas within a systematic framework. To date over 70 Antarctic Specially Protected Areas (ASPAs) have been designated by the Antarctic Treaty System (ATS), but a recent analysis finds that these areas are not fulfilling the terms of the Protocol (Shaw et al. 2014). This paper discusses that analysis and recommends that ATCPs can remedy this situation by increasing the size and number of ASPAs, with a focus on achieving representation of all known Antarctic Conservation Biogeographic Regions (ACBRs) and designating inviolate areas, wilderness areas, and areas of interest to science. This will increase and enhance the terrestrial protection of Antarctica in line with the Protocol and with other international recommendations.

Keywords

Protected Areas, Antarctica, Antarctic Specially Protected Areas.

"Inadequate, Unrepresentative and at Risk"

Article 3, Annex V of the Environment Protocol states,"Any area, including any marine area, may be designated as an Antarctic Specially Protected Area to protect outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research…Parties shall seek to identify, within a systematic environmental-geographical framework, and to include in the series of Antarctic Specially Protected Areas: (a) areas kept inviolate from human interference so that future comparisons may be possible with localities that have been affected by human activities; (b) representative examples of major terrestrial, including glacial and aquatic, ecosystems and marine ecosystems; (c) areas with important or unusual assemblages of species, including major colonies of breeding native birds or mammals; (d) the type locality or only known habitat of any species; (e) areas of particular interest to ongoing 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."

The Antarctic protected area system has been reviewed in the scientific literature and in ATCM documents from a broad range of perspectives and approaches, including the balance between conservation and science needs (Hughes et al. 2013), spatial analysis (Australia 2012), the protection of geological values (UK/UK et al 2014), and coastal and marine values (Netherlands 2014).

Few articles have undertaken an analysis of the effectiveness of the protected areas system as a whole. However, an article published in the journal PLoS Biology last year concludes that "Antarctica's protected areas are inadequate, unrepresentative and at risk" (Shaw et al. 2014). This conclusion is based on a thorough examination of the characteristics of the current ASPAs. The article's overall picture of the ASPA system is thus:

Antarctica is one of the planet's least protected regions, with only 1.5% of its ice-free area formally designated as specially protected areas. Five of the distinct ice-free ecoregions have no specially designated areas for the protection of biodiversity. Every one of the 55 designated areas that protect Antarctica's biodiversity lies closer to sites of high human activity than expected by chance, and seven lie in high-risk areas for biological invasions. By any measure, including Aichi Target 11 under the Convention on Biological Diversity, Antarctic biodiversity is poorly protected by reserves, and those reserves are threatened (Shaw et al. 2014).

In addition to the clear expectation in the Protocol that ATCPs will establish a system of ASPAs with a number of characteristics important for science and conservation, other global bodies such as the Convention on Biological Diversity (CBD) have determined terrestrial protection targets based on scientific advice. One of these targets, in the CBD's Strategic Plan for Biodiversity, advocates that 17% of terrestrial areas should be protected. While the Protocol does not suggest such specific percentage goals, it does list nine characteristics that areas in the system of protected areas should have. Most ASPAs designated to date have come under the category "areas with important or unusual assemblages of species, including major colonies of breeding native birds or mammals" (Appendix 1). Fewer than five have been designated as inviolate areas or wilderness areas, and as noted above,

out of fifteen known Antarctic terrestrial ecoregions/Antarctic Conservation Biogeographic Regions (ACBRs), only ten are represented in the ASPA system. Even those ten are not likely to be adequate for conservation given their small size.

Expanding the protected areas system

In a time when the Antarctic environment is changing due to climate change and is increasingly exposed to new threats such as invasive species, the strengthening of the protected areas system is critical. Additionally, expanding and improving the protected areas system can overlap with other important aspects of governance, such as the management of scientific and tourism activities. To date, these activities have often been examined on a case-by-case basis. Globally, spatial prioritization of important and/or vulnerable areas is being recognized internationally as a useful tool in conservation planning and the designation of protected areas. Protected area designation in Antarctica should consider this and other contemporary conservation planning tools in the development of an integrated, continent-wide protected area network in terrestrial Antarctica.

Shaw et al. (2014) identify a number of specific deficiencies within the current protected areas system. These problems can be addressed as part of an integrated, region-wide planning process that enacts the obligations set out in the Protocol. In ASOC's view, key outcomes from this process should include:

• Creation of protected areas in the five ACBRs not currently represented. These should be at least 17% of each ACBR in line with Aichi Target 11.
• Designation of additional protected areas of interest to science, inviolate areas, and areas with wilderness values. These may overlap with each other or with the ACBRs, but it is important to ensure that the representation of these values within the protected areas system increases.
• Designation of protected areas representative of marine ecosystems.
• Analysis and (where necessary) expansion of existing ASPAs in ACBRs so that at minimum 10% of each area is protected.

Assuming that these areas are chosen on the basis of a robust planning process, they would dramatically strengthen Antarctica's protected areas network.

Though this approach may require more initial work, it is likely to save time and effort in the long run. For example, managing human activities such as scientific research and tourism could be simplified if large protected areas in each ACBR were established . This would not obviate the need for an EIA process, but would reduce uncertainty about possible environmental impacts and assist ATCPs and tourist operators in identifying appropriate areas for activities.

Conclusion

Recent research on Antarctica's protected areas system identifies a number of deficiencies that could be rectified by a continent-wide planning process based on available science.

ASOC recommends that the ATCM/CEP

• Critically review the scope of ASPA coverage in Antarctica; and
• Initiate an integrated, region-wide planning process that enacts the obligations set out in Article 3, Annex V of the Environment Protocol.

Classification	Reason for designation	Antarctic Specially Protected Areas	Ice-free, biodiversity designated ASPAs at high risk of invasion
A	Inviolate areas	2	
B	Representative of major ecosystems	10	
C	Important or unusual assemblage of species	37	6
D	Type locality of known species	0	
E	Area of interest to science	10	1
F	Outstanding geological, glaciological geomorphological feature	5	
G	Outstanding aesthetic or wilderness value	1	
H	Sites or monuments of historic value	6	
I	Outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values or on-going planned scientific research	2	
Total		73	7

Table S1. *from Shaw et al. 2014 (used with permission). Designation of ASPAs and their invasion risk. Designations from Antarctic Protected Areas Database, Secretariat of the Antarctic Treaty: http://www.ats.aq/devPH/apa/ep_protected_detail.aspx?type=2&id=69&lang=e.*

References

Lead author: Claire Christian with contributions from R. M. Roura and Mark Epstein.
-Australia. 2012. Analyses of the Antarctic protected areas system using spatial information. ATCM XXXV, IP 26.
-Convention on Biological Diversity. 2010. Aichi Biodiversity Target 11. Accessed online 25 April 2015 from <https://www.cbd.int/sp/targets/rationale/target-11/> .
-Hughes KA, L.R. Pertierra, and D.W.H. Walton (2013): Area protection in Antarctica: How can conservation and scientific research goals be managed compatibly? Environmental Science & Policy Volume 31, August 2013, Pages 120–132. doi:10.1016/j.envsci.2013.03.012
-Netherlands. 2014. The role of the Antarctic Treaty Consultative Meeting in protecting the marine environment through marine spatial protection. ATCM XXXVII, IP 49.
-Shaw, Justine D., Aleks Terauds, Martin J. Riddle, Hugh P. Possingham, and Steven L. Chown. 2014. "Antarctica's Protected Areas Are Inadequate, Unrepresentative, and at Risk." PLoS Biology 12 (6): 1–5. doi:10.1371/journal.pbio.1001888.
-United Kingdom, Argentina, Australia and Spain. 2014. The Antarctic Protected Area system: protection of outstanding geological features. ATCM XXXVII, WP 35.

NEXT STEPS FOR VESSEL MANAGEMENT IN THE SOUTHERN OCEAN

ASOC

ABSTRACT

An International Code for Ships Operating in Polar Waters (Polar Code) focused on cruise vessels and cargo vessels of over 500GT is expected to be completed in May 2015, and to enter into force from 1 January 2017. Part 1 of the Code and related amendments to the International Convention for the Safety of Life at Sea (SOLAS) were adopted in November 2014, while Part 2 of the Code, focusing on pollution prevention, is expected to be adopted along with amendments to the International Convention on the Prevention of Pollution from Ships (MARPOL) Convention in May 2015. This paper summarises a few new requirements of the Code and highlights some areas which ASOC believes should receive further consideration during Step 2 of work on the Polar Code. Step 2 of the work is focused on vessels such as fishing vessels, private yachts, and cargo vessels under 500GT, and is due to commence in 2016. Ahead of the work commencing, information is being sought on the number of "non-SOLAS" ships operating in polar waters and reports of accidents and incidents including those requiring search and rescue interventions since 2010. ASOC urges the Antarctic Treaty Parties to formally assist Step 2 of the development of a mandatory Polar Code by contributing to the information gathering exercise through the provision of copies of relevant ATCM papers and reports to the IMO. While Step 2 of work on the Polar Code will focus on the non-SOLAS vessels, such as fishing vessels, vessels under 500GT and private craft, ASOC is hopeful that some existing provisions can also receive further consideration, in particular so-called Category C vessels and damage stability requirements and matters relevant to environmental protection of polar waters. ASOC welcomes the adoption of the first mandatory Polar Code to improve the management of vessels operating in the polar waters, and urges full participation by ATPs in Step 2 of work to complete consideration of the requirements of non-SOLAS vessels.

KEYWORDS

Polar Code, pollution, security, ships.

Polar Code – a quick update

During 2009 work was undertaken at the International Maritime Organization (IMO) to extend the existing IMO Guidelines for Ships Operating in Arctic Ice-covered Waters to cover both Antarctic and Arctic (or Polar) waters . The revised and extended Guidelines took effect from 2011, however during the work it had become apparent that there would be value in developing a mandatory and legally binding instrument. Work to develop the International Code for Ships Operating in Polar Waters (Polar Code) commenced at the IMO in February 2010, with Step 1 focused on cruise vessels and cargo vessels of over 500GT expected to be completed in May 2015, and to enter into force from 1 January 2017. Part 1 of the Code and related amendments to the International Convention for the Safety of Life at Sea (SOLAS) were adopted in November 2014. Part 2 of the Code, focusing on pollution prevention, is expected to be adopted along with amendments to the International Convention on the Prevention of Pollution from Ships (MARPOL) Convention in May 2015.

The decision to develop a mandatory Polar Code was spurred on by the publication of the investigation into the sinking of the ice strengthened cruise ship Explorer in November 2007, following a collision with ice . The investigation found that the inexperience of the Master was the primary reason the Explorer suffered the casualty. What was thought to be first year ice was in fact much harder land ice, and the Master was unfamiliar with the type of ice encountered in Antarctic waters. The Master's decision to abandon the vessel as a precautionary measure and the Engine Crews efforts to restore and maintain power so that passengers could be successfully transferred into lifeboats in all likelihood saved lives. The fair weather conditions at the time of the accident contributed to the successful rescue of the passengers. Within two hours of the passengers being safely transferred from lifeboats to the Nordnorge, the weather conditions deteriorated to gale force winds. It would be interesting to review the mandatory Polar Code and consider what might have happened differently had the Code been in effect before 2007.

New developments in the Polar Code

A new development for ships operating in polar waters will be the requirement for a valid Polar Ship Certificate, which should, where applicable, reference a methodology to assess the operational capabilities and limitations in ice. The Polar Ship Certificate will be issued after an initial survey for new vessels or a renewal survey for existing vessels provided a ship meets the requirements of the Code. Ships will also have to have a Polar Water Operational Manual which should include:

- information on the ship-specific capabilities and limitations in ice,
- procedures to be followed in normal operations,
- procedures to be followed in the event of incidents in polar waters,
- procedures to be followed in the event that conditions are encountered that exceed the ship's specific capabilities and limitations, and
- procedures to be followed when using icebreaker assistance.

While Part 2 of the Code focuses on provisions to address environmental protection, there are

other areas which focus on safety of the ships and safety of people on board but will also be important in terms of reducing the impact of international shipping on polar environments. Voyage planning, a routine part of any shipping operation, is one example. Through improved voyage planning the risks to the marine environment can be further reduced, particularly in polar waters. The Polar Code requires that in addition to standard procedures when planning the route, the Master should also consider the limitations of hydrographic information and aids to navigation. This is welcome as a significant number of incidents in recent years have occurred as a result of groundings and as new areas become accessible as sea ice reduces, there is a greater the chance of entering completely uncharted waters. Other matters to be included in voyage planning include:

- sourcing up to date information on the extent and type of ice (while recognising the limitations in available data) and recent records on ice and temperatures,

- seeking available information on marine mammal populations and migratory routes along with measures to be taken if marine mammals are encountered,

- sourcing information on designated areas along the route, and

- considering operations in in areas remote from search and rescue (SAR) capability.

Part 2 of the Code focuses on pollution prevention and when in effect will introduce more stringent requirements for operational discharges from ships including oil, chemicals and garbage, however the provisions are primarily relevant to Arctic waters as Antarctic waters already received enhanced protection under the MARPOL Convention. With respect to sewage discharges, the provisions have been clarified and disinfected sewage can only be discharged more than 3 nautical miles from land, ice shelves or fast ice, and as far as practicable from areas of ice concentration exceeding 1/10. For untreated sewage the distance is extended to 12 nautical miles. New ships constructed after the entry into force date will not be able to discharge any sewage unless treated.

Limitations of the Polar Code

Development of the Polar Code has been a complex process, with a large number of IMO sub-committees invited to consider and contribute to different chapters of the Code. It is unusual amongst IMO instruments because it is geographically focused on a part of the world where there is relatively less history and experience of international shipping, and where there are significant differences between the two regions, despite both being polar. It is not only cross-cutting across safety matters but also across environmental protection issues.

While the adoption of the first mandatory Polar Code is to be welcomed, ASOC remains concerned that some provisions will not provide the level of protection required for polar waters and that the current Polar Code will lead to different interpretations of ice strengthening standards for so-called Category C vessels. Throughout the development of the Code there has been considerable discussion of the three categories of ships

introduced in the Code and which categories will be able to operate in different levels of ice cover . While Category A and B ships will need to be ice-strengthened in accordance with the ice conditions they are allowed to operate in, Category C ships do not need to be ice-strengthened although they will be allowed to operate in some level of ice cover. The situation is further confused in that some Category C ships are likely to be ice strengthened able to operate in up to 95cm first year ice, while some will have no ice class and be allowed to operate in up to 10 - 15cm first year ice. Furthermore, Category A and B ships will be required to have sufficient residual stability to sustain ice-related damage but Category C ships are exempt from damage stability provisions – even if they are ice-strengthened and operating in first year ice up to 95cm thick. ASOC is concerned that different interpretations of the standards for Category C vessels will result, and that appropriate levels of safety or protection for polar waters will not be in place. ASOC believes that the burden of proof should be reversed with all ships operating in polar waters required to meet the damage stability requirements, unless exempted due to the intended area of operation. This is particularly advisable as the polar climate changes, position and thickness of ice can be expected to change, making encounters with ice less predictable.

Early in the process of development the Code, it was envisaged that the Code, unlike the Polar Guidelines, would address both environmental protection and the safety of shipping. A number of submissions to the IMO envisaged that, in considering the potential for impacts from international shipping on polar environments, the Code could cover not only pollution prevention measures but also a broader range of environmental protection matters. Despite a range of environmental protection concerns being raised in the early stages of discussion, ASOC believes that these were reduced to a smaller, albeit important, range of amendments to the MARPOL Convention for the sake of expediency. As a result, ASOC is concerned that despite clear original intentions insufficient attention has been given to environmental protection issues in preparing the Code.

Recognising the wide range of potential impacts in polar regions, and the vulnerability of the environment and wildlife, a comprehensive list of environmental priorities and possible solutions was identified, however not all have been addressed. For example, the threat from a heavy fuel oil (HFO) spill in the Arctic has not been addressed, and ships will still be allowed to discharge raw, untreated sewage into the sea provided they are more than 12nm from land, ice-shelves or fast ice and as far as possible from areas of ice concentration exceeding 1/10. Also, there has been no consideration of the threat posed by discharges of grey water, air emissions, or through the introduction of invasive species via ballast discharges or hull fouling.

Step 2 (or phase 2) of the development of the Polar Code

In June 2015, the IMO's Maritime Safety Committee (MSC) is expected to consider Step 2 of work on the Polar Code as proposed by the Polar Code Working Group at the 54th session of the IMO's sub-committee on ship design and equipment (DE) (now the sub-committee on ship design and construction, SDC) and subsequently endorsed by DE 54 and the Maritime Safety Committee 88th Session. Prior to work commencing on Step 2, information is being sought on the number

Vessel and flag	Incident, location and date	Further information available
Argos Georgia, U.K. (fishing vessel)	Loss of power in Ross Sea, Dec. 2007; spare parts air dropped to vessel.	ATCM XXXI IP52: Report of Main Engine Failure of FV Argos Georgia in the Ross Sea on 24 December 2007. Submitted by the UK.
Berserk, Norway (yacht)	Lost, presumed sunk with three fatalities in Ross Sea; would have carried some oil; search and rescue involved, Feb. 2011.	ATCM XXXIV IP18: The Berserk Incident, Ross Sea, February 2011. Submitted by New Zealand, Norway and the United States. ATCM XXXIV IP75: The Legal Aspects of the Berserk Expedition. Submitted by Norway.
Sparta, Russia (fishing vessel)	Holed in ice, Ross Sea; search and rescue involved, Dec. 2011.	ATCM XXXV WP 49: ATCM Response to CCAMLR Fishing Incidents. Submitted by New Zealand. ATCM XXXV IP 17: Search and Rescue Incidents in the 2011/12 Season: FV SPARTA and FV JEONG WOO. Submitted by New Zealand.
Jeong Woo 2, Republic of Korea (fishing vessel)	Fire, loss of three lives; presumed sunk with fuel oil, though possibly consumed by fire in Ross Sea; search and rescue involved, Jan. 2012.	ATCM XXXV WP 49: ATCM Response to CCAMLR Fishing Incidents. Submitted by New Zealand. ATCM XXXV IP 17: Search and Rescue Incidents in the 2011/12 Season: FV SPARTA and FV JEONG WOO. Submitted by New Zealand.
Brazilian oil barge, Brazil (oil barge)	Capsized and sank with 10,000 litres of diesel on board, South Shetland Islands, Feb. 2012; the barge was later recovered intact.	ATCM XXXV IP65: Comandante Ferraz Station: Oil Barge Incident. Submitted by Brazil.
Endless Sea, Brazil (motorised yacht)	Beset in ice and sank at King George Island, South Shetland Islands in April 2012 while carrying around 8,000 litres of fuel; search and rescue involved.	ATCM XXXV IP64: Brazilian Yacht Accident. Submitted by Brazil.

Table 1. *Examples of recent fishing vessel and other non-SOLAS ship losses and incidents in polar waters*

of "non-SOLAS" ships operating in polar waters and reports of accidents and incidents including those requiring search and rescue interventions with these ships in polar waters since 2010. ASOC, working with environmental non-governmental organisations with consultative status with the IMO, has provided some basic information on recent accidents and incidents in polar waters (Antarctic waters relevant information is shown in Table 1 below). ASOC urges the Antarctic Treaty Parties to formally assist Step 2 of the development of a mandatory Polar Code by contributing to the information gathering exercise through the provision of copies of relevant ATCM papers and reports to the IMO.

Step 2 – revisiting provisions of the Polar Code

While Step 2 of work on the Polar Code will focus on the non-SOLAS vessels, such as fishing vessels, vessels under 500GT and private craft, ASOC is hopeful that some aspects of Step 1 can also receive further consideration. At the last MSC meeting in May 2014, the environmental NGOs submitted a paper expressing the concerns about Category C vessels and damage stability requirements as outlined in Section 3 above , and MSC agreed that the paper from the environmental NGOs "should be considered during the second phase of the work (i.e. non-SOLAS ships)" (MSC 94-21, paragraph 3.34).

Furthermore, other threats which have the potential to harm marine wildlife and polar waters and have been identified but not been addressed in the Code require further consideration, for example the introduction of non-native species, considered one of the most significant threats to global marine biodiversity, New Zealand proposed making the existing Guidelines for Ballast Water Exchange in the Antarctic Treaty Area mandatory for vessels entering the region, while Norway proposed that until the Ballast Water Management Convention had been globally implemented, ballast water management should be address with respect to polar regions through the Code . In addition, a study by Det Norske Veritas (DNV) emphasizes the need to control the spread of organisms via fouling on ships' hulls and rudders and notes that this is an issue for which there is no global legal instrument at the current time, only guidance.

With respect to another threat, Norway highlighted the potential threat from grey water , noting that at present MARPOL does not control discharges of grey water, and that discharges in polar waters will take place in areas where elevated temperatures may be regarded as an environmental disturbance factor. As grey water will include high concentrations of detergents that could be accessible to the marine environment and wildlife as nutrients, Norway posed a question as to whether grey water should be considered with the context of the Polar Code. DNV also identified the unregulated discharge of grey water from cruise ships as an area of concern that should be subject to further investigation with regard to potential harmful effects in polar waters. The report recognised that the wide variety of sources of grey water on board a vessel could result in the discharge of effluent containing several chemicals for which the effects and decomposition under different conditions are not necessarily known.

ASOC proposes that further consideration of these and other threats, including black carbon discharges, raw sewage discharges, antifouling systems and underwater noise, should be undertaken during Step 2.

Other shipping matters

Last year, ASOC submitted a paper to ATCM XXXVII on the management of vessels in the Southern Ocean , which proposed a review of shipping management measures to address collisions, groundings and protection of vulnerable areas through the use of existing IMO measures such as areas to be avoided and ship routeing measures. As ASOC indicated, the use of such measures to manage shipping have not been used extensively in Antarctic waters (with the exception of IMO's Special Area status which addresses discharges of pollutants) and will not be covered by the Polar Code. ASOC continues to believe that a review of the potential opportunities for reducing the risks

of collisions and groundings and protecting the most vulnerable areas through the use of existing IMO measures should be further considered.

Action required

ASOC welcomes the adoption of the first mandatory Polar Code to improve the management of vessels operating in the polar waters, and urges full participation by ATPs in Step 2 of work to complete consideration of the requirements of non-SOLAS vessels.

ASOC Recommends:

• ATPs agree to participate in Step 2 of work on the development of a Polar Code for vessels operating in polar waters, and
• ATPs agree to formally provide relevant ATCM documentation to the IMO to inform the development of the work to take forward Step 2.

References

This paper was written by Sian Prior.

-MSC / Circ. 1056 MEPC / Circ. 399 Guidelines for Ships Operating in Arctic Ice-covered Waters. 23 December 2002.
-Resolution A.1024(26) Guidelines for Ships Operating in Polar Waters. Adopted 2 December 2009.
-Republic of Liberia. 26 March 2009. Decision of the Commissioner of Maritime Affairs and the Report of Investigation in the Matter of Sinking of Passenger Vessel EXPLORER (O.N. 8495) 23 November 2007 in the Bransfield Strait near the South Shetland Islands.
-Category A: ships designed for operation in polar waters at least in medium first-year ice, which may include old ice inclusions; Category B: ships not included in Category A, designed for operation in polar waters in at least thin first-year ice, which may include old ice inclusions; and Category C: ships designed to operate in open water or in ice conditions less severe than those included in Categories A and B.
-MSC 95/21/11 Request for data on incidents within polar waters. Submitted by Friends of the Earth International (FOEI) and Pacific Environment.
-MSC 94/3/17 Category C ships in the draft Polar Code. Submitted by Friends of the Earth International (FOEI), Pacific Environment and the Clean Shipping Coalition (CSC).
-DE 55/12/3 Environmental considerations for the development of the Polar Code. Submitted by New Zealand.
-DE 55/12/5 Draft proposal for a environmental protection chapter for inclusion in the Polar Code. Submitted by Norway.
-DE 54/INF.5 Environmental aspects of emissions and discharges from shipping during regular operation in polar areas. Submitted by Norway.
-DE 54/13/7 Environmental aspects of the Code. Submitted by Norway.
-DE 54/INF.5 Environmental aspects of emissions and discharges from shipping during regular operation in polar areas. Submitted by Norway.
-ATCM XXXVII IP70 Management of Vessels in the Antarctic Treaty Area. Submitted by ASOC.
-ATCM XXXIV IP91 Vessel Protection and Routeing – Options Available to Reduce Risk and Provide Enhanced Environmental Protection. Submitted by ASOC.

*

CLIMATE CHANGE 2015: A REPORT CARD

ASOC

ABSTRACT

ASOC annually composes a climate change report card to present a summary of up-to-date scientific findings about current and future climate change in the Antarctic. In it, we reviewed environmental changes including temperature, ice sheets and glaciers, sea ice, ocean acidification, and species impacts. This year, we introduce a new category of "blue carbon" reflecting the uptake of carbon by krill.

Climate change in Antarctica is happening now—it is not a future event. This makes scientific research in Antarctic worthy of the highest support possible. However, climate change in Antarctica is not simply a matter of scientific understanding. If we want to protect the Antarctic and its ecosystems, the Antarctic Treaty Consultative Parties should seek solutions that enable, to the greatest possible extent, the adaptation of the Antarctic environment to climate changes on the continent and work to limit future climate change through international agreements.

KEYWORDS

Antárctica, climate change.

Overview

	Overview of research focus	In Sum	Changes from Last Year
Temperature	Surface temperatures on continent	Warming overall	Similar, with extreme temperature event
Ice Sheets and Glaciers	Current and future ice sheet behavior	Instabilities in WAIS, new research on EAIS instabilities, contributing incrementally to sea level rise	Big gains in scientific research, further SLR contributions expected
Sea Ice	Sea ice expansion and thickness	Sea ice extent in Antarctica is expanding for a net positive growth, though regional variation exists	Similar, research continues
Ocean Acidification	Impacts of acidification on invertebrates	Acidification has different effects on different species, but future conditions may be disastrous	More data on individual species' responses to predicted future acidic conditions
Blue Carbon	The role of organisms in the global carbon cycle	Krill are both a carbon sink and play a role in nutrient cycling	New analysis of how krill affects carbon cycling
Impacts on Antarctic Species	Habitat changes and trends in populations	Climate change can impact habitats on a micro and macro level. Adélie penguins are declining on the Peninsula.	Data synthesis on habitat impacts identifies key gaps in data. Better data is available to understand penguin population trends.

Antarctic Climate Changes

Temperature

Antarctica made headlines on March 24, 2015 with its highest ever temperature recording: 17.5 degrees C at Esperanza Base (Argentina), located on the northern tip of the Antarctic Peninsula. This reading broke the record of 17.3 degrees C set on March 23, 2015 at nearby Marambio Base (Argentina). While single temperatures do not indicate a pattern and the bases are located outside of the Antarctic Circle, the extreme temperature is noted in relationship to broader climatological observations.

Like the rest of the Earth, Antarctic surface temperatures have increased since the 1950s. However, in Antarctica, IPCC assessors assign low confidence to this warming being anthropogenic, due to

large observational uncertainties, such as the wide dispersal of instruments around the continent. Statistical significance of temperature observations is currently being debated in peer-reviewed literature. , , For the rest of the planet, anthropogenic sources are "extremely likely" to be the cause of temperature increases.

In sum: Antarctic surface temperatures have been increasing [warming] overall for several decades. Antarctic temperature data is challenging to analyze due to patchy observations and instrumentation. The continent experienced record-setting high temperatures in March.
Changes from last year: similar, with an extreme temperature event.

Ice sheets and glaciers

Understanding glacial dynamics relies both on observational data as well as models about the future behavior of the ice sheet.

Historically, observational data has provided only a small contribution from the Antarctic Ice Sheets—comprised of the larger, land-based East Antarctic Ice Sheet (EAIS) and the smaller, marine-based West Antarctic Ice Sheet (WAIS)—to global sea level rise. Observational data indicates that the Antarctic (and Greenland) ice sheets are losing mass, and that this loss is accelerating.

Ice sheet models have been deemed highly uncertain and seemed to indicate relative ice sheet stability in the short- to mid- term. However, the last year brought new research that changes this perception.

Two 2014 publications suggest that parts of WAIS may already be experiencing accelerated disintegration (i.e, collapse). In the first, Joughin et al. have created a model and run simulations of the Thwaites Glacier Basin, West Antarctica, that indicate a faster melt rate and disintegration than previous studies predict. The authors state, "the similarity between our highest melt rates and present observations suggests that collapse may be closer to a few centuries than to a millennium." This study also notes that uncertainties are increased due to the standard decoupling of ice sheet models to broader global climate models. Future coupling of ice sheet models to those of the rest of the Earth's system are likely to improve certainties.

In the second article, Rignot et al. analyze observational data from Earth Remote Sensing (ERS-1/2) satellite radar interferometry from 1992 to 2010. They look at Thwaites, above, alongside the nearby Pine Island glacier, Haynes glacier (also included in the Joughin et al. study), and the Smith/Kohler glaciers. Their data show that each of these glaciers are already experiencing significant retreat, measured in distance as:

* Pine Island Glacier retreated 31km at its center, with rapid retreat from 2005-2009, the timeframe "when the glacier ungrounded from its ice plain."
* Thwaites Glacier retreated 14km in its center and 1-9km along the side.
* Haynes Glacier retreated 10km along its sides.
* Smith/Kohler Glacier retreated 35km retreat along its ice plain, with pinning points (locations where the glacier is buttressed onto land) vanishing.

According to the authors, "we conclude that this sector of West Antarctica is undergoing a marine ice instability that will significantly contribute to sea level rise in decades to centuries to come."

This statement is particularly important when we consider it alongside the IPCC's most recent projections for sea level rise. In the IPCC's two middle-of-the-road Representative Concentration Pathways (RCP), a likely 2100 sea level rise falls between 0.26m-0.82m, with their higher-end RCP under 1m by 2100.

Nonetheless, an IPCC footnote carries an important caution that actual sea level rise could be much higher based on the response of the Antarctic ice sheet to warming:

Based on current understanding (from observations, physical understanding and modelling), only the collapse of marine-based sections of the Antarctic ice sheet, if initiated, could cause global mean sea-level to rise substantially above the likely range during the 21st century. There is medium confidence that this additional contribution would not exceed several tenths of a meter of sea level rise during the 21st century.

The findings of Rignot et al. (2014) and Joughin et al. (2014) concur that, though disintegration does seem to be in process in parts of the WAIS, disintegration is not as fast as the colloquial term "collapse" might indicate. However, this modest 21st century contribution indicates an irreversible process that holds meters of potential sea level rise in a slightly longer timescale.

While the researchers above focused their findings in an Antarctic area known for glacial dynamism, whole-continent remote sensing afforded a more comprehensive overview of glaciers in other places. McMillan et al. used radar altimetry data from CyroSat-2 to study elevation changes over the whole continent. They found that West Antarctica lost 134 +/-27 Gt/ yr, the Antarctic Peninsula lost 23 +/- 18 Gt/ yr, and East Antarctica lost 3 +/-36 Gt/yr. While accumulation rates (which are increasing in the Antarctic) must be taken into account with this numbers, the authors conclude that Antarctic ice sheets annually contribute 0.45 +/- 0.14 mm to global sea level.

Another recent study examines increasing dynamism at the Totten Glacier, East Antarctica. Totten Glacier is similar to WAIS in that it is a marine-grounded ice sheet and therefore interacts directly with the ocean. Researchers Greenbaum et al. note that Totten contains 3.5m potential global sea level rise and have identified ocean water intrusion into the underside of the glacier. Totten Glacier has been thinning recently and will remain a point of research interest for East Antarctic instability in the near future.

Pairing these rate increases with the new research on signals of upcoming and occurring dynamical events indicates that Antarctic ice sheet research is strong, and the environmental implications of their findings are serious.

In summary: Antarctic ice sheets are contributing to global sea level increases. Major research breakthroughs indicate some events are occurring now, increasing global sea level rise estimates for this century and beyond.

Changes from last year: Big gains for both scientific understanding and in projections for our world's coastlines.

Sea ice

The increase of sea ice extent in parts of Antarctica garners a lot of attention and press coverage. Current climate models, including CMIP5, predict Antarctic sea ice decreases, which suggest some uncertainties or errors in these models.

Between 1979-2012, Antarctic sea ice extent has increased 1.2-1.8% per decade. However, the IPCC notes that "there is high confidence that there are strong regional differences in Antarctica, with extent increasing in some regions and decreasing in others."

Simmonds (2015) analyzes satellite data to compare Arctic and Antarctic sea ice extent and discusses possible reasons for the discrepancy, including changes in atmospheric circulation. He notes that no answer has yet been agreed upon, though there continues to be substantial speculation and research about the role of freshening as ice sheets melt.

The role of wind—and how wind patterns change under anthropogenic warming—is also a piece of the conversation about Antarctic sea ice extent. A recent modeling study found a correlation between wind intensification and sea ice extent. Also, modeling studies involving both the role of wind as well as sea ice thickness—a characteristic of sea ice not well observed—are helping to provide more points of analysis into understanding Antarctic sea ice increases.

In summary: There are regional differences in Antarctic sea ice extent, though the overall trend is significant positive growth. There is no clear scientific explanation for this phenomenon.

Changes from last year: Similar, research continues.

Ocean acidification

It has been established that ocean acidification (OA) may affect wintertime levels of calcium carbonate in the Southern Ocean as early as early as 2030, making this one of the most urgent problems for the Antarctic. Furthermore, recent evidence suggests that ocean acidification caused the mass extinction event at the Permo-Triassic Boundary (252 million years ago), under conditions that might occur on earth again in the near future. Thus it is critical that researchers obtain more information to be better able to predict these changes. One analysis indicates that declining carbonate levels in the Southern Ocean have been mirrored by a reduction in calcification rates in the Indian and Pacific sectors of the Southern Ocean. The calcification rate has increased in the Atlantic sector, probably resulting from the Polar Front moving further south, which could have created more favourable conditions for calcifying coccolithophores.

Though these results indicate that ocean acidification is causing measurable changes already in some parts of the Southern Ocean, it remains to be seen how individual species will react. The Antarctic

brachiopod Liothyrella uva appears to be able to maintain growth rates and continue to repair its shell at pH levels predicted to occur in 2050 and 2100. However, only adult L. uva were studied, so it is unknown how larval stages might react, and larvae may be particularly vulnerable. Larval stages of other calcifying invertebrates such as echinoderms and bivalves may be particularly vulnerable to OA's effects. Thus it is important to study the effects of OA throughout an organism's life cycle. Research on the common Antarctic sea urchin, Sterechinus neumayeri, found that although embryos were not significantly affected, larvae in CO2 conditions that will occur by 2100 grew smaller than those exposed to current conditions. However, the study only monitored larval development for 30 days, so how the conditions would have affected subsequent growth is unknown. Another study on adult S. neumayeri found that adults could adapt to higher pH conditions over a period of 6-8 months, with normal spawning. Again, however, the study did not follow larvae through the entire development process.

Pteropods, or zooplanktonic sea snails, are also vulnerable because they have thin shells at risk of dissolution in a more acidic ocean with less calcium carbonate available. An analysis of pteropods collected in sediment traps from 1997-2007 showed differing responses to decreasing aragonite (a form of calcium carbonate) from different taxa. Interestingly, Limacina helicina Antarctica forma Antarctica, one of the most abundant in circumpolar waters, showed lighter shells as expected, but by a greater amount than would be expected by the decline in aragonite levels in that period, suggesting that other factors may exacerbate the effects of ocean acidification.

In summary: Ocean acidification, though likely to cause significant changes in Southern Ocean marine foodwebs, may not have immediate effects. There will likely be much variation between species and between regions.

Changes from last year: Research is showing a variety of impacts on vulnerable organisms that are not as negative as might be expected, but some critical life-cycle stages have not been assessed. Nevertheless, research into acidification occurring under similar circumstances 252 million years ago resulted in mass extinction, so a precautionary approach is desirable.

Blue Carbon

It is well-known that the Southern Ocean is a large carbon sink and is a key part of the carbon cycle. It is also well-known that Antarctic krill (Euphausia superba) are likely to be affected by climate change and ocean acidification, and that this may cause problems for the many krill-dependent predators in the Southern Ocean. However, the role that Antarctic krill may play in the global carbon cycle has not been adequately considered to date. A recent report on open ocean carbon stores by the International Union for the Conservation of Nature found that 2.3 x 1013 g carbon are taken up by krill annually. This is equivalent to the weight of 15.2 million cars or about 0.26% of anthropogenic CO2 emissions. Additionally, due to their large numbers, krill may be a factor in other aspects of the carbon cycle, likely by bringing nutrients from benthic sediments to the ocean surface. These findings point to the need for a holistic approach to understanding climate change in Antarctica, particularly for species such as krill that play a variety of roles in the ecosystem, from prey item to carbon sink.

In summary: Examining Antarctic's role in the carbon cycle reveals that krill are an important part of the cycle.

Changes from last year: Quantification of krill's carbon sequestration ability, and hypotheses about other roles it may play in the carbon cycle by bringing nutrients from the seafloor to the surface.

Impacts on Antarctic Species

The Southern Ocean Sentinel workshop held in 2012 produced an important review paper in late 2014 that summarized the state of knowledge on the effects of physical habitat changes on species. The paper highlights the full range of climate change impacts, including those that may receive less media attention. For example, although sea ice extent and its impact on ice-associated species such as penguins and seals is a topic of significant interest for those studying Antarctic species facing climate change, relatively less attention is given to other aspects of Antarctic habitats such as ocean currents and even localized eddies. Appreciating the full range of habitat changes and their impacts on species (and even each other) is a difficult task. Unfortunately, as is indicated in the paper, there are large gaps in our knowledge of how many species will respond to those factors. Recommendations from the workshop for addressing these gaps are to study:

- How plankton (primary producers) would react in changed habitats;
- How invertebrate life cycles will be affected by changes in primary production and temperature;
- How seasonal food consumption affects bird and mammal reproduction; and
- How seals and birds might be affected if their prey moves to other locations.

Moving from the general to the specific, the "first global census" for Adélie penguins was released. Adélies are thought to be vulnerable to climate change and so are an important indicator species. The census, which was conducted using satellite imagery, indicates that there are significantly more penguins than previously estimated, with the current total found to be approximately 3.79 million breeding pairs. Overall, Adélies are, as expected, declining in the Peninsula and increasing in East Antarctica (although in some areas of the East Antarctic they are decreasing). A study focusing on Adélies in the Ross Sea region found population declines associated with increases in sea ice as well, but recently have been doing better, perhaps due to the removal of Antarctic toothfish, which eats some of the same prey as penguins. This provides further evidence that there is an optimum amount of sea ice for Adélies, and that they will generally have trouble adapting to changes in ice extent caused by climate change. In the future, the Ross Sea will probably be a climate refuge as the Peninsula first loses most of its sea ice. Finally, a review of all penguin species notes that marine reserves that are large enough to protect penguins at all stages of their lifecycle, will help penguins maintain resilience in the face of climate change.

In sum: Antarctic species are facing changing environmental conditions, the impacts of which are not well understood. Adélie penguin populations are declining on the Antarctic Peninsula. Marine reserves can help penguin populations as they adjust to climate change.

Changes from last year: A synthesis of the knowledge on how species respond to habitat changes is

available, indicating critical data gaps. Better data on Adélie penguins is available to help understand the changes to this key species.

Conclusions

In summary, Antarctic scientists continue to provide robust research in many key areas of climate change, improving our understanding of environmental changes already underway, as well as those predicted.

Nonetheless, there remain significant gaps between what scientists know about climate change with high certainty and what policy makers are willing to do to respond to this knowledge, including the establishment of protected areas that can serve to build resilience and to serve as scientific reference areas. While international climate policy is the domain of the United Nations Framework Convention on Climate Change, ASOC urges ATCPs to:

1. implement logistics in ways that are as environmentally sustainable as practicable.
2. continue supporting world-class Antarctic scientific research and share the results to the scientific community as well as broader public.
3. adapt management plans to reflect changing conditions in some areas of the Antarctic.
4. energetically support the goals of the multi-year strategic work-plan on climate change.

References

-This paper was written by Jessica O'Reilly and Claire Christian with reviews by Mark Epstein, R. M. Roura and Barry Weeber.
-http://news.nationalgeographic.com/2015/03/150331-antarctica-hottest-temperature-climate-change-global-warming-science/.
-IPCC Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)] ICC, Geneva, Switzerland (2014).
-IPCC 2014, page 5
-Bromwich, David H., et al. "Central West Antarctica among the most rapidly warming regions on Earth." Nature Geoscience 6.2 (2013): 139-145.
-Bromwich, David H., and Julien P. Nicolas. "Reply to 'How significant is West Antarctic warming?'." Nature Geoscience 7.4 (2014): 247-247.
-Bunde, Armin, et al. "How significant is West Antarctic warming?." Nature Geoscience 7.4 (2014): 246-247.
-IPCC 2014, page 4.
-IPCC 2014, page 42
-Joughin, Ian, Benjamin E. Smith, and Brooke Medley. "Marine ice sheet collapse potentially under way for the Thwaites Glacier Basin, West Antarctica." Science 344.6185 (2014): 735-738, page 738.
-Rignot, Eric, et al. "Widespread, rapid grounding line retreat of Pine Island, Thwaites, Smith, and Kohler glaciers, West Antarctica, from 1992 to 2011." Geophysical Research Letters 41.10 (2014): 3502-3509, page 3502.
-Rignot et al. 2014, page 3508
-IPCC 2014, page 11

-McMillan, Malcolm, et al. "Increased ice losses from Antarctica detected by CryoSat's 2." Geophysical Research Letters 41.11 (2014): 3899-3905.
-Greenbaum, J. S., et al. "Ocean access to a cavity beneath Totten Glacier in East Antarctica." Nature Geoscience 8.4 (2015): 294-298.
-Turner, John, et al. "An initial assessment of Antarctic sea ice extent in the CMIP5 models." Journal of Climate 26.5 (2013): 1473-1484.
-IPCC 2014, page 4.
-IPCC 2014, page 4.
-Simmonds, Ian. "Comparing and contrasting the behaviour of Arctic and Antarctic sea ice over the 35 year period 1979–2013." Ann. Glaciol 56 (2015): 18-28.
-Holland, Paul R., and Ron Kwok. "Wind-driven trends in Antarctic sea-ice drift." Nature Geoscience 5.12 (2012): 872-875.
-Zhang, Jinlun. "Modeling the impact of wind intensification on Antarctic sea ice volume." Journal of Climate 27.1 (2014): 202-214.
-Holland, Paul R., et al. "Modeled trends in Antarctic sea ice thickness." Journal of Climate 27.10 (2014): 3784-3801.
-Ben I McNeil and Richard J Matear, 'Southern Ocean Acidification: A Tipping Point at 450-Ppm Atmospheric CO2.', Proceedings of the National Academy of Sciences of the United States of America, 105 (2008), 18860–18864.
-M. O. Clarkson and others, 'Ocean Acidification and the Permo-Triassic Mass Extinction', Science, 348 (2015), 229–232.
-Natalie M Freeman and Nicole S Lovenduski, 'Decreased Calcification in the Southern Ocean over the Satellite Record', Geophysical Research Letters, 2015, 1–7.
-Ibid.
-Emma L. Cross, Lloyd S. Peck and Elizabeth M. Harper, 'Ocean Acidification Does Not Impact Shell Growth or Repair of the Antarctic Brachiopod Liothyrella Uva (Broderip, 1833)', Journal of Experimental Marine Biology and Ecology, 462 (2015), 29–35.
-Haruko Kurihara, 'Effects of CO2-Driven Ocean Acidification on the Early Developmental Stages of Invertebrates', Marine Ecology Progress Series, 373 (2008), 275–284.
-Pauline C Yu and others, 'Growth Attenuation with Developmental Schedule Progression in Embryos and Early Larvae of Sterechinus Neumayeri Raised under Elevated CO2.', PloS one, 8 (2013), e52448.
-Coleen C Suckling and others, 'Adult Acclimation to Combined Temperature and pH Stressors Significantly Enhances Reproductive Outcomes Compared to Short-Term Exposures.', The Journal of animal ecology, 2014 .
-Donna Roberts and others, 'Diverse Trends in Shell Weight of Three Southern Ocean Pteropod Taxa Collected with Polar Frontal Zone Sediment Traps from 1997 to 2007', Polar Biology, 2014, 1445–1458.
-Roberts and others.
-So Kawaguchi and Steve Nicol, 'Antarctic Krill', in The Significance and Management of Natural Carbon Stores in the Open Ocean, ed. by Dan Laffoley and others (Gland: IUCN, 2014), pp. 69–78.
-D. Laffoley and others, The Significance and Management of Natural Carbon Stores in the Open Ocean, 2014.
-Kawaguchi and Nicol.
-Andrew J. Constable and others, 'Climate Change and Southern Ocean Ecosystems I: How Changes in Physical Habitats Directly Affect Marine Biota', Global Change Biology, 2014, 3004–3025 <doi:10.1111/gcb.12623>.
-H. J. Lynch and M. a. LaRue, 'First Global Census of the Adélie Penguin', The Auk, 131 (2014), 457–466 <doi:10.1642/AUK-14-31.1>.

-Phil O B Lyver and others, 'Trends in the Breeding Population of Adélie Penguins in the Ross Sea, 1981-2012: A Coincidence of Climate and Resource Extraction Effects', PLoS ONE, 9 (2014), 1–10.
-Lyver and others.
-Phil N. Trathan and others, 'Pollution, Habitat Loss, Fishing, and Climate Change as Critical Threats to Penguins', Conservation Biology, 00 (2014), 1–11.

*

The Antarctic Treaty System, Climate Change and Strengthened Scientific Interface with Relevant Bodies of the United Nations Framework Convention on Climate Change (UNFCCC)

ASOC

ABSTRACT

The Antarctic – in its scientific research of climate changes occurring in the region, including documentation of the first significant impacts of climate change, and increasing evidence that those changes will impact the entire globe, for example through sea-level rise and changes in ocean circulation patterns – figures broadly in our global understanding of anthropogenic climate change. As such, the Antarctic Treaty System has an important role to play in promoting the relevance of climate-related Antarctic research to the climate change community, including the United Nations Framework Convention on Climate Change (UNFCCC), in accordance with the intent of Art. III of the Antarctic Treaty, particularly Art III (1)(c) and Art. III (2), as well as Art. II(3)(c) of CCAMLR. ASOC urges better realization of this role for the ATCM and its scientific bodies, most notably the CEP and SCAR. This could be similar to the regular input by the relevant Arctic Council working groups in updating climate-relevant research to the broader climate community. ASOC also urges the ATCM to take all possible actions to address climate change in the Antarctic region, including through focused dialogue with CCAMLR.

Keywords

Antarctica, climate change, United Nations framework Convention on Climate Change.

Fully Realizing the ATS Role

1. Timely and Appropriate Communication of Antarctica's Importance to Climate and Relevant New Research

At the request of the XXXII ATCM, the ATCM Chair (the United States) wrote a letter to the President of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCC) transmitting the Review Report on Antarctic Climate Change and the Environment (ACCE) prepared by the Scientific Committee on Antarctic Research (SCAR), along with two ministerial declarations from that XXXII ATCM. This letter was delivered in advance of the key 15th Conference of Parties (COP) in Copenhagen later that year. Similarly, an update of the SCAR ACCE was transmitted in 2010 to the President of the COP, as well as the Executive Secretary of the Intergovernmental Panel on Climate Change Secretariat (IPCC); the Secretary General of the World Meteorological Office (WMO); and the Secretary General of the International Maritime Organization (IMO);

ASOC recommends that such communications from the ATCM to the UNFCCC and other relevant UN bodies become a regular occurrence, consistent with developments in Antarctic research and with a mind to key junctures in UNFCCC negotiations. We note that the Arctic Council has also conducted such communications, for example prior to the Montreal COP (COP-11, 2005) as well as COP-15 in Copenhagen (2009). In particular, climate change-related decisions made at the ATCM should be communicated.

Given the importance of the upcoming Conference of Parties in Paris (COP-21), ASOC suggests that the XXXVIII ATCM consider such a communication including statements from relevant ATCM declarations, for example highlighting the pace of climate change impacts indicated by Antarctic research since the IPCC Fifth Assessment, such as that regarding the future stability of the West Antarctic Ice Sheet (WAIS).

ASOC also strongly supports the Resolution offered by the United Kingdom and Norway in WP16.

2. Strengthened Science/ Policy Interface.

SCAR has held side events and produced an Information Paper to report on their attendance at UNFCCC meetings (for example, ATCM XXXVII IP39), and has also hosted or participated in side events at various UNFCCC meetings, thus bringing awareness of relevant Antarctic science to climate negotiators and the general public. ASOC applauds such efforts to highlight important research to the ATCM, as well as efforts to keep the ATCM apprised of Antarctic-relevant scientific developments under the UNFCCC and Intergovernmental Panel on Climate Change (IPCC), and recommend that this reporting be strengthened. Possible improvements could include requesting annual reporting from the ATCM on Antarctic-related matters at international climate meetings, making UNFCCC and IPCC reports available at the ATCM, or inviting IPCC authors (such as Antarctic scientists of Working Group I – the Physical Science Basis, or those of the Polar Regions chapter in Working Group II – Vulnerability of Socio-

economic and Natural Systems) to present at the ATCM.

3. Focused Attention on Climate Change in the Antarctic.

The ATCM has worked for several years on a Multi-Year Strategic Workplan on climate change. To complement these efforts, ASOC recommends focused attention on ways to address and respond to climate change impacts in the Antarctic, including:

a. Climate impacts and mitigation as part of the EIA process and the establishment of a representative network of protected areas;
b. Strategic planning linking protected areas and climate change, including resilience planning and scientific reference areas;
c. Continued strong support for climate science research in the Antarctic; and,
d. Continued dialogue with CCAMLR that focuses on addressing climate change in the Antarctic region, including protected areas in the Southern Ocean, strategic planning, and climate science research.
e. Ensuring that relevant climate research of global significance is incorporated into decisionmaking by ATCM parties.

References

This paper was written by Jessica O'Reilly with reviews by Claire Christian, Lyn Goldsworthy, Pam Pearson, Ricardo Roura and Barry Weeber.

*

Journal of
Antarctic Affairs

Contributors

Ron Naveen
Ron Naveen, the founder and CEO of Oceanites, an organization dedicated to raising public awareness of the world´s living marine resources, is the project director of the Antarctic Site Inventory. He is the author of Wild Ice and The Oceanites Site Guide to the Antarctic Peninsula.
E-mail: oceanites@icloud.com

Esteban Barrera Oro
Esteban Barrera Oro is a biologist with an undergraduate degree from the University of Buenos Aires and a doctorate in Natural Sciences from the University of Bremen, Germany. He is Director of the Ichthyology Project at the Argentine Antarctic Institute, as well as a researcher for CONICET, with the laboratory in the Ichthyology Division of MACN Bernardino Rivadavia in Buenos Aires. He is a member of the Argentine Delegation for the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), being a Representative of the Scientific Committee and advisor to the Commission. He has published papers on Antarctic fish with relation to general ecological themes (feeding, reproduction, age and growth, interaction with predator) and conservation (impact of commercial fishing). He has participated in numerous Antarctic campaigns, mainly in the area of the South Shetland Islands and the Antarctic Peninsula.
E-mail: ebarreraoro@dna.gov.ar

Nighat Amin
Graduated in Environmental Chemistry from the University of Sussex, England. Worked for several years at the European Commission Directorate General for Research on setting up partnerships between industry, academia and institutes to deliver innovation. Worked as an analyst of European environmental legislation in Brussels, and helped to set up the International Polar Foundation in 2002. Was involved in launching the Princess Elisabeth Station project in 2004, and contributed actively to the zero state analysis of the site, the conception, construction and operational phases, becoming Station Manager after the inauguration in 2009.
E-mail: gg@polarfoundation.org

Cristina Montalbán
Cristina Montalbán holds degree in Historical Sciences from the Faculty of Humanities and Sciences of the Republic (Montevideo, Uruguay). She is the Technical Sub-Director

of the Center for Naval and Maritime History. She has been involved in the Meetings of Antarctic Historians since 1999, and has submitted to each meeting previously unpublished papers. One of them "Two Homonyms and a Single Destination: South Orkney," was published in 2003 for the First Centenary of the Weather Observatory of South Orkney, by the National Directorate of the Argentine Antarctic.
E-mail: cristmon@adinet.com.uy

Gabriela Roldán
Gabriela Roldán is a native of Argentina with a strong passion for Antarctica. Living in Ushuaia, the world's southernmost town, sparked Gabriela's personal and academic interests in Antarctica, where she has visited over thirty times. Gabriela's Antarctic experience has led her to take on a variety of roles within the Argentine Antarctic Programme and regional government, ranging from training Antarctic personnel to assisting policy makers on Antarctic Tourism matters. Antarctic Education Programmes for children and Community Engagement with Antarctic matters are pillar projects that Gabriela has been developing for almost twenty years, not only in her native country but also in Christchurch, taking on the role of Education Manager at the International Antarctic Centre. An avid and curious traveler, Gabriela lectures regularly on Antarctic cruise ships on South American and Antarctic current affairs and politics. Gabriela has a degree in Tourism Management from Universidad de la Patagonia (Argentina), she has completed a Postgraduate Certificate in Antarctic Studies (PCAS, University of Canterbury) and she is currently doing a PhD at Gateway Antarctica, University of Canterbury (Christchurch, NZ).
E-mail: gabriela.roldan@pg.canterbury.ac.nz

Pablo Fontana
Pablo Fontana holds a degree in History from the University of Buenos Aires. It was also in this university that he completed his doctorate in history. He was a fellow of the National Council of Scientific and Technical Research (CONICET) and on two occasions for the German Academic Exchange Service. He currently serves as a historian for the National Directorate of the Antarctic-Argentine Antarctic Institute. Among his publications is the book, The Antarctic Battle: The Conflict for the Sixth Continent 1939-1959.
E-mail: fontana.pablo@gmail.com

Claire Christian
Claire Christian is the Secretariat Director of the Antarctic and Southern Ocean Coalition, the only organization working full-time to protect Antarctica. Claire aims to educate and inspire people around the world to protect the Antarctic continent and its surrounding ocean.
E-mail: claire.christian@asoc.org

Contributors

Howard Weir
Howard has an Master of Arts in global environmental policy from American University. He has worked on a number of marine issues over the years, primarily focusing on the polar climates of the Arctic and Antarctic. Currently he works with the Antarctic and Southern Ocean Coalition as a research assistant.
E-mail: howard.weir@asoc.org

Matías Sodor
Matías Sodor is a journalist specializing in international issues. He is founder of the project Antártida Urbana, where he editeS www.antártidaurbana.com, and is also a columnist for the radio program of the same name. He produced the documentaries "Esperanza Station" and "Antarctica, Life on the Ice," on the Antarctic Argentine bases Esperanza and Carlini.
E-mail: msodor@gmail.com

*

Journal of Antarctic Affairs

Rules of Publication

Articles

- The articles, which are unpublished, have a maximum length of 7,500 words, including footnotes and bibliography page, even shorter extensions appreciate. You should not use too many references. The abstract should not exceed 300 words. Each article should be preceded by five key words.
- The articles should be written in Spanish or English.
- It will assess the inclusion of charts and graphs that support the thesis developed in the article.
- You should see the name of the author/s on the first page, along with their academic qualifications and university official, institution or company in which they are employed and e-mail.
- References appear at the end of the article under the heading References, arranged alphabetically by authors and according to the following order: name (lowercase) of author, initials of the last names, year of publication (in brackets and distinguishing, b, c, in the event that the author has more than one work cited in the same year), title of article (in quotation marks) and title of the journal to which the article belongs (in italics or underlined).
- There should be no spelling or grammatical errors. The contents of the articles should be carefully read and reviewed prior to shipment.
- The originals will be published electronically in "Word" or compatible and color.
- The images of the publication will be sent in jpg format.
- The magazine reserves the right to edit and correct items, including certain portions separate and square up the particularly relevant or bold text, respecting the spirit of the original.
- The selection of the published articles is decision of the Editorial Board of the Journal of Antarctic Affairs.
- There is no charge for publication.

REVIEWS

- The reviews, which are unpublished, have a maximum length of 2.500 words. It should be a short comment of a book, movie or pubblication related to the Antarctic continent or the Southern Ocean.
- The title of the article should be expressed both in Spanish and English.
- Reviews should be written in Spanish or English.
- Authors shoud sign the review along with their institutional affiliation and e-mail address.
- References appear at the end of the article under the heading References, arranged alphabetically by authors and according to the following order: name (lowercase) of author, initials of the last names, year of publication (in brackets and distinguishing , b, c, in the event that the author has more than one work cited in the same year, title of article (in quotation marks) and title of the journal to which the article belongs (in italics or underlined).
- There is no charge for publication.

*

Volume II - September 2015

Journal of Antarctic Affairs

www.agendaantartica.org

AGENDA ANTARTICA

Antarctic and Southern Ocean Coalition

www.asoc.org