

marine actuellement fragmentée dans l'est de l'Arctique canadien. Par conséquent, nous proposons l'établissement d'un réseau de surveillance et d'évaluation communautaire de même que d'un organisme coopératif et interjuridictionnel de gérance. Un tel effort de collaboration pourrait donner lieu à des progrès tangibles pour aboutir à la gestion solide et intégrée des écosystèmes de la biorégion de la baie d'Hudson.

Mots clés : îles Belcher, surveillance communautaire, effets cumulatifs, gérance de l'environnement, baie d'Hudson, gestion intégrée des océans, gérance marine, Sanikiluaq, effets transfrontières

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INTRODUCTION

When something in the environment changes, you follow the change and look at the area where the change is occurring because when one thing changes, everything around it also changes, and we, as people, have to change along with it.

—Lucassie Arragutainaq from Sanikiluaq
(McDonald et al., 1997:5)

The Hudson Bay bioregion, comprising the marine and coastal areas of Hudson Bay, James Bay, Foxe Basin, and Hudson Strait, is a rapidly changing yet poorly understood marine ecosystem (Stewart and Lockhart, 2005). Like most Arctic marine ecosystems, it is important to the well-being of aboriginal peoples (Arctic Council, 2004; Pauly and Alder, 2005). Inuit in Sanikiluaq, living on the Belcher Islands in the southeastern portion of the world's second-largest inland sea, are an integral component of the bioregion. Their subsistence and lifestyle largely depend on the continued health of Hudson Bay's marine life and on the usability and reliability of its ice cover (Stewart and Lockhart, 2005; NTK, 2006). Also interrelated with the issue of food security are the human and natural stresses that lead to a decline in harvesting activities and access to wildlife. Climate and environmental change, local and long-range contaminants, and land-use activities in the Hudson Bay watershed all add to the cumulative pressure being placed on the ecosystem and affect the capacity of Inuit and Cree communities to harvest the region's marine wildlife (Martini, 1986; Société Makivik and Centre d'études nordiques de l'Université Laval, 1992; Sly, 1995; McDonald et al., 1997; Fast and Berkes, 1998). On paper, the Government of Canada recognizes that "in Canada, the preservation of traditional foods and way of life for aboriginal peoples and coastal communities is a special concern" (EC, 2000:4). Although proudly labeling itself as a maritime nation (EC, 2000; DFO, 2002a) and as the first country to enact comprehensive ocean management legislation (DFO, 2005), Canada has only half-heartedly supported these assertions. The following conclusion, pertaining to the Gulf of Maine, unfortunately holds true for much of the eastern Canadian Arctic, and particularly for the Hudson Bay bioregion:

It is an unfortunate consequence of the Canadian structures of governments and their related roles and responsibilities that the sustainable management of coastal and marine resources, although critical to the survival of most of our

coastal communities, continues to be largely overlooked, fragmented and/or uncoordinated in this region.

(Coast Lands Consultants, 2005:3)

The challenge is significant. In northern ecosystems, scientific information is as scarce as the range of natural variation is large, and the rate of change is ever rising (Berkes and Fast, 2005). In addition, although recognition of Inuit *Qaujimajatuqangit* or Inuit societal values, perspectives, and knowledge is increasing, consideration and application of them is still unequal. The same could be said of Cree traditional knowledge and values. The region is also far-reaching: Hudson Bay and James Bay receive over 30% of the total flow of Canada's rivers (OMRN, 2004) and draw on a catchment larger than those of the Mackenzie and St. Lawrence rivers combined (Stewart and Lockhart, 2005). This ecological complexity partly explains the gap between government's theoretical integrated management of oceans and marine resources, promoted through the Oceans Act (Government of Canada, 1997), and the more practical, comprehensive definition of marine environmental stewardship of the Belcher Islands Inuit.

Nonetheless, given aboriginal peoples' link to the environment and their dependence on country foods, which form the basis of societies, cultures, and economies (Arctic Council, 1998), it is essential to close this gap. There is growing recognition that community-based initiatives and the implementation of an adaptive, integrated management approach are keys to ensuring that northern resources and the subsistence economy can be sustained for future generations (Fast and Berkes, 1998; Arctic Council, 2004; Olsson et al., 2004; OMRN, 2004; Cobb et al., 2005; Huebert et al., 2005; MEA, 2005). Recent community-driven initiatives, such as the Kativik Regional Government's Access to Territory and Resources Project, are a case in point (Tremblay et al., 2007, 2008).

CURRENT GAPS

NTK uses cooperative approaches to study and report on issues and implications of development on Hudson Bay and James Bay in a coordinated, efficient, and focused manner to ensure that concerns of the Sanikiluaq community, Nunavut Inuit, and the Nunavut government are addressed. When the Great Whale hydroelectric project was first proposed in the late 1980s, the Municipality of Sanikiluaq was

an intervener in the federal review process. Significant funding was provided by public and private organizations to look into the science and traditional knowledge about the marine environment. The resulting publication (McDonald et al., 1997) revealed gaps in our knowledge of how freshwater flow changes affect the marine environment.

The Great Whale, Conawapa, and Ontario hydroelectric projects were all cancelled in the early 1990s, but by 2001, long-term plans for multiple, large-scale hydroelectric developments were being re-launched, beginning with the Wuskwatim and Keeyask generating stations in Manitoba and the Eastmain 1 Power House and the Eastmain-1-A and Rupert Diversion Project in Quebec. In essence, NTK was formed because the concerns about such development that the community of Sanikiluaq initially raised in 1990 remained—and still have not been addressed (Société Makivik and Centre d'études nordiques de l'Université Laval, 1992:56–57).

Our understanding of the combined impact of human activities and natural stresses on marine ecosystems and the cumulative sociocultural effects of rapid change is by and large deficient (Fast and Berkes, 1998; Csonka and Schweitzer, 2004; Young and Einarsson, 2004; OMRN, 2006). More specifically, the fragmented nature of most research, modeling, monitoring, and assessments conducted in the Hudson Bay bioregion precludes a thorough understanding of the relationships underlying its ecological integrity (Hamilton, 2004; NTK, 2005). Conceptually, at least, the Oceans Act and associated policies aim to respond to this flaw by using an ecosystem approach to recognize the long-term cumulative impacts of human actions on the marine environment and to address environmental, economic, and social considerations (DFO, 2002a, b, 2005). However, since the Oceans Act introduced integrated management to the Canadian marine agenda, it has become increasingly clear that the oceans provide a testing ground for governance and management approaches (Charles et al., 2005). Two aspects of the integrated management policy seem particularly wanting as far as the Hudson Bay bioregion is concerned: monitoring and assessment, and sustained cooperation.

Monitoring and Assessment

Essentially, the Inuit and Cree of the Hudson Bay bioregion seek assurance that their land and environment will remain healthy for future generations (McDonald et al., 1997). However, a lack of adequate information on baselines and stressors of the marine ecosystem acts as a stumbling block to identifying trends and impacts on the region, especially large-scale impacts that cross boundaries (Bunch and Reeves, 1992; Hamilton, 2004; NTK, 2005; Stewart and Lockhart, 2005). Although project-specific monitoring has produced isolated datasets, Duinker and Greig (2006) point out that the type of research needed to understand thresholds that are ecologically meaningful

in time and space is simply beyond the scope of standard project-level reviews. In short, if monitoring and assessments are to respond to the expectations of the bioregion's residents, they should not merely comply with a set of environmental quality targets, but also improve our understanding of the ecosystem (ICES, 2003; McLaughlin and Krantzberg, 2006).

Interconnected pressures within coastal zones are growing, and marine ecosystems are the downstream recipients of direct and indirect impacts of land use (GPAC, 2000; Hamilton, 2004; Agardy and Alder, 2005), so proper monitoring and assessment are particularly important to ensure the continued health of the Hudson Bay bioregion. Impending pressures on the marine ecosystem such as the likely increase of marine transportation, as well as the repercussions of climate change and of the adjoining provinces' energy choices and strategies, further magnify the need for informative, relevant monitoring. Proper monitoring, in its inclusive sense, would entail activities related to the broader objective of understanding cross-scale linkages and ecosystem responses to the sum of natural and human-induced change (North Sea Conference, 2002; Huebert et al., 2005). In this regard, it has been acknowledged that the structure and function of a marine ecosystem are best assessed through a two-track approach: one focusing on crucial ecosystem processes and the other on how human activities are affecting the ecosystem (North Sea Conference, 2002).

Cooperation

Fragmented jurisdiction, differing environmental and procedural standards, sometimes competing institutions, information deficiencies, financial constraints, and other factors will have to be overcome to ensure sustainable resource use in the bioregion.

(McDonald et al., 1997:6)

The need for cooperation in the Hudson Bay bioregion was identified long ago. Canada's Oceans Strategy, announcing the establishment of mechanisms and bodies for cooperation and collaboration regarding oceans (DFO, 2002a), held great promise for a bioregion overlooked by a previous action plan meant to ensure the protection of the marine environment through coordinated local, regional, national, and global actions (EC, 2000). Regrettably, Fisheries and Oceans Canada, the lead agency, has essentially disregarded the Hudson Bay bioregion and has dedicated resources and personnel to the western Arctic and St. Lawrence areas.

There have, however, been attempts to foster multi-tiered and interjurisdictional cooperation and stewardship in the Hudson Bay bioregion. These efforts have included the independently led Hudson Bay Programme in the early 1990s and the more recent federally led Hudson Bay Oceans Working Group.

The Hudson Bay Programme

In January 1992, the Canadian Arctic Resources Committee, the Environmental Committee of the Municipality of Sanikiluaq, and the Rawson Academy of Aquatic Science launched the Hudson Bay Programme. This independent effort to apply an ecosystem approach to the Hudson Bay bioregion aimed to provide a source of independent expertise on the impacts of resource development projects in Quebec, Manitoba, and Ontario on Hudson and James bays. The Hudson Bay Programme had two main objectives: (1) to provide a comprehensive assessment of the cumulative impacts of human activities on the marine and freshwater ecosystems of the Hudson Bay bioregion; and (2) to foster sustainable development by examining and proposing processes for cooperative decision making by governments, developers, aboriginal peoples, and other stakeholders.

Phase I of the programme was to identify key cumulative impacts of existing and proposed developments from scientific and traditional knowledge perspectives. Although Phase I deliberately adopted a broader approach than those used in the environmental assessments of the Great Whale (Quebec) and Conawapa (Manitoba) hydroelectric projects, it was anticipated that the information generated would also be of considerable value to participants in those reviews.

Phase II was intended to propose a process for co-operation of governments, developers, aboriginal organizations, and other stakeholders. This could have taken the form of regular consultations, establishment of a bioregion management authority, or development of a formal agreement that committed stakeholders to the principles of an ecosystem-based approach to sustainable development. Watershed management institutions, such as the Canada-United States International Joint Commission, were to be studied as part of the process to identify an effective inter-jurisdictional regime for Hudson and James bays.

In the end, the first phase (traditional knowledge and scientific information-gathering and analysis for input into a cumulative effects assessment) was completed, but the second phase was never implemented.

The Hudson Bay Oceans Working Group

In 2000, more than 150 people came together to discuss and evaluate the merits of applying integrated management planning to the Hudson Bay region at a workshop hosted by Fisheries and Oceans Canada. The workshop concluded with strong support for a coordinated planning effort (Fast et al., 2001). A subsequent tour of nine Hudson Bay communities in the Kivalliq Region confirmed that coastal residents supported the development of a management plan for Hudson Bay (DFO, 2001). The Hudson Bay Oceans Working Group was formed in 2001 and began meeting twice a year. Participants ranged from 20 to 30 people and included representatives of federal, provincial,

territorial, and municipal agencies, First Nations, co-management bodies, and Nunavut public institutions, as well as community residents.

The Hudson Bay Oceans Working Group plan included a statement of purpose, terms of reference, and objectives. Its purpose was to develop an integrated management plan for Hudson Bay to promote stewardship by all interested parties. The focus was on the western coastal area, recognizing linkages to the rest of the Hudson Bay ecosystem. The objectives were to (1) foster stewardship and sustainable resource development, including mining, tourism, and hydroelectric development; (2) inform and educate interested parties concerning the group's mandate and activities; (3) address issues and specific concerns relating to wildlife and the environment within an integrated management framework; (4) broaden the group's perspective through the use of traditional knowledge; and (5) identify and explore research interests and priorities for the group (Fast and Junkin, 2003).

The Hudson Bay Oceans Working Group met twice a year for two and a half years, but when the Department of Fisheries and Oceans decided to shift departmental capital and human resources from Hudson Bay to the Beaufort Sea, the group was suspended. Its last meeting was in March 2004.

While inter-agency working groups such as the Hudson Bay Oceans Working Group and NTK may have a role in fostering co-operation, federal departments must shoulder the greater part of the coordination effort required for stewardship of the Hudson Bay marine and coastal ecosystem. This is both because the federal government has a central role in land and ocean management in the North, and because the effects of land-based activities on the marine environment raise inter-jurisdictional issues (EC, 2000). Given the complicated array of jurisdictional authorities that juggle responsibilities for monitoring marine ecosystems and stewarding their resources (GPAC, 2000; Coast Lands Consultants, 2005), sectoral and inter-governmental partnerships are even more crucial. As Okrainetz (1992:1) emphasized 16 years ago, Hudson Bay "is surrounded by three provinces whose jurisdiction stops at the water edge, but whose influence extends over the entire ecosystem by virtue of provincially controlled and encouraged industrial activities and land usage." The jurisdictions surrounding Hudson Bay have a shared responsibility to cooperate in ensuring that their individual and collective activities do not pose serious threats to the health, integrity, and functioning of the bioregion.

CASE EXAMPLE:

DEVELOPMENT OF HYDROELECTRIC POTENTIAL IN THE HUDSON BAY BIOREGION

Nowhere are the gaps in monitoring, assessment, and sustained cooperation in the Hudson Bay nearshore and offshore areas more pronounced than in the planning,

environmental assessment, and development of hydroelectric projects. Therefore, in this case example, we provide an overview of the existing and proposed hydroelectric projects that alter and affect the flow of freshwater into Hudson and James bays. Secondly, we look at the various regimes for environmental assessment that apply to such projects. Thirdly, we outline the potential for cooperation and the efforts of NTK to shed light on the problems and advocate, through the review assessment process for the Eastmain-1-A Powerhouse and Rupert Diversion Project, for sustained multi-level cooperation.

Hydroelectric Projects Affecting the Hudson Bay Bioregion

Currently several hydroelectric projects are generating power in the three provinces bordering Hudson Bay. The projects in Quebec and Manitoba warrant particular attention because of their large scale. The diversion and regulation of rivers for hydroelectricity production have, cumulatively, had a major impact on the timing, location, and quantities of freshwater entering the Hudson Bay marine ecosystem. The Churchill (~ 650 m³), the Eastmain (~ 850 m³), and the Caniapiscou (~ 800 m³) diversions, among the largest on the planet, have already shifted a total of about 2300 m³/sec to the Nelson and La Grande rivers. The Rupert diversion that is under construction will add another ~ 450 m³ for a total of about 2750 m³/sec. The augmented, and highly altered, outflows from the Nelson and La Grande rivers now make up a much larger proportion of the discharge to the Hudson Bay marine ecosystem. In addition, although Nunavut has no hydroelectric projects yet, the Nunavut Land Claims Agreement (1993, Article 20.1.1) specifically contemplates the development of such projects. Despite the large scale of the existing projects, a major proportion of the hydroelectric potential of rivers discharging to the Hudson Bay marine ecosystem remains undeveloped.

Quebec

Hydro-Québec, a provincially controlled Crown corporation, plays a major role in the Quebec economy. It has about 31 500 megawatts of installed capacity, with about 50% of the total coming from the La Grande complex (Hayeur, 2001). In addition, it has access to the ca. 5000 megawatts of energy generated by the Churchill Falls facility in Labrador. The four major phases of the company's original hydroelectric project, one of which is complete, would reshape an area the size of France at a 1990 cost of more than \$64 billion, resulting in the world's largest complex of dams and dikes. This immense project has aroused widespread concern about its combined economic, environmental, and social impacts.

Hydro-Québec has embarked on an ambitious program and, through the existing La Grande complex, has diverted about 1500 m³/sec into La Grande Rivière. The new

Eastmain-1-A and Rupert Diversion Project will add another 450 m³/sec, which would mean that the average flow into La Grande Rivière will be about 3700 m³/sec, some 2000 m³/sec more than occurred under natural conditions (Hamilton, 2004). Perhaps most importantly, the seasonal inflows of freshwater to James Bay have been drastically altered to meet hydroelectricity demands. Maximum discharges from La Grande Rivière now occur in late winter rather than in spring and summer. Temperatures in the late spring and summer discharges of La Grande Rivière are also significantly lower than under pre-project conditions.

These are globally significant quantities of freshwater. The augmented annual flows in La Grande Rivière and the Nelson River in northern Manitoba presently contribute about 25% of the freshwater entering Hudson and James bays. During the spring freshet this percentage drops to about 15%, while in late winter almost 75% of the freshwater entering the Hudson Bay marine ecosystem comes from these two rivers. The amount of freshwater flowing into Hudson Bay, comparable to the combined total flows of the Mackenzie and St. Lawrence rivers, equals approximately 20% of the freshwater that flows into the Arctic Ocean. The combined inflows of rivers emptying into James Bay are comparable to the flow of the Mackenzie River. This freshwater inflow, together with freshwater derived from the annual melt of sea ice, leaves Hudson Bay via Hudson Strait and contributes a major portion of the surface freshwater entering the Labrador shelf and sea.

Much of the hydroelectric potential of Quebec rivers discharging into the Hudson Bay marine ecosystem remains untapped. For example a recent preliminary study (Hydro-Québec Équipement, 2003) that examined the hydroelectric potential of the Nastapoka, Caniapiscou, Whale, and George rivers identified potential projects that, if they prove economically feasible, would add about 6000 megawatts capacity.

Ontario

Hydroelectric megaprojects are also proposed by Ontario Hydro for southern James Bay. Of 18 new hydroelectric developments included in Ontario Hydro's *Providing the Balance of Power*, its demand-supply plan issued in 1990, 12 are in the Hudson Bay bioregion. Six new dams and six redevelopments of existing dams are proposed for the Moose, Abitibi, and Mattagami rivers in northern Ontario, to be developed over the period 1990 to 2016. The 12 projects would generate 1890 megawatts of electricity and flood at least 2299 hectares of land. The published demand-supply plan outlines the environmental impacts and indicates that they will be addressed during subsequent project assessments.

In October 1991, Ontario Hydro announced that planning and field studies for all Moose River developments (with the exception of the extensions to Mattagami stations) were suspended. A large portion of Ontario's hydroelectric potential lies in other rivers flowing into James

Bay (the Albany and the Attawapiskat) and into Hudson Bay (the Severn and the Winisk). While hydroelectric development of these rivers was not proposed in the demand-supply plan, the Government of Ontario is considering private-sector proposals to produce hydroelectric power on these rivers.

The province of Ontario is also encouraging the development of the Conawapa Dam on the Nelson River by negotiating to purchase the hydroelectricity that the project generates (Canadian Press, 2005).

Manitoba

Manitoba Hydro has about 5400 megawatts of installed capacity, about 70% of which is provided by three facilities (Kettle, Long Spruce, and Limestone) on the Nelson River. Less than half the hydroelectric potential of Manitoba rivers flowing into Hudson Bay has been developed (Lecuyer et al., 2004).

In 2000, Manitoba Hydro signed an agreement-in-principle with the Tataskweyak First Nation to start the development process on the proposed Gull Rapids (Keeyask) hydroelectric project. The Keeyask Generating Station would produce about 700 megawatts of electricity (Manitoba Hydro, 2008a).

A project development agreement was signed between Manitoba Hydro and the Nisichawayasihk Cree Nation in 2006 (Manitoba Hydro, 2008b). This agreement allows the Nisichawayasihk Cree Nation to obtain an equity position by investing in the proposed Wuskwatim and Notigi generating stations, which will also be located on rivers that feed Hudson Bay. The project, now under development, will add 200 megawatts of installed capacity to the system and is scheduled to be online in 2012 (Lecuyer et al., 2004).

The Conawapa Dam on the Nelson River in northern Manitoba is also being negotiated and planned with First Nations. The proposed Conawapa generating station, at a site 28 km downstream of the Limestone Generating Station on the Nelson River, would be the largest hydroelectric project built in northern Manitoba, capable of generating 1485 megawatts of electricity (Manitoba Hydro, 2008c).

Environmental Assessment in the Hudson Bay Bioregion

Environmental impact assessment provides a means to integrate environmental factors into project planning and decision making. It generally involves the preparation of an environmental assessment report by a proponent and the review and critical evaluation of that report and other input. It is a public process aimed at providing information about the environmental effects of a proposed project to assist decision making by proponents and by governments. Every jurisdiction in Canada has environmental assessment legislation. Further, most aboriginal land-claim agreements have provisions that allow for aboriginal environmental assessment of projects within their settlement areas.

Generally, the environmental impact assessment process involves the following sequence of events. (1) A government authority responsible for issuing permits to allow projects to proceed (for example a water license) determines whether it also has a responsibility to ensure that an environmental assessment is conducted. (2) This authority, usually in conjunction with other departments, determines how the environmental assessment will be conducted, identifying the scope of the proposed project, the factors that must be considered, and the time lines for the environmental assessment. (3) One or more qualified environmental assessment practitioners identify the potential environmental effects and measures to mitigate those effects and present their findings in a written report. (4) The government authority reviews the report for adequacy and accuracy, and may have others review the report as well. (5) On the basis of the findings in the report, the responsible authority (or authorities) decides whether adverse environmental effects are likely to be significant and whether the proposed project should proceed. (6) If the proposal is to be carried out, the proponent must incorporate mitigation measures identified in the report into the design plans and implement them with the project. Where required or appropriate, the proponent also designs and implements a follow-up program to verify that the environmental assessment was accurate and the mitigative measures were effective.

Environmental assessment legislation and aboriginal land-claim agreements dealing with environmental reviews usually have two or more assessment procedures, depending on the size and likely environmental effects of the proposed project. Typically, the legislated procedures are screenings and assessments.

A screening is an approach to documenting the environmental effects of a proposed project and determining the need to eliminate or minimize the adverse effects, modify the project plan, or recommend further assessment through mediation or by a review panel. As a rule, all development projects will require at least this minimum level of environmental review, and the responsible authority must ensure that the screening is carried out. Screenings will vary in the timing and depth of analysis, depending on the circumstances of the proposed project, the existing environment, and the likely environmental effects. Some screenings may require only a brief analysis of the available information and a brief report; others may need new background studies and will be more thorough and rigorous.

An alternative to screening is to appoint a review panel to make an impartial and objective assessment of a project with likely adverse environmental effects, or in cases where public concerns warrant it. The review panel requires a much more involved process with public involvement and usually applies to larger projects.

Often, however, projects will have extra-territorial effects and therefore require coordination between affected jurisdictions to complete an effective environmental assessment. Inter-jurisdictional cooperation has proven to

be one of the more vexing problems facing environmental assessment.

Limitations of Environmental Assessment in the Hudson Bay Bioregion

Hudson Bay borders four provincial political jurisdictions (Manitoba, Ontario, Quebec, and Nunavut) and four aboriginal settlement areas (the Nunavut Settlement Area, the James Bay and Northern Quebec Agreement, the Eeyou Marine Region, and the Nunavik Marine Region). Additionally, the Canadian Environmental Assessment Agency is responsible for assessing impacts on federal territories, including impacts of proposed projects on Hudson Bay and its shoreline.

This complex web of environmental impact assessment jurisdictions is of limited value as a framework for evaluating the cumulative transboundary effects of projects—particularly of those affecting water flow into Hudson and James bays—on the Hudson Bay marine ecosystem. The Canadian Environmental Assessment Act does require that the cumulative effects of existing, proposed, and reasonably foreseeable projects be taken into account, and this is an important recognition of the need to think beyond a project-by-project approach. An inter-jurisdictional commitment to consider transboundary effects, and especially the cumulative effects of proposed developments, in environmental assessment processes would be a welcome contribution.

At the same time, it should be recognized that other cooperative mechanisms are also needed to increase our shared understanding of the cumulative effects of development on the Hudson Bay marine ecosystem. Ultimately what is needed is a more cooperative and coordinated approach to the long-term environmental planning and management of those activities that have the potential, singly and in combination, to negatively affect the Hudson Bay marine and coastal ecosystem. Recently, as described below, a federal review panel established under the Canadian Environmental Assessment Act clearly recognized this need.

The Eastmain-1-A and Rupert Diversion Project

NTK took part in the environmental assessment process for Hydro-Québec's Eastmain-1-A and Rupert Diversion Project, now called the Eastmain-1-A-Sarcelle-Rupert Project. The initial focus of NTK was to ensure that the guidelines for the environmental hearings considered potential impacts on the marine environment. Seeing that little attention had been paid to these concerns, NTK raised funds to conduct its own assessment using Inuit knowledge and observations, scientific investigation, and Geographic Information System (GIS) modeling. The core of NTK's work is compiled in the conformity analysis submitted in response to Hydro-Québec's Environmental Impact Statement for the Eastmain-1-A Powerhouse and Rupert Diversion Project (NTK, 2005).

NTK is working to get power generators and governments to acknowledge that the incremental increases and seasonal alterations in the volume of freshwater outflow resulting from hydroelectric developments have a genuine impact on the marine environment of James and Hudson bays. However, NTK's overarching goal is to highlight the lack of—and the need for—a suitable inter-jurisdictional mechanism to study, monitor, and model the long-term cumulative and transboundary effects of hydroelectric developments on the Hudson Bay marine environment for mitigation purposes.

To this effect, NTK advocated that the Nunavut Impact Review Board conduct a transboundary review of the Eastmain-1-A and Rupert Diversion Project. NTK (2006) also made written and oral submissions to both the federal and Quebec review bodies for the Eastmain-1-A and Rupert Diversion Project: the Canadian Environmental Assessment Panel and Quebec's Environmental and Social Impact Review Committee (COMEX).

On 18 December 2006, Prime Minister Harper announced that the Eastmain-1-A and Rupert Diversion Project would proceed. The Prime Minister's announcement came shortly after the federal panel established under the Canadian Environmental Assessment Act formally submitted its report to Rona Ambrose, then Canada's Minister of the Environment. It was no surprise, at that time, to see the federal panel recommending that the project proceed. It was surprising, however, that one of the panelists, Jocelyne Beaudet, issued a divergent opinion. She argued that the advantages of the project were not great enough to outweigh its negative impacts, and that the magnitude of those impacts is still uncertain (Federal Review Panel for the Eastmain-1-A and Rupert Diversion Project, 2006:286). She further concluded that "the projects economic profitability must be assessed on the basis of environmental requirements before permits are obtained, otherwise the project would be funded on 'environmental credit,' in which case it would be unacceptable for the project to go ahead" (Federal Review Panel for the Eastmain-1-A and Rupert Diversion Project, 2006:287).

Halting the Eastmain-1-A and Rupert Diversion Project until the cumulative "downstream" inter-jurisdictional challenges had been seriously considered was not politically plausible. However, the final reports of the federal panel and COMEX had some good news for NTK agencies, who were particularly pleased to see the federal panel's strong recommendation that the federal government establish and implement a large-scale inter-jurisdictional research and monitoring program to address the cumulative effects of hydroelectric development on the marine ecosystem in Hudson and James bays. In its summary, the federal panel also advocated recognizing the affected communities as stakeholders in the research and monitoring program. Specifically, Recommendation 34 of the federal panel report states:

The issue of cumulative effects affects several jurisdictions, including the federal government, the provinces of Quebec, Ontario and Manitoba, the territory of Nunavut as well as several government departments linked to these various levels of government. Assessing cumulative effects therefore goes far beyond the responsibility of a single proponent. Within this context, it would be imperative for the federal government to implement a large-scale research and monitoring program for James Bay and Hudson Bay ecosystems. Such a program could be coordinated by an independent body whose structure is akin to that of the International Joint Commission. Such a structure could foster the pooling of efforts and resources of all concerned government agencies, as well as those of the academic community, which is already working on various problems related to cumulative effects in this sector. Whatever the chosen structure, it would be essential for the various aboriginal communities affected to be stakeholders in this research and monitoring program, in order to integrate into it traditional knowledge and local expertise.

(Federal Review Panel for the Eastmain-1-A and Rupert Diversion Project, 2006:283)

COMEX also included a specific summary with respect to the James Bay–Hudson Bay marine ecosystem, which became a condition of issuance of the Québec Certificate of Authorization (Développement durable, Environnement et Parcs Québec, 2006: 28):

Condition 8.1: The evaluation of the cumulative impacts of the hydroelectric projects of James Bay and Hudson Bay, by reason of their scope, concerns several jurisdictions and goes beyond the responsibility of one single proponent. The analysis of these impacts cannot be done without setting up a large-scale research and follow-up program carried out by a consortium comprised mainly of government authorities concerned and including participation by academic circles and by all the stakeholders responsible for this issue which devolves only partly on the proponent. The program should take into account traditional knowledge with a view to better defining the lines of research. As the case may be the proponent will submit the information collected to the administrator.

The recommendation to the federal government was clear and strong and left NTK optimistic that Sanikiluaq had finally made itself heard. It was reassuring that there might soon be a major initiative to try and understand the nature, extent, and significance of the combined effects of these large-scale and largely undocumented modifications to the Hudson Bay system, which are compounded by the effects of climate change. However, our initial optimism was dampened by the fact that the prime minister made no reference to the panel's recommendation in his announcement on 18 December 2006, and it was further eroded when the government's formal responses to the federal panel's recommendations were released in February 2007.

The federal government's public response to Recommendation 34, as last updated online on 1 February 2007, was as follows (DFO, 2007):

The Government of Canada agrees with the Panel's recommendation. Federal departments implicated in the cumulative effects of anthropogenic activities on Canada's physical, biophysical and human environments will monitor and/or coordinate, as may be appropriate, research activities in the James Bay and Hudson Bay region with provincial authorities and aboriginal communities.

FILLING THE GAPS

Identifying flaws is one thing, but tackling them is an altogether different matter. Yet Inuit in Sanikiluaq and other residents of the Hudson Bay bioregion do not have the luxury of sitting back, content in pinpointing governments' glitches and disregarded responsibilities; their cultural, economic, and physical health is intimately tied to the health of their natural environment (McDonald et al., 1997). The Arctic Council (2004) acknowledges this fact by asserting that Arctic inhabitants must be informed and involved in the shaping of a regional approach to their changing environment. Ocean management needs to be steered towards an ecosystem approach that allows the use of both science-based and community-based knowledge (UNEP, 1998; OMRN, 2006) and implicitly recognizes that natural resources are part of a cultural landscape (de Groot and Ramakrishnan, 2005).

This broader view, which is more in line with the perspective of the Hudson Bay bioregion's residents, generates potential solutions. Community-based initiatives are proving to be responsive to the integrated ecological and social dimensions of the resources and their uses (Csonka and Schweitzer, 2004; OMRN, 2004; Tremblay et al., 2006). Also, the need to take a cross-sectoral, integrated approach to environmental management is becoming increasingly evident (BoFEP, 1999; North Sea Conference, 2002; MEA, 2005). In both contexts, concerted joint-venture models are seen as the best way forward.

Community-based Monitoring Network

The environment must remain healthy because people have to rely on it for food.

—Lucassie Arragutainaq from Sanikiluaq
(McDonald et al., 1997:6)

The development of mechanisms to enhance local involvement in planning, decision making, and monitoring of environment-related issues enjoys broad-ranging support (Arctic Council, 2004; Olsson et al., 2004; Huebert et al., 2005). The United Nations Environment Programme earlier gave momentum to this notion by emphasizing that

“the closer the management is to the ecosystem, the greater is the responsibility, accountability, participation, and use of local knowledge” (UNEP 1998:8).

In particular, community-based monitoring is cost-effective and able to incorporate the complexity inherent to coastal management issues (OMRN, 2004). Inuit in Sanikiluaq have a vested interest in the monitoring of the Hudson Bay bioregion, which stems from a desire to maintain their ability to harvest country foods and to preserve their culture rooted in the hunting of marine life. This reality explains why NTK has spearheaded the development of a comprehensive, community-based, inter-jurisdictional environmental monitoring and assessment network for the Hudson Bay bioregion.

For the most part, we have been spurred on by the success of a pilot project establishing, through the complementary collection of community-based and science-based knowledge and observations, the foundation for a long-term environmental monitoring system for the Belcher Islands (Municipality of Sanikiluaq, 2006). In parallel, the numerous hurdles along the path of the environmental review process for the Eastmain-1-A and Rupert Diversion hydroelectric project also led us to the realization that community-level issues are extremely similar throughout the bioregion. Regardless of politics or jurisdictions, Inuit and Cree communities share a common concern for the health of the bioregion's marine and coastal life. Yet, despite shared community objectives, community-level resources and initiatives are largely directed in isolation.

NTK's goal is to establish a network that will offer regional organizations and residents of the bioregion's coastal communities the opportunity to share knowledge and play a decisive role in monitoring and assessing the health of their marine environment. The main purpose of this network is to provide a common infrastructure for community-based monitoring and analysis by active harvesters and field technicians in Nunavut, Manitoba, Ontario, and Quebec by developing and implementing monitoring projects, as well as coordination, support, management, and information transfer/sharing services. The existence of a network would also facilitate the bioregion-wide expansion of local monitoring projects that would benefit from broader implementation, such as the Kativik Regional Government's community-driven Access to Territory and Resources Project, which focuses on climate change as it relates to ice dynamics, trail networks, and the safe continuation of harvesting activities.

The need to monitor the freshwater pulse, salinity, useable sea-ice cover, and combined effects of hydroelectric developments and climate change on the Hudson Bay bioregion's marine life has been expressed by Inuit and Crees alike. The role of the bioregion's residents must therefore go a step farther than what is contemplated by the federal government, which suggests only that “coastal communities will be actively involved in the development, promotion and implementation of sustainable oceans activities” (DFO, 2002a:8).

We consequently advocate the development and establishment of a long-term, community-based, fundamentally community-driven and government-supported, marine and coastal monitoring and assessment system for the Hudson Bay bioregion. Such a system would complement and reinforce a federally led research and monitoring program, such as that envisaged by the federal panel reporting on the proposed Eastmain-1-A and Rupert Diversion project. To this effect, NTK is encouraging and supporting the Municipality of Sanikiluaq in its efforts to engage and involve knowledgeable people, both aboriginal and non-aboriginal, in developing the conceptual basis and policy framework for a community-based monitoring and reporting network for the marine, coastal, and riverine areas in the Hudson Bay bioregion. These efforts are also supported by the Municipality of Inukjuak, the Chisasibi First Nation, the Whapmagoostui First Nation, the Walter and Duncan Gordon Foundation, the Nasivvik Centre for Inuit Health and Changing Environments (Université Laval), Environment Canada, the Grand Council of Crees (Eeyou Istchee), and the Makivik Corporation

COOPERATIVE, INTER-JURISDICTIONAL STEWARDSHIP BODY

The environment has no boundaries.

—Titi Kadluk from Chesterfield Inlet
(McDonald et al., 1997:69)

A shift from political or administrative boundaries to ecologically meaningful areas has been recognized as a prerequisite to any effective coastal management aiming to take upstream land uses into account (CARC et al., 1991; EC, 2000; DFO, 2002a, b; Agardy and Alder, 2005; Coast Lands Consultants, 2005; Duinker and Greig, 2006). At the same time, cooperative regional planning is seen as the most appropriate method to assess both cumulative effects and the sustainability of valued ecosystem components (Lecuyer et al., 2004; Duinker and Greig, 2006). The Hudson Bay bioregion does not contradict this approach. In fact, the vastness of this marine ecosystem is almost synonymous with transboundary issues and impacts.

We accordingly advocate, as we did for the review bodies of the Eastmain-1-A and Rupert Diversion Project, greater inter-jurisdictional cooperation and the creation of a lasting institutional mechanism to enable the joint planning and cooperative research, monitoring, and assessment activities needed for the present and future stewardship of the bioregion. The enduring character of this effort is critical because many human impacts on marine ecosystems are slow to appear (MEA, 2005), and because cumulative effects are especially difficult to define and track (Bunch and Reeves, 1992). The federal government recognizes that the integrated management of coastal and marine environments is a long-term commitment (DFO, 2002b). This obligation is especially true for the Hudson

Bay bioregion, where any governance structure must respectfully abide by the residents' aboriginal rights and viewpoints, as well as a number of land claims and associated co-management regimes.

The governance models and approaches of existing coastal and marine stewardship bodies (i.e., the Gulf of Maine Council on the Marine Environment, the Bay of Fundy Ecosystem Partnership, the Great Lakes Fishery Commission, the International Joint Commission, the Great Lakes Water Quality Agreement, the North Sea Commission, and the North Sea Conference) differ significantly, but a common thread lies in their flexibility, responsiveness to change and appropriate scale, maximizing their effectiveness and legitimacy. Inuit and Crees of the Hudson Bay bioregion share a vested interest in the stewardship of the ecosystem's marine life for present and future generations, so we believe that working-level cooperation between communities is as crucial as collaboration among federal, provincial, and territorial governments and departments. Like the community-based monitoring network, the core and drive of the stewardship body belong in the bioregion's communities. Indeed, increased opportunities for community participation and cooperation in designing and establishing a community-based monitoring network may provide the impetus for the creation and success of a more formal, political-level forum for enabling and promoting the stewardship of the Hudson Bay bioregion.

In a comprehensive review of resource governance in the Arctic, Caulfield (2004) sensibly highlights that, as the involvement of Arctic residents increases, the character of resource governance institutions and political debates will almost certainly change. This transformation implies that there must be willingness at all levels of government to adjust the approaches in order to launch and manage a stewardship body that will be meaningful to the Hudson Bay bioregion's residents. The success of a community-driven stewardship body hinges largely on its active support by government. Ideally, beyond government departments holding environmental portfolios, relevant industrial partners (e.g., hydroelectric power producers) and academic partners (e.g., research programs like ArcticNet and the Ouranos Consortium) may also see, in a marine stewardship body, an opportunity for mutual benefit within a collaborative framework.

CONCLUSION

NTK has demonstrated many urgent and important reasons why we must understand the cumulative impacts of various pressures that could fundamentally transform the Hudson Bay marine ecosystem. Climate change and hydroelectricity development are two obvious drivers that singly and in combination are altering the ice regime of the Hudson Bay complex, as well as other aspects of the region's hydrological cycle. Changes in the hydrological

cycle are undoubtedly influencing the chemical, physical, and biological integrity of the marine ecosystem in and beyond the Hudson Bay complex.

Recommendation 34 recognizes the need for a substantial, federally led research and monitoring program to address the cumulative impacts of hydroelectricity developments on the Hudson Bay marine ecosystem. NTK sees full implementation of Recommendation 34 as a priority to help governments, communities, and others prepare for a very different Hudson Bay ecosystem. An Independent Stewardship Body (ISB), with representatives from governments, affected communities, aboriginal groups, and industry, is crucial to this implementation. The Canadian Environmental Assessment Agency panel recommended an independent body with a structure akin to the Canada-U.S. International Joint Commission to coordinate the major research program for monitoring the cumulative effects of hydroelectric developments, which is important when contemplating the details of the ISB advocated in Recommendation 34. While members of the International Joint Commission are appointed by the leaders of their respective countries, they are mandated by Article XII of the Boundary Waters Treaty of 1909 to "faithfully and impartially perform the duties imposed...under the Treaty" (International Joint Commission, 2008). Commissioners, therefore, consider themselves as members of a unitary, bi-national body and not as representatives of their respective governments.

A community-based monitoring system based on the traditional ecological knowledge of community residents is also an imperative and would complement and reinforce the research and monitoring program called for in Recommendation 34. Such a network would have a vested interest in managing human activities in the Hudson Bay bioregion and would help ensure that the interests and observations of the coastal Inuit and First Nation peoples were more effectively incorporated into research, monitoring, and policy decisions concerning the future of the Hudson Bay region. Recording and reporting traditional ecological knowledge and local observations will also provide a community-sensitive means of measuring and quantifying both small-scale and large-scale trends and impacts to complement, inform, and reinforce long-term marine ecosystem investigations conducted by Western scientists.

Recommendation 34 is a clarion call to fill the major gaps in our understanding of the Hudson Bay marine ecosystem so that affected peoples and responsible agencies can better anticipate and adapt to the challenges and opportunities that are likely to accompany the rapid changes in the system. NTK is having discussions with federal departments responsible for the Hudson Bay region and with community and regional stakeholders to reach consensus on implementing Recommendation 34 of the federal panel. We hope that with enough stakeholder support and involvement, our "life vest" will keep Hudson Bay's stewardship afloat. All the pieces of the puzzle are there; we just have to fit them together.

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