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A NORTHERN SCIENCE POLICY FOR CANADA

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The time has come for a Canadian northern science policy

It is widely acknowledged that good public policy should be built on reliable knowledge. The base of knowledge that informs policy should be reliable, timely, accessible, reflect a diversity of perspectives (what scientists would call working hypotheses), be considerate of long-term changes, and yet be sufficiently flexible to address unexpected, short-term and local events.

Over the past 40 years there have been numerous well-considered attempts to establish a framework for a northern science policy in Canada. Much has already been written about how to best support science, research and education in the Canadian North and in the circumarctic region as a whole. At the core of a northern science policy must be a commitment to sustain core capabilities, including the institutional bodies with responsibility for supporting northern science, the necessary physical infrastructure, and the human capacity required to provide, retain and use knowledge.

Despite previous attempts, it appears that the right conditions for adopting a northern science policy in Canada have not yet emerged. In the past decades the potential for massive resource development and concerns about sovereignty have both led to greater scientific activity (but not a science policy). Several years ago Cynthia Pyc published an editorial comment in *Arctic* (March 2000) entitled 'An Arctic Science Policy? All We Need is a Sovereignty Crisis'. Her argument was that Canadians express affection for the Arctic only when other nations encroach upon it, and that a strategy for polar science is a key component of asserting sovereignty. This perspective is consistent with the view that Arctic sovereignty is about actively exercising national responsibilities in a manner that provides sound stewardship of natural resources and people living there.

In this paper I will briefly review why a northern science policy is necessary, some

of the previous efforts to identify the process and priorities of such a policy, and some recommendations to establish such a policy in the near future. We cannot afford to continue to discuss this issue until 2030!

Benefits of a northern science policy

A policy that supports northern, Arctic and polar research would provide a framework to better coordinate the acquisition, dissemination, translation, preservation and utilization of relevant knowledge for a wide variety of users and needs. A northern science policy framework would also support social, economic and human development, ensure that Canadian researchers can be leaders in scientific inquiry relevant to the north, ensure that there are resources available to build capacity through training and scholarship programs, and help to sustain these efforts over the long-term.

Governments develop science policies for several reasons including to guide investments and set priorities that will guide investments, to ensure accountability, to help frame the interests of partners, and to fulfill commitments made under various international treaties or domestic land-claims agreements, or that are required under legislation. Such a policies would articulate the attitude, commitment and sense of priority of those who espouse them, and if developed in a collaborative and open manner can be very useful for encouraging multidisciplinary, long-term, and/or strategic research.

The Science-Policy Gap

The gap between science and policy-making and policy-implementation is well recognized but probably not well understood. The essence of the gap is between the process of social learning (knowledge creation and transmission) and the process of social action, where

knowledge is filtered through competing belief systems and other social constraints (Bradshaw & Borchers 2000). While scientists tend to be comfortable with uncertainty, the public and policy makers often seek certainty and deterministic solutions. The reconciliation of these different perspectives may be achieved through adopting a science policy that recognizes the need for better mechanisms to link science and policy through adaptive management of both perspectives.

Bridging this ‘Science-Policy Gap’ will require enhancing public understanding through better communication of science and its implications. This approach has been an explicit and very successful aspect of the International Polar Year, and could be adopted widely by the northern science community. It may also be helpful to increase confidence in research by accelerating the pace of scientific confirmation and dissemination of results. However, science will remain complex and scientists may not be able to decrease uncertainty sufficiently to allow more precise estimations of risk for policy makers.

Consequently, it may be necessary for scientific uncertainty to be regarded in the policy arena as it is in scientific circles: as information for hypothesis building, experimentation, and decision making. This approach was also recognized by the study conducted by the Canadian Centre for Management Development on ‘The Integration of Science and Policy in Canada’s Public Service’ (2002). In their words, “it is the challenge of the science community to be able to clearly express the meaning of the uncertainty of their science to policy people. It is the challenge of the policy community to be able to interpret the ‘shades of grey’ associated with uncertainty in scientific information, and translate that uncertainty into ‘black or white’ policy.”

However, science and knowledge are intrinsically uncertain, with new information continually altering our perceptions and beliefs; decisions based on scientific information

must be made in a context of uncertainty; and faster and better science as an adequate basis for policy formulation is not always possible. Some recent work done by the Science For Policy Project of the Bipartisan Policy Center in Washington D.C. (March 2009) confirms the notion that policy debate would be clarified and enhanced if a systematic effort were made to distinguish between questions that can be resolved through scientific judgments and those that involve judgments about values. This report also emphasized the value of scientific advisory panels in evaluating scientific information that would guide policy decisions.

Efforts to develop a Canadian northern science policy

Efforts to implement a Canadian northern science policy began in earnest in the 1970's and these earlier studies and conferences represent an enormous amount of work to build on. Scientific and government reports and committees have routinely recognized and commented on the challenges facing the North and the need for cooperative and collaborative interdisciplinary solutions based on sound knowledge. The key elements of a northern science policy are already well-articulated, and while there are some gaps, these largely reflect the evolution over time of other social, economic, political and environmental influences at local, national and international levels.

The 1972 Mont Gabriel Seminar identified six areas of scientific activities in the North: Northern peoples; Natural environment; Renewable resources; Non-renewable resources; Technology; and International research, and these have not changed substantially over time. However, in addition to recognizing the need for a northern science policy, the Mont Gabriel seminar also identified the need to recognize northerners as full partners. Northerners in general, and the aboriginal population in particular, must be consulted

before scientific work has begun and must participate meaningfully in scientific research. It was also acknowledged that the initiators of research must “...show what effect their actions will have on the environment and renewable resources.”

Several years later, the Science Council of Canada conducted a long, comprehensive study, “Northward Looking: a Strategy and a Science Policy for Northern Development”. This report emphasized that polar science and technology cannot be used effectively in the absence of a polar science policy. The Science Council also made a distinction between policy for science and science for policy and it should be clear that the absence of sound government policies for northern science will certainly not make it easy to deploy northern science in support of government policies. The subsequent Science Council report, “Northern Science for Northern Society: Building Economic Self Reliance”, similarly stressed aspects of science education and technical training; collection and dissemination of scientific and technological information; support for technology development, adaptation and transfer; and circumpolar co-operation.

So while there was generally consensus about what needed to be done there wasn't much obvious progress. At the Circumpolar Conference on Northern Ecology held in Ottawa in September 1975, W. S. Osburn (1977: V-11) remarked that “time after time summaries of these conferences have been remarkably similar. A succinct summary of these conferences would likely discuss the following: lack of ecological-environmental information, the need to develop an effective environmental data storage and retrieval system, systematic or holistic planning and interdisciplinary or team research approach, high cost of research, and a need for cooperation and integration at all levels including international efforts.”

In the spring of 1994, the new Canadian Polar Commission sponsored a conference entitled “Canada and Polar Science”. The purpose was to determine Canada's commitment

to polar science-past present and future. G.S.H. Lock provided a paper titled ‘Observations on Polar Science in Canada: Tradition and Turning Point’, which outlined the thesis that polar science can enrich the lives of all Canadians, particularly northern Canadians, but we cannot begin to achieve our full potential in the absence of clear policy.

Lock and others have suggested that polar science is currently scattered all over the scientific map in seemingly unrelated fragments. As a result, a community of polar science lacks a focal point around which to grow and flourish. The establishment of the Canadian Polar Commission was an attempt to provide this core capacity, but with limited capacity to influence program development its influence has been limited.

In 1997, the 7th Report of the House of Commons Standing Committee on Foreign Affairs and International Trade was completed entitled “Canada and the Circumpolar World: Meeting the Challenges of Cooperation into the Twenty-First Century”. It contains several specific recommendations that, if acted upon, would address long-standing needs and gaps related to science and research capacity. Parliamentary studies have continued to recognize this need for a sustained investment in comprehensive research to inform policy and decision makers, including the recent report of the Standing Senate Committee on Energy, Environment and Natural Resources (May 2009). Indeed, this recent report recommends that the federal government should ‘increase and sustain its funding of research in the North and in doing so, place greater emphasis on monitoring and data collection that will help track long term trends in climate change.’ Of course doing this in the absence of a northern science strategy may not achieve the desired outcomes.

However, in the past decade there have been some encouraging developments to advance northern research in Canada. Perhaps the establishment of the ArcticNet, a Networks of Centers of Excellence (NCE), has provided the most influential opportunity to enable Arctic

science in Canada in the past decade. However, even ArcticNet has had a geographically limited (primarily coastal and marine regions and Inuit communities), and a limited duration (7 years + 7 years renewable) within the scope of the NCE program. Similarly, the Canadian investment in the International Polar Year (IPY) has reinvigorated the polar research community. In fact, much of what was accomplished during IPY 2007-2008 can form the basis for understanding what might be required for implementing a northern science policy. But neither of these programs replace a commitment to a northern science policy.

Toward a Northern Science Policy for Canada – Next Steps

We can acknowledge that public policy must be supported by a strong knowledge base. The results of scholarly studies and various research and monitoring programs help government to identify problems, set priorities, and implement solutions. Creating sound public policy means that science and research play an integral role in identifying problems, setting priorities and implementing solutions in an integrated, coherent and inclusive way.

Adequate funding is crucial to achieving the goals of a Northern research program. However, this alone can not guarantee success in achieving public policy goals. Public policy goals and work in the public interest is long-term and goes beyond the life of a single government. Governments must also ensure that the necessary structural elements and institutional mechanisms are in place to support and maintain this work for the long term. A meaningful commitment to Northern Science Policy will ultimately be articulated in a system of enhanced (political) identity, collaboration and coordination, clearly identified responsibility, and accountability. Accountability is achieved through mandatory reporting mechanisms and clear lines of responsibility and authority.

A central issue is that the responsibility for the conduct and coordination of science

in northern Canada is widely distributed across numerous federal agencies, universities, territorial and provincial governments, Inuit and First Nations organizations, the private sector, and others. This diversity is helpful, but also needs to be reconciled if a northern science policy will be successful.

A Northern Strategy would encompass and be responsive to the impacts of key challenges facing the North, namely: the new governance realities, massive ecological change, emerging economic development opportunities and Canada's role in the northern Circumpolar world. Recent assessments and studies have determined that an emphasis on Northern Science, Research and Technology is central to achieving the objectives of a Canadian Northern Strategy. Elements of the national S&T strategy might be relevant, but it is unlikely that many northern issues will be adequately captured within the broader scope of a national policy alone.

I. Northern Leadership

Before a policy can be implemented to meet societal needs, these needs must first be articulated. In other words, the effective deployment of polar science in the north depends upon a clear statement of northern societal goals. Without definite and detailed policies on social and economic development, for example, it is impossible to know if polar science can bring any tangible benefits. Northerners, through governments and land-claims organizations should take primary responsibility for setting this agenda, and hence defining the key elements of a northern science policy. Territorial governments, Inuit, First Nation and Metis organizations should work to define the key elements of a science policy for the North.

2. Canadian Northern Research Institute

A Canadian Northern Research Institute would provide coordination of the current programs dedicated to northern science and research and would become a convergence point for northern researchers across the country, whether they are academics, government scientists, or practitioners of Traditional Ecological Knowledge or IQ. Government programs that support northern science and research (for example the Polar Continental Shelf Project and the Northern Scientific Training Program) could be incorporated. Some of the recommendations of the CARI report (2008) and initial planning for the new High Arctic Research Station have also identified this need.

3. Support for evidence-based policy making

Mechanisms and processes need to be put in place which bring researchers and policy-makers together from the earliest stages of project development. This will enable researchers to better understand policy-making needs and provide policy-makers with a context in which they can contribute to the development of project outcomes that will be directly useful. At a national level, organizations have attempted to identify best practices for improving the science-policy interface including the Canadian Council of Science and Technology Advisors (1999), the Canadian Centre for Management Development (2002), and European Commission (2008), among many others. A renewed national effort to bridge the gap between science and policy could focus on northern issues.

4. Support for Sustaining Arctic Observation Networks

The need for comprehensive, sustained and interdisciplinary Arctic observations and data management has been identified previously in the Arctic Climate Impact Assessment (ACIA)

and the report of the International Conference on Arctic Research Planning (ICARP II), among others. Although the International Polar Year 2007-2008 (IPY) has provided an opportunity to implement new observing activities in the Arctic, and even though there are a wide range of ongoing observing programs, networks and existing observational platforms, Arctic observing activities are still fragmentary and exist in varying stages of development. From the present fragmentary state, there is a need to fill spatial, temporal and disciplinary gaps in observing records, to strengthen the sustainability of observing programs, and make data readily available. Some of this assessment was undertaken in the past two years by the Sustaining Arctic Observing Networks (SAON) initiating group.

The collection of observational information on the Arctic environment, its societies and economies is necessary if governments of Arctic nations, Arctic peoples and other stakeholders are to respond effectively to the rapid changes witnessed in the North today. Arctic observations are collected by a number of different entities and through different processes, each with its own purpose, but all ultimately feeding data and information back to society. Each observing program should be designed to engage the stakeholders and investigators that are necessary to answering the requirements that meet clearly defined societal needs. Those engaged in Arctic observing activities currently include northern residents (especially indigenous peoples), government agencies that support operational and research-driven observations, and the science community. Improved knowledge is of value to all stakeholders as it will enable the dissemination of timely, accurate and appropriate information necessary for developing projections of future change and for policy development and decision making at local/community, national and global levels.

The Recommendations from the SAON Initiating Group that were adopted by Arctic Council Ministers in Tromso include having the Arctic Council (including permanent

participants and observers) should lead the facilitation of international collaboration among government agencies, researchers, and northern residents, especially indigenous people at the community level, to promote a sustainable pan-Arctic observing system; sustaining current level of observing activities and data and information services; increase inter-governmental cooperation in coordinating and integrating Arctic observing activities; and recognizing that the Arctic issues are of global common concern. In addition, the arctic indigenous peoples raised the need to define their role in Arctic observing, including the role of traditional and local knowledge, the differences and similarities between knowledge systems, and restrictions on personal data and other related issues.

5. Improved Access to data and information

Related to SAON, but worth listing separately, is the issue of data management and sharing of information and knowledge that will be central to any northern science policy. Canada moving in the right direction with the recent decision to expand the Polar Data Catalogue for all Canadian Arctic Metadata. However, there is still no direct support for researchers to do this and it will be a very significant effort to enter non-IPY metadata records from all current or recent non-IPY research/monitoring programs and all historical Arctic science metadata. And of course there is still the issue of where the actual data and/or physical samples will be appropriately archived.

6. Education, Outreach and Communications in support of Northern science.

Continued support for Northern science in science centers and museums and in school curriculum across Canada is needed. At the post-secondary level more support is required for the territorial colleges and to establish a University of the Arctic Canada consortium,

as well as additional support for independent organizations that can help to develop policy like ACUNS.

7. Minister of Northern and Circumpolar Affairs

Finally, consideration should be given to creating a federal Minister (or Minister of State) for Northern and Circumpolar Affairs would provide political identity, and ensure accountability, coordination and structure for Northern initiatives. The new Minister's portfolio would include requirements to: Support Canada's Northern science and research capacity; Advance the relationship between the federal government and the Territories and Provinces; Foster the development of economic opportunities in the North; and Promote Canada's place in the world as a northern nation and a member of the Circumpolar North, an area of increasing geopolitical significance.