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ARCTIC BIODIVERSITY

Note by the Executive Secretary

SUGGESTED RECOMMENDATIONS

The Subsidiary Body on Scientific Technical and Technological Advice may wish to make a recommendation along the following lines:

The Subsidiary Body on Scientific Technical and Technological Advice

1. *Welcomes* the report on Arctic biodiversity prepared by the International Secretariat of the Working Group of the Arctic Council on the Conservation of Arctic Flora and Fauna;
2. *Encourages* the continued collaboration between the Convention on Biological Diversity and the Working Group on the Conservation of Arctic Flora and Fauna with regard to monitoring and assessments of status and trends in, and threats to, biodiversity.

I. INTRODUCTION

1. The tenth Conference of the Parties to the Convention on Biological Diversity, in decision X/13 on new and emerging issues, invited the Arctic Council to provide relevant information and assessments of Arctic biodiversity, in particular information generated through the Circumpolar Biodiversity Monitoring Program (CBMP) of the Arctic Council's Conservation of Arctic Flora and Fauna Working Group, for consideration by the Subsidiary Body on Scientific, Technical and Technological Advice.
2. In response to this invitation, the following report was prepared by the Executive Secretary of the International Secretariat of the Working Group of the Arctic Council on the Conservation of Arctic Flora and Fauna (CAFF) and is presented to the Subsidiary Body on Scientific, Technical and Technological Advice. The report presents an overview of the activities of CAFF and highlights current and planned work within CAFF that will contribute to the objectives of the process of the Convention on Biological Diversity, namely the tracking of the status and trends in biodiversity across the Arctic.

* UNEP/CBD/SBSTTA/15/1.

II. ARCTIC BIODIVERSITY

Why is the Arctic of global importance?

3. The circumpolar Arctic, as defined by CAFF, covers 14.8 million km² of land and 13 million km² of ocean. These vast wilderness areas, where ecosystem processes continue to function in a largely natural state, play a key role in the physical, chemical and biological balance of the planet. Seven of the ten largest remaining wilderness areas on the Earth are located in the Arctic region. One of them, the Northeast National Park in Greenland at 972,000 km², is the largest national park in the world. Together with the Antarctic, the Arctic contains the largest freshwater resources on Earth. The Arctic is home to diverse, vibrant, and unique societies whose indigenous cultures depend on and maintain close ties to the land, water and ocean, and speak hundreds of distinct languages.

4. The Arctic plays host to a vast array of biodiversity, including many globally significant populations.¹ Included among these are more than half of the world's shorebirds,² 80 per cent of the global goose populations,³ several million reindeer and caribou, and many unique mammals, such as the polar bear. During the short summer breeding season, 279 species of birds arrive from as far away as South Africa, Australia, New Zealand, and South America to take advantage of the long days and intense period of productivity. Several species of marine mammals, including grey and humpback whales, and harp and hooded seals, also migrate annually to the Arctic.

5. The Arctic is estimated to contain a quarter of the world's remaining oil and gas reserves development of which is expected to increase. Already, 10 per cent of the world's oil and 25 per cent of the world's natural gas is produced in the Arctic and sub-Arctic regions, with the majority coming from the Russian Federation.⁴ Such information emphasizes that the Arctic is a region of global significance and what happens there will have an effect felt far beyond its confines.

What is happening with Arctic biodiversity?

6. In 2001, CAFF published *Arctic Flora and Fauna: Status and Conservation*,⁵ the first truly circumpolar overview of Arctic biodiversity. The report provided, "a clear understanding of the importance of the Earth's largest ecoregion and its status in the face of a rapidly changing world". The report observed that while much of the Arctic was in its natural state and that the impacts of human activity were relatively minor, individuals, species, and ecosystems throughout the Arctic faced threats from many causes, and that the long-term consequences of human impacts were unknown. It particularly noted that the information necessary to determine status and trends of Arctic fauna was fragmentary, and almost entirely non-existent for flora.

7. Since the publication of the *Arctic Flora and Fauna: Status and Conservation*⁵ assessment, the Arctic has entered into a period of intensive pressure and change involving a new set of challenges and stressors, with climate change at the forefront. A warming climate in the Arctic is projected to set off many environmental changes including melting sea ice, increased run-off, and an eventual rise in sea level with immense coastal implications. Some of these changes are already being felt. Increasing temperatures are already showing many effects on Arctic biodiversity including the northward movement of more southern species, shrubbing and greening of the land, changing plant communities and their associated fauna, increases in invasive species displacing native Arctic inhabitants, and the emergence of

¹ Arctic Climate Impact Assessment (ACIA). 2005. Arctic Climate Impact Assessment. Cambridge University Press, Cambridge, UK, 1042 pp.

² Zöckler, C., Delany, S. & Hagemeyer, W. 2003. Wader populations are declining – how will we elucidate the reasons? Wader Study Group Bull. 100: 202–211.

³ Zöckler, C. 2008. The Role of the Goose Specialist Group in the Circumpolar Biodiversity Monitoring Programme (CBMP). Vogelwelt 129: 127-130.

⁴ Arctic Oil & Gas., Arctic Monitoring and Assessment Programme (2007), Page 17.

⁵ Conservation of Arctic Flora and Fauna (CAFF). 2001. Arctic Flora and Fauna: Status and Conservation. Edita. Helsinki. 266 pp.

new diseases. Additionally, changes in the timing of events (phenology) are an aspect of change which may lead to mismatches between related environmental factors. As a result, some local biodiversity may be in imminent danger of extinction.

8. In the past 100 years, average Arctic temperatures have increased at almost twice the average global rate.⁶ Over the past thirty years, seasonal minimal sea ice extent in the Arctic has decreased by 45,000 km² per year⁷. Along with earlier break-up and freeze-up, the extent of terrestrial snow cover in the Northern Hemisphere has decreased and is expected to continue to do so.⁷ The magnitude of these changes will exert major influences on biological dynamics in the Arctic. Some of the most rapid ecological changes associated with warming have occurred in marine and freshwater environments. Species most affected are those with limited distributions or with specialized feeding habits that depend on ice foraging. Other predicted effects of climate change, and other stressors, such as industrial development and resource exploitation on Arctic biodiversity include:

- (a) Changes in the distribution, geographical ranges, and abundances of species (including invasive alien species);
- (b) Changes in habitats for endemic Arctic species;
- (c) Changes in genetic diversity; and
- (d) Changes in the behaviour of migratory species.

9. A number of challenges are envisaged for Arctic biodiversity with climate change emerging as the most far-reaching and significant stressor on Arctic biodiversity. Other stressors are also important and continue to have impacts, e.g. contaminants, habitat fragmentation, development, bycatch and unsustainable harvest levels. Complex interactions between climate change and such factors have the potential to magnify impacts on biodiversity.

10. With a warming climate, shipping and resource development (e.g. oil and gas exploration) likely to increase, there is a potential for increased pollution and disturbance to Arctic biodiversity. More development may lead to different human settlement patterns and changes in resource use. Decreased ice cover may increase the number of areas accessible to fisheries and make new species economically available and so create both opportunities as well as challenges for sustainable use. Many Arctic species also migrate great distances throughout the world and so are subject to environmental changes during their travels, including carrying pollutants back to the north in their bodies. These ongoing and developing changes provide a challenge in determining how best to respond and take into account these changes when planning for the sustainable and effective management of the Arctic. CAFF operates at the interface between science and policy and as such is crucial in providing a mechanism to develop common responses on issues of importance.

III. CAFF AND THE ARCTIC COUNCIL

11. The Arctic Council countries have recognized that their shared ecosystem with its unique flora and fauna is fragile and threatened from a number of causes and that changes in Arctic biodiversity have global repercussions. In order to encourage the conservation of Arctic flora and fauna, their diversity and their habitats the Conservation of Arctic Flora and Fauna (CAFF) working group was established in 1992 under the Arctic Environmental Protection Strategy (AEPS). CAFF is one of six Working Groups within the Arctic Council⁸ and its focus is on biodiversity. It covers a circumpolar range as is reflected in the composition of its management board which is comprised of board members from the eight Arctic

⁶ Intergovernmental Panel on Climate Change (IPCC). 2007. Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)

⁷ Post, E et al, P. 2009. Ecological dynamics across the Arctic associated with recent climate change. *Science*. 325 (5946):1355–1358.

⁸ www.arctic-council.org

countries,⁹ six indigenous organizations¹⁰ and observers from international organizations, i.e. IUCN - The International Union for Conservation of Nature, the World Wildlife Fund and the United Nations Environment Programme as well as non-Arctic countries.¹¹

12. CAFF's mandate is to address the conservation of Arctic biodiversity and to communicate the findings to the Governments and residents of the Arctic, helping to promote practices which ensure the sustainability of the use of the Arctic's resources. In order to successfully conserve the natural environment and allow for economic development comprehensive baseline data including status and trend of Arctic biodiversity, habitats and ecosystem health are required.

13. CAFF's projects provide data for informed decision-making, thereby helping to resolve the dilemma between the desire to both conserve the natural environment and permit regional growth. CAFF is guided by the Arctic Councils Strategic Plan for the Conservation of Arctic Biological Diversity. CAFF employs an ecosystem approach and its activities, where feasible, are linked to clearly identified ecosystem units.

14. The objectives and actions assigned to CAFF are in summary:

- (a) To collaborate for more effective research, sustainable utilization and conservation;
- (b) To cooperate to conserve Arctic flora and fauna, their diversity and their habitats;
- (c) To protect the Arctic ecosystem from human-caused threats;
- (d) To seek to develop more effective laws, regulations and practices for flora, fauna and habitat management, utilization and conservation;
- (e) To work in cooperation with the indigenous peoples of the Arctic;
- (f) To consult and cooperate with appropriate international organizations and seek to develop other forms of cooperation;
- (g) To regularly compile and disseminate information on Arctic conservation;
- (h) To contribute to environmental impact assessments of proposed activities; and
- (i) To provide policy recommendations to facilitate more knowledgeable decision-making and sustainable use of the Arctic's living resources.

15. The common priorities agreed upon for the Norwegian, Danish and Swedish chairmanship period (2007 – 2013) of the Arctic Council are concerned with climate change, integrated resource management, the International Polar Year (IPY), indigenous peoples, local living conditions and management issues. Sweden's chairmanship of the Arctic Council (2011-2013) added biodiversity to this list. CAFF's work reflects the emphasis placed on these priorities with a focus on outreach/communication, cooperation, data integration, spatial information, circumpolar datasets and analyses. CAFF has also placed a focus on the IPY both through benefiting from IPY-generated research and contributing to the IPY legacy. CAFF's Arctic Biodiversity Assessment (ABA), the Circumpolar Biodiversity Monitoring Program (CBMP), and the various other activities of CAFF are important contributions towards understanding the impacts of climate change and other stressors on biodiversity and the sustainable use of living resources in the Arctic.

⁹ The eight Arctic Council countries are Canada, Denmark / Greenland / Faroe Islands, Finland, Iceland, Norway, Sweden, The Russian Federation and The United States of America

¹⁰ The six Arctic Council Indigenous organizations are the Inuit Circumpolar Conference, Arctic Athabaskan Council, Gwich'in Council International, Saami Council, RAIPON, Aleut International Association

¹¹ Observer countries to the Arctic Council include France, Germany, Poland, Spain, The Netherlands and The United Kingdom

IV. THE CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM (CBMP)

16. Arctic warming, with its many and increasing impacts on flora, fauna, and habitats, has heightened the need to identify and fill the knowledge gaps on various aspects of Arctic biodiversity and monitoring. This need was clearly identified in the 2005 Arctic Climate Impact Assessment (ACIA) which recommended that long term Arctic biodiversity monitoring be expanded and enhanced. The CAFF Working Group responded to this recommendation with the implementation of the CBMP.¹²

17. The CBMP is CAFF's cornerstone programme and - via CAFF and the Arctic Council - its activities are being channelled into effective conservation, mitigation, and adaptation policies promoting the sustainability of the Arctic's living resources. The CBMP is an international network of scientists and local resource users working together to enhance Arctic biodiversity monitoring to improve detection, understanding and reporting of important trends in biodiversity so as to facilitate more informed and timely management decisions. The CBMP functions as an international forum of leading scientists and conservation experts from all eight Arctic countries, the indigenous organizations of the Arctic Council, and major global conservation organizations. Its goal is to facilitate more rapid detection, communication, and response with respect to the significant biodiversity-related trends and pressures affecting the circumpolar region. Its purpose is to facilitate the conservation of biological diversity in the Arctic and the sustainable use of the region's natural resources by:

- (a) Harmonizing and enhancing Arctic monitoring efforts, thereby improving our ability to detect and understand significant trends; and
- (b) Reporting to, and communicating with, both key decision makers and stakeholders, thereby enabling effective conservation and adaptation responses to changes in Arctic biodiversity.

18. It is first and foremost a coordinating entity for: (i) existing Arctic biodiversity monitoring programmes; (ii) addressing gaps in knowledge through the identification of new programmes; (iii) gathering, integrating, and analysing data; and (iv) communicating results. Through its coordinating function, the CBMP can create a collaborative framework for Arctic biodiversity monitoring and assessment that will yield insights previously unattainable on a circumpolar scale. The end result is a broader understanding of the Arctic environment and how best to conserve its resources and adapt to the changes occurring within it.

19. In order to ensure coordination and integration with related global initiatives, the CBMP is strategically linked to other international conservation programmes and research and monitoring initiatives, such as CAFF's Arctic Biodiversity Assessment (ABA), the GEO-Biodiversity Observation Network (CBMP is a regional Biodiversity Observation Network ('Arctic-BON'), the Biodiversity Indicators Partnership (BIP) and the Sustaining Arctic Observing Networks (SAON) initiative. The CBMP is currently led by Canada. An international steering committee oversees the strategic direction and implementation of the CBMP.

Expert Monitoring Groups

20. The CBMP takes an ecosystem-based management approach, operating as a network of networks coordinating existing species, habitat and site-based networks. A series of Expert Monitoring Groups have been activated (marine, freshwater and terrestrial; coastal still pending), each dealing with one of the Arctic's major systems. These serve as umbrella mechanisms for coordinating existing biodiversity monitoring activity in the Arctic. Each Expert Monitoring Group is tasked with developing long-term integrated monitoring plans. The first of these monitoring plans (marine ecosystem) has been completed and endorsed by the Arctic Council and implementation begins in the fall of 2011. The freshwater and terrestrial plans are scheduled for completion in 2012. CAFF's Arctic Biodiversity Assessment which is scheduled for completion in 2013 will provide the baseline for the CBMP monitoring plans.

¹² www.cbmp.is

Monitoring networks and plans

21. In support of the Expert Monitoring Groups and their circumpolar monitoring plans a series of monitoring frameworks have been developed or are under development. Completed monitoring frameworks include: seabirds, marine mammals, shorebirds, reindeer and human-wild reindeer systems. The CBMP is currently working to develop a series of additional monitoring frameworks e.g. the first Arctic Polar Bear monitoring plan is currently undergoing review and is scheduled to be finalized in September 2011. Also under development is the protected areas monitoring framework with a background paper in final review phase.

Indices and indicators

22. Effective monitoring is the foundation of responsive decision-making. However, unless the right information is reported in the right formats to the right audiences the results of such monitoring are effectively lost. In light of this, targeted and consistent reporting is a cornerstone of the CBMP. In order to facilitate effective and consistent reporting the CBMP has chosen a suite of indices and indicators that provide a comprehensive picture of the state of Arctic biodiversity – from species to habitats to ecosystem processes to ecological services. They were chosen through an expert consultation process and reflect existing monitoring capacity and expertise.

23. The suite of indicators and indices are being developed in a hierarchical manner allowing clients to ‘drill’ down into the data from the high-order indices to more detailed indicators underpinning a particular index and - where the data allows – to specific population, subpopulation or regional habitat trend data. This approach will maximize the utility and reach of the information by addressing the varying data needs of end users. The Arctic Species Trend Index (ASTI)¹³ is a good example of the effectiveness of this approach and the value of such indicators in contributing to the Convention on Biological Diversity. Further information can be found in the CBMP’s Strategy for Developing Indices and Indicators to Track Status & Trends in Arctic Biodiversity. The implementation of the CBMP’s pan-Arctic monitoring plans underpins these indicators and the resulting information will ensure that these indicators will be continually updated to report on the status and trends in Arctic biodiversity.

Communication and outreach

24. The CBMP is developing coordinated reporting and outreach tools including a suite of Arctic biodiversity indicators and indices i.e. protected areas, linguistics and the ASTI as well as a web-based data management and mapping tool (data portal) for biodiversity data. A prototype web-based data portal has been developed (The Seabird Information Network) for managing and depicting a diversity of arctic biodiversity data. The portal serves as a focal point for current information on biological resources and trends throughout the Arctic. The Seabird Information Network is undergoing further development with new analytical tools being developed and further national seabird datasets being incorporated. The activities of the CBMP have resulted in a wide range of publications, a full list of which can be accessed on the CAFF website.¹⁴

Future direction

25. The CBMP will continue to focus upon further development of its biodiversity indicators, of its web-based data portal, and completion and implementation of its pan-Arctic monitoring plans. The technical framework for the CBMP will be further enhanced through the creation of data management platforms (CBMP web-based data portal and Polar Data Catalogue), pan-Arctic biodiversity indicator datasets (e.g. Arctic Species Trend Index) and implementation of the CBMP’s integrated monitoring plans and frameworks. The CBMP will continue to focus upon strategic partnership, i.e. expanding programme capacity in key areas. This involves targeting key organizations in Europe, Russia and North

¹³ www.asti.is

¹⁴ www.caff.is/publications

America with the aim of further developing a broad-based consortium for improved Arctic biodiversity monitoring and conservation.

V. ASSESSMENTS

26. In order to successfully conserve the natural environment and allow for economic development comprehensive baseline data including on the status and trend of Arctic biodiversity, habitats and ecosystem health are required. To fulfill this aspect of its mandate CAFF conducts an array of assessment activities. These focus upon *synthesizing and assessing the status and trends of biological diversity in the Arctic*. They provide much needed descriptions of the current state of the Arctic's ecosystems and biodiversity, creating baselines for use in global and regional assessments of Arctic biodiversity and inform and guide future Arctic Council work. Examples of current assessment activities include the following the Arctic Biodiversity Assessment, Assessment of Arctic Sea Ice Associated Biodiversity and the Arctic Species Trend Index. It should also be noted that aside from these current assessments the CBMP will through its implementation plan conduct follow-up assessments on a five-year basis:

The Arctic Biodiversity Assessment (ABA)

27. The purpose of the ABA is to synthesize and assess the status and trends of biological diversity in the Arctic. It will provide a much needed description of the current state of the Arctic's ecosystems and biodiversity, create a baseline for use in global and regional assessments of Arctic biodiversity and a basis to inform and guide future Arctic Council work. It will provide up-to-date scientific and traditional ecological knowledge, identify gaps in the data record, identify key mechanisms driving change and produce recommendations.

28. The ABA is being conducted in three phases. Phase 1 was completed with the release of the *Arctic biodiversity trends 2010: selected indicators of change* report.¹⁵ In conjunction with the launch of the report, a dedicated portal was opened: www.arcticbiodiversity.is. The report presents a preliminary assessment of status and trends in Arctic biodiversity and is based on the suite of indicators developed by the CBMP. For this report, twenty-two indicators were selected to provide a snapshot of the trends being observed in Arctic biodiversity today. The indicators were selected to cover major species groups with wide distributions across Arctic ecosystems. Special consideration was given to indicators closely associated with biodiversity use by indigenous and local communities, as well as indicators with relevance to decision-makers. Indicators were also selected on the basis of what was achievable in terms of existing data and in the timeframe available. Each indicator chapter provides an overview of the status and trends of a given indicator, information on stressors, and concerns for the future.

29. The report is aimed at a broad audience including Governments and residents of the Arctic. It was the Arctic Council's contribution to:

- (a) The 2010 Biodiversity Target of achieving a significant reduction in the rate of biodiversity loss;
- (b) The International Year of Biodiversity in 2010; and
- (c) The third edition of Global Biodiversity Outlook.

30. The Arctic Council has stressed the importance of follow-up on the key findings of the report. In response a number of projects have been initiated, e.g. an assessment of sea ice associated biodiversity. Phase 2 of the ABA is a full scientific Arctic Biodiversity Assessment scheduled to be completed in 2013. Phase 3 will consist of a policy recommendations document to be completed in 2013.

¹⁵ <http://caff.arcticportal.org/arctic-in-focus/284-arctic-biodiversity-trends-2010>. This report was presented at a side event during the CBDs COP-10 in October 2010.

Assessment of Arctic Sea Ice Associated Biodiversity

31. This project led by Canada and the United States in CAFF aims to:

- (a) Provide a summary of the current status and trends of ice-associated biodiversity, including direct effects on marine species and indirect effects on terrestrial species;
- (b) Discuss the expected reaction of these biota to lower occurrences of ice;
- (c) Reflect on the effects of low ice and its impact on species biodiversity to northern peoples; and
- (d) Recommend actions that might mitigate these changes.

32. Climate models indicate trends towards reductions in the extent and thickness of sea ice in the Arctic. Many species are found in association with this ice and can therefore be expected to be significantly affected by the projected reduction in ice availability. It is also important to recognize that sea ice-associated species are trophically linked directly and indirectly to others in marine and terrestrial ecosystems and must be considered in any analysis of the effects of sea ice loss.

33. Consideration of the effects of warming oceans on ice-dependant species in the Arctic is well underway. SWIPA (Snow, Water, Ice and Permafrost in the Arctic) is the Arctic Council's Project on Climate Change and the Arctic cryosphere. This project has reviewed the biological impacts of changes to sea ice in the Arctic and summarizes the role sea ice plays for several key species in the north. This kind of information will prove valuable for the ecosystem-level analysis that will be conducted as part of the project proposed here. This project will build on other initiatives like the Arctic Biodiversity Assessment, and SWIPA in synthesizing and assessing the status and trends of biological diversity in the Arctic. Further information can be found at www.caff.is/assessments.

Arctic Species Trend Index (ASTI)

34. The ASTI uses population monitoring data to track trends in marine, terrestrial and freshwater Arctic vertebrate species. The index allows for a composite measure of the overall population trends of Arctic vertebrate populations (between 1970 and 2004). It can also be organized to display trends based on taxonomy, biome or region. The Index tracks almost 1,000 Arctic vertebrate population datasets by biome, taxon and migratory status.

35. To facilitate the examination of regional trends, the Arctic was divided into three subregions: Sub Arctic, Low Arctic and High Arctic (see map). As well, species population data was classified based on the broad habitats they live in (land, lakes and rivers, or oceans). The latter were also identified by which ocean basin--Arctic, Atlantic, Pacific--they inhabit. The individual populations in the ASTI were further tagged based on migratory status, trophic level and other relevant categories. The ASTI allows us to track broad trends in the Arctic's living resources and identify potential causes of those trends, whether they be responses to natural phenomena or human-induced stressors.

VI. STRATEGIES

36. CAFF's mandate is to address the conservation of Arctic biodiversity and to communicate the findings to the Governments and residents of the Arctic, helping to promote practices which ensure the sustainability of the Arctic's resources, while also working towards regulations and practices for flora, fauna and habitat management, utilization and conservation of the Arctics resources. To help fulfill this role CAFF produces a range of strategies which present plans for directly conserving species and also designed to develop the framework which will facilitate more effective conservation measures.

37. CAFF has developed a cooperative strategy for the conservation of Arctic biodiversity which serves as a framework for further conservation strategies and action plans dealing with, for example, specific Arctic habitats, and species or species groups of common conservation concern within the Arctic countries *e.g.* ivory gulls, eiders and murre. In 2008, through the CBMP a Strategy for Facilitating and

Promoting Community-Based Monitoring Approaches in Arctic Biodiversity Monitoring was released. These strategies include scientific and conservation recommendations on how to implement them and to insure the most effective management response. They are developed through intensive international cooperation between countries and scientists across the Arctic region. They contribute to enhancing cooperation among Arctic countries, communities and organizations to secure the natural productive capacity of Arctic ecosystems to secure biological diversity at all levels in the Arctic.¹⁶

VII. CAFF ACTIVITIES

Expert groups

38. CAFF may establish expert groups with specific mandates related to key activities for CAFF, and which ensure that scientists, conservationists, and managers interested in Arctic flora and vegetation have a forum to promote, facilitate, and coordinate conservation, management, and research activities of mutual concern. These groups have been invaluable in synthesizing, coordinating and publishing research. CAFF currently has two expert groups:

(a) The Circumpolar Flora Group (CFG - www.caff.is/cfg) with botanical expertise drawn from Arctic Council and observer countries promotes, encourages and coordinates internationally the conservation of biodiversity of arctic flora and vegetation, habitats and research activities in these fields. It also works to enhance the exchange of information relating to arctic flora and vegetation and factors affecting status and trends in arctic flora;

(b) The Circumpolar Seabird Group (CBird – www.caff.is/cbird) facilitates seabird conservation, management and research activities between circumpolar countries, and works to improve communication between seabird scientists and managers both within and outside the Arctic. Conservation issues include introduced predators, habitat alteration, oil pollution and contaminants, seabird bycatch, harvesting and climate change. CBird also promotes the conservation of migratory seabirds outside of the Arctic, coordinates the Circumpolar Biodiversity Monitoring Program's seabird monitoring network in addition to developing various seabird initiatives.

Supporting activities

39. CAFF also has a wide range of supporting activities which focus on various aspects of Arctic biodiversity by helping to understand and discover the status and trends and ways in which Arctic conservation can be improved and helping to promote practices which ensure the sustainability of the Arctic's resources. An example of such work includes participation in projects such as the Arctic Spatial Data Infrastructure (Arctic SDI – www.arctic-sdi.org). The Arctic SDI will allow for the creation of a harmonized map covering the entire Arctic region. This will facilitate more robust handling and manipulation of data for both research and management purposes.

VIII. CHALLENGES FACING ARCTIC CONSERVATION

40. Although we have learned much since 2001, many questions remain unanswered. We do not know enough about the effects of climate change on biodiversity, what these changes mean to local flora and fauna, and what effects they have on natural resources many of which are of great importance to local peoples. The Arctic Climate Impact Assessment clearly demonstrated a general lack of information on quantified effects of climate change on biodiversity.¹⁷ It is not enough to show that climate change results in changes to the physical environment.

41. Directly or indirectly, the peoples of the Arctic live off the biological products of land, freshwater, and sea through hunting, fishing, and agriculture. It is vital that we are able to detect changes

¹⁶ A full list of completed strategies can be accessed from <http://www.caff.is/strategies>

¹⁷ Arctic Climate Impact Assessment (ACIA). 2005. Arctic Climate Impact Assessment. Cambridge University Press, Cambridge, UK, 1042 pp.

and how they vary geographically, between species, populations, and biological communities. We need to understand the complex interactions between climate and communities of Arctic species.¹⁸ Although this information is beginning to surface, the accumulation of data on biodiversity is still trailing climate modelling and the gathering of information on the abiotic environment.

42. A number of challenges are envisaged for Arctic biodiversity. With a warming climate, shipping and resource development (e.g., oil and gas exploration) are likely to increase, with a potential for increased pollution and disturbance to Arctic biodiversity. More development may lead to different human settlement patterns and changes in resource use. Decreased ice cover may increase the number of areas accessible to fisheries and make new species economically available and so create both opportunities as well as challenges for sustainable use. Many Arctic species also migrate great distances throughout the world and so are subject to environmental changes during their travels, including carrying pollutants back to the North in their bodies.

43. Because they move through Arctic as well as non-Arctic territories, international cooperation beyond the Arctic is needed for their concerted and sustained conservation. One response to greater human pressures in the Arctic is the creation of protected areas. Although improving, current protected areas are still inadequate in representation of habitats and ecosystems. For instance, it is generally recognized that marine protected areas are particularly scarce. Even a full overview of biologically sensitive areas in the Arctic marine ecosystem, including in marine areas beyond national jurisdictions, is lacking. However, protected areas are only one aspect of biodiversity conservation as climate change inevitably calls for greater attention to more general conservation measures due to shifts in distributions and new introductions into local flora and fauna.

44. Addressing the pressures facing Arctic biodiversity requires better and more coordinated information on changes in biodiversity. Through the Circumpolar Biodiversity Monitoring Program, CAFF has brought together numerous datasets that indicate changes in biodiversity. This programme is an effective response to the many challenges that are envisaged in the wake of climate change and changing human use of the Arctic regions. Much data already exists on Arctic biodiversity but the challenge is to bring these data together, to analyse and identify the gaps in circumpolar monitoring, and put them to use to facilitate better informed policy decisions.

45. The aim of the CBMP is to cover biodiversity at all levels, from the genetic to the ecosystem level, using the latest technologies as well as traditional ecological knowledge of the northern peoples. The CBMP is a process that cannot be implemented all at once but is well underway with the establishment of monitoring networks, indicators and indices, and management tools such as the Circumpolar Seabird Information Network. The CBMP is a definite response to the international commitments that the Arctic countries have undertaken on halting the loss of biodiversity. The results are of practical use for the many questions facing the Arctic countries and the Arctic Council in their deliberations. The current challenge is to use the available data in a better and more coordinated way, fill gaps in knowledge, and increase the geographic coverage of Arctic information for the conservation and sustainability of the environment, as well as for the benefit of decision makers, Arctic peoples, science, and the global community at large.

46. Aspects of vanishing local knowledge such as Arctic languages and traditional ecological knowledge need to be fully recognized and acted upon. Climate change and all the associated issues – be they of the natural environment or human-related – pose a new suite of challenges for biodiversity and peoples of the Arctic. Taking care of the environment poses major challenges for the Arctic Council and all other stakeholders interested in the north. CAFF, as the biodiversity arm of the Arctic Council, contributes towards seeking appropriate solutions to those challenges.

47. In order to respond, plan and adapt to the changes currently underway conservation in the Arctic must be dynamic and forward looking. There are a number of challenges that need to be considered:

¹⁸ Post, E et al. 2009. Ecological dynamics across the Arctic associated with recent climate change. *Science*. 325 (5946):1355–1358.

Scale and approach: The development of a dynamic forward looking approach

48. Within the Arctic Council, attention has been focused upon producing assessments that are static and not dynamic. There are often very large time gaps between when information is collected, analysed and made available to the Arctic Council. This means that often the data they contain may not be the most recent and consequently the analysis built on this information may be out of date. Regular one-off assessments have been the norm and, once completed, the work and effort gone into building these circumpolar cooperations stops and the process begins anew on some other aspect and often from the ground up. This highlights a primary challenge which is to shorten the gap between when data is collected to when it has been processed and presented to decision-makers. The aim must be to allow for a quicker response time for policymakers. Conservation activities must be dynamic and forward looking and not stuck in the static approach which has dominated until now.

49. CAFF has recognized this challenge and in recent years worked towards developing a solution. This approach has focused on not just conducting traditional assessments but also addressing the creation of a framework to allow for the collection, processing and analysis of data on a continuous basis. The aim being through the Arctic Biodiversity Assessment (ABA) not to produce a traditional one-off static assessment but rather to create a baseline of current knowledge and at the same time developing the engine, i.e. the Circumpolar Biodiversity Monitoring Program (CBMP), which will feed data into this baseline allowing it to become a dynamic living tool which is sustainable and can produce regular and more flexible assessments and analyses. This dynamic baseline will supply up-to-date and regular data to aid decision makers in identifying priority actions.

Availability and access to information

50. Availability of information and its accessibility in formats and standards which allow for ease of data integration to form circumpolar datasets play a key role in how effective conservation efforts will develop. Initiatives such as the Arctic SDI and the ASTI constitute important contributions which help insure that data collected throughout the Arctic can be comparable, easily integrated and accessible. It is important for the future development of effective conservation efforts that use is made of technologies such as remote sensing which are now developing the capacity to play an important role in circumpolar-scale monitoring and assessments.

Communication and outreach

51. There is a need to insure effective means of conveying information developed through monitoring and assessment activities in a format that makes information accessible and usable both for the public, scientific and policymaking audiences. The development of communication tools to convey results is critical, e.g. the Seabird Information Network is as an example of a successful communication tool. Finding creative ways to integrate data makes it more useful by providing regional and circumpolar coverage, but it is difficult and requires patience. It is crucial to insure feedback as communication is not one way, i.e. researchers to communities, data analyzers to data collectors, understandable results to policy. Regular status and trends reporting is an essential aspect of insuring the results and messages from monitoring are conveyed successfully. CBird has perhaps had the most extensive experience influencing management. With the results of monitoring CBird has been able to identify when a species is in trouble and could then develop conservation strategies to address the results of monitoring.

Funding

52. Attention must be paid to insuring continuity of efforts and sustainability of monitoring efforts in order to allow for the development of circumpolar and long-term datasets. These datasets are required in order to allow for adaptation and response to the changes taking place.

IX. KEY FINDINGS FROM ARCTIC BIODIVERSITY TRENDS

53. In 2008, the United Nations Environment Programme passed a resolution expressing ‘extreme concern’ over the impacts of climate change on Arctic indigenous peoples, other communities, and biodiversity.¹⁹ It highlighted the potentially significant consequences of changes in the Arctic. *Arctic Biodiversity Trends – 2010: Selected Indicators of Change* provides evidence that some of those anticipated impacts on Arctic biodiversity are already occurring. Furthermore, although climate change is a pervasive stressor, other stressors such as long range transport of contaminants, unsustainable harvesting of wild species and resource development are also impacting Arctic biodiversity. The key findings reflect the information from the 22 indicators presented in this report. A more complete scientific assessment of biodiversity in the Arctic will emerge from the full Arctic Biodiversity Assessment, currently in preparation. Unique Arctic habitats for flora and fauna, including sea ice, tundra, thermokarst ponds and lakes, and permafrost peatlands have been disappearing over recent decades. Key findings include:

(a) Although the majority of Arctic species examined in this report are currently stable or increasing, some species of importance to Arctic people or species of global significance are declining;

(b) Climate change is emerging as the most far reaching and significant stressor on Arctic biodiversity. However, contaminants, habitat fragmentation, industrial development, and unsustainable harvest levels continue to have impacts. Complex interactions between climate change and other factors have the potential to magnify impacts on biodiversity levels continue to have impacts. Complex interactions between climate change and other factors have the potential to magnify impacts on biodiversity;

(c) Since 1991, the extent of protected areas in the Arctic has increased, although marine areas remain poorly represented;

(d) Changes in Arctic biodiversity are creating both challenges and opportunities for Arctic peoples;

(e) Long-term observations based on the best available traditional and scientific knowledge are required to identify changes in biodiversity, assess the implications of observed changes, and develop adaptation strategies;

(f) Changes in Arctic biodiversity have global repercussions.

X. CAFF AND THE CONVENTION ON BIOLOGICAL DIVERSITY

54. Arctic biodiversity is facing increased challenges due to the impacts of climate change and other stressors, and increased cooperation is essential towards understanding and addressing these challenges. A Memorandum of Cooperation has been signed between the Secretariats of the Convention on Biological Diversity and CAFF. This Memorandum contributes to building and sharing knowledge and in creating awareness about the state of Arctic Biodiversity. The objectives and activities of the Convention on Biological Diversity and the Conservation of Arctic Flora and Fauna complement one another in that CAFF, as a Working Group of the Arctic Council, provides a vehicle for knowledge and action in the Arctic region, while the Convention on Biological Diversity provides a global framework for biodiversity efforts. The Convention can help place Arctic Biodiversity within a global framework while CAFF can help inform the Convention on the status and trends of biodiversity in this globally significant region.

55. Recent activities have included CAFF’s contribution to the development of the third edition of Global Biodiversity Outlook. This synthesis contains a text box on Arctic sea-ice and biodiversity and a sub-section on Arctic indigenous languages. CAFF also held a side event at the tenth meeting of the Convention on Biological Diversity held in Nagoya, Japan, which focused on Arctic biodiversity and

¹⁹ United Nations Environment Programme (UNEP). 2008. Governing Council Decision SS.X/2. Tenth special session of the Governing Council/Global Ministerial Environment Forum, Monaco, 20-22 February 2008.

where the first product from the Arctic Biodiversity Assessment – *Arctic Biodiversity Trends 2010: selected indicators of change* - was presented.

56. In the future information and products generated through ongoing and planned activities of CAFF will continue to contribute to the three objectives of the Convention on Biological Diversity and the implementation of the Strategic Plan for Biodiversity 2011-2020 including the Aichi Biodiversity Targets. Specific examples of this will include the baseline on Arctic Biodiversity Status and Trends which will become available upon the completion of the Arctic Biodiversity Assessment in 2013. The work of CAFF's Circumpolar Biodiversity Program will make invaluable contributions through activities such as the Arctic Species Trend Index and the recently approved first Arctic Biodiversity Marine Monitoring Plan.
