CIRCUMPOLAR VOICES

SUSTAINABLE DEVELOPMENT, CLIMATE CHANGE AND HUMAN HEALTH IN THE ARCTIC

Alan J. Parkinson

U.S. Centers for Disease Control and Prevention, Arctic Investigations Program, Anchorage, USA

Received 15 June 2009; Accepted 29 November 2009

Presentation and recommendations made to an international experts meeting: “Sustainable Development in the Arctic in the Face of Global Climate Change: Scientific, Social, Cultural and Educational Challenges,” Monte Carlo, Monaco, 3–6 March 2009.

The statements and positions contained in this report represent the proceedings of the meeting. They are those of the presenter and do not necessarily represent the official position of CDC or the symposium’s sponsors.

INTRODUCTION

Background

A meeting held in Monte Carlo, Monaco 3–6 March 2009 to discuss aspects of sustainable development in the Arctic in the face of global climate change brought together 42 participants from 13 countries, including all Arctic states and Greenland.

Participants were experts in the field of the natural and social sciences, education ethics, law, health and international affairs. These experts included representatives from United Nations Environmental Program (UNEP), the Arctic Council and circumpolar Indigenous peoples organizations working with the Russian Association of Indigenous peoples of the North (RAIPON), the Inuit Circumpolar Council (ICC) and the Sami Parliament. The meeting was supported and hosted by the Principality of Monaco, and coordinated by United Nations Education Scientific and Cultural Organization’s (UNESCO) Natural Science Sector, the International Oceanographic Commission, Cultural Sector and Social and Human Sciences Sector.

The meeting assessed the scientific, social, cultural and educational challenges to be met
to ensure the sustainable development of the Arctic within the global context. There was a combination of plenary and working group level discussions focusing on:

- oceans and atmosphere
- biodiversity and ecosystem services
- circumpolar Indigenous peoples and intangible heritage
- economic development and social transformations

Four cross-cutting themes were also explored. These included:

- education and sustainable development
- environmental ethics
- monitoring and observing systems
- global connections to change in the Arctic

Participants identified key challenges and knowledge gaps and addressed recommendations to the director general for follow-up action by UNESCO and transmission to appropriate institutions, member states and intergovernmental committees.

The full report and recommendations of this meeting can be found at http://portal.unesco.org/science/en/ev.php-URL_ID=76&URL_DO=DO_TOPIC&URL_SECTION=0.html.

Presentation

The Arctic, like most other parts of the world, has warmed substantially over the last few decades. The warming trend is projected to continue and may lead to significant economic and cultural upheaval, particularly for the Indigenous peoples of the Arctic (1). Resident Indigenous Arctic populations are uniquely vulnerable to climate change because of their close relationship with, and dependence on, the land, sea and natural resources for their cultural, social, economic and physical well-being. Climate change will affect the sustainable development of these communities through its impact on the sanitation and water facilities, food supply, prevalence of infectious diseases and transportation infrastructures. Without addressing these basic public health needs, Arctic communities are not sustainable.

While the health of Arctic populations has greatly improved over the last 50 years, life expectancy is lower and infant mortality is higher for Indigenous Arctic residents in the U.S. Arctic, northern Canada, Greenland and the Russian Federation than in Arctic residents of Nordic countries (2). The rapid pace of change within the Arctic also presents new challenges to the health and well-being of Arctic residents, which will require additional health research (3). For example, in many Arctic regions, living conditions continue to change from an economy based on subsistence hunting and gathering to a cash-based economy. Across the circumpolar north, there is increasing activity towards sustainable growth through development of local resources and greater involvement in the global economy. Such changes have had many positive influences on the physical health of Arctic residents, including improved housing conditions, a stable food supply and increased access to a wide variety of Western goods, along with decreases in morbidity and mortality from infectious diseases. But these changes in lifestyle have also led to an increase in the prevalence of certain chronic diseases, especially diabetes, hypertension, obesity and cardiovascular disease. In addition, increasing rates of child abuse, alcohol abuse, drug abuse, domestic violence, suicide and unintentional injury are associated with the rapid cultural change now taking place, resulting in the loss
of cultural identity and self-esteem in these populations (2–4).

Similarly, globalization of the Arctic economy was accompanied by improvements in the Arctic transportation infrastructure. Many communities that were once isolated are now linked to major cities in the south by air transportation. Consequently, these communities are now vulnerable to many infectious diseases (including influenza, infectious diseases like SARS and antibiotic-resistant pathogens such as multi-drug resistant tuberculosis) commonly found in more densely populated urban centres (5).

Environmental pollutants are a global problem. Contaminants such as mercury and other heavy metals, PCBs, DDT and other organochlorines, along with dioxins, originate primarily in the mid-latitude industrial and agricultural areas of the globe, but are concentrated in the Arctic as a result of atmospheric, river and ocean transport. Their subsequent biomagnification in the Arctic food webs and appearance in subsistence food sources means they end up in the Indigenous people who rely on them, and this is of great concern to Arctic residents. Potential human health effects include damage to the developing brain, endocrine and immune systems of both the unborn and young children. A new concern is the role of mercury on cardiovascular diseases. Research is needed to identify the levels and human health effects of these contaminants in Arctic residents, particularly the very young, and to provide guidance on both the risks and benefits of consuming traditional food (6).

Climate change is already affecting many Arctic rural communities, and is bringing with it threats to both the economy and health, as well as possible opportunities. The impact of climate change on the health of Arctic residents will vary, depending on factors such as age, socio-economic status, lifestyle, culture, location and the capacity of the local health systems to adapt. It is likely that the most vulnerable will be those living close to the land in remote communities, who are already facing health-related challenges (7).

Direct health threats from climate change include morbidity and mortality resulting from the increasing number of extreme weather events (storms, floods, increased heat and cold temperatures), and the rising incidence of injury and mortality associated with unpredictable ice and storm conditions. Indirect effects include greater mental and social stress related to changes in environment and the accompanying loss of traditional lifestyle, changes in bacterial and viral diseases and reduced access to quality water sources. Some regions will be at risk from illness caused by failing sanitation infrastructures, which could be damaged by changes in the permafrost and storm surge. Some groups will also have to modify their traditional diet as a result of changes in subsistence species distribution and accessibility. This change may have negative impacts on health, as shifting from a traditional diet to a more Western diet is associated with increases in “modern diseases” such as obesity, diabetes, cardiovascular disease and cancer. Projected warming will affect the transport, distribution and behaviour of contaminants, further threatening the safety of the traditional food supply and potentially increasing human exposure. These changes are taking place in the context of ongoing cultural and socio-economic changes. Climate change represents one of the many sources of stress on northern societies and cultures, as it affects the relationship between
the people and their environment, which will further stress the community’s and the individual’s psychosocial health.

The potential impact of climate change on human health will differ from place to place, depending on regional differences in climate alterations, as well as variations in health status and the adaptive capacity of different populations. Rural Arctic residents in small, isolated communities, with fragile support systems, little infrastructure and marginal to non-existent public health systems, may be the most vulnerable. People who depend on subsistence hunting and fishing will be vulnerable to changes that affect targeted species. Climate stress and shifting animal populations may create conditions for the spread of certain infectious diseases from animals to humans.

The Arctic Climate Impact Assessment (ACIA) was published in 2005 and was the first comprehensive scientific assessment of climate change in the Arctic (1). The ACIA provides recommendations for communities, researchers and policymakers to begin to address the human health challenges caused by climate change (7). The main conclusions of the assessment on health impacts of climate change were that:

- much research remains to be done on the relationship between climate change and individual and community health
- climate change will continue to influence public health in small and remote communities of the Arctic
- there is an urgent need for adopting community based monitoring strategies that would identify both emerging threats and opportunities. For example, there may be increased availability of funding for infrastructure improvements.

Further, the ACIA outlines a number of gaps in the current body of knowledge and the need for action. For example, it is currently difficult to compare health status data between countries. This calls for the creation of a core set of health indicators that can be gathered and defined in a similar manner. There is also a need for a carefully planned strategy at both community and regional levels to monitor and document environmental change. Currently, there is a lack of organized effort to collect and utilize Indigenous knowledge regarding climate and climate changes. Data on climate change and its impact on regional biota are limited. Diseases affecting the wildlife and human-animal interactions need to be monitored. Data on climate-induced changes in the diets of subsistence species are also lacking, and these changes affect their nutritional value in traditional diets. There is no monitoring system in all regions to report snow and ice conditions for local and regional travel necessary to subsistence activities. Monitoring is critical in regions of the Arctic where physical infrastructure depends on permafrost, or where a village site relies on sea ice protection from storm erosion. Data on the movement of pollutants into and out of the Arctic is critical for projecting impact and risk to Arctic wildlife and residents. A changing climate also makes this type of monitoring essential.

An international workshop was held in Anchorage, Alaska 13–15 February 2008, to update the current knowledge about the impact of climate change on human health; re-examine the principal conclusions and recommendations of the ACIA on human health to determine potential items for action; and examine the feasibility of implementing community-based monitoring strategies both within and across regions to measure a common set of climate,
health status, environmental infrastructure and ecosystem indicators (8). The workshop reaffirmed the principal conclusions of the ACIA report on actions required to address the impact of climate change and human health, and outlined the essential elements needed to establish a community-based monitoring strategy (Table I).

Similarly, an international workshop sponsored by the United Nations in the Russian Federation was held in Moscow 23–24 April 2008. Entitled the “Impact of Global Climate Change on Human Health in the Russian Arctic” (9), the workshop’s participants made several recommendations, which are summarized in Table II.

**Table I. Recommendations of the international workshop held in Anchorage, Alaska, 13–15 February 2008 (8).**

| Recommendation |
|----------------|
| 1. The identification of communities and segments of the population at greatest risk. These should be targeted for the assessment of existing or potential health risks and vulnerabilities, and engaged in the design of community-based monitoring, and to formulate intervention and adaptation strategies. |

| 2. The identification of community leaders or project managers. In Alaska, communities have access to training in emergency preparedness and implementation of the Incident Command System for managing community emergencies. This system could be utilized for the management of incidents related to climate change (e.g. village evacuation, unsafe ice conditions, threats to the sanitation infrastructure). |

| 3. The evaluation of existing capacity, resources, motivation and infrastructure is needed to establish a community-based monitoring system. |

| 4. Identification and creation of regional partnerships. Linkage with and engagement of appropriate tribal, public health and wildlife agencies, non-governmental organizations and universities engaged in climate change activities and research are important as potential funding sources, and to ensure local, regional, national and international coordination of monitoring, research and prevention and control activities. |

| 5. Identification, selection and monitoring of basic indicators for climate change and community health. The selection of site- or village-specific indicators should be guided by local concerns. |

| 6. Expansion of community-based monitoring systems to include other communities both regionally and internationally. Linkage of community-based monitoring systems to include other communities is important for the detection of trends in climate and health impacts over larger geographic regions. This should include sharing standardized protocols for monitoring climate change community health indicators. |

| 7. Develop contingency plans, communication networks, education programs and early warning systems. These would include, for example, village evacuation contingencies, notifications of dangerous ice or weather conditions, alternate travel routes, alternate food sources, food storage/preservation methods and alternate water sources. |
Table II. Recommendations of an international workshop sponsored by the United Nations in the Russian Federation, held in Moscow 23–24 April 2008, entitled “Impact of Global Climate Change on Human Health in the Russian Arctic” (9).

**Recommendation**

1. Support and enhance assessments of regional climate change in the Russian Arctic, including environmental and social community monitoring involving Indigenous peoples.

2. Develop regional scenarios for the Russian Arctic based on global models of climate change.

3. Enhance efforts to determine the health status of the inhabitants of the Russian Arctic, including Indigenous peoples.

4. Develop preventive programs to minimize the adverse consequences of climate change. Strengthen government health surveillance systems in Arctic communities that are vulnerable to climate change.

5. Develop recommendations and action plans to protect the population against the consequences of emergencies associated with climate change (natural disasters, extreme weather, infectious disease outbreaks).

6. Train health care experts in various fields (including those working in universities and regional institutes) concerning the impacts of climate change on human health.

7. Raise awareness about the impacts of climate change among federal and regional officials.

8. Expand basic and applied research on the impact of climate change on human health in the Arctic.

9. Expand international cooperation to assess the impact of climate change on human health in the Arctic using the capacity of individual countries, the Arctic Council, the Arctic Forum, the European Commission, United Nations programs and agencies of the World Bank.

10. Assess the effectiveness and adequacy of existing federal and regional systems of sanitary epidemiological monitoring and epidemiological emergency response in the context of climate change, and develop recommendations for their improvement.
Recommendations from the Monte Carlo meeting
Given the importance of human health to the maintenance and advancement of sustainable development in the Arctic, and the threat of climate change to human health, the following recommendations were made by participants in the circumpolar indigenous peoples and intangible heritage working group.

1. The Arctic Council and the World Health Organization (WHO) should take action on the human health recommendations put forward by chapter 15 of the ACIA, and the report by the United Nations in the Russian Federation “Impact of Global Climate Change on Human Health in the Russian Arctic.”

2. WHO and other relevant authorities should continue to raise awareness about the problems of contaminants and other threats to human health.

3. UNESCO and WHO should work with other agencies to ensure the provision of adequate primary care and other medical services to Arctic communities.

4. The United Nations Environment Program (UNEP) and UNESCO should organize a “food security” conference focusing on the Arctic, in collaboration with the Arctic Council.

REFERENCES

1. Arctic Council. Arctic climate impact assessment scientific report. Cambridge: Cambridge University Press; 2005. p. 863–960.
2. Hild C. Human health and wellbeing: Arctic human development report. Akureyi Iceland: Stephansson Arctic Institute; 2004. p. 159–168.
3. Curtis T, Kvermo S, Bjerregaard P. Changing living conditions, lifestyle and health. Int J Circumpolar Health 2005;64(5):442–450.
4. Bjerregaard P, Young TK, Dewailly E, Ebbesson SO. Indigenous health in the Arctic: an overview of the circumpolar Inuit population. Scand J Public Health 2004;32(5):390–395.
5. Butler JC, Parkinson AJ, Funk E, Beller M, Hayes G, Hughes JM. Emerging infectious diseases in Alaska and the Arctic: a review and a strategy for the 21st century. Alaska Med 1999;41(2):35–43.
6. AMAP, 2009. AMAP Assessment 2009: Human Health in the Arctic. Oslo, Norway: Arctic Monitoring and Assessment Programme (AMAP); 2009. p. 77-96. Available from: www.amap.no.
7. Berner J, Furgal C. Impacts of a warming Arctic: Arctic climate impact assessment scientific report. Cambridge: Cambridge University Press; 2005. p. 863–906.
8. Parkinson AJ, Berner J. 2009. Climate change and impacts on human health in the Arctic: an international workshop on emerging threats and response of Arctic communities to climate change. Int J Circumpolar Health 2009;68(1):84–91.
9. United Nations in Russia 2008. Impact of global climate change on human health in the Russian Arctic. [cited 2009 June 23] Available from: http://www.unrussia.ru/doc/Arctic-eng.pdf.

Alan J. Parkinson, Ph.D.
Centers for Disease Control and Prevention,
Arctic Investigations Program
4055 Tudor Center Drive
Anchorage, Alaska, 99508
USA
Email: ajp1@CDC.GOV