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Recommended Citation

Djoghlaif, Ahmed. "Climate Change and Biodiversity in Polar Regions." *Sustainable Development Law and Policy*, Spring 2008, 14-16, 60.

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CLIMATE CHANGE AND BIODIVERSITY IN POLAR REGIONS

by Dr. Ahmed Djoghla^{*}

INTRODUCTION

Polar ecosystems are home to an array of plants and animals that survive in some of the most extreme conditions in the world. For example, the seas surrounding the Antarctic are rich in plankton, which support a rich marine food chain, while the Arctic itself supports many mammals and plays an important role in the annual cycle of migratory birds. The scientific studies carried out at the occasion of the celebration of the International Polar Year have provided additional evidence of the rich, unique nature of the marine Arctic environment. Indeed the biodiversity of the Arctic is fundamental to the livelihoods of Arctic peoples. However, the Millennium Ecosystem Assessment, along with recent reports from the Intergovernmental Panel on Climate Change, have made us aware that climate change negatively impacts existing ecosystems and is one of the main drivers of biodiversity loss.¹ Particular attention is now being paid to Polar Regions, where evidence of the impacts of climate change have been observed and widely reported. Indeed, Polar Regions are currently experiencing some of the most rapid and severe climate change on Earth, which will contribute to environmental and socio-economic changes, many of which have already begun. During the twentieth century, Arctic air temperatures increased by approximately five degrees Celsius, which is an increase that is ten times faster than the observed global-mean surface temperature.² An additional warming of about four to seven degrees Celsius in the Arctic is predicted over the next hundred years.³ Moreover, Polar Regions are particularly threatened by climate change since Polar species and societies have developed very specialized adaptations to the harsh conditions found at the poles, thus making them extremely vulnerable to dramatic changes in these conditions.

OBSERVED AND PROJECTED IMPACTS

Walrus, polar bears, seals, and other marine mammals that rely on sea ice for resting, feeding, hunting, and breeding are particularly threatened by climate change. For example, studies reveal that in 1980, the average weight of female polar bears in western Hudson Bay, Canada, was 650 pounds. While in 2004,

their average weight was only 507 pounds.⁴ It is believed that the progressively earlier breakup of the Arctic sea ice is responsible for the decrease in the polar bears' average weight,⁵ as this ice loss reduces their hunting season and food intake. Although for a different reason, reduced sea-ice extent is also believed to have

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caused a fifty percent decline in emperor penguin populations in Terre Adélie.⁶ Populations of krill and other small organisms may also decline as ice recedes.⁷ Due to the high importance of krill in various food chains, the entire marine food web could be adversely affected.⁸

Climate change is already affecting the livelihood of indigenous peoples in the Arctic. Losses in biodiversity affect the traditional practices of

indigenous people, particularly fishing and hunting. For example, the Saami people have observed changes in reindeer grazing pastures, while the Inuit people of Canada have observed reductions in the ringed seal population, their single most important source of food.⁹

CLIMATE CHANGE AND INDIGENOUS AND LOCAL COMMUNITIES IN THE ARCTIC

Due to its unique nature, climate, and sensitivity to climate changes, the Arctic is an important early warning system as far as climate change is concerned. The findings of the Intergovernmental Panel on Climate Change show that eleven of the last twelve years (1995–2006) rank among the twelve warmest years in the instrumental record of global surface temperatures since 1850.¹⁰ In the past one hundred years, average temperatures in the Arctic increased by almost twice the global average rate.¹¹ Consequently, the annual average Arctic sea ice extent has shrunk by 2.1 to 3.1 percent per decade. Further, temperatures at the top of the permafrost layer have generally increased up to three degrees Celsius since the 1980s.¹² It is projected that higher temperatures will contribute to continuing snow contraction and widespread increases in thaw depth over permafrost regions. Also, the gradual melting of the Greenland ice sheet is

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projected to contribute to sea level rise, even beyond the year 2100.¹³

The consequences of climate change are becoming more visible in the Arctic, and are greatly influencing the environment, animals, and living conditions of humans, especially the indigenous peoples who strongly depend on the Arctic ecosystem and natural resources. The Arctic indigenous peoples, their life, culture, and traditional knowledge, are adapted to and largely dependent on the cold and extreme physical conditions of the region. Over the years, they have adapted to the challenges brought about by the Arctic geography and climate.

Although the Arctic climate has always undergone change, the ongoing changes in the climate are taking place at such an alarming speed that indigenous communities are having severe difficulties coping.

The Arctic Climate Impact Assessment (“ACIA”), commissioned by the Arctic Council,¹⁴ provides important insight into the impacts of climate change in the Arctic region.¹⁵ Over a period of five years, an international team of over three hundred scientists, others experts, and members of indigenous communities prepared this assessment. The ACIA Report identifies a range of climate change impacts including: rising temperatures in the Arctic with worldwide implications; shifts in Arctic vegetation zones; changes in animal species’ diversity, ranges, and distribution; and increased exposure to storms by coastal communities.¹⁶

The ACIA Report devotes a separate chapter to address matters concerning the changing Arctic from an indigenous perspective. Indigenous peoples have provided case studies addressing the situation in Kotzebue, the Aleutian and Pribilof Islands Region, the Yukon Territory, Denendeh, Nunavut, Greenland, Sápmi, and Kola. An important common theme or observation in the case studies is that the weather in the Arctic region has become more variable and less predictable by traditional means.¹⁷

The Arctic Climate Impact Assessment recognizes that further research is required to understand environmental changes occurring in the Arctic, as well as the ways in which people view these changes. It states that in both cases, there is a growing, but still insufficient, body of research to draw on, in particular in those Arctic areas where few or no current records of indigenous observations are available. The assessment concludes that further research needs to detect and interpret climate change, and to determine appropriate response strategies.

ADAPTATION OPTIONS

Through the adoption of biodiversity-friendly adaptive and mitigative strategies, the resilience of ecosystems to the impacts of climate change can be enhanced, and the risk of damage to

human and natural ecosystems reduced. Biodiversity is essential to the maintenance and delivery of many ecosystem services including the provision of food and fodder, nutrient cycling, and the maintenance of hydrological flows. As such, maintaining biodiversity is an important component of adaptation planning. Maintaining the ability of resilient species to adapt is critical because climate change will favour species that are better able to adapt to changing climatic conditions. In addition, the reduction of other stressors, such as permafrost degradation, chemical pollution, over-fishing, land-use changes (including unsustainable development), and habitat fragmentation could improve polar ecosystems’ resilience to climate change.

Adaptation activities can and should make use of local and indigenous knowledge, and include their full and effective participation. Indeed, indigenous peoples can contribute to the understanding of changes in the Arctic through their observations and perspectives on changes in biodiversity and ecosystem functioning.

For example, the Inuvialuit Hunters and Trappers in Canada’s High Arctic, along with the International Institute for Sustainable Development (“IISD”), initiated a year-long project to document Arctic climate change and communicate it to Canadian and international audiences. During the initiative, a video and several scientific journal articles were produced to communicate the negative impacts of climate change observed in the Arctic and to understand the adaptive strategies that local people are using in response.¹⁸

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THE PATH AHEAD

The Convention on Biological Diversity (“CBD”) establishes the international framework for biodiversity conservation, and very early on looked into the relationship between biodiversity and climate change. The CBD integrated climate change components within all of the programmes of work of the Convention, with the exception of technology transfer and cooperation. The Convention has also built synergies with the United Nations Framework Convention on Climate Change and convened an Ad Hoc Technical Expert Group on climate change and biodiversity. The Secretariat of the Convention has also initiated an exhibition of indigenous and local communities highly vulnerable to climate change, as well as calling for the “International Expert Meeting on Responses to Climate Change for Indigenous and Local Communities and the Impact on Their Traditional Knowledge related to Biological Diversity—The Arctic Region,” which was held in Helsinki, Finland, March 25–28, 2008.

There remains, however, a number of challenges and opportunities for the further development of interlinkages between biodiversity and climate change. These include capacity build-

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ing, mainstreaming, communication and awareness raising, and research and technology.


Indigenous and local communities' traditional knowledge, innovations, and practices are an inseparable part of their culture, social structures, economy, livelihoods, beliefs, traditions, customs, customary law, health, and relationship to the local environment. The totality of all such elements makes their knowledge, innovations, and practices vital in relation to biological diversity and sustainable development. Consequently, serious adverse climate change impacts on indigenous and local communities, in particular the multiple impacts, will also have adverse consequences on the elements that the Convention on Biological Diversity identifies as their "knowledge, innovations, and practices." Indeed, Article 8(j) of the Convention acknowledges the knowledge, innovation, and practices of indigenous and local communities, and promotes its wider application in the context of conservation and sustainable use of biological diversity. The Convention established specific obligations for State parties to respect, preserve, and maintain such knowledge, innovations, and practices, as far as this is possible, and as appropriate within the framework of their respective national legislation and subject to the approval of the knowledge holders.¹⁹ In light of the accelerated threats caused by climate change, it is necessary for Party States to adopt political, administrative, and legal measures to protect and maintain the knowledge, innovations, and practices of indigenous and local communities. Such measures should be developed with full and effective participation of the representatives of indigenous and local communities.

CONCLUSION

Recent scientific assessments have provided clear evidence of the impacts of climate change on the biodiversity of Polar Regions, and how this in turn affects indigenous and local communities. A number of reports also illustrate the contribution of biodiversity to adaptation to climate change. Therefore, through its various programmes and cross-cutting issues, the Conven-

tion seeks to address all threats to biodiversity and ecosystem services including threats from climate change through scientific assessments, the development of tools, incentives and processes, the transfer of technologies and good practices, and the full and active involvement of relevant partners including Governments, Parties, indigenous and local communities, youth, NGOs, and Women. It is also for this reason that the international community celebrated the International Day on Biological Diversity on May 22, 2007 under the theme "Biodiversity and Climate Change." In his message delivered for this occasion, the United Nations Secretary-General, Mr. Ban Ki-moon, reminded the international community that the conservation and sustainable use of biodiversity is an essential element of any strategy to adapt to climate change. He also stated:

Through the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change, the international community is committed to conserving biodiversity and combating climate change. The global response to these challenges needs to move much more rapidly, and with more determination at all levels—global, national and local. For the sake of current and future generations, we must achieve the goals of these landmark instruments.²⁰

Therefore, because every person on this planet, whether they know it or not, draws on biodiversity for their daily lives, and because climate change is a global problem, protecting the biodiversity of Polar Regions from the impacts of climate change requires a multi-layered web of intersecting initiatives involving all stakeholders and the Convention on Biological Diversity has to play a crucial role. The international community is called upon to redouble its effort to achieve the Johannesburg Biodiversity Target, which is aimed at substantially reducing the rate of biodiversity decline by 2010. The celebration in 2010 of the International Year on Biodiversity will offer a unique opportunity to keep the momentum generated by the International Polar Year going. 

Endnotes: Climate Change and Biodiversity in Polar Regions

¹ See Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Current State and Trends*, Vol. 1, 2005; see also INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *CLIMATE CHANGE 2007: SYNTHESIS REPORT*, 2007.

² Convention on Biological Diversity, Booklet for International Day for Biological Diversity, *Biodiversity and Climate Change*, 12 (2007), available at <http://www.cbd.int/doc/bioday/2007/ibd-2007-booklet-01-en.pdf> (last visited Apr. 13, 2008) [hereinafter CBD Booklet].

³ ARCTIC CLIMATE IMPACT ASSESSMENT [ACIA], *IMPACTS OF A WARMING ARCTIC: ARCTIC CLIMATE IMPACT ASSESSMENT* (Cambridge Univ. Press 2004).

⁴ NASA Goddard Space Flight Center, *Warming Climate May Put Chill on Arctic Polar Bear Population* (Sept. 13, 2006), available at http://www.nasa.gov/centers/goddard/news/topstory/2006/polar_bears.html (last visited Apr. 13, 2008).

⁵ NASA Goddard Space Flight Center, *id.*

⁶ Secretariat of the Convention on Biological Diversity, *CBD Technical Series No. 10, Interlinkages between biological diversity and climate change: Advice on the integration of biodiversity considerations into the implementation of the United Nations Framework Convention on Climate Change and its Kyoto protocol* (2003), available at <http://www.cbd.int/doc/publications/cbd-ts-10.pdf> (last visited Apr. 13, 2008).

⁷ U.N. Env't Program [UNEP], *How Will Global Warming Affect my World?* (2003).

⁸ See Virginia Gascón & Rodolfo Werner, *CCAMLR and Antarctic Krill: Ecosystem Management Around the Great White Continent*, *SUSTAINABLE DEV. L. & POL'Y*, Fall 2006, at 14.

⁹ CBD Booklet, *supra* note 2, at 13.

¹⁰ INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE [IPCC], *Summary for Policymakers*, in CLIMATE CHANGE 2007 – THE PHYSICAL SCIENCE BASIS: WORKING GROUP I CONTRIBUTION TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, 4 (Susan Solomon et al. eds., 2007), available at http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_SPM.pdf (last visited Apr. 13, 2008) [hereinafter *IPCC Summary for Policymakers*].

¹¹ See Gordon McBean et al., *Arctic Climate: Past and Present*, in ARCTIC CLIMATE IMPACT ASSESSMENT 22 (Lelani Arris ed., Cambridge Univ. Press 2005).

¹² *IPCC Summary for Policymakers*, *supra* note 10, at 6.

¹³ *IPCC Summary for Policymakers*, *supra* note 10, at 12.

¹⁴ The Arctic Council is a high-level intergovernmental forum that provides a mechanism to address the common concerns and challenges faced by Arctic people and governments. It is comprised of the eight Arctic states (Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden, and the United States of America), six indigenous peoples organizations (Aleut International Association, Arctic Athabaskan Council, Gwich'in Council International, Inuit Circumpolar Conference, Russian Association of Indigenous peoples of the North, and Sámi Council) as permanent participants, and official observers (including France, Germany, the Netherlands, Poland, United Kingdom, non-governmental organizations, and scientific and other international bodies). About Arctic Council, Arctic Council website, <http://arctic-council.org/article/about> (last visited Apr. 13, 2008).

¹⁵ ACIA, IMPACTS OF A WARMING ARCTIC: ARCTIC CLIMATE IMPACT ASSESSMENT, *supra* note 3.

¹⁶ ACIA, POLICY DOCUMENT (Nov. 2004) (issued by the Fourth Arctic Council Ministerial Meeting, held in Reykjavik, Iceland), available at http://www.acia.uaf.edu/PDFs/ACIA_Policy_Document.pdf (last visited Apr. 13, 2008).

¹⁷ See Henry Huntington & Shari Fox, *The Changing Arctic: Indigenous Perspectives*, in ARCTIC CLIMATE IMPACT ASSESSMENT 22 (Lelani Arris ed., Cambridge Univ. Press 2005).

¹⁸ INTERNATIONAL INSTITUTE FOR SUSTAINABLE DEVELOPMENT [IISD], INUIT OBSERVATIONS ON CLIMATE CHANGE, available at <http://www.iisd.org/casl/projects/inuitobs.htm> (last visited Apr. 13, 2008).

¹⁹ Convention on Biological Diversity art. 8(j), June 5, 1992, 31 I.L.M. 818 (stating that “each contracting Party shall, as far as possible and as appropriate: Subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.”).

²⁰ Press Release, Secretary General, Conservation, Sustainable Use of Biodiversity Essential for Adapting to Climate Change, Secretary-General Says in Message for International Day, SG/SM/10994 (May 14, 2007), available at <http://www.un.org/News/Press/docs/2007/sgsm10994.doc.htm> (last visited Apr. 13, 2008).