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# AN EFFORT TO MAKE THE IMPOSSIBLE POSSIBLE – MANAGING ANTARCTICA FOR CLIMATE CHANGE

**Birgit Njåstad**

## ABSTRACT

*Antarctica is set aside as a reference area for science and monitoring, as is clearly underlined in the Environmental Protocol. Anthropogenic climate change is already having an impact in Antarctica and will in the future likely to be the most important factor threatening the values held in this unique nature reserve. While climate change over the last 5-10 years has been a top priority issue in the work of the Committee for Environmental Protection, this has not always been the case. This article explores the evolution of CEP's climate change discussions over the years and how the Committee has worked to organize and prioritize its efforts in this regard. Through the Committee's continued efforts to develop climate change strategies and actions the Antarctic Treaty Parties will be better placed to maintain the values of the Antarctic nature reserve in the face of climate induced environmental change.*

## KEY WORDS

**Antarctic, Environmental Protocol, CEP, policy, climate change.**

## INTRODUCTION

The Parties to the Antarctic Treaty, through the adoption of the Protocol on Environmental Protection to the Antarctic Treaty (1991), the Environmental Protocol, set aside Antarctica as a nature reserve, and thereby committed themselves to comprehensive protection of the Antarctic environment, as well as dependent and associated ecosystems<sup>1</sup>. Antarctica as a nature reserve differs from the traditional concept of nature reserves<sup>2</sup> in many respects, as the emphasis is on protection of the whole suite of environmental values present in the entire area<sup>3</sup> rather than specific and/or rare values in a relatively limited geographic area. But as the case is for many nature reserves, also Antarctica is set aside as a reference area for research on and monitoring of processes of both regional and global importance, as is clearly underlined in the Environmental Protocol<sup>4</sup>. Whatever way one looks at it, it is clear that the protection objectives of the Environmental Protocol sets high aims for safeguarding Antarctica's unique environment into the future.

The Protocol holds a large collection of provisions that direct Parties in their effort to achieve this overarching protection objective. Key to this is the general environmental principle that all activities that are to take place in Antarctica have to be planned and conducted in such a manner that adverse effects on the environment are avoided<sup>5</sup>. This key requirement is supported by a large number of specific provisions that frames and guides all human activity in Antarctica for which advance notice is required in accordance with the Antarctic Treaty. Furthermore, the Environmental Protocol also stipulates a number of additional tools that the Parties can effectuate to strengthen protection where values may be at risk. The opportunity to designate specific areas as Specially Protected Areas<sup>6</sup> and species at risk as Specially Protected Species<sup>7</sup> are examples of such tools.

In adopting the Environmental Protocol, the Antarctic Treaty Parties also established an organizational structure to support their efforts in overseeing the implementation of this extensive legal framework. This was accomplished by including a provision establishing a Committee for Environmental Protection (commonly known as, and hereafter referred to as the CEP or the Committee), which would be mandated to provide advice and guidance to the Parties as how to maintain and reach the overarching goal of comprehensive protection<sup>7</sup>. In its advisory capacity the CEP also develops management tools for the consideration and adoption by the Treaty Parties, for example guidance for environmental impact assessments, conservation of flora and fauna, environmental monitoring, marine pollution, protected species, waste from past activities, historic sites and monuments, and more. The Committee guides and prioritizes its discussions on basis of a five-year work plan, in which it has identified high-priority environmental issues<sup>9</sup>.

Climate change has over the last 5-10 years been a top priority issue in the CEP five-year work plan. While it is clear that climate change is caused and aggregated by human activities and actions that take place elsewhere than in Antarctica itself, there is a clear and general agreement that anthropogenic climate change is already having an impact in Antarctica and is in the future likely to by far be the most important factor influencing the Antarctic environment (see Box 1), and thereby threatening the values held in the unique nature reserve that Antarctica is. However, climate did not have such a prominent place in the agenda at the start of the Committee's work. This article explores the evolution of CEP's climate change discussions over the years, and how the Committee has dealt with

the dilemma of having to manage for a major threat caused by actions and activities that lie outside the remit of the Committee's responsibilities.

### BOX 1

The climate system and the way it is changing is complex and dynamic, and there are many knowledge gaps to be filled to achieve a full and comprehensive understanding of how the changes will influence the overall environment. However, below are briefly described some recent observations that may be relevant to highlight as potential signals of climate change induced changes to the environmental values of Antarctica.

The recent IPCC Special Report on Oceans and Cryosphere in a changing Climate (IPCC, 2019) summarizes that the Southern Ocean is warming and being disproportionately and increasingly important in global ocean heat increase. Ocean warming here as elsewhere has contributed to observed changes in biogeography of organisms ranging from phytoplankton to marine mammals, consequently changing community composition, and in some cases, altering interactions between organisms.

While many continental regions of Antarctica have not exhibited significant change over the past century, in some parts of the Antarctic Peninsula, the annual mean air temperatures rose significantly between 1950 and 2000, although noting a recent pause in this atmospheric warming. The terrestrial Antarctic biota is characterized by considerable physiological and ecological flexibility and can generally speaking be expected to show increases in productivity, population sizes and ranges of individual species, and community complexity, while the establishment of non-native organisms (exacerbated by climate change) may present an even greater threat than climate change itself (see e.g. Convey and Peck, 2019).

Recent studies and observations relevant in context of impacts of climate change include<sup>10</sup>:

- Rapid changes in terrestrial vegetation in response to regional drying in the Windmill Islands, East Antarctica (Robinson et al. 2018).
- Two massive breeding failures in an Adélie penguin colony in Terre Adélie, East Antarctica, with no chicks surviving the 2013–14 and 2016–17 breeding seasons in years with crucial differences in the timing of sea-ice recession compared to other years (Ropert-Coudert et al. 2018).
- Indications that the main krill population centre between 20° and 80°W in the Southern Ocean experience a climate-related poleward contraction in its distribution over the last 90 years (Atkinson et al. 2019).
- Emperor penguins are shown to be highly sensitive to climate change, given their critical reliance on sea ice during breeding (e.g. Ainley et al., 2010; Jenouvrier et al., 2017).
- The risk of establishment of non-native species is likely to increase with climate warming. Most known Antarctic non-native species have been found within the Antarctic Peninsula

### BOX 1

region. Non-native invertebrate species have already begun to increase their distribution within Antarctica (Newman et al. 2014).

- Ice-free areas in Antarctica could expand by over 17,000 km<sup>2</sup> by the end of the century, close to a 25% increase, under the strongest IPCC forcing scenario (Lee et al., 2019). Most of this expansion would occur in the Antarctic Peninsula, where the availability and connectivity of biodiversity habitat would drastically change.

It is important to note that the implications of climate change for individual species over the short term can be both positive and negative, while the ecosystem balance would be expected to change in the longer term. Certain species and ecosystem components that define Antarctica as we know it today are under pressure, and as such threatens the aim of the Environmental Protocol in protecting Antarctica.

## THE JOURNEY TOWARD THE TOP OF THE PRIORITY LIST – PATH AND DECISIVE ACTIONS

When the Environmental Protocol came into force and the CEP had its first meeting in 1998, climate change had already started to become a clearly visible issue of global concern. IPCC had just released its second assessment report in 1995, and in 1997 the UNFCCC's Kyoto Protocol was adopted (coming into force in 2005). Nevertheless, despite the obvious key role climate has in shaping Antarctica, the CEP in its early years had very few dedicated discussions relating to climate change and its implication for the Antarctic environment, and judging by report language few connections were made between other conservation issues and the overarching climate change challenge in the setting of the Committee. In the first seven meetings the word “climate” is only found a handful times in total in the final reports from the Committee's meetings.

A small shift took place around 2005, after the release of IPCC's third assessment report in 2001 and the coming into force of the Kyoto Protocol in 2005, with an increasing focus on climate change challenges relating to a wide array of the agenda items discussed. At its meeting in Stockholm (Sweden) in 2005 the CEP had extensive discussions about its future work, including major issues facing the CEP currently and in the future. The records from these discussions show that “global environmental pressures, including climate change” was amongst those issues identified as needing further consideration<sup>11</sup>. The initial discussions in Stockholm were followed up by a dedicated CEP workshop on Antarctica's Future Environmental Challenges, held in conjunction with the Committee's meeting in Edinburgh (United Kingdom) in 2006, where climate change again was highlighted as an important external pressure for the Committee to consider in its future deliberations<sup>12</sup>.

At the tenth meeting of the Committee in New Delhi (India) in 2007 climate change jumped right to the top of issues that the Committee dedicated its attention to. Two important steps were

taken. Firstly, as a follow-up from the future challenge discussions that had taken place during the preceding CEP meeting, the Committee adopted its first (provisional) five-year workplan as a tool for it to prioritize topics it should focus its discussions and work on<sup>13</sup>. In this first workplan climate change was identified as an issue of high priority. Secondly, the Committee agreed to add climate change as a standing item on its agenda, albeit initially as a sub-item under its agenda item on Environmental Monitoring and Reporting<sup>14</sup>.

These important steps forward did not happen in a vacuum, but rather in the context of a number of major relevant global climate events and initiatives. It was just a few years after the Arctic Council in the north had concluded its important and very politically speaking impactful work on assessing climate change and climate change impacts for the Arctic<sup>15</sup>, it was the same year as IPCC released its fourth assessment report<sup>16</sup>, and it was in the run-up of the massive international scientific initiative, the International Polar Year 2007-08 which aimed amongst other to improve the general understanding of the critical role of the polar regions in global (climate) processes.

Thus there was a clear backdrop to the heightened focus on climate change in the Committee. There was an obvious motivation for making climate change visible on the agenda with a widening recognition of the importance and significance of climate change in Antarctica and the implications for the CEP's environmental management responsibilities in the continent. Although the Committee did agree to add climate change to the agenda, the idea of focusing more on climate change in the CEP did not come without hesitation amongst some Members. And in the discussions it was clearly indicated by some Members that attention on the issue of climate change should be restricted to the Antarctic context and not duplicate efforts by other international organizations such as the IPCC and UNFCCC. Nevertheless, climate change has since 2007 been an identified and prioritized topic for discussion at the Committee's meetings. This shift is also clearly reflected in a generally speaking increased number of relevant references to climate change in the final reports of the Committee's meetings. From 2011 climate change became a stand-alone item on the agenda - Climate Change Implications for the Environment.

## IDENTIFYING KEY ISSUES AND ORGANIZING THE DISCUSSIONS

The implications of climate change for the management of Antarctica are extensive and complex, and the CEP in many respects faced an enormous challenge in finding a direction and focus for its efforts. Two important initiatives were particularly important in assisting the Committee in shaping its direction.

Firstly, the Scientific Committee for Antarctic Research (SCAR) did a fundamentally important effort by collating and assessing all available scientific evidence on climate change and climate change impacts in the Antarctic through its Antarctic Climate Change and the Environment (ACCE) process, cumulating in an extensive report published in 2009 (Turner, J. et al.). This initiative was very much inspired by the work that had been undertaken by the Arctic Monitoring and Assessment Program (AMAP), a working group under the Arctic Council, a few years earlier in compiling and assessing the current Arctic climate and climate impact science in the Arctic Climate Impact Assessment (ACIA) report. The effort had proved to be substantial and groundbreaking for robust and evidence

based discussions on climate change issues in the north, and SCAR noted that the ACCE “should be taken as a companion to the Arctic Climate Impact Assessment published in 2005”<sup>17</sup>. Through the ACCE report SCAR presented the current understanding of the physical and chemical climate system of the Antarctic region, the way it varies through time, and the profound influence of that variation on life on land and in the ocean around the continent. It also examined predictions of how the system would evolve over the next century under conditions of increasing concentrations of greenhouse gases and recovery of the ozone hole. A summary of ACCE was prepared and submitted to the CEP at its meeting in Baltimore (the United States) in 2009. The Committee welcomed this assessment as an important scientific foundation for its climate related discussions, and both strongly encouraged further research to close important knowledge gaps and welcomed regular updates of the report to ensure that it at all times would have the best available science as basis for its discussions.

Secondly, the Antarctic Treaty Parties, at their meeting in 2009 (Baltimore, United States), decided on basis of advice from the CEP to arrange a separate meeting of experts on the implication of climate change for management and governance of the Antarctic region<sup>18</sup>. This Antarctic Treaty Meeting of Experts (Climate ATME) was held in Norway in April 2010. The meeting was mandated to examine a number of topics relevant to the issue of climate change in Antarctica, in particular key scientific aspects of climate change and consequences of such change to the Antarctic terrestrial and marine environment; implications of climate change to management of Antarctic activities; the need for monitoring, scenario planning and risk assessments; and the outcomes of the Copenhagen negotiations relevant for the Antarctic. The Climate ATME was highly successful and broadly attended meeting. The participants agreed that Antarctic climate change and the implications for governance and management in Antarctica was both a relevant and important topic to discuss under the Antarctic Treaty system and emphasized the importance of continuing the discussions on climate change issues in Antarctica. They also particularly emphasized the importance of the ACCE as a fundamental source of scientific information and the importance that the findings and recommendations of the report will play in further consideration of climate change issues in the Antarctic. A full 22 the 30 recommendations that came out of the Climate ATME were directly relevant for the CEP’s agenda and continued discussions and would in the years to come prove to provide invaluable guidance for the Committee.

The next major structural initiative taken by the CEP to tackle the complexity of the climate change discussions related to a key recommendation from the Climate ATME which had suggested that the CEP should consider developing a climate change response work program, incorporating for example management of non-native species, vulnerability of ASPAs in light of climate change and the suitability of existing management tools in a climate change context. In 2013, at its meeting in Brussels (Belgium) the Committee, in being presented with an update of the ACCE findings from 2009, noted the pace of change reported in the update and in this context recalled the Climate ATME recommendation regarding a response work program, and decided on this basis to initiate work in developing such a program<sup>19</sup>. Extensive discussions took place both during the meetings and through formal intersessional work, paving the way for the adoption of the Committee’s first Climate Change Response Work Programme (CCRWP) at the Committee’s meeting in Sofia (Bulgaria) in 2015. In adopting the CCRWP, the Committee noted that it identified actions consistent with its roles and functions, specifically focusing on addressing impacts of climate change in Antarctica and

not duplicating the climate change mitigation activities which were appropriately the responsibility of other bodies. The Committee agreed to retain the CCRWP as a separate document, to be flexible and dynamic, and to be updated annually as required<sup>20</sup>. The Antarctic Treaty Parties, welcoming the work and advice of the CEP, adopted a Resolution that same year, encouraging the CEP to begin implementing the CCRWP as a matter of priority, and provide annual progress reports to the Antarctic Treaty Consultative Meeting on its implementation<sup>21</sup>. Box 2 provides a summary of the CCRWP as it was adopted in 2015. Currently the implementation and review of the Climate Change Response Work Programme is a standing subitem on the CEP's agenda item on climate change.

**Box 2: CCRWP**

The Committee for Environmental Protection's Climate Change Response Work Programme has been developed with the following vision as basis:

Taking into account the conclusions and recommendations from the ATME on Climate Change in 2010, the CCRWP provides a mechanism for identifying and revising goals and specific actions by the CEP to support efforts within the Antarctic Treaty System to prepare for, and build resilience to, the environmental impacts of a changing climate and the associated implications for the governance and management of Antarctica.

Within a number of specific climate change issue areas (first column in table) the CCRWP identifies gaps and needs (second column in table) and suggests prioritized actions and tasks for the CEPs further work.

<b>Climate related issue</b>	<b>Gaps/needs</b>
Enhanced potential for non-native species (NNS) introduction establishment	<ul style="list-style-type: none"> <li>•Framework for surveillance for non-native species establishments in marine, terrestrial and freshwater environment</li> <li>•Response strategy for suspected NNS introductions</li> <li>•Assessment of whether existing regimes for preventing NNS introductions and transfer are sufficient. Analyze management tools applied in other areas.</li> <li>•Improved understanding of risks associated with relocation of native terrestrial species</li> <li>•Assessment and mapping of Antarctic habitats at risk of invasion</li> <li>•Assessment of risks of introducing non-native marine species</li> <li>•Techniques for eradication and control</li> <li>•Ongoing surveillance programme to identify status of NNS in light of climate change</li> </ul>
Change to the terrestrial(incl. aquatic) biotic and abiotic environment due to climate change	<ul style="list-style-type: none"> <li>•Understanding how terrestrial and freshwater biota will respond to a changing climate and the impacts of these changes</li> <li>•Understanding as to how the abiotic terrestrial environment will change and the impacts of these changes</li> </ul>

**Box 2: CCRWP**

<b>Climate related issue</b>	<b>Gaps/needs</b>
Change to marine near-shore abiotic and biotic environment (excluding OA)	<ul style="list-style-type: none"> <li>•Understanding and have the ability to predict near-shore marine changes and impacts of the change</li> <li>•Have a broader understanding of what monitoring data will be required to assess climate driven changes to the marine environment</li> </ul>
Ecosystem change due to ocean acidification	<ul style="list-style-type: none"> <li>•Understanding of the impact of OA to marine biota and ecosystems</li> </ul>
Climate change impact to the built (human) environment resulting in impacts on natural and heritage values	<ul style="list-style-type: none"> <li>•Understanding how the abiotic terrestrial environment will change and how this might impact result in impacts on environmental or heritage values</li> <li>•Understanding of effects of climate change on contaminated sites and implications for species/ecosystems (eg. whether climate change will increase mobilization and exposure of species/ecosystems to contaminants and understanding how species/ecosystems will respond to exposure to such contaminants)</li> <li>•Understanding what conservation/remedial interventions might be applicable to counteract these impacts</li> </ul>
Marine and terrestrial species at risk due to climate change	<ul style="list-style-type: none"> <li>•Understand population status, trends, vulnerability and distribution of key Antarctic species</li> <li>•Improved understanding of effect on climate on species at risk, including critical thresholds that would give irreversible impacts</li> <li>•Framework for monitoring to ensure the effects on key species are identified</li> <li>•Understand relationship between species and climate change impacts in important locations/areas</li> </ul>
Marine, terrestrial and freshwater habitats at risk due to climate change	<ul style="list-style-type: none"> <li>•Understand habitat status, trends, vulnerability and distribution</li> <li>•Improved understanding of the effects of climate change on habitat, eg. sea ice extent and duration, snow cover, ground moisture, microclimate, changing melt flows and consequences to lake systems</li> <li>•Improved understanding of potential expansion of human presence in Antarctica as a result of changes resulting from climate change through e.g. changes in sea ice distribution; collapse of ice shelves; expansion of ice free area).</li> </ul>

Recognizing that a work program rarely implements itself, but needs oversight and coordination, the CEP immediately initiated a discussion to identify the best mechanisms for managing and supporting implementation of the CCRWP. This culminated cumulated in the CEP agreeing at its meeting in 2017 (Beijing, China) to establish a Subsidiary Group on Climate Change Response (SGCCR) charged to facilitating the coordination and communication and updating of the CCRWP<sup>22</sup>. Today



the SGCCR is starting to find its place as a permanent subsidiary group of the CEP, balancing the structural charge of coordinating and communicating the CCRWP actions and proactively moving CCRWP actions forward. It should be expected that the SGCCR will start to visibly shape the climate agenda of the CEP in the years to come.

## CONNECTING WITH CCAMLR ON THE ISSUE OF CLIMATE CHANGE

Climate change in Antarctica has both terrestrial and marine implications, which interlink and intertwine. As a consequence, climate change is clearly an overlapping area of interest and concern between the CEP and its sister body the Scientific Committee under the Convention for the Conservation of Marine Living Resources (SC-CCAMLR), where both are bound to consider implications of climate change in this area in their efforts to provide advice for sustainable management to the Antarctic Treaty Consultative Parties and the CCAMLR Members respectively. This was clearly recognized at a (first) joint workshop between the two committees, held in Baltimore in 2009, where climate change was identified as an area where the development of joint approaches and understanding would be particularly pertinent<sup>23</sup>. A second joint workshop, held in Punta Arenas (Chile) in 2016, focused on this topic in particular, aiming to identify the effects of climate change that were considered most likely to impact the conservation of the Antarctic, and to identify existing and potential sources of research and monitoring data relevant to the two bodies<sup>24</sup>. This workshop was particularly valuable in further enhancing the cooperation and information sharing between the two committees, enabling a joint understanding of the evidence base relating to climate change in the area of joint concern, and thereby paving the way for compatible approaches in supporting policy making in a changing Antarctic and Southern Ocean into the future.

## WHAT CLIMATE ISSUES HAVE BEEN IN FOCUS?

It could be said that the CEP in principle has two general tracks to follow with regard to the specific discussions relating to climate change as basis for any advice to the Antarctic Treaty Parties on the effectiveness of current measures and need for additional measures to protect Antarctica (as mandated through Article 12 of the Environmental Protocol).

One track relates to any influence Antarctic activities may have on the overall climate change which in turn impacts the Antarctic environment. Article 3 (2)(i) of the Environmental Protocol requires activities to be planned and conducted so as to avoid adverse on climate and weather patterns. The other track is more convoluted, considering existing and potential new measures that would contribute to mitigate the negative impacts of climate change on the Antarctic environment, and thereby maintain the values of the nature reserve envisioned by the Environmental Protocol. This track has by far been the main focus of the CEP climate discussions, reflecting the relative importance between these two climate pressures issues in the Antarctic context. The following will briefly touch on some of the issues that the CEP has had its attention on with respect to these two tracks.

## PROTECTING ANTARCTICA FROM ANTHROPOGENIC CLIMATE CHANGE

The CEP is charged with advising on effectiveness of current measures and need for additional measures

for the Parties' efforts to protect Antarctica<sup>25</sup>, which without doubt should be understood to include consideration of measures that aim to mitigate negative impacts of anthropogenic climate change.

Understanding how and where climate change impacts the Antarctic environment is a fundamental basis and starting point for assessing effectiveness of existing measures and considering new measures. Understanding how and where climate change impacts the Antarctic environment is also an extremely complex charge, where there will always be a lack of knowledge while at the same time new knowledge is produced and made available constantly.

The Environmental Protocol specifies that the CEP, in carrying out its functions, should consult with the Scientific Committee on Antarctic Research (SCAR)<sup>26</sup>, and SCAR does indeed provide significant scientific support for the CEP. Some key examples include:

- SCAR's compilation of current state of knowledge through the ACCE report was an enormous step forward and a key contribution to the CEP's climate change toolbox. The Committee very quickly requested that SCAR to provide annual/regular updates on this report, to allow the Committee's members to have the best available scientific understanding as basis for their deliberation. The regular updates are not represented as a synthesis report, but as a perspective on recent scientific advances.
- Since 2003 the Antarctic Treaty Consultative Meetings have included a SCAR lecture, in which SCAR has highlighted for the Antarctic Treaty Parties and the CEP Members science issues with policy implications. A number of these lectures have directly or indirectly provided insight into climate change issues relevant for Antarctic governance, and is an important supplement in the evidence base toolbox available to the CEP in its climate discussions. In 2017 the SCAR Science Lecture focused on what the United Nations Paris Climate Agreement means for Antarctica, followed up in 2019 on what the Paris Climate Agreement means for Antarctic and Southern Ocean Environmental Protection, the latter outlining the implications of the 2015 Paris Climate Agreement for biodiversity and its protection in the broader Antarctic region, and for biodiversity conservation globally. The Committee noted that this lecture in particular lecture was impactful, widely attended, and provided useful and detailed context for its discussions<sup>27</sup>.
- SCAR plays an active role towards the CCRWP, both through mapping SCAR members' activities against gaps and needs identified in the work program and by participating actively in the SGCCR providing invaluable guidance in the group's efforts to track science developments relevant for management purposes and thus updating of the CCRWP.

Another tool which is available for the CEP for the purpose of having access to the evidence base is the Antarctic Environments Portal, which aims to be an important link between Antarctic science and Antarctic policy, by allowing easy access to reliable, science-based information on a range of issues relevant to the management of the Antarctic environment<sup>28</sup>. The Portal contains a number of relevant information summaries on the topic of climate change and climate change implications.

Generally speaking discussions relating to climate change impacts have been topic based, rather than

taking on the full scale complexity of climate change impacts in one go. The Climate ATME gave a rare opportunity for spending time discussing the science underpinning impact knowledge. In 2019, at its meeting in Prague, the Committee had an unusual extensive and comprehensive climate change impact discussion relating to the Antarctic Peninsula under a 1.5°C global warming scenario, where it underlined the importance of it remaining informed about climate change and to take a leadership role in considering the implications of a climate change for the Antarctic environment. The Committee noted that it would be important to take the anticipated changes into account as it continued to develop its management tools and guidance material and emphasized the importance of considering regional variations in climate change, both for management actions and for research and long-term monitoring, and highlighted the need for a better understanding of the impacts of the combined pressures of human activities and climate change in Antarctica<sup>29</sup>. Although the CEP itself does not discuss and provide advice related to implementation and commitments to global climate agreements, discussions and advice that clearly show the implications of potential future climate scenarios could be said to provide an important impetus to the Parties to participate in such discussions.

Since climate change gained a strong foothold in the CEP agenda the Committee has to a large degree approached the question of climate change impacts topic by topic, or maybe rather management tool by management tool. This has likely been a sensible approach, and the only way to gain any headway with the complexity of the topic. While early discussions in this regard were more by chance, topic directed recommendations from Climate ATME contributed to formalize and structure such topical discussions, as did the CCRWP. The topics that have been under most scrutiny in context of climate change impacts are non-native species, Antarctic protected areas and protected area systems, protected species and EIA-processes.

The Committee has had numerous discussions relating to area protection in light of climate change, which have contributed to develop the overall thinking and the particularities of this particular management tool. At their meeting in Brasilia (Brazil) in 2014 the Committee discussed experiences from the Arctic in applying a particular management tool and noted that protecting areas which are resilient to climate change may ultimately assist in the longer-term protection of biodiversity<sup>30</sup>. Although the discussion itself did not lead to concrete decisions, it nevertheless contributed to heighten awareness of the utility of protected area tool as an active response to climate change in order to pursue the protection goals of the Environmental Protocol. The SCAR/CEP Workshop on Further Developing the Antarctic Protected Area System held prior to the Committee's meeting in Prague (Czech Republic) in 2019 also discussed the importance of climate change in the further development of the Antarctic protected area system, including considering climate change pressures in identifying sites for protection, addressing the synergistic pressures of climate change and other pressures, and considering the potential of protecting "climate refugia"<sup>31</sup>.

Likewise, in 2016, the Committee adopted a revised version of its guidelines for the Environmental Impact Assessment (EIA) process, where amongst other the issue of climate change was incorporated as a new element. The updating of the guidelines in this regard was a direct response to the Climate ATME recommendation which called for a review of existing

management tools to assess their continuing suitability in a climate change context, identifying the relevance of updating the EIA guidelines particularly with regard to planned long-term activities. The updated guidelines thus, include a number of reference to climate change as an impact factor, and calls for those planning activities in Antarctica to give consideration to anticipated / potential environmental consequences of climate changes in the location of the proposed activity, and over the timeframe of the proposed activity, including the decommissioning phase where relevant. While such guidelines only provide guidance to a proponent of Antarctic activities, they are nevertheless provide the proponent with a reminder of the seriousness of the issue and the fact that it may influence the planning of activities.

If a scientific assessment determines that a species is at significant risk of extinction the CEP can recommend Specially Protected Species designation to the ATCM<sup>32</sup> and develop an Action Plan for the species. The Committee has so far not designated any species as Specially Protected Species. However, research has shown that climate change is contributing to putting certain species at risk (see eg. Morley et al., 2019; Thratan et al., 2020). While the CEP so far has not developed sufficient information on the conservation status of Antarctic species to support SPS designation on this basis, there are currently indications that proposals relating to designating species as SPS due to climate risk may be expected shortly. At its meeting in 2019 the Committee discussed the dependence and vulnerability of emperor penguins to climate change and noted the need for further research and collaboration on the subject. There were clear indications in the material put forward that this was to be seen as initial steps in a designation assessment process<sup>33</sup>.

#### AVOIDING ADVERSE IMPACT ON CLIMATE AND WEATHER PATTERNS FROM ANTARCTIC ACTIVITIES

There have been few in-depth discussions in the CEP relating to how Antarctic activities contribute to climate change, and when the topic has been brought to the table it has mostly been dismissed, both with the argument from some Members that the contribution of Antarctic emissions to global emissions are negligible and cautioning that the CEP should not duplicate efforts of other organizations in this regard. While some Members have stressed the symbolic effect that the opportunity provided for Antarctica to set an example to the rest of the world in actively reducing greenhouse gas emissions, these discussions have generally speaking not led to any clear and specific actions. For example, a suggestion brought to the table by the United Kingdom at CEP XI (Kiev, Ukraine) to standardize emission calculations in Comprehensive Environmental Evaluations (CEEs) met opposition, where for some Members expressed concern that the CEP should not be duplicating efforts of other organizations, particularly with respect to CO<sub>2</sub>, while other Members expressed caution over attempting to set standards for calculating emissions, with many countries bound by their own domestic standards<sup>34</sup>.

Although the CEP discussions relating to greenhouse gas emissions and reduction of carbon footprint in Antarctica often has been stifled as it has touched upon sensitive policy and political agendas, where the “difficult” Members have varied through time, the Committee has nevertheless in many instances throughout the years discussed and promoted green technology as an important effort to reduce environmental impacts and risks in Antarctica, but which has been recognized to

also contribute to reduced emission in Antarctica. While the Committee at its first meeting (1998) considered that it might be better that energy sources and alternative energy issue should be considered first in the operations discussion of the ATCM itself, as these were issues that had operational implications<sup>35</sup>, in following up on one of the recommendations from the Climate ATME the Committee nevertheless acknowledged and encouraged continuing efforts in developing and exchanging experience of energy efficiency and alternative energy practices so as to promote reduction of the carbon footprint of activities in Antarctica and cut fossil fuel use from stations, vessels, ground transportation and aircraft<sup>36</sup>.

Two issues relevant in the context of climate change, and which are of global concern - Black Carbon and Ocean Acidification – have only been superficially considered thus far, but have been identified by the Committee as issues that need attention in future discussions<sup>37</sup>.

#### THE SCIENCE NEEDS

Very often CEP discussions relating to climate change issues one way or the other conclude that further knowledge is required and there is a need for more research. The Committee itself is not in a position to do or initiate science, but it does highlight its needs for the science community to pick up on<sup>38</sup>. Both the CEP five-year workplan and the CCRWP contains an overview of general science needs, and are used for communicating these needs. The Committee's current science needs relating to climate change is extensive and ranges from the general need to improve our understanding of current and future change in terrestrial, aquatic, near-shore and marine biotic and abiotic environment due to climate change to more specific needs such as identifying areas that may be resilient to climate change and impacts of climate change on key Antarctic species<sup>39</sup>.

#### CONCLUDING REMARKS

This article has explored when and how the issue of climate change has made its way into the CEP agenda, and what the outcomes have been so far. Largely reflecting the increased global awareness of the problem, the issue has moved its way from barely being visible in the discussions to weaving into almost all of the topical discussions that take place in the Committee. Although the climate challenges are as extensive if not more as before, there is good cause to applaud the Committee's efforts to organize and tackle the complexity of the issue, and there is good reason to believe that through the Committee's continued efforts to develop climate change strategies and actions the Antarctic Treaty Parties will be better placed to maintain the values of the Antarctic nature reserve, as envisioned by the Environmental Protocol.

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## ENDNOTES

1. Environmental Protocol, Article 2.
2. A nature reserve is generally speaking understood to be an area of land protected in order to keep safe the animals and plants that live there, often because they are rare. Nature reserves are often relatively small. IUCN defines the protected area category "strict nature reserve" as an area strictly set aside to protect biodiversity or geological/geomorphological features, where human visitation, use and impacts are strictly

*controlled and limited. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.*

*3. The Antarctic continent itself is approx. 14 million square kilometres (the size of the United States and Mexico combined), while the surrounding Southern Ocean adds on another 20 million square kilometres or so.*

*4. For example the fifth operative paragraph of the Preamble to the Protocol confirms Parties acknowledgement of “the unique opportunities Antarctica offers for scientific monitoring of and research on processes of global as well as regional importance”*

*5. Article 3 of the Environmental Protocol sets out the underlying environmental principle of the protection regime as follows: “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.”*

*6. Environmental Protocol, Annex V, Article 3*

*7. Environmental Protocol, Annex II, Article 3 (4)*

*8. Environmental Protocol Article 11 establishes the Committee for Environmental Protection and entitles all Parties to be members, while Article 12 establishes the Committee’s functions.*

*9. The CEP adopted the first version of a five-year workplan (provisionally) at CEP X in New Delhi (cf. CEP X Final Report (2007), paras 7-17).*

*10. These examples draw on information found in CEP XXII IP 136, containing SCAR’s annual update on its Antarctic Climate Change and the Environment report, as well as CEP XXII IP 42 on implications of 1.5 degree warming in the Antarctic Peninsula and the Antarctic Environments Portal ([www.environments.aq](http://www.environments.aq)).*

*11. CEP VIII Final report (2005), paras 11-32 and Annex 6.*

*12. See CEP IX WP 42 and IP 113 reporting from the workshop on Antarctica’s Future Environmental Challenges.*

*13. CEP X Final Report (2007), paras 7-17.*

*14. CEP X Final report (2007), paras 269-275.*

*15. ACIA, 2005. Arctic Climate Impact Assessment*

*16. IPCC, 2007: Climate Change 2007*

*17. See the preface of the ACCE Report (Turner et al., 2009).*

*18. ATCM XXXII Decision 1 (2009) Meeting of Experts on Climate Change*

*19. CEP XVII Final Report (2013), paras 62-67.*

*20. CEP XIX Final Report (2015), paras 73-80 and Appendix 2.*

*21. ATCM XXXIX Resolution 4 (2015) Committee for Environmental Protection Climate Change Response Work Programme.*

*22. CEP XX Final Report (2017) paras 67-79. The establishment of SGCCR was confirmed by the Antarctic Treaty Parties through ATCM XL Decision 1 (2017) Subsidiary Group of the Committee for Environmental Protection on Climate Change Response (SGCCR).*

*23. CEP XII Final Report (2009), paras 261-268.*

*24. CEP XIX Final Report (2016), paras 43-56.*

*25. Environmental Protocol, Article 12 (1).*

*26. Environmental Protocol, Article 12 (2).*

27. *CEP XXII Final Report (2019), para 37.*
28. *The Antarctic Environments Portal is described in more detail in McIvor (2020) in this volume of JAA.*
29. *CEP XXII Final Report (2019), paras 38-42.*
30. *CEP XVII Final Report (2014), para. 56-58.*
31. *CEP XXII Final Report (2019), paras 172-180.*
32. *Environmental Protocol, Annex II, Article 3 (4).*
33. *CEP XXII Final Report (2019), paras 198-200.*
34. *CEP XI Final Report (2008), paras 135-143.*
35. *CEP I Final Report (1998), para 8.*
36. *CEP XIII Final Report (2010), para 370.*
37. *Ocean Acidification is identified as a separate climate change issue in the CCRWP ([https://documents.ats.aq/ATCM39/att/atcm39\\_att072\\_e.doc](https://documents.ats.aq/ATCM39/att/atcm39_att072_e.doc))*
38. *See McIvor (2020) in this volume of JAA for a more in-depth-discussion of CEP and science needs.*
39. *See the CEP 5 Year Work Plan for the specific list of needs ([https://documents.ats.aq/atcm42/ww/atcm42\\_ww005\\_e.pdf](https://documents.ats.aq/atcm42/ww/atcm42_ww005_e.pdf))*