

Arctic Change and Coastal Communities: Overview of the Coastal Zone Canada Conference, Tuktoyaktuk, August 2006

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INTRODUCTION

This special issue of *Arctic* represents the output from a conference sponsored by the Coastal Zone Canada Association and organized in large part by Fisheries and Oceans Canada. A number of sponsors (see Acknowledgements) also contributed to the success of the conference. The conference, entitled “Arctic Change and Coastal Communities,” was held from 12 to 16 August 2006 in the town of Tuktoyaktuk in the western Canadian Arctic. This overview was compiled from statements made at the conference by presenters and participants and does not necessarily represent the views of the authors.

INTENT OF THE CONFERENCE

The primary intent of the conference was to bring together government people, university people, and Inuit and Inuvialuit people from across the Canadian Arctic to talk about the rapid changes being witnessed in Arctic marine and coastal areas, the impacts of those changes on coastal communities, and the policies that affect marine management and governance in the Arctic Ocean. Nine federal government and territorial departments (Fisheries and Oceans Canada [including the Canadian Coast Guard], Department of National Defense, Indian and Northern Affairs Canada, Foreign Affairs and International Trade Canada, Parks Canada, Environment Canada, Natural Resources Canada, Transport Canada, and Industry, Tourism and Investment, Northwest Territories) were invited to present overviews of their marine programs. The conference was organized around three themes: Drivers of Change in the Arctic, Community Well-being, and Arctic Ocean Management and Governance.

A second intent of the conference was to provide a voice for conference participants to make recommendations to the Government of Canada regarding Arctic marine affairs. The Tuktoyaktuk Declaration, a conference statement drawn up with input from the full conference and reprinted in this issue, recommends that the federal government:

- support Canada’s sovereignty commitments in the Arctic, while broadening the definition of security to include social and environmental security as well as defense;
- support Canada’s Oceans Action Plan and encourage its continuation in all three oceans;
- enhance human adaptation to the changing climate of the North through youth education, respect for traditional knowledge, and increased understanding of change;
- create an Oceans and Coastal Council of Canada to inform people about Canada’s progress in ocean and coastal management; and
- support the International Polar Year (IPY), linking local, regional, and international initiatives in Arctic ocean management.

A third intent of the conference was to provide a venue—the “Northern Forum”—in which northern participants could voice their concerns regarding Arctic marine policy (Blakney, 2008). A central issue discussed at the Northern Forum was how to increase the input of Northerners into Arctic marine policy. In response to this issue, the Tuktoyaktuk Declaration included three commitments from the Coastal Zone Canada Association:

- to create an Arctic Regional Chapter of the Association;
- to support the IPY through Canada’s Ocean Management Research Network; and
- to encourage follow-up reporting by the new Arctic Regional Chapter at future ocean management conferences.

A fourth intent of the conference was to introduce young people from North and South to the challenges that climate change will bring in the next several decades. The four-day Youth Forum that preceded the main conference allowed young people to exchange ideas and posters about change, sustainability, and livelihoods. They also engaged in community discussions, cleaned up a local beach, and provided their perspectives in a formal presentation to the

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main conference. Susan Aglukark, a leading Canadian singer from the North, provided inspiration to the Youth Forum and to conference delegates at the opening ceremonies of the main conference.

THEME I: DRIVERS OF CHANGE

The first conference theme, “Drivers of Change,” explored the primary external factors or “drivers” that are leading to change in the Arctic, now and in the future. These drivers are climate change, which affects weather, contaminants, infrastructure, and coastlines; increased shipping; and oil and gas development.

All sessions emphasized that these drivers of change are linked, often as cause and effect. Increased shipping in the Arctic is becoming feasible because climate warming is increasing the period of open water. Climate warming, on the other hand, is being caused by the consumption of fossil fuels: the release of CO₂ into the atmosphere produces the “greenhouse effect.” Infrastructure is increasingly an issue because while growing industrial development requires it, climate change is weakening it.

Climate Change—A Warming Arctic

The changing climate was the central issue throughout the conference. At the welcome reception, every opening speaker talked about the implications of climate change for the North, and for the Mackenzie Delta and the Beaufort Sea in particular. Climate change was also one of the four points discussed by delegates to the Youth Forum that preceded the main conference, and it was in the background, if not the forefront, of virtually all of the sessions under Theme I.

Climate change is occurring in our lifetime and will continue in that of our children. In addition, change is occurring faster in the Arctic, particularly in the western Canadian Arctic, than anywhere else in the world. Climate change and global warming are a reality, not just hunters’ impressions or outputs from scientists’ models.

A general overview of the evidence for climate change and the processes driving it introduced the climate system of the earth and compared climate fluctuations that have occurred over geological time to what has happened recently. Climate predictions were presented and related to uncertainties, such as economic growth in India and China and international responses to the Kyoto protocol. Inuvialuit hunters gave personal accounts of climate change observations on Banks Island in the western Canadian Arctic (see Barber et al., 2008), and these observations were confirmed by comments from other northern residents.

Specific research studies reported climate change and its impacts on the environment from many different perspectives. For example:

- A reduction of landfast ice in the western Arctic is making travel between communities more difficult, and more open water has resulted in unpredictable fog, which makes coastal travel treacherous (Barber et al., 2008).
- An observed increase in deciduous shrubs in the tundra is expected to shade lichens, leading to a reduction in the food supply for caribou.
- Long-term monitoring of ringed seals in the Beaufort Sea is providing an understanding of the effects of climate change on the Arctic marine food chain, from ice conditions to fish to seals to polar bears. The condition of juvenile ringed seals has declined since 1992.
- A growing number of studies across the Arctic indicate that the wind is changing and creating an increasing number of weather-related hazards. Climate change will affect winds in both predictable and unpredictable ways.
- Increasing mercury levels in beluga whales, an important traditional food source for Inuvialuit of the Beaufort Sea, have raised health concerns. The sources of the mercury and its movement through the food chain have been explored in a number of studies. Industrial developments that add mercury to the atmosphere are the ultimate cause, but climate change is also implicated through the melting of permafrost that adds mercury to Arctic rivers.

The talks led to some interesting questions and comments from concerned members of the audience regarding the cause of the increased warmth, future problems with contaminants, new invasive species, and increased incidence of disease in other species. A commonly heard comment was that a united scientific/indigenous/government voice is needed to speak to the world about the effects of global climate change as seen from the Canadian Arctic (see the Tuktoyaktuk Declaration).

Arctic Infrastructure: Changes in the Arctic environment and increasing resource development are putting pressure on infrastructure in the Canadian Arctic. For example, in Nunavut, with a population of only 30 000 scattered throughout 27 communities, air travel is a major form of transportation. All but two of the communities have airstrips approved by the Canadian Department of Transport, but \$200 million is needed to upgrade related infrastructure. No inter-community highways exist in Nunavut, and although current emphasis is on winter and summer trails from communities to hunting and fishing areas, the changing climate is making these trails less certain. All Nunavut communities, with the exception of Baker Lake, are accessible via the ocean, and marine transport is the major avenue of supply. Possible port developments in the Canadian North include the Bathurst Port and Road project in Kitikmeot to serve mining activity in the Keewatin district, the Kimmirut Port and Road project to Iqaluit, and the Nunavut-Manitoba Road. Better

infrastructure is needed for tourist vessels, for upgrading of fuel storage and docks, and for new hydrographic charts.

The Small Craft Harbours Branch of Fisheries and Oceans Canada (DFO), at the request of the Government of Nunavut's Department of Economic Development & Transportation, is examining opportunities for multi-use harbours in seven different communities. Initial studies have focused on fishing and safety as well as economic development. The DFO has focused primarily on commercial fishing harbours. Policy changes would be necessary for the DFO to consider the importance of subsistence fishing in establishing priorities for Arctic harbour infrastructure.

Specific research studies discussed change on Arctic coasts and infrastructure from many different perspectives. For example:

- Secure travel by ice is important in northern Quebec, and local knowledge is being challenged by climate warming. One study linked traditional knowledge to weather conditions in an ice-monitoring program to improve the predictability of safe ice conditions (Tremblay et al., 2008).
- New technologies of seabed mapping will improve understanding of marine processes, help support marine and coastal management, improve safety and efficiency of hydrocarbon development, and assist in developing safe infrastructure, such as ports and shipping routes.
- Marine mammals, like terrestrial mammals, are subject to diseases. Research leading to a better understanding of these diseases is positioned to address risks to these marine species associated with stressors such as climate change and industrial development.

Impacts on Coastlines: The effects of climate variability and change on Arctic coasts and coastal infrastructure were addressed in a special session jointly sponsored by Coastal Zone Canada and the Canadian Coastal Science and Engineering Association. The session presented the state of knowledge about Arctic coastal processes and how climate change and human development will affect them over the next several decades. The Mackenzie Delta region, and Tuktoyaktuk in particular, will suffer from increases in relative sea level, increased flooding, increased erosion of coastal bluffs, and increased numbers of large storms and high-water levels accompanied by waves. Residents of the area are not alone: the same can be said for most low-lying coastlines in Canada and indeed in the world. Proper planning and design based on an understanding of the coming challenges increases the resilience of communities early on, and allows adaptation options later. An international network of coastal observatories, with four sites in Canada, is proposed under the IPY to provide information about high-latitude coastal processes and the impacts of climate change. Communities will be

active participants in the observatories, and information relevant to community needs is a priority.

Marine Shipping

A major economic driver directly related to climate warming is a potential increase in shipping throughout the Arctic as the sea ice recedes. To address this issue, the Arctic Council, acting on a recommendation from an early Arctic Climate Impact Assessment, initiated the Arctic Marine Shipping Assessment, a broad international initiative led by Canada, Finland, and the United States, to examine Arctic shipping today, in 2020, and in 2050. The assessment will look at community knowledge and needs and will address marine activity, environmental impacts, socio-economic impacts, and risk assessments in each of the Arctic Council countries. The studies will collect data on ships, routes, cargo, and patterns of Arctic shipping in each country, and a series of workshops is planned to solicit input from Arctic residents across Canada.

When considering Arctic shipping, Northerners tend to think first of re-supply and Canadians in general tend to think of icebreakers. However, the future holds potential for bulk carriers, cruise liners, oil tankers, research ships, fishing boats, and pleasure craft. Reduced ice will shorten the length of Arctic routes between markets in Europe and Asia. Global warming is making this change possible, but other factors include global demand and prices for natural resources, changes in ship design and navigation technology, a growing world economy, and the size of new vessels compared with the capacity of the Panama or Suez canals. The growing difficulty of establishing ice roads in the Arctic will place greater emphasis on marine shipping.

A special session was held to solicit the opinions of Arctic coastal-zone residents on increased levels of shipping activity. It was emphasized that it is important for Canada to set an example for others, protect the environment, and be a proper steward of our Arctic waters while domestic and international shipping rules to protect the Arctic environment are being developed. Canada's ability to enforce those rules was a major concern of many participants.

Oil and Gas Exploration

A third major driver of change in the Arctic is the knowledge that vast oil and gas reserves lie offshore within the Arctic Ocean's continental shelves. Energy prices and uncertainty in the Middle East and a longer ice-free season underlie continued energy exploration in the Arctic. Oil and gas activities have returned to the western Arctic after a hiatus of almost two decades. Much has been learned about the potential impacts of hydrocarbon development on the environment and on Arctic communities, but many issues and challenges remain. A special session focused on a number of recent developments (Voutier et al., 2008). Participants heard a discussion of policy and regulatory issues and an overview of Devon Canada's

experiences during the winter of 2005–06 drilling the first offshore well in the Canadian Beaufort Sea in 15 years. Presentations concluded with a discussion of the Beaufort Sea Strategic Regional Plan of Action, a proactive and collaborative initiative led by the Inuvialuit Game Council to address economic, social, and environmental issues related to a new round of oil and gas activity.

Presenters emphasized that collaboration by all parties is necessary to meet these challenges. The discussion highlighted trust as a pre-condition for collaboration. Open and clear communication is necessary to ensure that all parties understand the issues and responsibilities related to offshore development.

Conclusions

The Arctic is predicted to face some of the most profound climate changes anywhere in the world. These changes will affect the life of northern residents directly, by requiring substantial adaptation of existing, cold-climate infrastructure, and indirectly, by causing major changes to the marine ecosystems on which Northerners depend. At the same time, climate change will slowly make the North more accessible to ships, providing windows of opportunity for mining, oil and gas extraction, transportation, fishery development, and military activity. Whether Northerners can adapt successfully to these changes depends on how accurately changes can be monitored by traditional knowledge and Western science, how quickly the understanding of climate change can be incorporated into northern policy, and how well Canadian governance institutions and industries can support the changing needs of northern residents. The input of Northerners to public debate and policy concerning the implications of climate change is becoming increasingly important.

THEME II: COMMUNITY WELL-BEING

Theme II, Community Well-being, explored the impacts of change on human health and the capacity of coastal communities to manage change. In the overview session, Irniq (2008) spoke of drawing on strengths from the past to help us navigate the present. He reminded us of what makes a healthy community: *tapiriingniq* (teamwork); helping one another; cooperation of both the husband and wife; sharing, patience, and *Nalunajainiq* (resolving inter-personal conflicts). Sessions in this theme addressed *Inuit Qaujimagatuqangit* (IQ) and traditional knowledge (TK), community-based management, economic development, and research and education. IQ refers to traditional Inuit knowledge and values (Tester and Irniq, 2008).

IQ and TK

Participants in the session entitled “Tradition to Technology: Partnerships to Incorporate Local Knowledge into

Planning,” discussed the ability and capacity of coastal communities to respond to environmental change. Some communities were concerned about lack of local infrastructure, inappropriate land use, accelerated coastal erosion, and permafrost instability. Other participants talked more about demographic, economic, and social factors that affect communities. A key conclusion was that better planning is urgently needed.

Nunavut’s approach to adaptation includes a commitment to develop practices and policies consistent with Inuit culture and values, grounded in IQ. This approach means finding ways to harness the power of the communities to become involved in planning for the coming years. It means finding ways to reverse declining levels of TK/IQ among the younger generation, even while recognizing that everything is changing. Martha Flaherty, Director of the Aboriginal Healing Foundation, made the following comments concerning the integration of TK and scientific knowledge in her conference presentation:

It is easy to give lip service to the concept of using both TK/IQ and scientific knowledge—or rather integrating them—but it is not such an easy task. There have been many attempts to integrate science and traditional knowledge, and many of those attempts have failed. How to combine the information is a big problem. Oftentimes scientists have trouble interpreting what people mean with TK. Another integration problem is that science has tended to focus on single species—“Where were the caribou? How many? What sex?”—while TK is more holistic. “That was a good winter; lots of food, lots of calves that spring.”

One of the best examples that we saw [at the conference] was the linking of traditional knowledge of ice and marine mammals with scientific use of GIS-based maps of ice in the monitoring of the environment of Hudson Bay, especially around the Belcher Islands. And this is a critical area, of course, because Sanikiluaq is a small community of Inuit surrounded by one of the major drivers of change in the country: the huge hydroelectric producers, by that I mean dam builders, of Manitoba, Ontario, and Quebec, which are significantly altering the water quality and flows into Hudson Bay.

That said, there was widespread support [for the idea] that combining scientific knowledge and traditional knowledge can result in some real synergies. They can help to confirm one another and to build new knowledge. I should also add that when traditional and scientific knowledge come together in a positive fashion like this, it also helps to build bridges between the two communities. Scientists and hunters gain more respect and trust for the knowledge and contribution that the other [group] is making to the greater understanding.

TK and IQ are about relationships, and how people live and work together, so TK and IQ have many practical uses. For example, they help communities function by providing

guidance on how individuals should conduct themselves. IQ is integral to the well-being of Inuit society because it encourages healthy lifestyles. It stresses the importance of educating and teaching young Inuit. A central tenet is the conviction that rebuilding healthy communities depends on Inuit women resuming their traditionally held, central role in Inuit life. Ms. Flaherty emphasized that women must be treated with respect:

The role of women has changed drastically. Women were custodians of the family and still are today.... Inuit women's roles were equal to that of men, although the responsibilities were very different. Women were the carriers of our culture, they taught the empirical knowledge, the arts, the language, the stories and legends from generation to generation.... With the advent of contact, Inuit women have been displaced. Inuit men have adopted white people's culture about the role of women in our society. This must change if we are to have healthy communities.

Flaherty also made a plea to have the rest of Canada treat Inuit with equality and respect: "The underpinnings of any work conducted for and by Inuit must be on one first premise, that the knowledge of Inuit is recognized and respected in its own right and that Inuit be credited for the work they have undertaken."

Community-Based Management

A presentation from Nunavut emphasized the need to recognize Inuit principles and values and Inuit systems of wildlife management. Community-based management has replaced the quota system in Nunavut, but it is still recognized that harvesting must remain within sustainable limits. Community-based management is integrated with IQ and gives important decision-making powers and responsibilities to local hunters and trappers' associations.

Developers of community-based management are challenged by a number of complex issues: identifying and adopting management processes that are understood and accepted by elders; finding the additional funding needed to build local capacity through training and education; and coping with an increasingly technical and time-intensive workload. Reduced federal capacity was also highlighted, as was the need for better communication between elders and youth and between northern communities. Consultant and Nunavut Elder Peter Irniq suggested that enhanced training and partnerships with educational institutions and industry are needed:

When we meet at the co-management table, southerners only see one part of the person. They don't see that person's struggles, family priorities. IQ is about relationships, respect, and resolving differences. There is a history of intimidation of Inuit that is still felt today. IQ was born out of struggle and resistance, and even today

provides a safe place to practice what otherwise can't be said or practiced.

Strengthening Communities' Ability to Adapt to Economic Development

Social, economic, and physical well-being are linked. Economic development, resource management, and living conditions must be appropriate to local social, cultural, and economic situations. Policies related to economic development, resource management, and housing or living conditions must be worked out, defined, and implemented within the context of people's relationships to one another and to the environment.

For example, the real costs of housing shortages include social costs that are commonly overlooked. Overcrowding is a contributing factor to domestic violence, depression, stress, and anxiety. Unemployment and poverty exacerbate these conditions, and the rapid growth of populations in small communities inhibits access to the land, which is already being affected by changing sea ice and snow conditions.

One of three papers in the session, entitled "Strengthening Communities' Ability to Adapt to Economic Development," described local perspectives on oil and gas development throughout the circumpolar North, focusing on understanding local strategies for mitigating negative impacts of development and for embracing the positive opportunities oil and gas development may bring. It was understood that resilience depends on local economic diversification.

Wildlife is both a subsistence resource and a cultural resource for Nunavut. Economic development of the large marine wildlife industry includes harvesting by-products, such as seal and polar bear skins, and sport hunting of polar bears and walrus. Since these activities are an important source of employment for small communities, we need to know what effects climate change will have on transportation and development. So monitoring and responding to climate change are important, and Inuit should be engaged in monitoring these changes.

Fisheries are a pillar of the Nunavut economy, as well as a major food source, so access and allocation to the offshore area is a big issue for Nunavut. Key elements of the Nunavut Fishery Strategy include developing the organizational capacity to support an inshore and offshore fishery, developing and training people to fill the labour market, developing the infrastructure, and identifying new funding sources.

In Cumberland Sound on Baffin Island, changing storm patterns are resulting in loss of gear by under-ice fishermen. The shorter ice-covered season has also reduced the fishery, affecting the harvest and incomes of those fishermen. The Inuvialuit have expressed interest in a commercial fishery in the western Arctic providing it would not impair the beluga whale food chain. However, research and experience suggest that there is not sufficient biological productivity for a

sustainable commercial fishery, although subsistence fisheries are viable. The Fisheries Joint Management Committee is advocating that parts of the Beaufort Sea be designated as an Arctic Marine Reserve, to ensure the long-term protection of existing species for subsistence purposes.

In Nunatsiavut, coastal, marine, and estuarine areas are crucial to economic development. Creating a sustainable environment depends on striking a balance between economic, socio-cultural, and historical values. Inuit have recreational, subsistence, and commercial interests. Fulfilling these interests depends on relationships built on trust, respect, and openness, as well as shared values regarding stewardship and conservation. Nunatsiavut is in the process of developing mining policies in relation to uranium development that will ensure the protection of their natural and wildlife resources.

Nunavik fisheries are small-scale, but one success makes them worthwhile. Makivik focuses on Arctic char and shrimp, using seabed mapping, habitat classification, and an ecosystem approach to target the most economically viable species. Land-claim boards are distinctive and important institutions that often provide serious and long-term participation of aboriginal people in the management of their own resources. Industry and government are answerable to these independent boards and must respond to them; however, the work of the boards is constrained by the level of federal funding on which they depend.

Research and Education

Northern communities are changing very fast, and research is struggling to keep up with the pace of change. Nevertheless, there are shortcomings in the way that much of the research relates to the communities of the North. For example, most research relates to biophysical variables (e.g., ice thickness) and is done on a large scale, with few linkages to coastal communities. Studies of local observations are rarely linked to their effects on the nearest community. A number of recommendations for improving research emerged: steps for involving communities, including early and regular contact and community consultation; training opportunities built into the research; and effective communication of results back to the communities. The benefits of local involvement should also be considered in designing research projects. In general, the most successful research arises from partnerships between academics, government, and local stakeholders, with community members providing personnel to collect the data.

A good example of a successful community-based monitoring effort, conducted from 2003 to 2006, studied the potential effects of hydrocarbon exploration activity on ringed seals in the nearshore Beaufort Sea (Harwood et al., 2007; Paulatuk, Holman, and Tuktoyaktuk Hunters and Trappers Committees, 2008). The study relied on Inuvialuit hunters for most of the fieldwork. Goals of the study were to determine whether drilling would affect ringed seals, and if so, what types of mitigative measures would avoid

impacts if future drilling projects were to occur. It was concluded that the most likely impact of oil exploration would result from oil spills that could affect Arctic cod, the seals' main food source.

Differences between the research topics that academics choose and the research needs of communities were explored. It was observed that scientific researchers want TK/IQ to be verified by scientifically collected information. As this verification is not always possible, they tend to downgrade the importance of TK/IQ. Academic research values ownership and authorship, but the Inuit value system is about connection, collaborative teamwork, people-to-people inclusivity, and social gatherings during which working relationships are formed and conflicts resolved. Until these fundamental values are recognized, understood, accepted, and even adopted by non-Inuit researchers, merging TK/IQ with scientific knowledge will be very difficult.

Conclusions

Northern coastal communities are struggling to keep up with the pace of change. Climate change is one factor, but lack of housing and infrastructure are other factors affecting community well-being. It was suggested on several occasions that the real issue in Arctic communities is poverty—that at worst, climate change is a blinder for the real problem of poverty; at best, climate change can be used as a vehicle for getting other issues, like social problems, onto the table.

TK/IQ will be a major source of strength in re-establishing healthy Arctic coastal communities. Managing change successfully will depend on allowing communities to plan their own futures and ensuring that they have sufficient resources to undertake this work. According to Martha Flaherty:

We are all open to discussion and dialogue on the complex changes taking place in the northern communities. The Inuit are an accommodating people. Inuit are proud to start this teamwork with government, and they want to help others better understand their values.

THEME III: OCEAN MANAGEMENT AND GOVERNANCE

Theme III, "Ocean Management and Governance," examined how the government intends to deal with the rapid changes in the North and at the same time enhance the well-being of northern communities. Seven topics were involved.

Ecosystem-Based Management (EBM)

The "EBM approach" refers to the integration of agency initiatives with the aspirations of coastal communities so

that ecosystem health is preserved. The ecosystem approach is supposed to lead to 'sustainable development' of the Arctic. We know enough now to get started in developing EBM approaches, but we also realize that we do not fully understand Arctic ecosystems, so EBM must be necessarily experimental and adaptive in nature.

The size of the marine area being considered for management is important because the scale determines the issues, the management approach, and even the tools that are used for EBM. For example, at the scale of a community, community plans can guide development, whereas at the scale of, for example, the Beaufort Sea, a global approach is required. K. Sherman, Director of the Narragansett Laboratory, National Marine Fisheries Service, spoke to the conference about the Large Marine Ecosystem (LME) approach, noting that governments within nations and internationally, as well as a large sector of the scientific community, are supporting and endorsing it:

The forecasts for continued reduction in the ice cover and the probable effects on the indigenous people and on the important goods and services provided by the 17 Arctic LMEs, have energized the donor community, the United Nations system, and the Global Environment Facility (GEF) to support an ecosystem-based LME assessment approach that provides financial support to 'country-driven' projects.

An example of the ecosystem approach applied on a smaller scale, to the Barents Sea and the Beaufort Sea, may be found in Siron et al. (2008). (Another important consideration for EBM in a coastal setting, the impact of land-based activities on the sea, will be discussed below under "Interactions between Land and Sea.")

Integrated Ocean and Coastal Management

Various experiences with coastal and ocean management from across Canada were described in a specific session on integrated coastal management. This session included community-based initiatives in Quebec, addressing local issues and building support and collaboration for integrated coastal management, together with the large-scale Eastern Scotian Shelf Integrated Management Initiative, which has proceeded into advanced stages of developing an agreed-upon planning framework. Common elements in the various Canadian initiatives are (1) recognition of the uniqueness of coastal zones and the need for management, (2) development of a planning process, and (3) development of a set of indicators for assessing progress toward agreed-upon objectives. Differences in the initiatives across Canada include varying degrees of partnership with other governments (local, inter-provincial, or international), inter-provincial and international linkages, and varying degrees of bottom-up, community-driven efforts versus top-down, government-led ones.

Just as the form of EBM depends on the *scale* of the management area, the type of governance structure needed

for integrated management depends on *context*. Discussants noted that we cannot simply import a model from elsewhere because the mix of stakeholders and institutions and their relationships will be unique to each place. However, in general terms, the strategy for integrated management (IM) should be to develop trust and relationships first, decide on the right model or approach later, and then adapt that model over time, until everyone is comfortable. Furthermore, it is important for IM to use existing institutions and organizations wherever possible. In particular, IM can build on established co-management systems, or may even evolve into a co-management structure itself. The discussion noted the importance of being open to evolution—continuing to adapt the approach over time until everyone is comfortable. There is a challenge for the federal government in this task, undertaking government-to-government relationships involving First Nations, while also involving other stakeholders.

Marine Protected Areas (MPAs)

Protection of oceans currently lags far behind terrestrial protection. Only 1% of marine areas are protected compared to about 12% on land. To increase marine protection in Canada, a federal MPA Strategy was released in 2005, involving DFO, Environment Canada, and Parks Canada, amongst others. The conference discussion noted that MPAs are being developed in the Arctic and elsewhere to meet many goals, such as to protect species of concern, to protect sensitive habitats and to conserve representative areas. Key requirements are to understand how existing coastal communities can co-exist with protected areas and to ensure that MPAs are linked with IM efforts. Secure long-term funding and social science research on MPAs are needed, as well as a well-designed MPA network that links Canadian efforts with international initiatives. Since most MPAs have some interaction with fisheries, ways to use MPAs in building an ecosystem approach must be developed that will introduce a precautionary approach into fisheries management. Indeed, fisheries management typically uses spatial management measures, like closed spawning areas, and MPAs are also a form of spatial management. Although MPAs usually have broader objectives, they can nevertheless act as a tool of fishery management.

Three examples of MPA experiences in North America were presented at the conference. First, an MPA developed through a community-based approach in California's Channel Islands National Marine Sanctuary, which has the goals of biodiversity preservation, socio-economic enhancement, support of fisheries, protection of natural and cultural heritage, and education. Second, in the Queen Charlotte Islands on the Pacific Coast, the boundaries of Gwaii Haanas National Park stop at the high-water mark. The Haida Nation and Parks Canada are establishing a marine conservation area around the Park so that the land and the surrounding sea can be protected as an ecological

unit. Third, in the Arctic, the desires of Inuvialuit people to ensure that beluga whale numbers do not drop and that protection zones for the beluga in the delta of the Mackenzie River have legal status, inspired efforts to establish the Tarium Nirvutait MPA within the framework of the Beaufort Sea Beluga Management Plan.

Participatory and Community-Based Ocean Governance

Scholars and stakeholders tend to agree that management of coastal areas is best undertaken in a participatory manner, following the principle of subsidiarity, that as much management as possible should be carried out at the most local level possible. Community participation in marine management increases the “buy-in” and support of resource users and communities, but it also draws on the moral pressure that can arise in a community setting, leading all involved to “do the right thing” in terms of marine stewardship. A local management approach is also most likely to support the goal of community well-being. These simple realities reflect the strong links between Themes II and III of the conference.

Much of the discussion on governance and management under Theme III either involved or called for a participatory approach and community-based management, through individuals and communities working together with government, or even through devolution to a grass-roots level. This participatory approach was seen as a route to both community well-being and successful governance. Theme II also had several sessions that dealt directly with governance and management. Indeed, from the perspective of community well-being, it is not possible to move forward without entering the sphere of ocean and coastal management, i.e., where decisions are made that affect such key aspects as access to coastal resources, the extent of coastal infrastructure to be developed, empowerment of communities, and impacts of human activities on the marine environment. This involvement was illustrated in a number of sessions in Theme II, such as those dealing with community-based management (Suluk and Blakney, 2008), human health (Chan et al., 2006), traditional knowledge (Tester and Irniq, 2008) and cross-scale collaborative management (White, 2008).

Aboriginal Communities and Co-management

Successful co-management initiatives with indigenous peoples are taking place in many ocean and coastal locations across North America. For example, one conference presentation discussed the Alaska sea otter fishery, the Haida fisheries program, and the Northwest Indian Fisheries Commission. For Hudson’s Bay, the case was made for stronger governance using co-management arrangements, which take socio-cultural concerns into account, use community-based monitoring, and demand better inter-jurisdictional stewardship.

Co-management involving aboriginal peoples sometimes exposes a “colonial approach” to the use of land and sea. For example, efforts to manage “wilderness” areas sometimes ignore the reality that aboriginal peoples live within such areas, often excluding local residents from management or even from the area itself! A conference presentation reported that a similar situation in the United States grew out of the U.S. Wilderness Act, which defines wilderness as a place where “man is just a visitor.” It was noted that co-management forces a recognition that native culture should not be given a lower priority than wilderness preservation. Wilderness values can be preserved and management can benefit from the involvement of those who know the place best. For example, Finland’s 1991 Act on Wilderness Reserves has a specific focus on preserving Lapp culture and indigenous livelihoods.

Sovereignty and Security in Canada’s North

Conference discussions highlighted the important difference between sovereignty and security. Security includes health and environmental and enforcement aspects, with climate change and economic challenges in the North threatening security. It was noted that there are growing international disputes involving the right of access through the Northwest Passage and ownership of several other locations in Canada’s North, such as Hans Island, part of the Lincoln Sea, and the ocean extension of the Yukon-Alaska border. The Canadian Department of National Defence discussed the role of the Arctic Rangers—1650 of them in 58 northern communities, plus another 1200 junior rangers—who as part of Canada’s effort to monitor security in the Arctic are trained to keep track of what is happening there and to assist Canadian forces when necessary. Effective international cooperation can also be a key element of sovereignty and security; e.g., farther south, in the Bay of Fundy/Gulf of Maine region, transboundary governance is evolving, with a binational committee involved in managing transboundary groundfish stocks, and progress toward EBM.

Interactions Between Land and Sea

Another focus of discussion was the National Program of Action (for the Protection of the Marine Environment from Land-Based Sources of Marine Pollution). It was noted that 80% of pollution in coastal aquatic environments is from land-based human activities. This pollution in the Arctic includes sewage, persistent organic pesticides, and intertidal and subtidal alteration. A range of projects seeks to deal with this problem. For example, an Arctic project on the Rae-Edzo community sewage lagoons, involving the federal government and the Behchoko Community of the Dogrib First Nations, Northwest Territories, aims to improve effluent quality going into local waters. Its facilities will be completely locally owned in the near future, and it is hoped that similar effective

facilities will become widespread across the North. Similar initiatives underway elsewhere include efforts in the Atlantic region to deal with nutrient enrichment from fish-processing plants, sewage releases in the coastal zone, and the management of dredge material.

The flow of fresh water into coastal areas can have a significant impact on the ice of marine bays. In Hudson Bay, land-based hydroelectric projects are affecting wildlife and traditional ways of life by changing the seasonal flow of fresh water into James Bay. These effects have been demonstrated using science and TK by the Hudson Bay bioregion community-based monitoring network, which monitors salinity and sea-ice changes in response to water releases for hydroelectric generation.

Conclusions

In tackling ocean management and governance, we would do well to keep in mind some insightful comments made in conference plenary sessions:

- If it gets too complicated, things don't get done.
(Nellie Cournoyea)
- It is not just about coasts and oceans: it is also about a meeting of cultures.
(Jack Mathias)
- To move ahead, we need to be imaginative, innovative, and courageous.
(Peter Irniq)

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