Greater Than the Sum of Its Parts: Toward Integrated Natural Resource Management in Canada

Executive Summary

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GREATER THAN THE SUM OF ITS PARTS: TOWARD INTEGRATED NATURAL RESOURCE MANAGEMENT IN CANADA

The Expert Panel on the State of Knowledge and Practice of Integrated Approaches to Natural Resource Management in Canada

THE COUNCIL OF CANADIAN ACADEMIES
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This report was prepared for the Government of Canada in response to a request from Natural Resources Canada, supported by Agriculture and Agri-Food Canada, and Environment and Climate Change Canada. Any opinions, findings, or conclusions expressed in this publication are those of the authors, the Expert Panel on the State of Knowledge and Practice of Integrated Approaches to Natural Resource Management in Canada, and do not necessarily represent the views of their organizations of affiliation or employment, or the sponsoring organizations, Natural Resources Canada, Agriculture and Agri-Food Canada, and Environment and Climate Change Canada.

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The Expert Panel on the State of Knowledge and Practice of Integrated Approaches to Natural Resource Management in Canada

Under the guidance of its Scientific Advisory Committee, Board of Directors, and founding Academies, the CCA assembled the Expert Panel on the State of Knowledge and Practice of Integrated Approaches to Natural Resource Management in Canada to undertake this project. Each expert was selected for their expertise, experience, and demonstrated leadership in fields relevant to this project.

Cassie J. Doyle (Chair), Former Deputy Minister, Natural Resources Canada; Former Associate Deputy Minister, Environment and Climate Change Canada; Strategic Advisor and former CEO, Canadian International Resources and Development Institute (Vancouver, BC)

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Ione L. Taylor, Executive Director, Earth and Energy Resources Leadership, Department of Geological Sciences and Geological Engineering, Queen's University (Kingston, ON)

Alain Tremblay, Senior Environmental Advisor, Hydro-Québec (Montréal, QC)

Message from the Chair

Natural resources constitute a key element of Canada's identity. The ongoing debates and division regarding how these resources are being developed underscore the importance and timeliness of this report, which explores integrated natural resources management in Canada. In the last few decades, the health of many of Canada's diverse ecosystems has been increasingly threatened and there has been a loss of public confidence in our system of natural resource management. The limitations of project-level management practices are becoming more evident, leading to conflict and delays. Several significant court cases in recent years have challenged the status quo approach to resource management. At the same time, there is real concern over the competitiveness of Canada's resource industries. It is clear that Canada needs to shift the way it plans and manages natural resource development away from siloed project-level processes toward more integrated approaches. The Expert Panel on the State of Knowledge and Practice of Integrated Approaches to Natural Resource Management in Canada hopes this report will support enhanced implementation of INRM in Canada to strengthen the sustainability and legitimacy of our systems of resource management.

The Panel found that while INRM has currency and is practiced to some extent in Canada today, little consensus exists on what this approach actually means and most importantly, how to achieve true integration. To help address this challenge, the Panel developed a definition and a corresponding set of eight critical characteristics of INRM, along with guidance on implementation drawing from both research and practice. The Panel recognizes that context is very important for INRM and thus there is no prescriptive implementation formula; however, INRM does call for a move away from a focus on individual projects toward wider geographic and temporal scales. The report was informed by some excellent models of INRM in Canada, although the Panel observed that the effectiveness of these approaches is often limited by a lack of resources or sustained implementation. The Panel also observed the importance of the legislative context for resource management and found that while current legislation is not a barrier to INRM, there remains room for improvement.

INRM is inherently complex, necessitating strong governance to incorporate a wide range of knowledge sources and ensure the involvement of a diverse group of actors. The complexity is compounded by the role of multiple jurisdictions in natural resource management, incomplete information and uncertainty, and a lack of documentation of lessons learned implementing INRM to date. The Panel grappled with this complexity throughout its assessment and has established a framework designed to capture and combine the many essential elements of INRM.

Considerable effort by the Panel went into highlighting the role of Indigenous and local knowledge in INRM, as well as the importance of Indigenous participation in natural resource management decision-making. The Panel was concerned that while the Government of Canada is making commitments to implement the *United Nations Declaration on the Rights of Indigenous Peoples*, we have not adequately advanced our understanding of how to meaningfully bridge Indigenous rights, knowledge, history, and culture into resource decision-making in Canada. There is real potential for INRM to support reconciliation through shared decision-making, recognition of Indigenous rights, and mechanisms for bridging different ways of knowing. The Panel drew lessons from the experiences of co-management regimes which have been early leaders in implementing INRM in Canada.

I wish to acknowledge Natural Resources Canada, Agriculture and Agri-Food Canada, and Environment and Climate Change Canada for referring this important topic to the Council of Canadian Academies (CCA) for expert review. The Panel benefited from valuable inputs from several practitioners throughout the assessment who are acknowledged in the report. On behalf of all the Panel members, I want to express my deep appreciation to the CCA staff who provided expert support to the Panel throughout the assessment. Finally, I am very grateful to the members of the Panel for their generous contribution of expertise and collaborative engagement throughout this process.

Cassie J. Doyle, Chair
Expert Panel on the State of Knowledge and Practice of Integrated Approaches to Natural Resource Management in Canada

Message from the President and CEO

Canada is recognized the world over for its wealth of natural resources. However, efforts by public and private sector actors to care for, steward, and responsibly manage them have, at times, generated conflict. This is not unexpected at a time when climate change, environmental stress, coupled with economic opportunities, and other societal expectations are at work.

Some of the disputes are about the optimal way to collectively or individually manage these resources; others reflect broader societal, political, economic, and cultural issues. These issues help explain the timeliness of this assessment request from Natural Resources Canada, Agriculture and Agri-Food Canada, and Environment and Climate Change Canada — that the Council of Canadian Academies (CCA) convene an Expert Panel to review the evidence and current natural resource management practices and to consider ways in which an integrated approach to natural resources management could be used. Here, "integrated" refers not only to the attention given to multiple resources (e.g., land, water, and timber), but also to the multiple participants involved in the management process itself. It is for this reason that the title of the report is so apt: integrated natural resources management (INRM) is more than just the application of individual metrics and models; INRM involves individuals, groups, and communities, each with different sources of knowledge, ways of knowing, values, and rights. By definition, it must be "greater than the sum of its parts."

Taking on a topic of such importance for Canada requires leadership and expertise. I offer my sincere thanks to the Expert Panel Chair, Cassie Doyle, and the Panel members who volunteered their time and expertise to produce a comprehensive report that offers meaningful guidance to decision-makers and practitioners in moving forward to implement INRM across Canada. I would also like to thank the CCA Board of Directors, Scientific Advisory Committee, and our three founding Academies — the Royal Society of Canada, Canadian Academy of Engineering, and Canadian Academy of Health Sciences — for their guidance, leadership, and insight throughout the assessment process.

Eric M. Meslin, PhD, FCAHS
President and CEO, Council of Canadian Academies

Acknowledgements

Over the course of its deliberations, the Panel reached out to several individuals and organizations who shared their experiences of the practice of INRM in Canada. The Panel wishes to thank the following people for their participation: Sandra Honour from the Government of Alberta for sharing her experience with the Integrated Resource Management System in Alberta; Brad Stelfox for providing expertise on land use sustainability at the start of this assessment; Diane Wilson (Parks Canada) and Thomas Nesbitt (Avati Associates) for sharing knowledge about the practice of co-management agreements in northern Canada; Jeremy Benson (BC Hydro) for discussing BC Hydro's Water Use Planning; and Derek Thompson (former Deputy Minister of Environment, Land and Parks, Government of British Columbia) for providing his views on shared governance in Haida Gwaii. Rob Smith and Peter Morrison (Midsummer Analytics) provided the Panel with a review of the approaches used to assess the values and costs of INRM.

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Report Review

This report was reviewed in draft form by reviewers selected by the CCA for their diverse perspectives and areas of expertise.

The reviewers assessed the objectivity and quality of the report. Their submissions — which will remain confidential — were considered in full by the Panel, and many of their suggestions were incorporated into the report. They were not asked to endorse the conclusions, nor did they see final report drafts before release. Responsibility for the final content of this report rests entirely with the authoring Expert Panel and the CCA.

The CCA wishes to thank the following individuals for their review of this report:

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The report review procedure was monitored on behalf of the CCA's Board of Directors and Scientific Advisory Committee by **Barbara Neis, C.M., FRSC,** John Paton Lewis Distinguished University Professor, Memorial University of Newfoundland. The role of the peer review monitor is to ensure that the Panel gives full and fair consideration to the submissions of the report reviewers. The Board of the CCA authorizes public release of an expert panel report only after the peer review monitor confirms that the CCA's report review requirements have been satisfied. The CCA thanks Dr. Neis for her diligent contribution as peer review monitor.

Executive Summary

Canada's culture and economy have always been linked with its natural resources. These resources are diverse and include wildlife and other components of biodiversity, water, forests, minerals, energy, and arable land for agriculture, among others. While demands on, and concerns for, Canada's natural resources reveal competing interests and values, they can also foster common goals and opportunities for new approaches to resource management.

In Canada, natural resource management decisions have historically been made on a project-by-project or sector-by-sector basis, and usually by a single government entity. This approach has come up significantly short, lacking a broad, "bird's-eye" perspective on project effects and often with a limited diversity of knowledge and viewpoints used to support informed decision-making. Integrated natural resource management (INRM) holds promise because it takes into account complexity, multiple scales, and competing interests, and brings these together to make informed decisions.

The Charge to the Panel

Natural Resources Canada (the Sponsor) asked the Council of Canadian Academies (CCA) to conduct an evidence-based assessment to answer the following question:

> *What is the state of knowledge and practice of integrated approaches to natural resource management in Canada?*

To address the charge, the CCA assembled a multidisciplinary panel of 13 experts (the Panel) from across Canada and abroad. The Panel included both academic experts and practitioners of integrated approaches to natural resource management. The Panel and the Sponsor underscored the importance of recognizing the rights and values of Indigenous Peoples for this assessment, particularly the role of Indigenous and local knowledge (ILK) and the involvement of Indigenous Peoples in natural resource management decision-making.

Current Context and the Integration Imperative

Integration is needed to address current realities, and overcome the limitations of conventional approaches which focus on managing individual activities and resources.

Natural resource managers are confronted by challenges that include the intensification of environmental and social pressures, increasingly global competition, regulatory uncertainty, the impacts of climate change, and public

distrust. In the Canadian context, resource management is also undergoing changes in response to growing jurisdictional complexity, increased recognition of the rights of Indigenous Peoples, and commitment to reconciliation. As such, it is often difficult to make decisions about natural resources in Canada that are widely accepted.

INRM can leverage promising practices to address these challenges. Some INRM features that are particularly well suited for this task include extensive engagement processes, regional orientation, evaluation of trade-offs, and inclusion of all relevant jurisdictions. In the Panel's view, INRM is needed because conventional approaches to managing individual activities and resources are no longer sufficient.

A Framework for INRM

As the Panel undertook the charge, members quickly observed that INRM, as a concept, is subject to many interpretations and, as such, is difficult to define. To guide deliberations, the Panel defined INRM as:

> a way of managing human activities and natural resources that weighs and integrates multiple land uses, rights, needs, ways of knowing, and values across jurisdictional, temporal, and spatial scales to achieve environmental, economic, social, and cultural objectives.

The Panel's definition assumes a holistic account of *natural resources* that reflects the full spectrum of human activities. It includes a range of resources, services, and uses, including oil, gas, minerals, agricultural lands, forest, water, soil, wildlife and fish and, more broadly, ecosystems and the biodiversity they contain. Importantly, the definition also includes the other ecosystem services natural resources provide, such as water supply and regulation, erosion control, carbon sequestration, recreation, and cultural uses.

The Panel also identified eight defining characteristics of INRM. *An integrated approach to natural resource management is one that:*

- *pursues clear and comprehensive goals and objectives;*
- *plans, manages, and monitors at appropriate geographic scales and timeframes;*
- *engages all relevant jurisdictions;*
- *involves rights holders and interested and affected parties;*
- *weighs multiple values, uses, and functions;*
- *assesses alternatives and trade-offs;*
- *includes multiple ways of knowing; and*
- *addresses uncertainty.*

Every natural resource management system is unique so some of these characteristics may be more relevant than others. However, robust efforts to implement INRM are likely to encompass all eight of these characteristics to some degree.

INRM calls for higher-order decision-making that embraces land-use planning and strategic assessment at regional scales, enabling better and more efficient decision-making at project-specific stages.

In INRM, decision-makers emphasize scale-appropriate planning and evaluation in order to assess the cumulative effects of resource use; to weigh and consider the multiple values, uses, and functions of an ecosystem; and to identify trade-offs in resource management. Current project-based approval processes often exclude small projects, impose artificially narrow temporal and spatial scales, and ignore cumulative effects. While many existing regimes emphasize project-specific environmental assessments and permitting processes, leading practices for implementing INRM are characterized by a greater focus on land-use plans, and regional and strategic environmental assessments early in the process. The effectiveness of project-level approvals would be enhanced if they were implemented within the context of a regional plan or more strategically focused regional environmental assessment initiatives. Likewise, effective INRM includes strong links among regional-level plans and targets and project-level decisions.

INRM includes integration across the continuum of decision-making, as summarized in Figure 1. From the outset INRM is underpinned by legislation, treaties, and policies (which are themselves a function of societal rights, values, and norms). These then lay the foundation for regional planning processes that are inclusive, comprehensive, and informed by multiple ways of knowing. Land-use plans in turn inform the development of regional and strategic environmental assessments that consider cumulative effects and then inform and simplify project-level environmental assessments. Licensing and permitting decisions flow from these assessments. Monitoring, evaluation, and learning by doing are relevant across the continuum.

The Panel notes that INRM is not an all-or-nothing proposition. Incremental progress can be made to implement resource management approaches that increasingly satisfy the eight defining characteristics of INRM. In the Panel's view, rather than calling for an entirely new approach to decision-making, INRM puts a greater focus on regional planning processes early in the continuum.

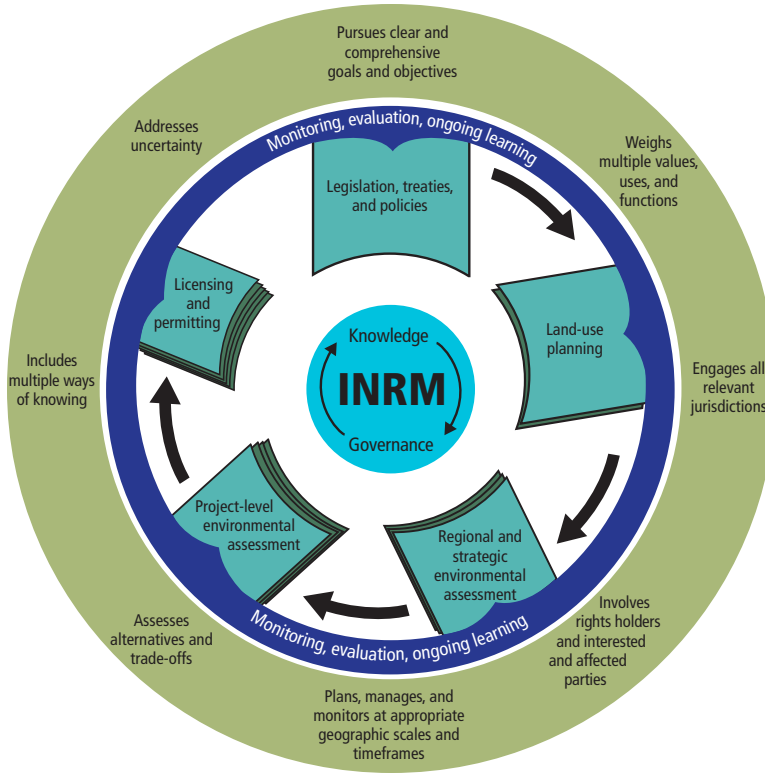

Figure 1

Continuum of Integrated Natural Resource Management Decision-Making

INRM applies across the continuum of natural resource management decision-making. It originates in legislation, treaties, and policies that lay the foundation for regional land-use planning. This in turn informs regional and strategic environmental assessments and subsequent project-level environmental assessments, which can then lead to licensing and permitting decisions. Process and outcome monitoring and evaluation can apply across the continuum to support ongoing learning. The eight characteristics of INRM are relevant throughout.

Knowledge for INRM

We know enough to act.

The foundation of knowledge and supporting tools related to resource management is sufficiently developed to enable INRM. Knowledge plays a critical role in INRM decision-making, improving the quality of decisions, building confidence, and understanding the values and limitations of information used to make a decision. There is growing recognition that the dynamics of

complex systems require an inclusive approach to knowledge-gathering so as to increase the range of knowledge brought to bear on a question. Multiple temporal and geographical scales are also important features of INRM, as is the need to recognize and account for multifunctional landscapes. The collection of new knowledge through monitoring is also important in INRM — it allows for the assessment of the performance of resource management strategies. Current monitoring efforts tend to be fragmented; to inform INRM, greater emphasis is needed on comprehensive monitoring of ecosystems across large regions and long timeframes.

Effective INRM depends not just on a wide range of knowledge but also on how that knowledge is applied. Reliance on emerging data-sharing tools and networks, as well as new strategies for applying this knowledge to decision-making, are contributing to our ability to practice INRM. Examples of tools for data sharing include geographic information system (GIS) and modelling, while tools for applying knowledge to decision-making include threshold analysis, trade-off analysis, and cumulative effects assessment. Knowledge diversity and application tools both support inclusive, comprehensive, and adaptive resource management and appropriately communicate and manage uncertainties.

While the theory behind INRM is well described in the literature, there is less empirical evidence on successes and challenges where INRM has been implemented. Initiatives across Canada, including the British Columbia Cumulative Effects Framework, Alberta's *Land Stewardship Act*, and the *Mackenzie Valley Resource Management Act*, show the growing inclusion and importance of practitioner insights that supplement theoretical and academic knowledge. While there is a wealth of experience in implementing management approaches in Canada that include several characteristics of INRM, in general undertakings have not been comprehensive and are often ultimately scaled back. Documentation of ongoing efforts by the provincial governments in British Columbia and Alberta to manage cumulative effects will help demonstrate learnings that can be applied to future initiatives.

Knowledge-sharing networks, a tolerance for decision-making under uncertainty, and better coordination of research and monitoring efforts can foster interdisciplinary knowledge creation and knowledge exchange at scales relevant to INRM. Actors can start to make better-informed decisions with existing knowledge while continuing to strengthen the creation and systematic distribution of information to fill knowledge gaps.

INRM is built on a foundation of knowledge that effectively bridges Western science and Indigenous and local knowledge.

Knowledge is the foundation for making informed decisions and implementing adaptation measures for changing environments and conditions. The complexity, uncertainty, and multiscaled nature of natural resources calls for a commensurate sophistication in the knowledge used to inform decision-making. INRM takes advantage of all relevant knowledge and ways of knowing. In Canada, both Western science and ILK are particularly important for INRM.

The bridging of knowledge systems can increase the effectiveness of INRM because consideration of multiple forms of knowledge produces better decisions. The Panel suggests that co-design of a bridging process will best incorporate ILK. The goal of bridging knowledge is not to reduce each source of data into one unified collection of information, but rather to consider and weigh each piece of knowledge in the context of its source. Early examples of success in bridging Western science with ILK offer a model for incorporating different ways of knowing. However, considerable work remains to ensure that practitioners are comfortable in co-designing processes for ensuring knowledge integrity. Challenges include a lack of well-established methodologies for bridging knowledge, the fact that knowledge is often based in different scales, and significant inequities in power among knowledge holders at times, with deference given to Western science. While these challenges may serve to deter resource managers from attempting to incorporate ILK in decision-making, making good-faith efforts to bridge ways of knowing is an essential first step. The Government of Canada's commitment to reconciliation and to the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP) calls for further efforts to elevate our collective capacity and mainstream methods for incorporating ILK into resource decision-making.

Governance for INRM

Careful and inclusive design of INRM governance is essential to its success.

The value of INRM comes from applying knowledge to decision-making through a carefully designed and implemented governance process. INRM calls for more inclusive forms of governance involving a broader set of actors and expanded ways of knowing, thereby legitimizing and improving the quality of decision-making. Research and practical experience have shown that effective governance involves a range of approaches that correspond with the nature and complexity of the resource management issues and processes under consideration. The governance approaches that have evolved in Canada over recent decades can be placed along a spectrum, from consultative to collaborative to shared (Figure 2).

Moving along the consultative-collaborative-shared spectrum, each approach represents an increasing and more substantive involvement of more than one actor in decision-making and accountability. Although progression along this spectrum is often desirable, there may be one or more aspects of INRM (e.g., legislation, policy, planning, project review, monitoring) for any given circumstance that dictate a more consultative approach.

Regardless of the approach, governance in INRM extends beyond whichever government has authority over the resource (e.g., federal, provincial, territorial, Indigenous) to include all relevant actors. Actors are more likely to buy into results, help identify solutions, and put them into practice if they are involved in decision-making. This begins with process design; in the Panel's experience, effective design is co-design — that is, the relevant actors collaboratively design the governance system from the outset. Governance that is inclusive in design and decision-making brings legitimacy and improves outcomes.

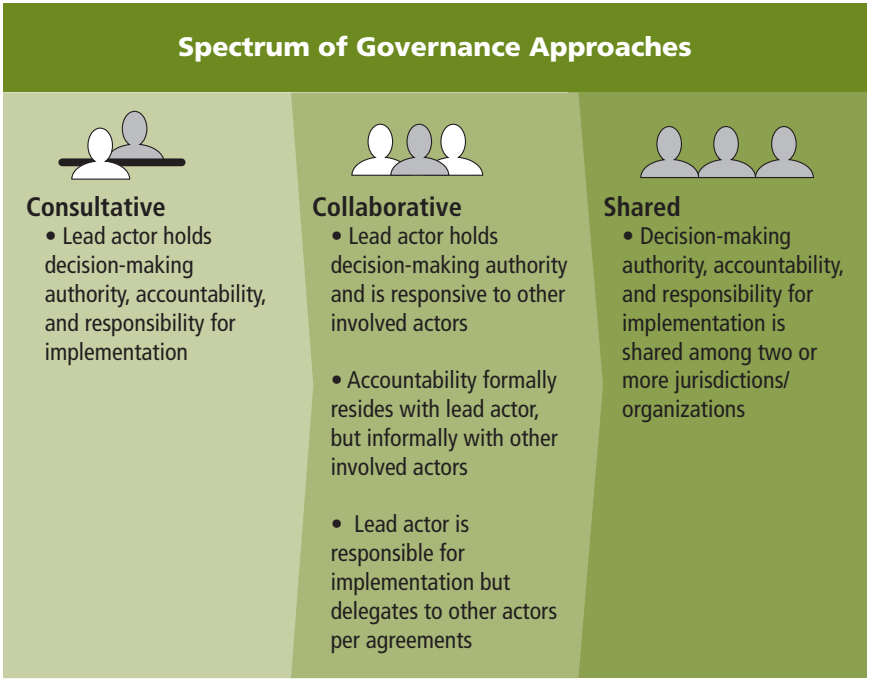

Figure 2

A Spectrum of Natural Resource Governance Approaches in Canada

Governance approaches can exist along a spectrum from consultative to collaborative through to shared governance.

Laws and regulations establish the boundaries of, and conditions for, resource-based decision-making in Canada, and can create a space in which INRM can thrive. Conversely, without supporting regulations and policies, implementing INRM processes may be difficult. With a few notable exceptions, most environmental and natural resource laws in Canada were passed before INRM garnered significant interest, and with limited recognition of Indigenous governments. However, the laws governing natural resource management in Canada do not prohibit and, in some cases, foster INRM.

Final Reflections

The Panel designed this report to be of value to leaders working to strengthen the legitimacy of resource management systems, and to the practitioners and actors wishing to implement or improve INRM. Canada is in a state of transition in resource management: from exclusively project-level planning to planning on a regional level; from consultative to collaborative or shared governance; and from recognition of single to multiple ways of knowing. At first glance, the eight defining characteristics of INRM described in this report appear to call for a complete overhaul of current resource management practices — which in turn appears out of reach for many actors. However, the Panel came across many promising emerging practices over the course of the assessment. Although Canada is still experimenting with INRM, these examples are early indicators that suggest progress is already being made. There is a need for enhanced documentation and sharing of lessons learned from these and other initiatives so that such lessons can be applied in other contexts.

INRM is a work in progress that will take time and resources to implement, and that needs to be both carefully designed and thoroughly implemented. INRM requires ongoing resourcing to support its operations, as well as regional and long-term monitoring efforts; information collection and sharing; and research. An INRM regime has the authority to carry out decisions. INRM requires leadership to bring about a change in culture within government, industry, and communities, and accountability to ensure objectives are being met on a sustained basis. Ultimately, for INRM to be effective, a greater level of commitment is needed on the part of governments to enhance knowledge and governance beyond the consideration of individual resource projects. However, in the Panel's view, widespread INRM implementation is crucial for addressing the scale and complexity of 21st century problems and to allow for Canada's continued prosperity.