

The Canadian Arctic Marine Ecological Footprint and Free Prior Informed Consent: Making the Case for Indigenous Public Participation through Inclusive Education

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Public participation of the Inuit concerning climate change adaptation in the Canadian Arctic is essential, given the extensive knowledge they possess about their traditional territories, especially as it relates to resources management. Unfortunately, much of this knowledge is not incorporated into the tertiary educational system and hence not part of the knowledge set of the people most likely to engage in public policy discussions and decisions. This article adopts a transdisciplinary approach, using an analysis of historic fish and marine mammal catch with the marine ecological footprint calculated for the year 2000. This scientific data, supported by the principle of free and prior informed consent as defined in United Nations Declaration on the Rights of Indigenous Peoples as well as the Tsilhqot'in case in Canada, demonstrates the need for inclusive education. We conclude that indigenous participation in climate change adaptation policies would benefit immensely from the offering of university programmes that incorporate, in a meaningful way, Inuit traditional knowledge and indigenous rights.

INTRODUCTION

The Inuit were among the very first to sound the alarm over climate change.¹ Irrespective of the debate on the cause of the problem, the Inuit are well aware of the effects. They have observed with great detail the changes in ice cover, migration paths, hunting routes, new flora and fauna, taste of traditional foods and so on.² Observations made possible by the Inuit cultural relationship to the land and sea go beyond an in-depth

knowledge of the ecosystem and its species to include Inuit cosmology and spirituality, as well as being a fundamental source of Inuit epistemology.³ This integrated relationship with the Arctic region makes the Inuit vital contributors to the creation of adaptation strategies, especially as it relates to resource management. Furthermore, given that this knowledge is part of the larger cultural dimension of the area, any public policy initiative that concerns Canada's Arctic region necessarily must involve the Inuit, as the Inuit culture is inseparable from the ecosystem itself. However, despite the tremendous value of Inuit and other indigenous traditional knowledge as an aggregate representation of science, society and culture, it is almost absent from tertiary education programmes across Canada, including the Arctic. In the Arctic context, this lack of exposure to Inuit knowledge is especially disconcerting, as this region is particularly vulnerable to climate change.⁴

Traditional knowledge is not limited to ecology but extends to most areas of learning, including the law. Law faculties have almost completely ignored indigenous legal systems. Inclusive education would not only bridge quantitative and/or qualitative science and traditional knowledge, but also the interpretation of legal rights. In the context of indigenous peoples, the United Nations Educational, Scientific and Cultural Organization (UNESCO) suggests the concept of inclusive education comprises the following:

- Developing guidelines for indigenous/tribal people relevant to their needs and aspirations, accommodating their culture, language and learning styles.

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¹ See <http://portal.unesco.org/en/ev.php-URL_ID=30532&URL_DO=DO_TOPIC&URL_SECTION=201.html>.

² K. Koutouki and N. Lyons, 'Canadian Inuit Speak to Climate Change: Inuit Perceptions on the Adaptability of Land Claims Agreements to Accommodate Environmental Change', 27:3 *Wisconsin International Law Journal* (2009), 516, at 533. This article contains examples of climate change reported by Inuit collaborators in three Canadian Arctic regions: Inuvialuit Elders and community members,

Mackenzie/Beaufort Region; Arviat Elders and community members, Western Hudson Bay and Kangiqsujuaq, Nunavik youth, Arctic Québec.

³ S. Tagalik, 'Inuit Qaujimaja-tuqangit: The Role of Indigenous Knowledge in Supporting Wellness in Inuit Communities in Nunavut' (National Collaborating Centre for Aboriginal Health, 2010). See also F. Taylor, *Developments in the Theory and Practice of Cybercartography: Applications in Indigenous Mapping* (Elsevier, 2014).

⁴ L. Westra, *Environmental Justice and the Rights of Ecological Refugees* (Routledge, 2009), at 142.

- Supporting reflection and action to render curricula and teaching methodologies sensitive to indigenous peoples' rights, perspectives, experiences and aspirations, notably by involving indigenous peoples in the work carried out in this area.
- Developing educational and training programmes for indigenous people in relation to indigenous people's rights, techniques of negotiation, and leadership skills.⁵

This is very relevant, given that the framework of Inuit traditional knowledge 'is grounded in four big laws or *maligait*'.⁶ As UNESCO states, inclusive education includes indigenous culture as well as teaching methodologies and legal rights relevant to a particular culture. *Maligait* and other traditional legal systems are part of the daily life of the Inuit. As a consequence, *maligait* is often classified as traditional knowledge rather than law.⁷ However, just because it does not function like Western law does not mean that it is not a legal system proper to the Inuit culture. This incongruence between different legal systems can lead to the suppression of one by the other but, as Short explains, this does not have to be the case. According to Short, 'in the context of any conflicting legal systems, legal pluralism can be a particularly useful tool. The term refers to the existence of multiple legal systems within one geographic area . . . The issue is championed particularly by those concerned that adoption of solely Western law can create a "gap" between the adopted law and its adherents' practices, rendering it potentially ineffective.'⁸ Canada's tri-juridical nature⁹ is almost completely absent from Canadian tertiary education, even though it is recognized by prominent law professors and Supreme Court justices.¹⁰

We argue that translating Inuit priorities into public policy will need to be effected by an ever-growing segment of college- or university-educated individuals capable of speaking both scientific languages in their

district cultural contexts and understanding the legal frameworks in which public policy exists. Our study illustrates the need for inclusive education in the context of Arctic climate change adaptation strategies by looking at advancements in determining the quantitative capacity of marine systems (systems disproportionately affected by climate change and particularly important to the Inuit) through multi-species ecosystem and fisheries models,¹¹ as applied for inter-cultural goals and resource management through a collaborative process. Clark *et al.* suggested that the basis for such an ethnoecological or cross-cultural process is not yet generally in place,¹² while Lemelin *et al.* concluded that the indigenous people and cultures themselves are not effectively engaged.¹³

Addressing the historical exclusion from, or ineffective engagement of, indigenous people in the management of resources in their territories is at the heart of the recent United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).¹⁴ Responding to the lack of indigenous rights in international law, UNDRIP embodies 'Indigenous historical grievances, contemporary challenges and socio-economic, political and cultural aspirations.'¹⁵ Although the declaration is not legally binding, it is influential for a myriad of reasons.¹⁶ In fact, the Office of the United Nations (UN) High Commissioner for Human Rights emphasizes that the 'declaration is now among the most widely accepted UN human rights instruments. It is the most comprehensive statement addressing the human rights of indigenous peoples to date, establishing collective rights and minimum standards on survival, dignity, and wellbeing to a greater extent than any other international text.'¹⁷ One of the reasons why UNDRIP is so important in expressing the priorities of indigenous peoples is the clear and explicit manner in which it discusses the critical importance of free and prior informed consent (FPIC) with regard to resource management.

⁵ See <http://www.unesco.org/new/en/education/themes/strengthening-education-systems/inclusive-education/indigenous-people/>.

⁶ See S. Tagalik, n. 3 above, at 1.

⁷ Nunavut Arctic College, *Interviewing Inuit Elders: Perspectives on Traditional Law* (Nunavut Arctic College, 2012), at 14.

⁸ L. Short, 'Tradition Versus Power: When Indigenous Customs and State Laws Conflict', 15:1 *Chicago Journal of International Law* (2014), 376, at 390.

⁹ In Canada, civil law (the Civil Code) governs relationships between persons within the provinces; in the rest of Canada common law applies. Furthermore, Canada has a third applicable legal system, indigenous legal traditions. Although there are many of these, the legal community erroneously refers to them as one system.

¹⁰ R.A. Macdonald, 'Bijuralism in Canadian Law – Towards a Model for the 21st Century', Address at the Symposium 'The Harmonization of Federal Legislation with Quebec Civil Law and Canadian Bijuralism' (24 November 1997), found at: <http://www.lcc.gc.ca/en/pc/speeches/s241197.html>. See also C. L'Heureux-Dubé, 'Bijuralism: A Supreme Court of Canada Justice's Perspective', 62:2 *Louisiana Law Review* (2002), 449, at 460.

¹¹ V. Christensen and C.J. Walters, 'Ecopath with Ecosim: Methods, Capabilities and Limitations', 172:2–4 *Ecological Modelling* (2004), 109.

¹² D.A. Clark *et al.*, 'It's Not Just About Bears: A Problem-Solving Workshop on Aboriginal Peoples, Polar Bears, and Human Dignity', 63:1 *Arctic* (2010), 134.

¹³ R.H. Lemelin *et al.*, 'Voices from the Margins: The Muskegowuck Athinuwick/Cree People of Northern Ontario and the Management of Wapusk/Polar Bear', 61:1 *Arctic* (2008), 113.

¹⁴ Declaration on the Rights of Indigenous Peoples (UN General Assembly Resolution A/RES/61/295, 13 September 2007) ('UNDRIP').

¹⁵ K. Coates, 'From Aspiration to Inspiration: UNDRIP Finding Deep Traction in Indigenous Communities' (18 September 2013), found at: <https://www.cigionline.org/blogs/aspiration-inspiration-undrip-finding-deep-traction-indigenous-communities>.

¹⁶ C. Oguamanam, 'Indigenous Peoples' Rights at the Intersection of Human Rights and Intellectual Property Rights', 18:2 *Marquette Intellectual Property Law Review* (2014), 261, at 277.

¹⁷ UN Office of the High Commissioner for Human Rights, 'Indigenous Rights Declaration Endorsed by States' (23 December 2010), found at: <http://www.ohchr.org/EN/NewsEvents/Pages/Indigenousrightsdeclarationendorsed.aspx>.

As this article shows, FPIC is the legal foundation upon which dialogue with indigenous people can be built with regard to their traditional knowledge, an essential part of any climate change adaptation strategy. Public policies concerning adaptation in the Arctic context would be incomplete and possibly harmful to the occupants of the region if traditional knowledge is not integrated into the larger legal framework in which public policy takes shape. We posit that inclusive education could be a catalyst for the creation of a pool of university- or college-trained individuals that are able to navigate both indigenous and non-indigenous interests in the Arctic. We illustrate this need by showing the need for cooperation between traditional knowledge holders and marine scientists in the management of fish stocks in the Arctic.

A TRANSDISCIPLINARY APPROACH

Our data, which quantifies the marine ecological footprint, demonstrates the need for resource management based on inclusive tertiary education within the Arctic region as a step towards meaningful participation of the Inuit people in public policy debates and decisions. The marine ecological footprint is an important marker for analysing human impacts on the sustainability of the ecosystem from community sources as well as climate change. Integration of traditional knowledge or *Inuit Quajimajitungit* (IQ) within quantitative ecology considerations made with the FPIC of the Inuit as prescribed under UNDRIP provides a more complete picture of the health of these marine environments.

However, some divisions within the Canadian academic system have been diametrically opposed to ethnoecology as a transdisciplinary approach.¹⁸ Merging tools such as IQ, legal rights, stock assessments, ecosystem-based modelling, transportation economics and business models at the local level is beyond the scope of standard college or university programming. In the Arctic, due to historically oppressive policies with little to no consultation with the Inuit about resource exploitation or any other policy decision, enhanced trust between local communities and various levels of the existing resource management systems may also be required. Marine resource management in the Arctic has been considered to be increasingly problematic,¹⁹ perhaps in part as a result of the knowledge clash between local people and what are viewed as external management systems that frequently exclude local people from the management

systems entirely. An underlying root cause of this disconnect may lie within the structure of the Canadian university curriculums that do not adequately include cross-cultural or ethnoecology content and analysis. Climate change, however, needs to be addressed in a multifaceted manner in the Arctic. The existing disconnect between traditional knowledge, tertiary education and indigenous legal rights is therefore counterproductive.

Supported by UNDRIP and its focus on FPIC, the Inuit can use the results of this quantitative study as a platform for communities to consider their resource management challenges, and to assist government and non-government agencies in their community and inter-community development strategies. Although several studies and reports have been published previously, there has been no comprehensive review of catches, combining both small-scale and commercial fish catches with marine mammal harvests for the entire Canadian Arctic. We estimate total catches from the marine ecosystem of the Canadian marine Arctic and the amount of primary production needed to support the catches for the year 2000.²⁰ Hence this study looks at communities as users of fish resources in the Arctic and the contribution of this use to the marine ecological footprint of the region as a whole.

The Arctic Ocean region of Canada is characterized by small coastal communities with an extremely limited tax base and a high degree of dependence upon marine resources, including mammals and fish, which have not previously been quantified. Although the significance of subsistence fisheries has been recognized,²¹ this area has previously received little attention as a fishing culture, due in part to the small population and limited government services. Marine resource dependence needs to be considered on an ongoing basis to help guide government and community programmes for the wellbeing of the people. In general, the marine environment provides a critical source of income as well as quality protein and calories, for which there is no viable substitution. For example, the price of ground beef and milk in the Canadian Arctic can be almost twice that of southern centres, and many local people do not have the income to readily make that dietary switch.

Although there have been significant advancements in the designation of large marine ecosystems (LMEs),²² there is a need to adapt these biodiversity-based concepts to reflect a management infrastructure that better responds to the context of the Canadian Arctic and the

¹⁸ T. Moffat, 'Environmental Responsibility through Ethnoecology Education', 21 *Advances in Environmental Research* (2011), 59.

¹⁹ T.K. Suluk and S.L. Blakney, 'Land Claims and Resistance to the Management of Harvester Activities in Nunavut', 61:1 *Arctic* (2008), 62.

²⁰ D. Pauly and V. Christensen, 'Primary Production Required to Sustain Global Fisheries', 374:6519 *Nature* (1995), 255.

²¹ F. Berkes, 'Native Subsistence Fisheries: A Synthesis of Harvest Studies in Canada', 43:1 *Arctic* (1990), 35.

²² See, e.g., <www.lme.noaa.gov>.

culture of the people themselves.²³ Similar LMEs or bioregional marine education programmes have been proposed for other resource-dependent settings²⁴ and subsequently initiated through a comprehensive, ecosystem-wide application.²⁵ Clearly, the vulnerability and low adaptive (i.e., economic) capacity of the indigenous coastal communities of the Canadian north connect the people directly to the state of the environment, a condition that has specific challenges.²⁶

This connection to the land and sea has resulted in a comprehensive set of knowledge of the ecosystems that make up the traditional territory of the Inuit. This knowledge is not only scientific in nature, but includes the spiritual, cultural and aesthetic value of ecosystems and their inhabitants. Intercultural and cross-cultural processes concerning ecosystem capacity, resource management and scientific modelling can be made far more complete with the addition of traditional knowledge at the onset of a study. However, few, if any, have the training necessary to recognize and classify indigenous traditional knowledge in an appropriate and useful manner. Furthermore, this integration of traditional knowledge and scientific data needs to be done with the FPIC of the knowledge holders as stipulated under international law, primarily the Nagoya Protocol²⁷ and UNDRIP.²⁸ The participation of the Inuit under mutually agreed terms and with their consent in a tertiary programme, leading to the creation of scholars with the aforementioned skill sets, will go far in ensuring the incorporation of Inuit priorities and world view in public policy decisions concerning the Arctic, especially those with regard to resource and land management.

THE CANADIAN ARCTIC MARINE ECOLOGICAL FOOTPRINT

Perhaps uniquely, the required methods for the current work illustrate the challenge of a transdisciplinary and cross-cultural approach. To build a database of all the fisheries and marine mammal harvest in the Canadian Arctic meant that it was necessary to examine literature that is not formally published, sometimes involving

travel to small isolated libraries and often building upon the friendships established with researchers and knowledge holders over many decades. The idea behind the work was to produce the first Arctic marine footprint for Canada, which involved accessing harvest data from individual species reports and various publications, some regional by jurisdiction and all differing in methodology, application, purpose and timeframe. The work to build a dataset and standardize existing results was done over an extended period of time, first considering fish harvest,²⁹ and then adding on marine mammals.³⁰

The fisheries catches, marine mammal harvests and potential caloric value of the marine footprint were estimated for each of the three LMEs³¹ for the year 2000. In calculating the potential caloric value of the marine harvest, polar bears and walrus were removed from the calculations due to their limited use as food by community members. Community harvests of fish and marine mammals were either taken from reported catch/harvest statistics or were based on estimates. Commercial fisheries were estimated as a nine-year average and include catches from test fisheries. Fisheries catches and marine mammal harvests were expressed in weight, and include estimates of uncertainty. The catches for each LME and for Canada's total marine footprint were then expressed in terms of the primary production required to support this level of catches.³²

Estimates of the primary production required for marine harvest for each LME were taken from the Sea Around Us Project. For polar bears we used a trophic level of 5.1;³³ for fish, we used the mean trophic level from Fishbase;³⁴ and for marine mammals, we used those from Pauly *et al.*³⁵ We used a 10% trophic transfer efficiency, referring to the energy transfer from one trophic level to the next. A trophic level refers to 'each of several hierarchical levels in an ecosystem, consisting of organisms sharing the same function in the food chain and the same nutritional relationship to the primary sources of energy'.³⁶

This study was complex, involving a large geographical area, various species of fish and mammals and dozens

²³ R. Siron *et al.*, 'Ecosystem-Based Management in the Arctic Ocean: A Multi-Level Spatial Approach', 61:1 *Arctic* (2008), 86.

²⁴ P. Watts *et al.*, 'A Programmatic Approach to Empowerment in CRM: Aurora, Philippines', 3 *Gateways* (2010), 120.

²⁵ M. Pajaro *et al.*, 'The Northern Philippine Sea: A Bioregional Development Communication Strategy', 9:2 *Social Science Diliman* (2013), 49.

²⁶ S. Hales *et al.*, 'Health Aspects of the Millennium Ecosystem Assessment', 1:2 *EcoHealth* (2004), 124.

²⁷ Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya, 29 October 2010; in force 12 October 2014) ('Nagoya Protocol').

²⁸ UNDRIP, n. 14 above.

²⁹ S. Booth and P. Watts, 'Canada's Arctic Marine Fish Catches', 15:2 *Fisheries Centre Research Reports* (2007), 3.

³⁰ D. Zeller *et al.*, 'Reconstruction of Coral Reef Fisheries Catches in American Samoa, 1950–2002', 25:1 *Coral Reefs* (2006), 144; see also D. Zeller *et al.*, 'Re-estimation of Small-scale Fisheries Catches for U.S. Flag Island Areas in the Western Pacific: The Last 50 Years', 105:2 *Fishery Bulletin* (2007), 266.

³¹ See R. Siron *et al.*, n. 23 above.

³² See D. Pauly and V. Christensen, n. 20 above.

³³ K.A. Hobson and H.E. Welch, 'Determination of Trophic Relationships within a High Arctic Marine Food Web Using d13c and d15N Analysis', 84:1 *Marine Ecology Progress Series* (1992), 9.

³⁴ <<http://www.fishbase.ca>>.

³⁵ D. Pauly *et al.*, 'Diet Composition and Trophic Levels of Marine Mammals', 55:3 *ICES Journal of Marine Science* (1998), 467.

³⁶ <<http://www.oxforddictionaries.com/definition/english/trophic-level>>.

of communities. Although complex, the study was based on the best available theoretical frameworks and models for this type of study. As complete and scientifically sound as our study is, we cannot help but be aware of the limited space available in scientific best practices for epistemologies such as traditional knowledge. In fact, it is an excellent example of the challenge of transdisciplinary and cross-cultural approaches to data collection; data that is significant to any comprehensive public policy on climate change adaptation. This will become more obvious as we discuss the results below.

The people of Arctic Canada were estimated to have harvested 4,882 (+/- 510) tonnes of marine resources in the year 2000. Fish catches accounted for 32% of the estimated total harvest, with Arctic charr accounting for 22% of the total harvest. Commercial fisheries targeting turbot, Atlantic mackerel and shrimp account for 6% of the total harvest. Five species of marine mammals accounted for approximately 64% of the marine resources harvested. Ringed seal were the most important marine mammal hunted, accounting for 28% of the total biomass harvested, with beluga, narwhal, bearded seal and walrus accounting for 12%, 10%, 7.9% and 6.4%, respectively.

The calculations regarding the potential caloric value of marine harvest in the Canadian Arctic indicate that these resources provide a significant contribution to food security, and hence an especially critical natural resource for the communities. For example, the highest caloric per capita value of the harvest represents almost 40% of the requirements for basal metabolism by a 75 kg adult.³⁷ However, the transfer of potential calories to nutrition is determined by both processing activities and wastage, which may be increasing.³⁸

The original work comparing primary productivity to harvest, which did not include considerations of marine mammals, found the lowest was for the open ocean (1.8%). Our study points to a marine footprint for the whole Canadian Arctic of 0.20%, hence a low magnitude of impact even when compared with other low-magnitude studies.³⁹ This is due in part to the lack of large-scale commercial fisheries, but it may also be linked to differences associated with the relationship between primary productivity and higher food chain biomass accumulation in polar systems. Two LMEs, the Beaufort Sea and Baffin Bay, are also part of the Exclusive Economic Zone (EEZ) of other nations. People of Alaska also harvest marine resources from the Beaufort Sea LME, and Greenland also harvests marine

resources from Baffin Bay LME. Thus, for the Beaufort Sea and Baffin Bay LMEs, the marine ecological footprint can be considered to be Canada's marine ecological footprint on these two LMEs. The Arctic archipelago and Hudson Bay LME are confined to Canada's EEZ and thus the marine ecological footprint as determined here represents the total marine footprint.

The results do not indicate that there is a particular problem with the level of harvest in the Canadian Arctic, in terms of overfishing or viability of the habitat. However, we note that some of the harvest areas are much smaller than an entire LME and may represent local resource use that exceeds the maximums suggested by Pauly *et al.*⁴⁰ The development of the current dataset has established a basis for further determinations of ecosystem capacity and opportunities for the development of marine resources. The bioenergetic analysis of marine ecosystems has been used by many countries; however, the application of these tools to the Arctic will require a process of analysis, planning and further research. This process will need to be tailored to the unique features of each of these LMEs, something that requires further enhancements in the cross-cultural and collaborative evaluations of information and knowledge systems. The use of a respect-based approach to considering academic science within traditional knowledge and IQ can perhaps be done through reflexive or inclusive science education that considers multiple epistemologies.⁴¹

Although it is recognized that the fish and mammals do not represent the total marine usage in the Arctic,⁴² our study provides a minimum estimate of the marine footprint for the Arctic. Additional usage of invertebrates and plants may be significant for the food systems in individual communities or as a source of revenue. From a local standpoint, the harvest of marine mammals is significant, as each animal represents a large source of resources, either in terms of calories, protein or income from sports hunt and other activities. The results do not indicate a particular problem in terms of the level of extraction from the marine Arctic system of Canada by the indigenous communities. However, the availability of marine resources for harvest in this polar region may not be as high or as accessible as from predicted values of Pauly *et al.* for other specific areas.⁴³ Furthermore,

³⁷ M. Kleiber, *The Fire of Life: An Introduction to Animal Energetics* (Krieger, 1975).

³⁸ E.F. Pufall *et al.*, 'Perception of the Importance of Traditional Country Foods to the Physical, Mental, and Spiritual Health of Labrador Inuit', 64:2 *Arctic* (2011), 242.

³⁹ See D. Pauly and V. Christensen, n. 20 above.

⁴⁰ D. Pauly *et al.*, 'Ecopath, Ecosim, and Ecospace as Tools for Evaluating Ecosystem Impact of Fisheries', 57:3 *ICES Journal of Marine Science* (2000), 697.

⁴¹ M. Bang and D. Medin, 'Cultural Processes in Science Education: Supporting the Navigation of Multiple Epistemologies', 94:6 *Science Education* (2010), 1008.

⁴² G.M. Egelund *et al.*, 'Indigenous Peoples Food Systems: The Many Dimensions of Culture, Diversity and Environment for Nutrition and Health', in: H.V. Kuhnlein, B. Erasmus and D. Spigelski (eds.), *Indigenous Peoples Food Systems: The Many Dimensions of Culture, Diversity and Environment for Nutrition and Health* (Food and Agriculture Organization of the United Nations (FAO), 2009), 9.

⁴³ See D. Pauly *et al.*, n. 40 above.

the assessment of climate change impact is ongoing and problematic. More open water due to climate change could mean the possibility of larger commercial fisheries, resource extraction and presence of invasive species that may adversely affect fish stocks and marine mammals. Recently it was reported that over the past 34 years there has been a 26% decline in the biodiversity of the high Arctic.⁴⁴ It is not known how these biodiversity changes or climate shifts could further affect resource availability and challenges such as food insecurity. Developing a framework for the assessment of community vulnerability to climate change⁴⁵ should perhaps start with a quantitative approach to community-based resource management systems in collaboration with community members, especially hunters and trappers.

These Arctic communities are significantly dependent upon marine resources and it can be expected that the communities' health will follow changes in marine resource status in this ecohealth marine management unit. The changes that are occurring in the Arctic define a need for a quantitative approach to research as it pertains to the marine system, supported by key observations from the people who spend their lives on the land and sea. In keeping with international standards as well as global best practices, a more cognitive approach to education at all levels may be optimal.⁴⁶ However, this form of planning will require a level of cross-cultural collaboration currently not operational in the Canadian Arctic or Canada in general. There are indications that ocean resource management is a growing area of cross-cultural resistance.⁴⁷ The inclusion of traditional knowledge or IQ from the communities is often considered not possible within government bureaucratic management systems.⁴⁸ This perspective needs to be reversed and emphasis put on the integration of established government management with traditional knowledge and IQ through focused university-level programmes.

It has been recognized that there is a need for better linkages between community knowledge and conven-

tional science,⁴⁹ but, given the speed of climate change, we suggest that process needs to be identified now. We believe that approach needs to be developed through trust-building so that there is full collaboration to identify the best way forward.⁵⁰ However, there are specifics that cannot be overlooked. First, ecosystem processes and potential extraction rates are largely determined by the trophic level processes,⁵¹ and either directly or indirectly need to be considered in any estimations of maximum sustainable yield, and perhaps natural resource management. Second, the real issue in these Arctic communities is poverty.⁵² All resource extraction translates back to food and economic security within the communities, thus individual resource issues, such as the harvest of polar bears, need to be considered from that standpoint.

THE IMPORTANCE OF INUIT PUBLIC PARTICIPATION IN CLIMATE CHANGE STRATEGIES

In the Canadian context, poverty and food security are major issues for indigenous peoples, including the Inuit, and are very closely related to natural resource management. Child poverty rates in First Nations communities are at 40%, and at 27% in Inuit communities. Both those figures are far higher than the Canadian 17% and the 12% rate for non-racialized, non-immigrant children.⁵³ Furthermore, the Arctic region, and particularly Nunavut, have high rates of food insecurity. In Nunavut 36.8% of the population did not have access to adequate food, a much higher rate than the Canadian average of 8.3%.⁵⁴

As we saw in the ecological footprint for the Canadian Arctic region, there is room for sustainably catching more fish and mammals, as the study shows that there is no evidence of over harvest at the LME level at this time. The study demonstrates that the carrying capacity of the region can support larger catches. However, this significant result needs to be examined in the context of climate change as well as individual species population

⁴⁴ <<http://www.asti.is>>.

⁴⁵ J.D. Ford and B. Smit, 'A Framework for Assessing the Vulnerability of Communities in the Canadian Arctic to Risks Associated with Climate Change', 57:4 *Arctic* (2004), 389.

⁴⁶ S. Atran *et al.*, 'The Cultural Mind: Environmental Decision Making and Cultural Modeling Within and Across Populations', 112:4 *Psychological Review* (2005), 744.

⁴⁷ T.K. Suluk and S.L. Blakney, n. 19 above.

⁴⁸ S.C. Ellis, 'Meaningful Consideration? A Review of Traditional Knowledge in Environmental Decision Making', 58:1 *Arctic* (2005), 66; G. White, 'Not the Almighty': Evaluating Aboriginal Influence in Northern Land-Claim Boards', 61:1 *Arctic* (2006), 71; M. Dowsley and G. Wenzel, 'The Time of the Most Polar Bears': A Co-management Conflict in Nunavut', 61:1 *Arctic* (2008), 177; F.J. Tester and P. Irniq, 'Inuit Qaujimaqatuqangit: Social History, Politics and the Practice of Resistance', 61:1 *Arctic* (2008), 48.

⁴⁹ D.G. Barber *et al.*, 'The Changing Climate in the Arctic', 61:1 *Arctic* (2008), 7; M. Tremblay *et al.*, 'Climate Change in Northern Quebec: Adaptation Strategies from Community-Based Research', 61:1 *Arctic* (2008), 27.

⁵⁰ Cf. A.E. Lewis, 'Movement and Aggregation of Eastern Hudson Bay Beluga Whales (*Delphinapterus leucas*): A Comparison of Patterns Found through Satellite Telemetry and Nunavik Traditional Ecological Knowledge', 62:1 *Arctic* (2009), 13.

⁵¹ See D. Pauly and V. Christensen, n. 20 above.

⁵² J. Mathias *et al.*, 'Arctic Change and Coastal Communities: Overview of the Coastal Zone Canada', 61:1 *Arctic* (2008), iii.

⁵³ D. Macdonald and D. Wilson, 'Poverty or Prosperity: Indigenous Children in Canada' (Canadian Centre for Policy Alternatives, 2013).

⁵⁴ S. Roshanafshar and E. Hawkins, 'Food Insecurity in Canada' (Statistics Canada, 2015), found at: <<http://www.statcan.gc.ca/pub/82-624-x/2015001/article/14138-eng.pdf>>.

dynamics. Climate change impacts the safe access to these foods and also their taste, thus creating obstacles to relieving the pressure of poverty with increased use of these resources for food and as a source of income. Critically the quantitative research vital to the understanding of the ecosystem's carrying capacity needs to be buttressed with traditional knowledge through the local communities to properly serve a shared-knowledge role as an indicator of effective or ineffective resource management.

Given that over 80% of indigenous communities are found in isolated areas, including 56% of all Inuit people, natural resources are fundamental to the economic development of these communities.⁵⁵ Management of these resources, be it marine or terrestrial, is rarely in the hands of the communities most impacted by the manner in which they are managed. Sustainable economic development is essential to combat oppressing rates of poverty. In the Aboriginal context in Canada this becomes all the more urgent when we consider the dramatic rise of the Aboriginal population. According to the a 2011 household survey, 28% of the Canadian Aboriginal population is under 14 years of age and 18.2% is between 15 and 24. The Canadian average is 7% and 5.9%, respectively.⁵⁶ Hence, in many of these remote Arctic communities we find a relatively large youth population in search of economic security, given that they are in their prime working age. Their options are often limited to natural resource development or extraction, including traditional activities such as hunting and fishing.⁵⁷

FPIC: A FUNDAMENTAL RIGHT FOR INUIT PUBLIC PARTICIPATION AND NATURAL RESOURCE MANAGEMENT

International and Canadian law are now beginning to understand the importance of the natural environment for indigenous peoples. Beyond its vital role in the economy of many indigenous communities, the natural world is also important for cultural, religious, aesthetic, medicinal and nutritional reasons. Therefore, managing the natural resources in indigenous territories without or with very little indigenous participation results in management that ignores indigenous culture

and is unaware of indigenous priorities. We suggest that a long-term solution to this persistent problem is to provide programmes at a college or university level that are inclusive of conventional science and traditional knowledge. We contend that this needs to be implemented now in order to respond to climate change challenges, as well as to fulfil Canada's international and domestic legal obligations.

In international law, we have finally entered the 'era of consent' when it comes to access to traditional knowledge of indigenous peoples and, to a certain degree, access to resources on their traditional lands. Arriving at this point was a long road, moving away from the perspective that indigenous peoples had no rights in their traditional territories to the concept of consultation. For example, the International Labour Organization went through several restatements to protect indigenous people, all of which were focused on integration of indigenous people without the possibility of self-determination, before arriving in 1989 to the Convention Concerning Indigenous and Tribal Peoples in Independent Countries.⁵⁸ This Convention states that 'the rights of ownership and possession of the peoples concerned over the lands which they traditionally occupy shall be recognised',⁵⁹ and Article 15 provides that the rights of people 'to the natural resources pertaining to their lands shall be specially safeguarded', including the right 'to participate in the use, management and conservation of these resources', the sharing of benefits and receiving 'fair compensation' for damages.⁶⁰ Furthermore, Article 2 gives governments the 'responsibility for developing, with the participation of the peoples concerned, co-ordinated and systematic action to protect the rights of these peoples and to guarantee respect for their integrity',⁶¹ and Article 7 declares that parties shall 'take measures, in co-operation with the peoples concerned, to protect and preserve the environment of territories they inhabit'.⁶²

The Convention on Biological Diversity⁶³ (CBD) was a turning point in the struggle to recognize the value of indigenous traditional knowledge with regards to conservation and the management of natural resources especially genetic diversity. We find this acknowledgement in the preamble:

Recognizing the close and traditional dependence of many indigenous and local communities embodying traditional lifestyles on biological resources, and the desirability of sharing equitably benefits arising from the use of traditional

⁵⁵ Statistics Canada, 'Aboriginal Peoples in Canada: First Nations People, Métis and Inuit: National Household Survey, 2011' (Statistics Canada, 2013), found at: <<http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-011-x/99-011-x2011001-eng.pdf>>.

⁵⁶ *Ibid.*

⁵⁷ For a discussion on the importance of traditional knowledge for the sustainable development of indigenous communities, see K. Koutouki, 'A Legal Placebo: The Role of International Patent Law in the Protection of Indigenous Traditional Knowledge of Medicinal Plants', 26:1 *Canadian Intellectual Property Review* (2010), 19.

⁵⁸ International Labour Organization Convention Concerning Indigenous and Tribal Peoples in Independent Countries (Geneva, 27 June 1989; in force 5 September 1991).

⁵⁹ *Ibid.*, Article 14.

⁶⁰ *Ibid.*, Article 15.

⁶¹ *Ibid.*, Article 2.

⁶² *Ibid.*, Article 7.

⁶³ Convention on Biological Diversity (Rio de Janeiro, 5 June 1992; in force 29 December 1993).

knowledge, innovations and practices relevant to the conservation of biological diversity and the sustainable use of its components.⁶⁴

However, by far the most important element in the CBD is the validation of indigenous traditional knowledge in Article 8 (j), which calls on parties to

maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.⁶⁵

This recognition of the value of indigenous traditional knowledge in a legally binding instrument changed the conversation from the regulatory requirement to consult to the need for free and prior informed consent of traditional knowledge holders. The Nagoya Protocol expanded on the concept of benefit sharing found under the CBD to include FPIC. Article 7 of the Protocol states:

in accordance with domestic law, each Party shall take measures, as appropriate, with the aim of ensuring that traditional knowledge associated with genetic resources that is held by indigenous and local communities is accessed with the *prior and informed consent* or approval and involvement of these indigenous and local communities, and that mutually agreed terms have been established.⁶⁶

The Nagoya Protocol, which came into force in October 2014, expanded on the CBD provisions with regard to FPIC and mutually agreed terms. Both were reserved mostly for States, but the Nagoya Protocol made them available directly to indigenous communities and indigenous traditional knowledge holders. Hence, in applicable circumstances, an individual or entity wishing to access genetic resources or traditional knowledge regarding genetic resources on indigenous territories must do so with the FPIC of the knowledge holders, not just that of the State, and the access must be on mutually agreed terms with the knowledge holders.

The importance of this for biological diversity and natural resource management is considerable when we accept the key role that indigenous communities play in the creation of biodiversity and in the sustainable management of natural resources. According to Oguamanam:

By some accounts well over 70 per cent [*sic*] of global biological or genetic resources are located in indigenous and local communities across the globe. These communities are the centres of global biodiversity. Analysts find a correlation

between biological diversity and cultural diversity. Hence, centres of biological diversity are also centres of cultural and epistemic diversity. For many indigenous and local communities, dealings with biological resources constitute a fundamental reality of their lived experience. These dealings are a site for the exploration of community knowledge and innovation systems, and for practical translations of the community's world view and cultural expressions. Despite the excessive romanticism prevalent in many of the narratives of indigenous and local communities' relationship with biological resources, it is undeniable that such relationships are premised on the imperative for a sustainable ecological order.⁶⁷

We note that beyond the positive impact that indigenous resource management techniques have on biological diversity, we also need to acknowledge the epistemic diversity that these knowledge systems represent. This epistemic diversity can be supported and further developed by inclusive education that draws on both conventional and indigenous knowledge acquisition systems. This heightened understanding can impact considerably the capacity of the Inuit to participate in the public policy concerning their traditional territories and Canada as a whole. Validation of Inuit epistemic diversity would not only reinforce community pride but could also contribute to establishing FPIC as a fundamental part of any interaction with the Inuit.

FPIC as an international legal principle of fundamental importance to indigenous rights was further elaborated and developed in the UNDRIP.⁶⁸ UNDRIP Articles 10, 11, 19, 29, 30 and 32 require the inclusion of FPIC in negotiations regarding land, culture, property, resources, and conservation. As Cowan states, 'a significant development throughout UNDRIP . . . is the widespread use of related terms including "free, prior and informed consent," "consultation and cooperation," "partnership" and "active involvement." This pattern extends participation beyond the political sphere, providing for close involvement in decision-making across all areas of engagement between states and Indigenous.'⁶⁹ The importance of FPIC for the broad participation of indigenous peoples in the public policy area cannot be underestimated. This is especially true when we accept the fact that for most indigenous peoples, science, religion and culture are not separate notions.⁷⁰

⁶⁴ *Ibid.*, preamble.

⁶⁵ *Ibid.*, Article 8(j).

⁶⁶ Nagoya Protocol, n. 27 above, Article 7 (emphasis added).

⁶⁷ C. Oguamanam, 'Genetic Resources & Access and Benefit Sharing: Politics, Prospects and Opportunities for Canada after Nagoya', 22:2 *Journal of Environmental Law and Practice* (2011), 87, at 89.

⁶⁸ J. Weddle, 'Navigating Cultural Resources Consultation: Collision Avoidance Strategies for Federal Agencies, Energy Project Proponents, and Tribes', 60 *Rocky Mountain Mineral Law Sixtieth Annual Institute* (2014).

⁶⁹ A. Cowan, 'UNDRIP and the Intervention: Indigenous Self-Determination, Participation, and Racial Discrimination in the Northern Territory of Australia', 22:2 *Pacific Rim Law and Policy Association* (2013), 247, at 262.

⁷⁰ R. Samson, 'Protecting Traditional Knowledge as Cardinal Technology in the Philippines', 49 *Les Nouvelles* (2014), 192, at 193.

To understand Inuit priorities with regard to the use of resources on their territory, we need their participation. FPIC provides a minimum security to the Inuit knowledge holders to share their vision with policy makers. According to Barry-Pheby, FPIC

is a fundamentally important concept for indigenous peoples. It replaces a potentially passive participation, or consultation, process with one that prevents coercion and demands active involvement, alongside the provision of timely comprehensive information, ultimately leading to development consent (or denial). The idea of seeking 'consent' is important to many indigenous peoples because it allows for the potential to veto or alter projects.⁷¹

An effective means of participation would be the inclusion of indigenous knowledge and world views based on FPIC in tertiary education, so that the education system produced indigenous and non-indigenous individuals able to appreciate the validity of different epistemologies and legal orders.

TSILHQOT'IN: THE WATERSHED CASE

Canada was one of four States to vote against UNDRIP.⁷² After several years of campaigning against the Declaration, Canada finally announced its support in 2010.⁷³ Canada's main objection was that FPIC as found in UNDRIP 'was ambiguous and overly broad, and could potentially be interpreted as an absolute veto afforded to Aboriginal communities, especially as it related to natural resource development in Canada'.⁷⁴

The impact on Canadian domestic law of the principle of consent in international law with regard to resource management on indigenous lands and to indigenous traditional knowledge can already be seen in the landmark case of *Tsilhqot'in*, decided in 2014 by the Supreme Court of Canada.⁷⁵ The Tsilhqot'in Nation, a semi-nomadic grouping of six bands, trace their roots in central British Columbia back for centuries. In 1983, British Columbia approved a commercial logging licence on traditional land of the Tsilhqot'in people. The band sought a declaration prohibiting commercial

logging on the land. The claim for Aboriginal title was for 4,380 square kilometres, an area much smaller than the extent of the Tsilhqot'in traditional territory. The federal and provincial governments opposed the title claim. In 1998, Chief Roger William of one of the six bands brought an action on behalf of the Tsilhqot'in against British Columbia and Canada. The territory claimed included areas that Tsilhqot'in's ancestors used for hunting, fishing and other events, far beyond the villages.

In considering a central question in the case, that of consent versus consultation, the Supreme Court of Canada stated that in cases where Aboriginal title is proven, a First Nation has exclusive control over the territory unless the Crown's right to use the land for a greater social or economic need is constitutionally justified. Furthermore, the 'uses must be consistent with the group nature of the interest and the enjoyment of the land by future generations'.⁷⁶ This means that Aboriginal titled land must be used for collective benefit and for the enjoyment of future generations. Hence, the government or industry wanting to pursue development projects on titled Aboriginal land must consider this collective benefit requirement. As a consequence, industry should negotiate permission with the First Nation holding title in order to use the land.

The broad considerations by the Court in cases where Aboriginal title is not yet proven or is in the process of being determined make this case all the more important. In cases of Aboriginal title that is claimed but not proven, the government has the pre-existing duty to consult and compensate. However, duty and compensation grow in proportion to the strength of the claim, as stated by the court in the quote above. Hence the closer to acquiring title, the higher the level of consultation and compensation necessary. Furthermore the Court states that if a project commenced before title, and is unjustifiably infringing of title once proven, then the project may have to be cancelled.⁷⁷ Similarly, legislation enacted pre-title can be deemed non-applicable if it unjustifiably infringes title. For our purposes, the most important part of the decision is the Court's solution to mitigating potential risk of title being proven after the fact, since it makes FPIC virtually universally applicable and not just in cases of proven title. The Court stated that 'governments and individuals proposing to use or exploit land, whether *before or after* a declaration of Aboriginal title, can avoid a charge of infringement or failure to adequately consult by *obtaining the consent* of the interested Aboriginal group'.⁷⁸

The Court has effectively opened the door to the development of a strong consent regime in Canada. By

⁷¹ E. Barry-Pheby, 'Examining the Priorities of the Canadian Chairmanship of the Arctic Council: Current Obstacles in International Law, Policy, and Governance', 25:2 *Colorado Natural Resources, Energy and Environmental Law Review* (2014), 259, at 273.

⁷² Canada, Australia, New Zealand and the United States.

⁷³ Government of Canada, 'Canada's Statement of Support on the United Nations Declaration on the Rights of Indigenous Peoples' (12 November 2010), found at: <<http://www.aadnc-aandc.gc.ca/eng/1309374239861/1309374546142>>.

⁷⁴ A. Pike and S. Powell, 'International Comparison of Solutions to Aboriginal Rights Issues Associated with Mineral Development: Free, Prior and Informed Consent – The Canadian Context', 20B *Rocky Mountain Mineral Law Foundation* (2013).

⁷⁵ *Tsilhqot'in Nation v. British Columbia*, 2014 SCC 44.

⁷⁶ *Ibid.*, at paragraph 88.

⁷⁷ *Ibid.*, at paragraph 92.

⁷⁸ *Ibid.*, at paragraph 97 (emphasis added).

stating that the only legally safe way to proceed with any activity on Aboriginal land, pre- or post-title, is by consent, there is a significant burden placed on the government or individuals to demonstrate why they felt consent was not necessary in a particular case and chose to simply consult. We should note that this case was decided in 2014; we need to see how it will be interpreted in the future and what exact meaning will be given to the concept of 'consent' and to the government's right to override Aboriginal rights in the name of a greater social or economic need. The same can be said of the Nagoya Protocol, which only came into force in late 2014, and UNDRIP, which is comparatively a new international legal instrument. However, according to Gilbert and Doyle, 'an interpretation of the Declaration that justifies derogations from the requirement to obtain FPIC on the basis of such arguments could therefore lead to a shift in the burden of proof away from the state and onto indigenous peoples in a manner that is incompatible with the spirit and intent of the Declaration'.⁷⁹

This is exactly why indigenous public participation is so vital. Given the extensive participation of indigenous people in the creation of the Declaration, there is a long history of the impact of their priorities and perspectives on the content of the Declaration and it will be hard to interpret the 'spirit and intent of the Declaration' as anything other than empowering indigenous people. Coates and Mitchell make this point by stating that 'UNDRIP is an international governance vehicle with the potential to strengthen the collective action of an ever increasing international community of Indigenous peoples as they shift from global aspiration to local realization of their rights to autonomy, self-determination, and cultural survival'.⁸⁰ In the same line of thought, the law firm First Peoples Law, specializing in duty to consult cases, states that in the *Tsilhqot'in* case, 'the Supreme Court has handed all Indigenous people a mighty victory – now is the time to see that the promise is realized'.⁸¹

The international and Canadian domestic legal regimes have taken a clear direction toward the requirement of the FPIC of indigenous people, especially where access to, and management of, natural resources found on

their territories and their traditional knowledge is concerned.⁸² History tells us that the external management systems do not respond to the needs of indigenous communities and that traditional ecological knowledge represents a key element to the understanding and management of such ecosystems.⁸³ It becomes apparent that the education system needs to realize that paying lip service to traditional knowledge, world views and legal orders through scholarly papers is not enough. Tertiary education programmes need to broaden their scope and include the participation of indigenous knowledge holders in the creation of inclusive programmes that produce scholars capable of understanding the needs of indigenous communities and the ecosystems in which they live, since they are part of the ecosystem and vice versa.⁸⁴ Therefore, ecosystem data reinforces the need for indigenous peoples' participation in climate change adaptation and natural resource management based on their evolving legal rights. Similarly, stronger legal rights for the Inuit mandate access to information that will allow for their full participation in adaptation and management strategies. Data on the marine ecological footprint of their territory provides such information that can be compared to and/or incorporated into their traditional knowledge to better understand and manage the variables associated with climate change.

This type of understanding can only improve the capacity of indigenous people to participate more effectively in their own food security. This is all the more important when the discussion concerns climate change and the impact it is having on natural resources that are vital to the health, culture and economy of indigenous peoples, such as fish stocks in the Arctic. At the heart of any climate change strategy is first and foremost traditional knowledge received with the FPIC of the knowledge holders, as made clear by UNDRIP and the *Tsilhqot'in* case. Nijar reinforces this point by stating that 'these knowledge systems have fed, clothed, and healed the world. They may yet hold the key to dealing with the risks posed by climate change. Yet today they are in danger of being marginalized'.⁸⁵

We argue that the opposite is needed: not marginalization but emancipation. The clear validation of traditional knowledge by forming a generation whose

⁷⁹ J. Gilbert and C. Doyle, 'A New Dawn over the Land: Shedding Light on Collective Ownership and Consent', in: S. Allen and A. Xanthaki (eds.), *Reflections on the UN Declaration on the Rights of Indigenous Peoples* (Hart, 2011), 289, at 319.

⁸⁰ K. Coates and T. Mitchell, 'UNDRIP: Shifting from Global Aspiration to Local Realization' (22 August 2013), found at: <<https://www.cigionline.org/blogs/rise-of-fourth-world/undrip-shifting-global-aspiration-local-realization>>.

⁸¹ First Peoples Law (2015), found at: <<http://www.firstpeopleslaw.com/public-education/publications.php#read-online>>. This trend seems to hold true for regional legal regimes as well. See T. Antkowiak, 'Rights, Resources, and Rhetoric: Indigenous Peoples and the Inter-American Court', 35:1 *University of Pennsylvania Journal of International Law* (2014), 113.

⁸² K. Carpenter, 'Indigenous Peoples and the Jurisgenerative Moment in Human Rights', 102 *California Law Review* (2014), 102.

⁸³ P. Wieland and T. Thornton, 'Listening to (Some) Barking Dogs: Assessing Hernando De Soto's Recipe for the Development of the Amazon Natives of Peru', 30 *Harvard Journal on Racial and Ethnic Justice* (2014), 131.

⁸⁴ A. Dussias, 'Room for a (Sacred) View? American Indian Tribes Confront Visual Desecration Caused by Wind Energy Projects', 38:2 *American Indian Law Review* (2014), 333.

⁸⁵ G.S. Nijar, 'Traditional Knowledge Systems, International Law and National Challenges: Marginalization or Emancipation?', 24:4 *European Journal of International Law* (2013), 1205, at 1205.

education includes traditional knowledge and FPIC as a fundamental part of Canadian culture. Only then will public policies concerning climate change adaptation in the Arctic be able to reflect the priorities of all those concerned.⁸⁶

CONCLUSION

The climate and the distances between Arctic communities, together with underdeveloped infrastructure and economy, represent challenges to the local population, policy makers, scientists and others working or living in the region. Climate change adaptation needs to be considered in the context of fundamental rights, cultural survival and resource impacts.⁸⁷ For example, this article demonstrates the significance of marine traditional food as the per capita caloric potential of the harvest from the sea. The collection and use of fisheries and ecosystem data appears to be a growing priority, even more so since offshore resource extraction is becoming increasingly common.⁸⁸ Climate change adaptation strategies need this type of data to make sound decisions, but this data alone is not enough. This data needs to be analysed within traditional knowledge parameters to provide a more complete picture of the issues surrounding fisheries catches. Finally, this traditional knowledge must be incorporated with the FPIC of indigenous traditional knowledge holders to ensure accuracy and legitimacy.

Establishing a form of university-level ethnoecology programming for resource management in the Arctic could reverse the dominance of non-Inuit in Arctic marine affairs through expertise development, or at the very least expose non-Inuit to Inuit world views. Canada's acceptance of the Nagoya Protocol and UNDRIP, in conjunction with the *Tsilhqot'in* case, affirm the right of Inuit people to FPIC when it comes to the use and management of natural resources on

their territories as well as their traditional knowledge. The complexity of data collection such as marine system analysis requires a level of ecological training beyond that of current college programmes. This level of education requires collaboration between critical resource science and the traditional knowledge or IQ of the Inuit people. This collaboration is becoming essential if the legal rights of indigenous peoples are to be respected. This article further points to the social, cultural, spiritual, nutritional, economic and justice links between the Inuit and these resources; links that cannot be fully understood without Inuit IQ and public participation.

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⁸⁶ Even in the United States, there are strong arguments to move from consultation to consent. See N. Fromherz, 'From Consultation to Consent: Community Approval as a Prerequisite to Environmentally Significant Projects', 116 *West Virginia Law Review* (2013), 109.

⁸⁷ R. Abate, 'Commonality among Unique Indigenous Communities: An Introduction to Climate Change and its Impacts on Indigenous Peoples', 26:2 *Tulane Environmental Law Journal* (2013), 179.

⁸⁸ B. Baker, 'Offshore Oil and Gas Development in the Arctic: What the Arctic Council and International Law Can – and Cannot – Do', 107 *American Society of International Law Proceedings* (2013), 275.