

**Towards a New Current of Thought:
Best Practices for Gathering and Incorporating
Traditional Ecological Knowledge
into Environmental Monitoring and Assessment**

**A Discussion Paper
Prepared for
the Mackenzie River Basin Board Traditional Knowledge and
Strengthening Partnerships Steering Committee**

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October 31, 2012

1.0 Introduction

1.1 Background

At a meeting held in November 2011 the Mackenzie River Basin Board (MRBB) Traditional Knowledge and Strengthening Partnerships Steering Committee discussed how it could “*support and facilitate the increased participation of Aboriginal Peoples in MRBB activities.*” The Steering Committee recommended that the MRBB collect and publish examples of how the application of traditional knowledge (TK) collection protocols and best practices have been coordinated with results gathered by western science to improve decision-making in the field of water and resource management. The *Mackenzie River Basin Transboundary Waters Master Agreement* (Part D Section 2C)¹ directs the MRBB to “*consider the needs and concerns of Aboriginal people through the provision of culturally appropriate communication and the incorporation of their traditional knowledge and values.*” With respect to TK, the MRBB recognizes that:

1) *A substantial amount of information about the state of the Mackenzie River Basin in the historic past and the observed changes in the recent past is known by the people who have lived in the basin for generations.*

2) *TK is based on the understanding that:*

- *the land is a powerful teacher;*
- *TK encompasses the physical, emotional, intellectual, and spiritual dimensions of life;*
- *TK complements and enhances Western scientific information; and*
- *scientists and TK holders must work in partnership to gain a more thorough understanding of the natural environment.*

3) *The use of traditional knowledge in decision-making provides a long term holistic perspective... (and) it is important to learn how to use this knowledge to assist in making today's water management decisions.*

Specifically, the “*MRBB wants to find better ways to use TK for decision making and for reconciling TK with the views of the scientific community.*”²

In April of this year, Dr. Marc Stevenson of *All Nations Services*, Edmonton, Alberta (the Consultant) was retained by Aboriginal Affairs and Northern Development to produce a report incorporating TK protocols and best practices. Marc has worked

¹ www.mrbb.ca/information/31/index.html

² <http://www.mrbb.ca/information/39/index.html>

with Inuit, Dene, Cree, and Métis peoples in northern Canada for over three decades on initiatives to incorporate their values and knowledge into co-management plans, environmental and socioeconomic impact assessments, traditional land use studies, traditional economy studies, research protocols, etc. He is the author of many scholarly articles on traditional knowledge and co-management with Indigenous Peoples, and is known internationally for his work in these areas. On June 5th, 2012, the Consultant met with the Steering Committee to: 1) confirm project objectives, schedule, milestones and deliverables, and 2) present a draft outline for the proposed report based on the Terms of Reference (ToR) for this project. The outline included:

- a) thoughts and reflections on defining TK
- b) reasons for incorporating TK into environmental resource management (ERM)
- c) synthesis of the *status quo* to incorporating TK into environmental decisions
- d) identification of systemic and cultural barriers to incorporating Aboriginal peoples and their knowledge into ERM
- e) questioning what we are attempting to manage and conserve
- f) validation processes for TK
- g) providing an example of a best practice: the southeast Baffin Beluga and Inuit
- h) creating space for Indigenous peoples and TK in ERM
- i) thinking and talking differently about TK

Presentation of the draft outline was well received by Steering Committee members with little comment forthcoming that necessitated revision of the proposed outline. Indeed, Steering Committee members looked forward to receiving and commenting on a draft report based on this outline at the next meeting, later scheduled for the fall of 2012.

1.2 Report Contents

The following report addresses the topics and issues in the draft report outline as approved by Steering Committee members on June 5th, 2012. It also elaborates on other issues that, in the opinion of the Consultant, are fundamental to achieving the Steering Committee's mandate. Specifically, it discusses how TK has been defined, conceptualized and organized so that it might be meaningfully incorporated into environmental monitoring and assessment. It then describes several case studies that, while underscoring the value of TK and its application to ERM, typify the usual or customary approach to integrating TK into environmental decision making. As described and analysed, the *status quo* may not be sustainable or among the "best

practices” for Steering Committee members to follow. The report then examines the cultural, political and other barriers that continue to characterize the *status quo* and undermine the full contributions of Aboriginal peoples, values and TK to ERM, while forwarding several recommendations to overcome these barriers. Subsequently, two additional case studies or ‘best practices’ are provided that go well beyond the *status quo* to include broader aspects of TK, the values that inform this knowledge, and the people who hold this knowledge into environmental assessment and monitoring. Finally, and by way of achieving this objective, this paper concludes with some thoughts about how environmental managers can think and talk about TK differently so that it might assume its proper place in the activities of the Steering Committee, and ERM generally.

2.0 What are We Talking About? Defining, Conceptualizing and Organizing Traditional Knowledge

2.1 Defining and Organizing TK

Increasingly, the incorporation of TK into environmental assessment and resource management across the North is becoming a policy, even a regulatory, requirement, especially as Aboriginal parties settle comprehensive land claims agreements. Yet, there is little guidance on how to implement such policies in public arenas, including “wildlife” co-management boards and independent environmental assessment review bodies where, according to Usher (2000:183),³ knowledge claims must be tested. Further, there is little mutual agreement between those who possess such knowledge and those required to incorporate it into ERM on how “best” define, organize and present TK, or indeed make generalizations about it; Indigenous scholars such Linda Tuhiwai Smith (1999)⁴ and Taiaiake Alfred (2005)⁵ have insisted that, while colonialism produced shared experiences, generalizations about Indigenous knowledge are inappropriate given the diversity of Indigenous peoples.

Even so, the solutions that some envisage are to develop clearer and more consistent definitions of TK, and more appropriate methods for incorporating it into environmental management and assessment processes (Usher 2000). The great

³ P. Usher (2000). Traditional Ecological in Environmental Assessment and Management. *Arctic* 53(2):183-193.

⁴ L.T. Smith (1999). *Decolonizing Methodologies: Research and Indigenous Peoples*, Zed Books, London.

⁵ T. Alfred (2005). *Wasáse: Indigenous Pathways of Action and Freedom*, Broadview Press, Peterborough.

diversity of labels used to describe the ecological and/or environmental knowledge held by Aboriginal peoples,⁶ however, may hinder rather than assist these tasks. Moreover, many definitions have been advanced for the most commonly used of these terms, TK or TEK (traditional environmental knowledge).⁷ Perhaps the most referred to definition in the literature is the oft-cited Dene Cultural Institute's definition of Traditional Environmental Knowledge,⁸ which acknowledges that the ecological and environmental knowledge held by Aboriginal peoples can accommodate change and innovation and is embedded within a system of knowledge that has broader social, economic and spiritual dimensions. Thus, TEK cannot be properly understood or applied without reference to the larger cultural and social contexts in which it is embedded. This has led a number of researchers to ask the question:

“What knowledge held by Aboriginal peoples can be used to inform environmental assessment and management without doing a disservice to this knowledge and the people who own and created it?”

Marc Stevenson (1996)⁹ and Peter Usher (2000), in particular, have attempted to identify the various “spaces” where TK can contribute to environmental assessment and conservation. Stevenson sees four integrated and embedded levels in which the knowledge of Aboriginal peoples can play a critical role in ERM:

1) Specific Environmental Knowledge: Knowledge about the environment (e.g., locations, distributions, conditions, and behaviours of various species of animals, and variations in these over time and space).

2) Traditional Ecological Knowledge (TEK): Composed of three interrelated components: specific environmental knowledge, knowledge required to sustain appropriate ecosystem relationships, and a code of ethics or values governing appropriate human–environmental relationships.

⁶ Traditional knowledge, traditional ecological knowledge, traditional environmental knowledge, traditional science, Aboriginal traditional knowledge, naturalized knowledge, Indigenous knowledge ethno-ecology, etc.

⁷ The National Aboriginal Forestry Association (2006) lists over 20 definitions of “traditional knowledge” alone.

⁸ The Dene Cultural Institute's definition states that: *“Traditional environmental knowledge is a body of knowledge and beliefs transmitted through oral tradition and first hand observation. It includes a system of classification, a set of empirical observations about the local environment and a system of self-management that governs resource use. Ecological aspects are closely tied to social and spiritual aspects of the knowledge system. The quantity and quality of TEK varies among community members, depending upon gender, age, social status, intellectual capability and profession.... With its roots firmly in the past, TEK is both cumulative and dynamic, building upon the experience of earlier generations and adapting to the new technological and socioeconomic changes of the present.”* Cited in Stevenson (1996).

⁹ M.G. Stevenson (1996). Indigenous Knowledge in Environmental Assessment. *Arctic* 49(3):278-291.

3) *Traditional Knowledge (TK)*: Composed of TEK and other kinds of traditional knowledge not directly tied to the environment, including those having social, cultural, spiritual and other dimensions.

4) *Indigenous Knowledge (IK)*: Includes the three previous categories of knowledge as well as non-traditional knowledge and, as such, encompasses the entire range of knowledge, experiences, wisdom, and philosophies that Aboriginal peoples can bring to bear on ERM.¹⁰

Usher (2000), “taking a page out of Stevenson’s book,” classifies TEK into four categories, all of which he insists are required for environmental assessment:

1) *Knowledge about the Environment*: Knowledge about things in the environment.

2) *Knowledge about Use of the Environment*: Factual knowledge about past and current uses of the environment.

3) *Values about the Environment*: Culturally-based values about how things should be, and what is fitting and proper to do, including moral or ethical statements about how to behave with respect to animals and the environment.

4) *The Foundation of the Knowledge System*: A culturally based cosmology underlying the first three categories and is the framework with which Aboriginal peoples construct knowledge from facts.¹¹

Similarly, the Mackenzie Valley Review Board, identifies three elements of TK that will contribute to the Environmental Impact Assessment process as set out in the *Mackenzie Valley Resource Management Act*:¹²

1) *Knowledge About the Environment*:

2) *Knowledge about the Use and Management of the Environment*:

3) *Values About the Environment*

With respect to water and watersheds, Indigenous peoples may be particularly well-positioned to contribute knowledge about:

¹⁰ Indigenous knowledge, which is beginning to find favour with Aboriginal organizations may be more inclusive and more empowering than other terms, acknowledges that Aboriginal peoples possess knowledge and experiences that have little to do with traditional lifestyles, spirituality, philosophy, social relations, cultural values, etc., and that IK includes the articulation, and frequently the resolution, of traditional and non-traditional knowledge constructions and systems (Stevenson 1996).

¹¹ According to Usher (2000:186) while this category is the least articulated and hence the least accessible to outsiders, some understanding of it may be needed to interpret or understand the other three categories of knowledge.

¹² *Guidelines for Incorporating Traditional Knowledge in Environmental Impact Assessment* (Mackenzie Valley Review Board 2005).

- short and long-term fluctuations in sediments levels, water flow rates, precipitation, ice conditions, temperature and other factors influencing water quality and quantity
- natural and anthropogenic sources and causes of these changes
- baseline conditions, indicators and thresholds for water quality and quantity assessment
- the effects of climate change on water quality and quantity
- developing appropriate responses to climate change¹³
- abundance, behaviours, distributions, health, etc. of valued aquatic-dependent species (fish, beaver, etc.), and changes in these over time and space
- individual and cumulative effects of human activity on water quality, water quantity, aquatic habitats, water-dependent species, etc.
- the relationship between surface waters and ground water systems,¹⁴
- critical aquatic habitats in need of protection
- appropriate strategies to develop and manage sustainable relationships with water and watersheds under changing conditions

2.2 Discussion

Clearly, attempts to conceptualize and organize the environmental and ecological knowledge held by Aboriginal peoples not only recognize different categories of knowledge, but endeavour to accommodate the values that inform them. Moreover, most schemes anticipate that these knowledge categories and values will play roles in ERM equivalent to that of western scientific knowledge and practice. Yet, whether it is ethical to define and organize TK *a priori* and without involving the people who own and created this knowledge is open to question. Many Indigenous peoples and Aboriginal scholars eschew definitions of TK or TEK imposed upon them by prevailing institutional structures in which they are relegated to participate. In other words, definitions are part of a colonial legacy that arbitrarily restricts or “pigeon-holes” the contributions of Aboriginal peoples and their knowledge to ERM. If *a priori* definitions of TK or TEK are considered necessary for achieving the mandate of the Steering Committee -- and this consultant does not think they are because different systems of knowledge require different methods of validation (see below) -- they should be negotiated by the parties involved rather than arbitrarily set by one party. The apparent inability to address the asymmetry in power relations is perhaps the greatest stumbling block to meaningfully and equitably incorporating Aboriginal peoples and their TK into environmental decision-making.

¹³ D. Nakashima et al (2012), *Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation*, United Nations University:

¹⁴ Traditional Water Knowledge. *Voice* (2010), Volume 6(4), University of Melbourne.

But herein lies the “rub” for the Steering Committee, and for most environmental management boards and committees with similar mandates: *How best to incorporate both the knowledge and values held by northern Aboriginal peoples into ERM?* It is not sufficient to consider only those aspects of TK that fit neatly with western scientific ways of thinking; the values and worldviews that underpin Indigenous knowledge must be considered as well. In order for this to happen a paradigm shift by those institutional forces and structures that hold most of the decision-making authority and responsibility must occur.

The remainder of this paper is devoted to providing a stage for this paradigm shift to occur: first, by presenting several case studies that define the *status quo* approach to incorporating TK into ERM; second, by examining and analysing deficiencies in this approach; third, by identifying the systemic and cultural barriers that marginalize Aboriginal peoples and their knowledge in ERM), and considering some ways that these barriers might be overcome; fourth, by presenting two examples that may be among the ‘best practices’ for incorporating Aboriginal peoples and their knowledge into ERM; and fifth, by considering alternative ways of thinking about talking about this issue.

3.0 Selected Case Studies: Incorporating TK (Specific Environmental Knowledge) into ERM

A major goal of this paper is to present and discuss “best practices” for incorporating Aboriginal TK and values into environmental monitoring and assessment through the examination of case studies. In reality, however, there are few ‘best practices’ that realize the full contributions of TK, Indigenous peoples or their values to ERM; Aboriginal peoples still struggle with finding even the smallest of spaces for their meaningful involvement in environmental decision making. In this section, several case studies are described to illustrate the customary approach to incorporating TK into ERM, beginning with cases that endeavour to demonstrate either the value and/or contributions of the “specific environmental knowledge” of Aboriginal peoples to environmental planning and implementation. There are many examples across Canada’s north where TK has been used to inform ERM and/or contribute more robust explanations of observed environmental phenomena than would otherwise be available

to western scientists. However, in almost all these cases, Aboriginal peoples and their values play only marginal roles in decision-making. Even so, these cases underscore the utility of TEK, and the potential contributions of Aboriginal peoples and their values to ERM.

3.1 Inuit Knowledge of Peary Caribou

Inuit know that Peary caribou population of the High Arctic fluctuates dramatically in numbers over long periods of times. They also know that the survival of Peary caribou depend upon maintaining the social structure of small herds in winter whereby hunting is opportunistic and does not select on the basis of age or sex. This practice is in contrast to the management approach advocated by scientists which seeks to “harvest” only large males, while prohibiting the hunting of females and immature animals. Inuit knowledge holds that the selective harvesting of large males not only jeopardizes the breeding success of herds, but may result in the accelerated death of the remaining herd members owing to the loss of dominant males which defend and lead the herd, a view borne out by subsequent monitoring of the south Ellesmere Island regional population.¹⁵ In the last several years, the Hunters and Trappers Associations of Resolute Bay and Grise Fiord have reduced their take of Peary caribou and have undertaken studies to identify the environmental factors that Inuit hunters consider important in making decisions about Peary caribou, that will be used to develop monitoring and reporting programs.¹⁶ In 2011 the Peary caribou of the High Arctic was listed as Endangered under the *Species at Risk Act*, and a multi-jurisdictional recovery strategy is being developed in cooperation with the Nunavut Government and the relevant regional and local wildlife authorities.¹⁷

3.2 Mistassini Cree TK and Evolutionary Biological Knowledge in the Assessment of Endangered Species: The Mistassini Lake Brook Charr

There have been few attempts to integrate TK and evolutionary biological knowledge (EBK) in the assessment of endangered/threatened species. Scientists

¹⁵ M.M.R. Freeman (1992). The Nature and Utility of Traditional Ecological Knowledge. *Canadian Arctic Resources Committee* 20 (1), Spring.

¹⁶ *Identification of Environmental Factors Relevant to Community Decisions Concerning the Conservation of Peary Caribou*. Environment Canada. <http://www.ec.gc.ca/hsp-pih/default.asp?lang=En&n=4C563568-1>

¹⁷ *NWT Species at Risk, Peary Caribou*. <http://nwtspeciesatrisk.ca/tiki/tiki-index.php?page=PearyCaribou>

(Fraser et al. 2006) contrasted long-term Mistassini TK with EBK about the seasonal migratory habits and population biology of brook char inhabiting a large, remote postglacial lake (Mistassini Lake) near James Bay.¹⁸ They found that TK complemented EBK by providing information about: 1) population viability, 2) breeding areas and migration patterns of divergent populations, and 3) the behavioural ecology of populations within feeding areas; all of which may ultimately affect the maintenance of population diversity. The relevance of TK to brook charr conservation was evident mainly at smaller spatial scales (e.g., that of individual rivers or certain lake sectors), while providing a broad temporal window into evaluating population differences and resilience. Researchers concluded that, despite different conceptual underpinnings, spatially and temporally varying TK and EBK contributed to achieving sustainability and effective biodiversity conservation planning for a given species. Such integration may be particularly relevant in many isolated northern regions, where intraspecific diversity can go unrecognized due to sparse scientific knowledge or undocumented TK, and where governmental agencies and local communities increasingly seek to find common ground on which to address biodiversity issues.

3.3 Eastern Arctic Bowhead: Inuit TK Vindicated

For many decades, the Inuit of Nunavut were not permitted to hunt bowhead whales based on scientific assumptions that: 1) commercial whaling in the 19th century had decimated the original stock or population of 12,000 or more, and 2) there were only a few hundred animals left in eastern Arctic waters. Subsequently, the eastern Arctic bowhead was placed on the *Endangered Species List*, where it remains. However, since the 1940s Inuit hunters have witnessed not only a resurgence in bowhead numbers in Nunavut waters, but an increase in the number and frequency of sightings, the size of pods and number of young, despite not intentionally setting out to observe or record such information.¹⁹ In fact, in waters surrounding many Nunavut communities, bowheads have become navigation hazards, so much so that a whale near Clyde River in

¹⁸ D.J. Fraser et al (2006). Integrating Traditional and Evolutionary Knowledge in Biodiversity Conservation: A Population Level Case Study. *Ecology and Society* 11(2): 4. URL: <http://www.ecologyandsociety.org/vol11/iss2/art4/>

¹⁹ As acknowledged in the *Final Report of the Inuit Bowhead Knowledge Study* (Nunavut Wildlife Management Board 2000:70) many Inuit hunters pointed out that their knowledge of bowheads has diminished over the last few decades because they were prevented from hunting them.

1995 capsized a boat killing four American tourists.²⁰ Yet, despite these facts, DFO felt there was no scientific justification for assuming that the bowhead population had recovered to justify Inuit hunting of this animal. Recent scientific studies culminating in 2008, however, estimated the eastern Arctic bowhead population to be 14,400 (4800 to 43,000, 95% confidence level).²¹ Combined with Inuit observations of bowhead over the last several decades the evidence was irrefutable. Subsequently, Nunavut Inuit are now allowed to hunt 1-2 bowheads a year and are beginning to rebuild their knowledge base of bowhead, much of which was lost in the interim. While positive for both the hunter and the hunted, the eastern Arctic bowhead remains on the *Endangered Species List*, and opportunities showcase to the world the value of Inuit TK and conservation strategies have been gone unnoticed by Canada.

3.4 Science Meets Traditional Knowledge: Water and Climate in the Sahtu²²

Deline elders have an in-depth knowledge of the many factors influencing water and ice conditions on Great Bear Lake and the way these are linked to stream and river flows, precipitation, wind, lightning/thunder fire events, climate change and other phenomena. In a recent meeting on the shores of Great Bear Lake, scientists from the Mackenzie Global Energy and Water Cycle Experiment Study (known as MAGS), and TK holders from Deline met to identify research hypotheses that could be investigated jointly, using both scientific techniques and TK. In this collaborative approach, WSK was not generally seen by community members as supplanting TK, but rather as a useful source of additional information that complements traditional empirical information and can be applied within a traditional moral and ethical framework. Community members expressed the view that their knowledge system embraces new information from scientific and other sources to build upon its traditional foundations, thus underscoring the importance of making research results accessible through dialogue and information sharing between scientific and TK keepers. The goodwill that developed in this “mutual learning” environment enhanced the potential for TK to help direct and validate scientific investigations, and for scientific knowledge to be used in

²⁰ New York Daily News, 8 September 1995. “Whale Tips Boat; 4 Feared Lost.”

²¹ CBC News North, 16 April 2008. “Eastern Arctic Bowhead Whales Not Threatened After All, Government Says.”

²² Science Meets Traditional Knowledge: Water and Climate in the Sahtu (Great Bear Lake) Region, Northwest Territories, Canada. M. Woo et al. (2007), *Arctic* 60(1):37- 46.

conjunction with TK to guide community decision making. Although follow-up has been difficult, it is anticipated by both parties that TK will play a large role in implementing the management plan for Great Bear Lake and its watershed.²³

3.5 Discussion

More examples illustrating the value of TK and incorporating it into ERM could have been considered. However, the above cases suffice to highlight that, even at the most perfunctory level, TK can make contributions to environmental assessment and monitoring. In particular, TK can provide specific environmental knowledge that scientists might not otherwise have access to, such as species distributions, conditions and behaviours, breeding and feeding habitats, etc., and variations in these over time and space. While this type of TK is the most comprehensible to practitioners of WSK, it can also contribute to establishing: 1) environmental baseline conditions against which to measure natural and anthropogenic induced changes (individual and cumulative) in these conditions, 2) environmental indicators and thresholds (i.e., acceptable ranges of variation), and 3) appropriate mitigative actions when these thresholds are exceeded.

TK can also assist in refining scientifically accepted approaches and models to wildlife management – which stem from the convergence of European agricultural, scientific, socio-political, economic and religious traditions – and are often at odds with the contextual knowledge of Aboriginal peoples, and emerging principles of ecology. For example, establishing hunting quotas based solely on age or sex – in particular, removing adult males from animal populations to the exclusion of other group members – not only ignores the social structure and dynamics of animal groups, it may undermine their reproductive fitness and/or make them more vulnerable to predation. Yet, throughout Canada's North, territorial regulations compel Aboriginal peoples to take adult males of many species, including moose, caribou, musk-ox, polar bears and whales. Without meaningfully involving TK holders and their knowledge in decision-making finding a sustainable balance between Aboriginal hunters and the animals upon which they depend may not be achievable.

²³ *"The Water Heart": A Management Plan for Great Bear Lake and its Watershed.* Great Bear Lake Working Group. May 31, 2005 with Caveat of February 7, 2006. Directed by the Great Bear Lake Working Group and facilitated and drafted by Tom Nesbitt.

What TK is beginning to tell us that it is not an esoteric system of knowledge to be dismissed for its lack of objectivity and other qualities to which WSK and its practitioners aspire, but that it possesses unique insights and perspectives that can complement WSK, and that there are different ways of perceiving the world and constructing a sustainable relationship with it. Yet, rarely are the people who hold this knowledge or their values considered seriously in ERM. As some of the above examples illustrate, this is not from a lack of effort on both sides; the will appears to be there. Rather, the epistemological and institutional foundations for both TK and WSK to work together and complement each other in ERM have yet to developed in ways acceptable to both parties.

4.0 The *Status Quo* to Incorporating TK into ERM

Most attempts to incorporate TK into environmental resource allocation, monitoring, assessment, mitigation and management share certain procedures in common. Individually and collectively, these practices have not taken full advantage of the contributions of Aboriginal peoples and their knowledge and values to environmental decision-making processes for a variety of reasons. First, the TK information requirements, guidelines, procedures and methodologies are usually set by non-TK holders who are well-versed in WSK approaches to understanding where positivism and reductionism separate knowledge from the individual. In the words of First Nation scholar M. Brant Castellano (2004:105):

Research that seeks objectivity by maintaining distance between the investigator and the informants violates Aboriginal ethics of reciprocal relationships and collective validation. If the researcher assumes control of knowledge production, harvesting information in brief encounters, the dialogical relationship with human and non-human sources is disrupted and the transformation of observations or information into contextualized knowledge is aborted.

The gathering or collecting of TK is, in turn, almost always carried out by non-Indigenous, non-traditional knowledge holders, trained in data collection techniques acceptable to WSK. These may include the use of specific information questionnaires conceptualized and framed in the language of the interviewer (which may or not be the

language of the TK holder),²⁴ detailed note-taking in that language, two-dimensional maps, and audio and video recordings. Moreover, translators with variable credentials and experience in both cultures and languages are frequently used to translate complex ideas and thoughts originating in the language and culture of one party into those of the other. Often audio-visual recordings are transcribed, again by individuals of with variable qualifications. These transcripts and the geospatial representations of TK as recorded on maps are then scrutinized and “cherry-picked” for information that can be easily understood and accommodated within WSK data sets and approaches to understanding.

In the process, maps and transcripts become the authoritative sources for TK in environmental decision-making, effectively excluding Aboriginal peoples and the full range and depth of their knowledge, and the values that informs this knowledge, from decision-making (Stevenson 2006).²⁵ At each step of the way there is a progressive and cumulative loss of information, knowledge and context; in particular, the social and cultural contexts in which TK resides. In this light, it is remarkable that Indigenous peoples would want to share their knowledge at all, although increasingly their political representatives are insisting that TK be given equal weight with WSK in making environmental decisions.

In all fairness, the fault lies not with those charged with incorporating TK into environmental decision-making as such mandates and the efforts and people employed to achieve them are often well-meaning. Rather, it derives from the fact that methods and theories to incorporate TK into ERM have not kept pace with the objective. In other words, there are as of yet no universally accepted epistemology by which to access, incorporate and realize the full potential of TK to environmental assessment and decision-making. Recognizing that each effort to do so may need to be negotiated on a case-by-case basis, the closest we have come to this goal is identifying a host of principles to assist parties to access TK in ERM, including:

²⁴ Such approaches avoid “leading questions” in favour of short responses, thereby discouraging learning about the cultural and social contexts in which TK is embedded and their interconnectness.

²⁵ M.G. Stevenson (2006). The Possibility of Difference: Rethinking Co-management. *Human Organization* 65(2):167-180.

- ensuring sufficient financial, administrative and other support for the documentation and application of TK
- ensuring adequate remuneration for Aboriginal participation
- obtaining free, informed and prior consent to access TK
- negotiating TK documentation, access, sharing and use agreements
- ensuring Aboriginal communities and TK holders are involved in the design of TK documentation and communication protocols
- taking a modest and gradual approach to TK collection
- negotiating the ethical space and extent of Aboriginal participation in TK collection, interpretation and use
- recognizing and respecting the legitimacy of TK and expertise of TK holders
- respecting the rights and sovereignty of TK holders
- ensuring that control and ownership of TK remains with Aboriginal peoples and groups
- developing long-term capacity for local people to document, use and apply TK
- ensuring (age, gender, economic, etc.) equity when documenting TK
- developing sustainable partnerships/relationships with all stakeholders (Aboriginal groups, environmental review boards, researchers, etc.)
- fulfilling social and fiduciary obligations created by TK partnerships
- sustaining opportunities for cross-cultural learning and sharing
- taking Indigenous values, languages, concepts and modes of knowledge production as starting points for accessing TK
- retaining the cultural and social contexts and meanings of TK
- appropriately representing TK and Aboriginal worldviews
- affirming Indigenous values, guidelines, priorities, methods, etc. in TK documentation
- refraining from sharing TK with third parties, unless otherwise agreed to
- engaging meaningfully TK holders in decision-making²⁶

While these principles are intended to serve as guides to assist in accessing, using and applying TK in culturally appropriate ways, opportunities do exist that may allow us to begin to build an epistemology for incorporating TK into ERM.

²⁶ These principles have been extracted from numerous sources, including: *Respecting Indigenous Peoples and Traditional Knowledge: International Best Practice Principles* (International Association for Impact Assessment Special Publication Series No. 6, April 2012); *Dene Traditional Knowledge* (M. Johnson, Canadian Arctic Resources Committee 20:1, 1992, Spring); *Lore: Capturing Traditional Environmental Knowledge* (M. Johnson, Dene Cultural Institute and International Development Research Centre, 1992); *Updating Aboriginal Traditions of Knowledge* (M. Brant Castellano, In: *Indigenous Knowledges in Global Context: Multiple Readings of Our World*. Edited by Sefa Dei et al, University of Toronto Press, 2000, pp. 21-36); *Considering Aboriginal Traditional Knowledge in Environmental Assessments Conducted under the Canadian Environmental Assessment Act: Interim Principles* (www.ceaa.gc/default.asp?lang=En&n=4A795E76-1); *Northwest Territories Cumulative Impact Monitoring Program Discussion Paper: Traditional Knowledge Framework* (Senes Consultants Ltd, 2007); *Negotiating Research Relationships with Aboriginal Communities* (M. Stevenson, In: *Changing the Culture of Forestry in Canada: Building Effective Institutions for Aboriginal Engagement in Sustainable Forest Management*, Edited by M. Stevenson and D. Natcher, Canadian Circumpolar Institute Press, 2009, 197-210); *Ethics of Aboriginal Research* (M. Brant Castellano, *Journal of Aboriginal Health*, January 2000, 98-114); *The Ethical Space of Engagement* (W. Ermine, *Indigenous Law Journal* 6[1]:193-203); *Decolonizing Methodologies: Research and Indigenous Peoples* (L.T. Smith, Zed Books, 1999).

4.1 On Validating TK and Western Scientific Knowledge

Although processes of incorporating TK into environmental assessment and management are often well-intended, not only is TK easily misappropriated and de-contextualized, it is frequently subjected to WSK methods of validation. Some aspects of TK pass the test while others do not, contributing to a loss of information and knowledge. For example, some individuals schooled in the western scientific tradition reject TK because of its non-quantitative and subjective nature, which may or may not contain spiritual, mythical or sacred elements. Yet, it is the social and cultural contexts in which TK originates and resides where this knowledge achieves its full meaning, efficacy and value. As the Maori scholar, Linda Tuhiwai Smith (1999:15) reminds us in *Decolonizing Methodologies*, it is no longer acceptable to:

...regard the values and beliefs, practices and customs of (Indigenous) communities as 'barriers' to research or as exotic customs with which researchers need to be familiar in order to carry out their work without causing offence. Indigenous methodologies tend to approach cultural protocols, values and behaviours as an integral part of methodology.

Moreover, different approaches to knowledge creation require different methods of validation:

Culturally different approaches to knowledge creation imply the need for different methods of gathering and validating information. In many Aboriginal communities, for example, individual perceptions (have) to be validated by community dialogue and reflection before they became collective knowledge, the basis of collective action. Because the integrity and validity of research cannot be assured by western methodologies alone, they must be tempered by methodologies that are compatible with Aboriginal methods of investigation and validation" (Brant Castellano 2004:105-06).

To be impartial, at the same time, many knowledge claims of wildlife biologists and environmental managers are questioned, if not dismissed, by Aboriginal elders and TK holders because they have not been vetted by the community nor stood the test of time. The more salient point to consider is that each system of knowledge has its own processes of validation, and the acceptance of knowledge claims by practitioners of one system should not be contingent upon validation by the other. Standards of validation acceptable to WSK are not only inappropriate, but may reject outright valuable

information, knowledge and wisdom held by Aboriginal peoples that is necessary to sustain their cultures, the species upon which they depend, and their relationships to the natural world. Because both systems of knowledge are needed and required in order to achieve sustainable environmental resource use and conservation objectives, there is an ethical obligation on the part of those individuals and organizations charged with incorporating TK into their decisions to ensure that the authenticity or validity of this orally transmitted knowledge is assessed by locally approved and culturally appropriate means and sources of validation.

5.0 Two Best Practices

While those case studies described in Section 3.0 are representative of the majority of examples in practice, two cases are described at length here that go beyond the *status quo*, and are considered by the Consultant to be among the ‘best practices’ for incorporating Aboriginal peoples and their knowledge and values into ERM.

5.1 Achieving Co-management: The Southeast Baffin Inuit and Beluga²⁷

In 1990 the Department of Fisheries and Oceans (DFO) reduced beluga whale quotas in three Southeast Baffin Island hamlets (Pangnirtung, Iqaluit and Kimmirut) from 40 whales to 5 in each community.²⁸ Ten years earlier, Inuit hunters from Pangnirtung had reluctantly accepted “catch limits” on beluga to appease DFO biologists even though Inuit had told DFO that quotas on beluga would likely result in the loss of more whales than would otherwise be the case under their own system of self-regulation and management.²⁹ Pangnirtung Inuit hunters made further compromises in 1985 when they agreed to refrain from hunting in Clearwater Fiord – the main calving grounds of what then was considered by DFO to be the SE Baffin beluga “stock” – and to stop hunting calves, pregnant females and/or females with calves. Further concessions were made in 1989 when Inuit hunters conscientiously endeavoured to reduce the loss

²⁷ *Co-management Plan for Southeast Baffin Beluga* (1994). Planning Committee for the Co-management of Southeast Baffin Beluga. Nunavut Wildlife Management Board and Department of Fisheries.

²⁸ Since Clearwater Fiord in Cumberland Sound, which is located near Pangnirtung, is the only known beluga calving grounds in the SE Baffin area, DFO assumed that whales hunted in by Pangnirtung’s hunters were also the same whales hunted by Inuit in Iqaluit and Kimmirut.

²⁹ Catch limits on highly valued animals with high social and cultural values, such as beluga, create competition among hunters that forces them to hunt under less than optimal conditions, potentially increasing the “struck and loss” ratios for beluga (DFO 1994:5).

of wounded animals, to take only one animal at a time and to strike no more than two whales in each pod encountered.

But this was not enough for DFO and the Arctic Fisheries Scientific Advisory Committee (AFSAC) as more than 100 whales were being “harvested” each year from the SE Baffin beluga “stock,” which was estimated to be less than 500 animals. AFSAC and DFO had initially recommended that no “harvest” of beluga take place in the southeast Baffin for 10 years in order to allow this decimated stock to recover to estimated historic levels of 5000 or more. Recognizing both the conservation crisis and the cultural importance of beluga to Inuit, the Minister of DFO without adequate consultation or warning allotted to the three Inuit communities annual quotas of 5 whales each for 1990 and 1991, and amended the federal *Fisheries Act* to reflect this new limit.

Still suffering from the socially, culturally and economically devastating effects of “anti-sealing protests,” Inuit opposition to these new imposed quotas was immediate and vitriolic. Inuit hunters formed dissident groups, vehemently protested in public forums, assaulted DFO officials, occupied DFO offices in Iqaluit and deliberately went over quota. In the mean time, DFO personnel and the media progressively painted a bleaker picture for the stock while divisions arose among Inuit leaders about how to handle the crisis, bringing national and international attention to the matter.

A Review Committee composed of Inuit, DFO and GNWT representatives was subsequently commissioned by the Minister of DFO to resolve the issue, and, in consideration of both science and Inuit TK (Inuit Qaujimaijatuqangit), found that:

- 1) the single-stock model for SE Baffin beluga did not fit the evidence; two summering groups (one in Cumberland Sound, the other in Frobisher Bay) were more likely;
- 2) there was no mixing of these two groups during the ice-free period, and
- 3) the number of summering beluga in Cumberland Sound must be considerably larger than DFO estimates.³⁰

³⁰ The number of beluga counted during aerial surveys of Clearwater Fiord in 1990 was greater than in 1985 or 1986 despite annual catches in the interim of 40 or more beluga by Pangnirtung hunters.

The recommendations of the Review Committee sought to establish independent quotas of 35 animals for each community and a co-management structure for beluga in the southeast Baffin region that would:

- 1) design, plan and undertake studies,
- 2) integrate Inuit TK and western scientific knowledge, and
- 3) develop a management plan, including sustainable use quotas.

In June of 1991 the Minister of DFO accepted the recommendations of the Review Committee, and by the summer of 1992 a co-management regime composed of Inuit and DFO representatives, and charged with developing a long-term plan for the management, sustainable use and conservation of beluga in the southeast Baffin, was up and running. However, little progress was made at first as each party tried to convince the other of the validity of its knowledge and the correctness of its position. Not until this impasse was acknowledged to be a “cultural conflict” whereby neither party’s “facts” nor the “values” by which these facts were being interpreted agreed with the other’s, was progress made. In the spirit of mutual respect for each other’s concerns and knowledge systems, committee members “agreed to disagree,” and set about to design a long-term plan for “*managing and conserving the co-existence of Inuit and beluga in the southeast Baffin region.*”

Based on their TK and experience, Inuit on the committee presented a very different picture of southeast Baffin beluga behaviour and population dynamics.³¹ Inuit knowledge on the size of this “stock” and its discreteness soon compelled DFO biologists to reconsider their assumptions on these matters, and to refocus on the age and gender of the whales taken as they felt that too many females and older males were being killed.³² But again, Inuit TK offered convincing explanations for why the sample of whales killed each year by Inuit was dominated by younger, male whales; older whales are harder to hunt because they have learned to avoid boats and Inuit had refrained from hunting females for years at the behest of DFO.

³¹ Inuit knowledge held that there was more than one beluga population in the SE Baffin region and that the one summering in Cumberland Sound each year and calving in Clearwater Fiord was continually being replenished by whales from other groups.

³² Both older males and females were comparatively rare in the sample of whales killed each year.

In the end, DFO was forced to reconsider the weakness of the scientific model upon which beluga quotas were reduced, and the intrinsic value and veracity of Inuit TK. Rather than retarding the design of a co-management plan, reflection by both parties accelerated it, allowing the advice, concerns and knowledge contributions of both scientists and hunters to be accommodated equally in developing a management plan. Specifically, the plan, which was accepted by the Minister of DFO in 1994, recommended higher quotas than scientific advice would suggest (35 per community per year), but more hunting restrictions than Inuit would deem appropriate, including expansion of “no hunting zones” and alteration of hunting practices in critical habitat, in addition to the acceleration of studies incorporating both western science and Inuit TK. However, the hallmark of the plan was that no subsequent management action would be undertaken until both Inuit and scientific knowledge agreed that beluga in the SE Baffin were found to be increasing, decreasing or remaining constant (Table 1). Today, implementation of the plan continues under the Nunavut Wildlife Management Board, no significant new management actions have been taken, and the animosity that formerly characterized DFO and Inuit relations is a distant and fading memory.

Table 1. Recommended co-management actions for Inuit beluga hunters in SE Baffin.

| Management Actions | Community Quotas | No Hunting Zones | Open/Closed Seasons | Additional Measures |
|---------------------------------|---|-------------------------|----------------------------------|---|
| <i>Numbers increasing</i> | Remove, or increase by a number agreed to by both parties | Reduce, or no change | Remove, or no change | None |
| <i>Numbers decreasing</i> | Reduce by a number agreed to by both parties | Enlarge | Reduce open season | Increase take of beluga at ice edge, + other measures |
| <i>Numbers remaining stable</i> | No change | Enlarge | Reduce open season, or no change | Increase take of beluga at ice edge |

5.2 “Keeping the Land, Reading the Signs”: Co-Creating an Anishanaabe Cultural Landscape Monitoring Framework

Criteria and indicators (C&I) frameworks for assessing and monitoring the state of local environments have become an important tool for assessing sustainability and

for guiding ERM planning and decision-making.³³ More recently, some C&I frameworks have sought to reflect Aboriginal knowledge and values, taking as their starting point existing C&I frameworks, which depend on hierarchic categories with indicator sets embedded within sets of criteria. But such frameworks fail to adequately incorporate Indigenous knowledge, values and relationships to the land into decision-making criteria. Subsequently, a group of University of Manitoba scientists and Pikangikum First Nation elders set out to “co-produce” a new “currency” for facilitating communication and understanding between both cultures having a vested interest in ensuring that the Whitefeather Forest in Northwest Ontario will be used sustainably.³⁴ In the process, a new framework of “signs” – i.e., phenomena that elders value and look for to assess the state of their lands, and their relations to it – was co-developed that would permit evaluation of whether management practices in the Whitefeather Forest were moving away or towards a more or less desirable state.³⁵

Pikangikum elders were interviewed initially with respect to the state of their forested lands and their concerns about current forestry practices and government policies, with researchers looking for patterns and connections within, between and among statements. However, it soon became apparent that values for *Keeping the Land* could not be easily represented or organized into discrete categories; Anishinaabe values and knowledge are inherently holistic and interrelated. It was further realized that, in working to create a shared understanding of Pikangikum C&I, it was necessary to engage a local community researcher, Paddy Peters, fluent in both cultures and languages, in addition to being the nation’s land use planning coordinator. In order to co-produce C&I comprehensible to both parties, researchers and elders, with the assistance of Mr. Peters, moved back and forth between the two cultural contexts during

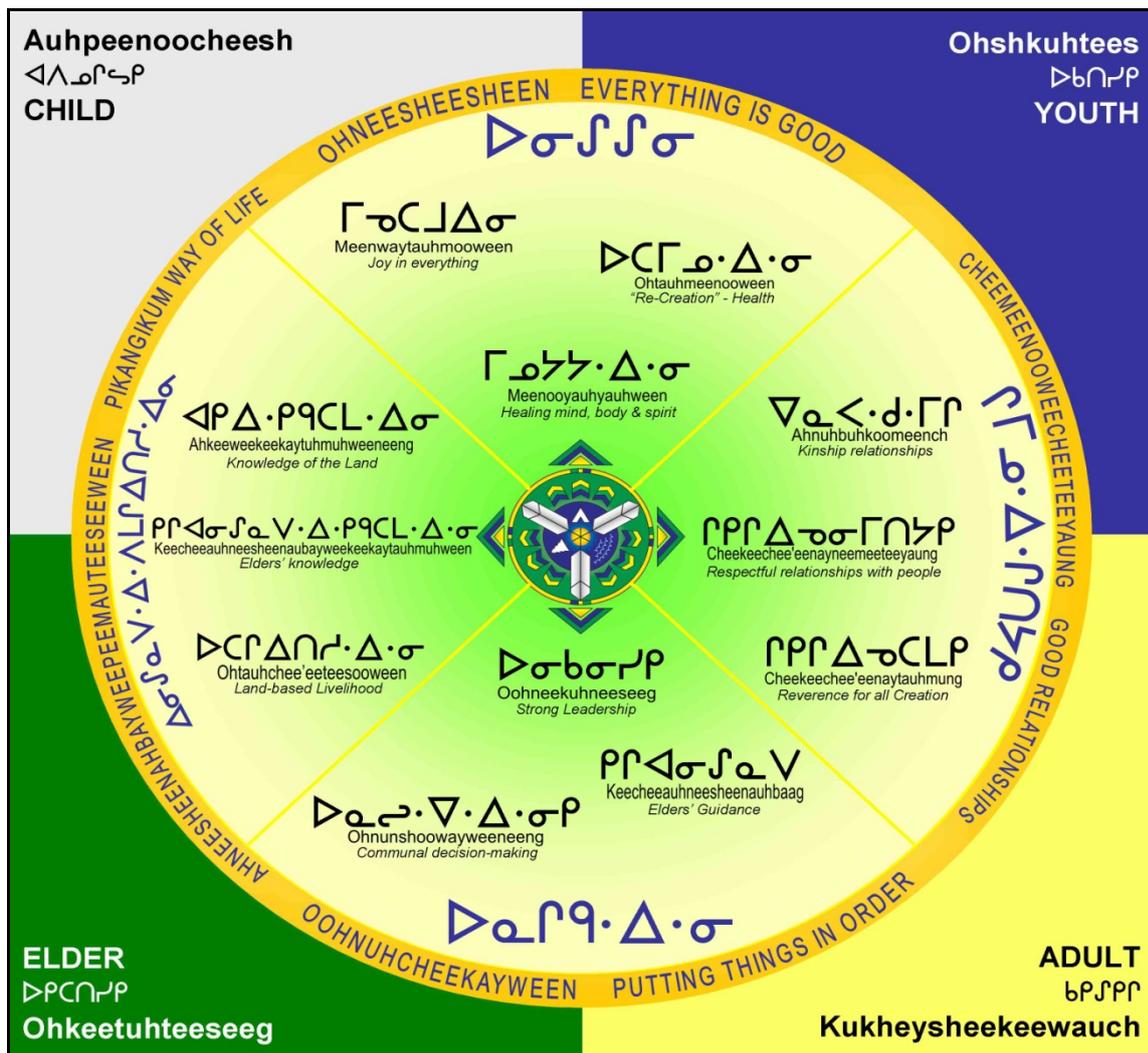
³³ M. Karjala and S. Dewhurst (2003). Including Aboriginal Issues in Forest Planning: A Case Study in Central Interior British Columbia, Canada. *Landscape and Urban Planning* 64:1-17.

³⁴ J. Shearer, P. Peters and I. J. Davidson-Hunt (2009). Co-producing a Whitefeather Forest Cultural Landscape Monitoring Framework, In: *Changing the Culture of Forestry in Canada: Building Effective Institutions for Aboriginal Engagement in Sustainable Forest Management*, Edited by M. Stevenson and D. Natcher, Canadian Circumpolar Institute Press, 2009, pp. 63-84.

³⁵ Customary approaches for monitoring signs of ecological change are one way that Aboriginal cultures have become attuned to social-ecological variability. The indicators used are unique to a given social-cultural-ecological setting as sign categories are based upon individual perceptions of the environment and their interpretation through collective deliberation structured by a society’s institutions (Shearer, Peters and Davidson-Hunt 2009).

several workshops in order to find common ground.³⁶ In this way, a collaborative process of co-creating knowledge and understandings emerged that: 1) resulted in a visual representation the like of which has rarely been seen in environmental management and C&I framework development (Figure 1),³⁷ and 2) revealed subtle and intrinsic connections among and between environmental, social, cultural, and spiritual phenomena in the Anishanaabe world (see arrow and feather symbols in Figure 1.)

Figure 1. *Keeping the Land: An Anishanaabe Cultural Landscape Monitoring Framework.*



³⁶ This process of co-creation drew from the field of semiotics, where communication is viewed as a mutual negotiation of meaning rather than a linear transfer of messages from transmitter to receiver (Danesi 1999, cited in Shearer, Peters and Davidson-Hunt 2009).

³⁷ As has been noted by Chambers (1994, cited in Shearer, Peters and Davidson-Hunt 2009), visualization techniques can facilitate collaborative research by allowing a greater degree of two-way participation and learning in the research process, increasing the accessibility of the knowledge produced through the research, and allowing ownership of the information produced to remain with the knowledge-holders.

The project initially set out to develop a framework for monitoring the land use plans of the Whitefeather Forest Initiative that was to be grounded in local values while fulfilling provincial requirements and industry needs, thus bridging disparate approaches in one harmonious model. However, as the project unfolded it became apparent that representing and communicating Pikangikum's values and management practices required a framework that illustrated their perspective unobscured by the authority of the dominant forest management paradigm, while also remaining comprehensible to industry and government partners. The concept of *Keeping the Land* emerged that fostered an intimate and holistic relationship between people and the land based on traditional teachings, as well as a land use strategy specifically designed for maintaining the values that shape and sustain the Whitefeather Forest cultural landscape.

Through a series of iterative workshops, critical relations between and among elements in the Pikangikum worldview were revealed, acknowledging the interconnectedness of environmental, social, cultural, spiritual and other phenomena. One cannot simply manage for one value without considering the implications for other values. Nor can any value be managed out of balance with others. Further, *Keeping the Land* cannot be accomplished by any one set of actions, but is a life-long commitment to maintain balance, and *Reading the Signs* is a process whereby one's behaviour is adjusted in accordance with implicit socially negotiated and accepted categories that entail environmental, social, cultural and spiritual considerations.

In the end, the final C&I values matrix produced embraced the complexity and inter-connectedness of Anishinaabe knowledge and values intrinsic to *Keeping the Land*, while underscoring the importance of multi-dimensional forest values to the Pikangikum people. As Pikangikum moves forward with the implementation of its land use strategy, engaging in the process of forest certification and environmental assessment, this "cultural landscape monitoring framework" remains an important tool for communicating the community's vision for the management of their landscape values. However, in sharing this vision with others, the discourse will surely meander, and require iterative negotiations of meaning throughout. But as Davidson-Hunt (2003) points out, alternatives to conventional ERM frameworks require not only the

knowledge and participation of local people and the process of co-production, but also a shared understanding of Indigenous institutions of knowledge and the values upon which the frameworks are constructed.³⁸

5.3 Discussion

These two cases studies were selected because they go far beyond most *status quo* approaches to integrating TK into ERM by incorporating, not just TK, but the people who created and hold this knowledge, and values that inform TK. However, they represent somewhat divergent approaches to achieving the same desired outcome. Specifically, one operates within a co-management structure designed to accommodate and rely equally on both knowledge systems and their holders/users to make decisions, while the other negotiated and co-produced a common “currency” – i.e., a cultural landscape monitoring framework whereby the need to manage relationships, as much as resources, are emphasized – that is understandable and acceptable to practitioners of both knowledge systems.

While the first appears to have achieved some degree of success, the latter has yet to realize its desired vision; Ontario government officials continue to have difficulty in finding the institutional space for this framework to be implemented. This perhaps suggests, among other things, that it is easier to “agree to disagree” from the outset rather than attempt to produce a mutually agreeable, consensus-based framework in the absence of the institutional support required to implement it. Nevertheless, eventually the mutual learning opportunities that will arise under both scenarios through engaging with each other will refine and improve on both knowledge systems and ERM decisions and actions. However, mutual learning will not occur without an examination of the cultural, political and other barriers that continue to thwart the full contributions of Aboriginal peoples and their TK and values to ERM.

³⁸ I. Davidson-Hunt (2003). Aboriginal Lands Management, Cultural Landscapes and Anishinaabe People of Shoal Lake, Northwest Ontario, Canada. *Environments* 31(1):21-41.

6.0 Systemic and Cultural Barriers to Incorporating TK, Aboriginal Peoples and their Values into Environmental Monitoring and Assessment

The systemic de-contextualization and marginalization of TK that characterizes the *status quo* fails to take full advantage of the real and substantive contributions that Indigenous peoples and their knowledge and values can make to environmental decision-making. One reason why this is so derives from the fact that the process of integration is inherently a political one whereby TK is usually subordinated to WSK (Johnson 1992).³⁹ Further, the *status quo* is built on a host of cultural assumptions and systemic barriers that continue to plague ERM. These are discussed below with ways to surmount these barriers framed as recommendations.

6.1 Involve Traditional Knowledge Holders, Not Just Their Knowledge

First and foremost, it must be acknowledged that TK cannot be separated from the peoples who created, hold and rely on it without doing them and this knowledge a disservice. If environmental authorities charged with incorporating TK and values into their decision-making processes are serious about realizing this mandate they must ensure that TK holders are meaningfully involved in the decision-making process. Again, this would likely entail a process of negotiation among the parties involved whereby protocols regarding the roles of TK holders and the use of their knowledge would be established.

6.2 Recognize that all Knowledge Systems are Value Laden

Aboriginal knowledge systems do not exist in isolation of other knowledge systems, but neither do they exist in the service of western science (Stevenson 1996). It is evident that both WSK and TK systems require thoughtful and systematic observation to understand ecological processes in order to ensure that resources are utilized in an ecologically sustainable manner (Johnson 1992). Non-aboriginal peoples 'cultured' in the western scientific tradition, however, often tend to view other knowledge systems as anecdotal or inferior to 'science.' Yet, reductionist/positivistic science too contains many culturally-biased and value-laden assumptions as well as hidden agendas in the service of dominant socio-political, economic, cultural and other interests. The

³⁹ M. Johnson (1992). *Lore: Capturing Traditional Environmental Knowledge*. Dene Cultural Institute and International Development Research Centre.

important fact to consider is that no one system or worldview has a monopoly on the truth. Rather, multiple worldviews and voices are needed in order to address the ecological challenges at hand and to develop sustainable relationships with our natural world. We thus have an ethical obligation to Aboriginal peoples, and society in general, to maintain and protect the integrity and context of TK. Environmental managers and organizations wishing to access TK in fulfilment of their mandate must abide by any local and other (regional) formal protocols in place in these regards. At the same time, in TK engagements with Aboriginal peoples, we have an ethical obligation to them to critically examine our own deeply held cultural assumptions and understandings about the world, and what roles they may play in silencing Indigenous voices.

6.3 Avoid Extending ERM Concepts to Aboriginal Peoples

Perhaps one of the greatest systemic barriers to realizing the legitimacy and efficacy of TK in ERM is the use of scientific language and concepts to codify and express TK and values. In an attempt to make complex and unfamiliar knowledge tractable, environmental managers often transform knowledge held by Aboriginal peoples into specific 'bits of information' or 'currencies' comprehensible to western science and its practitioners (Stevenson 2006). Complicit in this process is the application of the ERM language and concepts to describe certain aspects of Aboriginal knowledge and value systems as this the language that environmental managers are most comfortable with. Protection of the intellectual property of Aboriginal peoples entails not just preventing its exploitation by others, but retaining the linguistic context, cultural meanings and social environments that gives this knowledge its importance and efficacy in the first place. In particular, environmental managers must be cognizant of the critical role that language plays in their engagement with Aboriginal peoples.

Environmental managers are enriched by the economic, political, educational and others systems of which they are apart and privilege them. Consequently, they often engage Aboriginal peoples and other vulnerable communities from positions of power and influence of which they are largely unaware. Rules of engagement with Aboriginal peoples (i.e., what language is used, what concepts are employed, how knowledge is organized, etc.) must be negotiated, not unilaterally set or assumed by one party. In particular, the language in which Aboriginal knowledge and concepts are expressed and

described, like all rules of engagement with Indigenous peoples, must be mutually acceptable to both parties. It is especially important for environmental managers to realize that:

Skills for decoding complex messages from the social and natural environment are embedded in traditional languages... (and that) language, which carries the code for interpreting reality, is learned within the family and reinforced by the practices and values endorsed by the community (Brant Castellano 2004: 101).

Language is such a powerful tool that those who set the language of engagement, set the rules. Nowhere is this more evident than in the common extension of language, concepts and terms used in ERM and 'conservation science' to Aboriginal peoples. Many Aboriginal peoples feel that their portrayal as "managers" or "conservators" of "wildlife," and seeking to manage "wildlife" as "stocks," is inappropriate and potentially disrespectful.⁴⁰ Every time individuals uncritically use or apply language, terms, concepts, epistemologies and methodologies forged in the hegemony of ERM to Aboriginal peoples, s/he may unwittingly: 1) favour the interests and power relations existing within current political, social and economic systems and institutions (which may not be sustainable); 2) deny the fundamental human rights of Aboriginal peoples to self-expression and determination; and 3) undermine humankind's collective ability to develop sustainable relationships with our natural world.⁴¹

The language, knowledge, cultural values, and traditions of Aboriginal peoples are strongly connected to their lands, and provide the foundation upon which sustainable relationships to their environments are built. Consequently, efforts to incorporate TK into environmental decisions should be designed to strengthen, not erode, the human, intellectual, social and cultural integrity and capitals of Aboriginal communities, their knowledge systems and their relationships to their environments. Environmental managers having a mandate to include TK into decision-making also

⁴⁰ For reasons discussed below, many unilingual speaking Aboriginal elders and land users take offense that they could or should "manage animals" or that they are "conservationists."

⁴¹ This claim is informed by my efforts to assist Aboriginal peoples negotiate space for their knowledge, values and perspectives on co-management boards in northern Canada (Stevenson 2006), and is not meant to alienate or chastise researchers -- far from it. Rather, it meant to 'drive home' certain fundamental truths and realities that must be addressed if we are to create the ethical space and build the effective institutions to which we aspire.

have a duty to Aboriginal peoples, and to all humankind, to: 1) facilitate opportunities for Aboriginal peoples to contribute their unique language, terms, concepts and cultural understandings to ERM; and 2) assist in reconfiguring existing institutions and/or developing new ones that create the space for Aboriginal language, concepts, knowledge and knowledge holders in environmental research, policy and decision-making.

Successful realization of this duty will ultimately lead to the creation of new ways of thinking and doing things (i.e., new institutions and rules of engagement). At the very least, environmental managers have an ethical obligation to inform Aboriginal peoples of the pitfalls of accepting *a priori* the language, concepts, and methods of ERM, and relying on this paradigm to express their ideas, concepts and understandings of the natural world and their relationships to it (Stevenson 2006).⁴²

6.4 Consider that TK is More than Numbers

Environmental resource managers, particularly those charged with allocating, managing and conserving wildlife, depend largely on numbers or interval data sets to make decisions. While this can be a positive thing, especially given the socio-political and socio-economic factors that most environmental managers must consider, decisions are often made in the absence of other types of knowledge and sources of information. However, the old 'saw' that "what cannot be counted, does not count" does not apply. Traditionally, Aboriginal peoples rarely relied upon interval data sets (e.g., actual counts of animals) to make decisions.⁴³ Rather, there were much more important observations to make and much more detailed information to gather and process. Nowhere is this better illustrated than in the efforts of the Danish ethnographer, Knud Rasmussen (1931),⁴⁴ to elicit from Netslingmiut hunters in 1922 the actual numbers of seals they had killed during the previous winter (Figure 2).

⁴² These duties, in their own right, necessitate a certain amount of attention to building the capacity of environmental managers and researchers to effectively engage Aboriginal peoples, and therefore challenge our educational institutions to revamp current curricula to achieve this outcome (Stevenson 2006).

⁴³ For example, the traditional Inuit counting system differentiates and uses 6 intervals: 1,2,3,4,5, many.

⁴⁴ K. Rasmussen (1931). *The Netsilik Eskimos: Social Life and Spiritual Culture*. Report of the Fifth Thule Expedition 1921-24, Copenhagen.



Figure 2. Individual hunter seal kills at a Netslingmiut winter camp, circa. 1922 (Rasmussen 1931:230) (Note illustration is backwards).⁴⁵

⁴⁵ Rasmussen's caption for this figure reads: *I was greatly interested to learn how many seals and caribou the various hunters had caught in a season. None of them, of course, had the figures. It occurred to me to let them draw their catch, and it proved that all the various recollections associated with the occasions on which they made a kill, and their being able to remember whether it was a large or small animal, made it possible to draw up a fairly correct hunting score. The upper series of pictures show columns of seals caught by various hunters from the time when they first began to hunt at the beginning of winter and until they ceased in spring...*

Initially, Rasmussen's attempt to solicit this information was unsuccessful. However, it soon dawned on Rasmussen to provide hunters with a pencil so that each could draw the number of seals that he procured over the last few months. What was drawn, however, was not only the exact number of seals (in sequence) that each hunter had killed, but numerous minor differences among each seal (Figure 2). Had Rasmussen queried each hunter about what these differences meant – had he not been so preoccupied with the numbers – he might have learned something about the age, sex, health, physical condition, parasite load, diet, habitat, ice conditions, kill location, kill effort, etc. of each seal and how it was used and shared among community members, thus revealing information about hunting group structure and organization. These lines of inquiry might have also lead him to ask about changes or variations in these parameters through time (e.g., year to year) and space.⁴⁶

Numbers, like language, can be a very powerful tool that, if used indiscriminately and without reflection, can marginalize Aboriginal peoples and their TK. Nowhere did this become more apparent to me than during a meeting of the Beverly-Qaminuriaq Caribou Management Board in Thompson, Manitoba in the fall of 1998. Most Aboriginal members of this board were already sceptical of the aerial survey and radio-collaring techniques used by biologists to count and track barren ground caribou, the results obtained from this research, and any decisions based on either (see Spak 2001).⁴⁷ Undeterred, one government biologist offered a prize to the board member who came closest to guessing the correct number of animals on an aerial photograph. Lacking acumen and experience in this technique, few Aboriginal board members came within “rifle shot” of the correct answer. While probably unintended, this event had the effect of validating this methodology, and the scientific expertise and authority of those using it. At the same time, it emboldened non-Aboriginal board member efforts to challenge the experiential knowledge contributions and concerns of Aboriginal members (Spak 2001).⁴⁸ Crampton (1991:68) finds irony in such exchanges insofar as:

⁴⁶ Consider this: If your survival for 6 months of the year was dependent not only on each seal you caught, but fulfilling social obligations established under the rigid seal sharing system of the Netslingmiut, the number of seals caught would be relatively unimportant compared to other types of more salient, qualitative information.

⁴⁷ S. Spak (2001). *Canadian Resource Co-management Boards and Their Relationship to Indigenous Knowledge: Two Case Studies*. PhD Thesis, University of Toronto,

⁴⁸ I do not think it a coincidence that few Aboriginal board members attended this meeting after the first day.

“western scientists should not criticize what they see as unsubstantiated judgements in native science based on several generations of experience, when they are speculative about their judgements based on few measurements made over a short time-scale.”⁴⁹

6.5 Recognize that both TK and WSK are Evolving Epistemologies

Western scientific knowledge, like the TK of Indigenous peoples, is always evolving. Increasingly, practitioners of WSK are challenging the fundamental tenets of western science – rational analytical thinking, objectivity, reductionism – as being as too ethnocentric (Johnson 1992), and incapable of dealing with the realities and complexities of ecological systems and their inter-related components. As Freeman (1992) has pointed out “nowhere does the Cartesian model of modern science fail so completely and utterly as in trying to explain the workings of natural ecosystems.” Subsequently, scientists are expanding beyond simply measuring observed environmental phenomena to reveal linear cause and effect processes and predict future outcomes. Indeed, they are beginning to embrace the fact that ecosystems are complex systems of energy, matter and relationships best understood by means of the influence they have on each other (Freeman 1992). Thus, western science is becoming increasingly interdisciplinary whereby biological, social, cultural and psychological phenomena are recognized as belonging to inter-dependent systems (Capra 1982,⁵⁰ Johnson 1992). In this respect, it appears that WKS, as it pertains to ERM, is moving towards, not away from, some of the basic tenets upon which TK is grounded.

7.0 Thinking and Talking Differently About TK

Examination and discussion of the *status quo* and the cultural, political and other systemic barriers that limit the full contributions of Aboriginal peoples and their TK to ERM leads us to ask: *Are there better, more appropriate and productive, ways to address the issue?* If our goal is to preserve and protect the integrity of TK and the social, cultural and other contexts in which it is constructed, we must find space for TK and TK holders that complements and is equivalent to the roles played by WSK and its practitioners in ERM.

⁴⁹ C.B. Crampton (1991). Native Conservation in a Northern Canadian Landscape. *Environmental Conservation* 18:67-68.

⁵⁰ F. Capra (1982). *The Turning Point: Science, Society and the Rising Culture*, Fontana Collins, London.

One way of achieving this goal is to consider the question: *What are we attempting to manage and conserve?* For most environmental and wildlife managers the answer would be “resources.” For most Aboriginal TK holders, especially those who have not been forced into adapting his/her reality (language, concepts, understandings) to the dominant paradigm of western science, the answer would be “relationships.” This is not a trivial distinction, but reflects the epistemological foundations upon which each knowledge system is built.

Most Indigenous peoples were traditionally not conservationists in the usual sense of the word. Aboriginal peoples did not intentionally set out to conserve or manage resources, and examples are many where they have threatened or caused the extirpation of animal species through over-exploitation.⁵¹ Most Indigenous cultures believe that animals give themselves to humans if proper protocols are followed, and to reject this gift or sacrifice is potentially dangerous as it jeopardizes the sacred contract between hunter and hunted.

To the extent that Indigenous peoples traditionally managed and/or conserved anything, it is their “relationships” to the resources upon which they depended. While WSK and its practitioners may be best served by “managing and conserving resources,” TK and Aboriginal peoples may be best served by sticking to what they know best: “managing and conserving relationships (to resources).” The realization that all components of an ecosystem are interrelated is so fundamental to modern ecological thinking that some leading scientists have argued that: *“relationships should be used as a basis for all definitions, and this should be taught to our children in elementary schools. Anything ...should be defined not by what it is in itself, but by its relations to other things* (Bateson cited in Freeman 1992). In this light, we might begin to discover the long-awaited space for Aboriginal peoples and their knowledge and values in ERM by developing the concept of “valued ecosystem relationship” (VEC) as a complement to the “valued ecosystem component” (VEC) used in environmental assessment and monitoring praxis. In order to develop sustainable connections to our natural world at a

⁵¹ For example, when Indigenous peoples first inhabit islands or enter new areas devoid of human occupation, or when they adopt/develop more efficient technology (e.g., the repeating rifle), abundant prey species may quickly become vulnerable to over-exploitation until the relationship stabilizes or regains a type of dynamic equilibrium through adjustments in human behavior.

time when they are most needed, both VECs and VERs, and the knowledge systems from which they derive, are needed and must be given equal weight and consideration. What is this if not the realization of the promise made by the “two-row wampum” treaty to environmental monitoring and assessment?

Finally, the incorporation of Aboriginal peoples and their knowledge and values in environmental assessment and monitoring is as much about reconciling “responsibilities” as it is about accommodating “rights.” Specifically, it is about restoring “responsibilities” that have fallen from Aboriginal peoples’ grasps to “keep,” “care for” and “steward” their lands and their relationships to them. Rights and responsibilities are directly related, they are the flip side of the same coin, you can’t have one without the other. By redesigning existing and/or creating new institutional arrangements that incorporate these responsibilities the space for Indigenous peoples and their knowledge and values in environmental decision-making will be realized. Although the above prescriptions, and the efforts that they will require, may seem onerous at first glance, they are intended to enable, not obstruct, the development of ethical and mutually beneficial partnerships with Aboriginal peoples that may lead us collectively to develop sustainable relationships with our natural world. In the words of First Nations scholar Willie Ermine (2007:202-03):⁵²

The dimension of the dialogue might seem overwhelming because it will involve and encompass issues like language, distinct histories, knowledge traditions, values, interests, and social, economic and political realities and how these impact and influence an agreement to interact. Even so, ...the new partnership model of the ethical space, in a cooperative spirit between Indigenous peoples and Western institutions, will create new currents of thought that flow in different directions and overrun the old ways of thinking.

⁵² W. Ermine (2007). The Ethical Space of Engagement. *Indigenous Law Journal* 6(1):193-203.