

# **LINKING TRADITIONAL ECOLOGICAL KNOWLEDGE AND WESTERN SCIENCE: ABORIGINAL PERSPECTIVES FROM THE 2000 STATE OF THE LAKES ECOSYSTEM CONFERENCE**

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## **Abstract / Résumé**

The development of a lasting positive interface between Western science and Aboriginal Traditional Ecological Knowledge (TEK) is required if TEK is to have practical application in the resolution of global environmental problems. Aboriginal recommendations for “co-existence” have yet to be implemented, but are increasingly relevant as ecological crises worsen.

Il faut mettre au point une interface durable et positive entre la science occidentale et le savoir écologique traditionnel autochtone si l'on espère que ce dernier ait des applications pratiques en vue du règlement de problèmes environnementaux de portée mondiale. On n'a pas encore donné suite aux recommandations des Autochtones en faveur de la « coexistence », mais celles-ci deviennent de plus en plus pertinentes au fur et à mesure que s'aggravent les crises écologiques.

## **Introduction**

The debate over how best to combine Aboriginal “Traditional Ecological Knowledge” (TEK) and Western science in efforts to move towards global environmental sustainability, though now well over a decade old, continues to be contested as hotly as ever (McGregor 2004a, b; Agrawal 2002, Nakata 2002). Part of the reason for both the intensity of the discussion and the time required for the achievement of positive results stems from the fact that, much as it might be easier if the debate could remain a purely academic one, it has quickly become apparent that this is in fact a highly political subject. While numerous researchers have attempted to “study” Aboriginal people and their knowledge, Aboriginal people have not settled for this, demanding instead that they become full partners in decision-making processes (McGregor 2000a). The political ramifications of leveling the playing field between Aboriginal and non-Aboriginal parties (including the settlement of land claims and related issues) will take many more years to become clear. In the meantime, however, both regional and international resource management interests such as the Ontario Ministry of Natural Resources and the German-based Forest Stewardship Council have recognized the moral as well as the pragmatic need for establishing mutually beneficial relationships between Aboriginal and non-Aboriginal organizations and have begun to require evidence of such relationships and resulting agreements as part of forest management planning processes (FSC 2003, McGregor 2000a). What has yet to be achieved on any significant scale, however, is a fully operational, mutually beneficial system whereby both Western science and TEK are utilized to their full potential in sustainable resource management planning and operation. This is due in part to the political issues alluded to above. As well, though some non-Aboriginal scholars have downplayed the differences between the knowledge systems of Western science and TEK (Agrawal 1995, Tsuji and Ho 2002), there is, particularly from an Aboriginal viewpoint, an increasing realization that Aboriginal and Western world views are in general too disparate to simply integrate parts of one into the other (Deloria 1995). Although integration has been tried on numerous occasions (Nadasdy 1999), Aboriginal knowledge loses its meaning when disconnected from its original context and applied within a Western scientific setting (Agrawal 2002). Aboriginal knowledge is a “package deal”; it comes complete with its original holders, without which it cannot properly function. Aboriginal people must therefore be given a strong (equal in value to non-Aboriginal perspectives) voice in resource management decision making if we expect TEK to play a meaningful role in guiding resource management operations.

The question then becomes one of how to utilize both TEK and Western science in a sustainable resource management planning process. This paper offers a summary of views from Aboriginal environmental professionals on this issue. These professionals assembled as part of the State of the Lakes Ecosystem Conference (SOLEC) 2000, held in Hamilton, Ontario. Their task was to develop recommendations on how TEK and Western scientific processes might appropriately begin to be applied in conjunction with each other. While the recommendation made at that time were developed specifically for Environment Canada, they are relevant to a wide variety of resource management settings. SOLEC 2000 was the first of the SOLEC gatherings to formally include Aboriginal participation in its agenda. Now, eight years later, significant movement on the issues raised by these professionals has yet to be realized in either the SOLEC process or in other resource management forums across Canada. The views expressed at SOLEC 2000 are at least as relevant today as they were then, and it seems necessary to present them again here in order that they be viewed with a renewed sense of importance.

At SOLEC 2000, Aboriginal participation was achieved through the involvement of a Native Elder and six "Native Environmental Professionals" throughout the conference. In addition to a wealth of experience working with Aboriginal communities, each of these professionals had formal education and training in environmental studies, biology, environmental science, and/or environmental engineering. As Aboriginal community representatives trained in one or more areas of Western science, they were uniquely positioned to explore and comment on the potential application of TEK to the SOLEC process. The organizations represented by the Aboriginal participants included the EAGLE (Effects on Aboriginals from the Great Lakes Environment) Project, the Six Nations Environmental Management Committee, the Haudenosaunee Environmental Task Force, the Trent University Department of Native Studies, and Nin-Da-Waab-Jig of Bkejwanong Territory (Walpole Island). In addition to participation by these professionals, specific workshop presentations were made by First Nations representatives. As well, a First Nations-only caucus session was conducted to discuss TEK and Aboriginal involvement in the conference.

The goal of Aboriginal involvement in SOLEC was, and continues to be, the development of a process which facilitates the utilization of Aboriginal Traditional Ecological Knowledge (TEK) in SOLEC initiatives. This goal necessitates the establishment and maintenance of positive, long-term and mutually beneficial working relationships between Aboriginal peoples and the SOLEC organizers. While the original focus was on spe-

cific First Nations and government agencies, it is intended that the relationship-building strategies discussed here will be shared with and hopefully used by representatives from other jurisdictions on both sides of the Canada/US border.

With the help of the Aboriginal representatives, I documented their views on the conference itself as well as on various Great Lakes protection initiatives. What follows, then, is a summary of the Aboriginal views presented at that conference and in response to what Aboriginal representatives witnessed at the conference itself.

Prior to listing the First Nations recommendations, this document presents a series of discussions which both place the recommendations in context and provide a rationale for their inclusion. Initially, a brief history of the SOLEC process is offered. This is followed by discussions of the nature of TEK and the barriers which currently exist in applying it to environmental management initiatives. This in turn is followed by a summary of observations made of the SOLEC process by the Native environmental professionals who attended SOLEC 2000. These observations focus primarily on areas for improvement vis-a-vis Aboriginal involvement in SOLEC. The idea of “co-existence” as a solution to current shortcomings is then presented. Finally, a list of recommendations intended to bring about a partnership based on principles of co-existence is offered.

### **A Brief History of SOLEC**

The discussion below focuses on what SOLEC currently achieves and aims to achieve, with a view to broadening that scope to include First Nations and TEK. Unless otherwise stated, information on the history and achievements of SOLEC is taken from Environment Canada Web Pages (Environment Canada 2000a and 2000b, and Environment Canada and USEPA 2000. For related information see Environment Canada 2004 and 2000c.).

The SOLEC process is a direct result of the Canada/US Great Lakes Water Quality Agreement (GLWQA), first signed in 1972 and updated in 1978. This agreement commits both countries to controlling pollution in the lakes and reducing the amount of new pollution entering the system via industrial and community wastewater. Specifically, the agreement's aim was, “to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem” (Environment Canada 2000a, 1). As part of the implementation of these goals, the “1987 Protocol” was signed in order to establish Remedial Action Plans (RAPs) and Lakewide Management Plans (LaMPs). RAPs are developed to address identified Areas of Concern (originally 43 AOCs were

identified; 42 remain on the list) on an ecosystem basis and involving the local community. RAPs deal with “nearshore” waters and include lands along the shore while LaMPs focus on the reduction of critical pollutants in the open waters of the Great Lakes. The International Joint Commission (IJC), originally set up to resolve disputes over water use between Canada and the US as part of the 1909 Boundary Waters Treaty, is now responsible for overseeing and evaluating the progress of both countries towards meeting the goals of the GLWQA.

The SOLEC process was thus established as a way of monitoring such progress from a biochemical and biophysical standpoint. Hosted jointly by the United States Environmental Protection Agency (USEPA) and Environment Canada (EC), the bi-annual conference brings together representatives from government as well as the private sector and non-profit organizations whose work and decisions affect the Great Lakes. These representatives then exchange “information on the ecological condition of the Great Lakes and surrounding lands” (Environment Canada and USEPA 2000, 1).

A “State of the Great Lakes” report is produced in the year following each conference and provides an ecological update for the entire Great Lakes Basin. The status of ecological conditions, including human health, is the key focus of SOLEC and the State of the Great Lakes reports; other conferences and reporting methods are used to monitor and evaluate the Great Lakes programs aimed at improving these conditions (select SOLEC at Environment Canada’s Great Lakes Home Page, <http://www.ec.gc.ca/greatlakes>, for a series of reports).

### **SOLEC and TEK: A SOLEC 2000 Initiative**

Missing from the earlier SOLECs was the input of those who have the closest ties to and are most directly affected by the Great Lakes Basin and the ecological conditions within it. These people are the members of the 63 First Nations in Canada as well as the Tribes in the United States situated within the Great Lakes Basin, few of whom have had any prior dealings or involvement with the SOLEC process. The SOLEC 2000 organizers recognized that not only was this an injustice to First Nations, but that non-Native scientists and decision-makers involved in SOLEC were missing out on the potentially invaluable contribution of those who collectively held thousands of years of knowledge and understanding of the Great Lakes ecosystem. This knowledge, often referred to as Traditional Ecological Knowledge, or TEK, has allowed Aboriginal peoples to live, prosper from, and contribute to the Great Lakes ecosystem for countless generations, and could provide valuable insight as to how current society might reestablish more harmonious ways

of relating to the lands and waters of the area.

The approach to establishing a partnership between TEK and Western science in the work of SOLEC was originally one of integration or incorporation of TEK into the existing process. As the discussion below indicates, however, the disparate natures of TEK and Western science make this infeasible. Instead, an alternate model for applying TEK to Great Lakes issues is proposed.

## **Background to TEK**

### **The Semantics of TEK**

The field of Traditional Ecological Knowledge (TEK) and its potential use in resource and environmental management has emerged relatively recently in Canada. In spite of rapid development and burgeoning areas of research, the state of TEK research and application remains largely unsatisfactory from an Aboriginal perspective (AFN 1995, McGregor 2004a, Roberts 1996, Stevenson 1999). This is due primarily to the fact that TEK, from its definition to its utilization, has been for the most part controlled by interests external to the Aboriginal communities from which it originates (AFN and ICC 1991, McGregor 2000b, Nakata 2002,). TEK has therefore not yet realized its potential in Canadian environmental management regimes, although there are a few noteworthy exceptions (see, for example, Lickers 1997a).

One major criticism of the TEK field as it stands is the use of the term "TEK" itself (Berkes 1999, WIPO 2000). The term originates from Western academia, rather than from Aboriginal communities themselves. Many Aboriginal people object to the use of the term TEK to describe their knowledge systems. This is in part because the term TEK as it is used tends to connote a false homogeneity of knowledge across the diverse nations and cultures of Aboriginal people. As well, each of the words "traditional," "ecological," and "knowledge" limits this form of understanding in many significant ways. For example, "traditional" implies that the knowledge is static and confined to information gained in the past. In reality, this form of knowledge is continually evolving and expanding to incorporate new information as part of adapting and responding to current challenges. "Ecological" (sometimes "environmental" is used) limits TEK to a field of study defined by Western science. TEK, from a Native viewpoint, is a holistic form of understanding, encompassing all areas of human existence. As will be discussed further below, specific components such as "ecology" cannot appropriately be separated out. Even the use of "knowledge" as a descriptor for this form of understanding is problematic, as Native people tend to describe TEK as more of a "way of life" than something which can be concisely de-

scribed or written down (LaDuke 1999, McGregor in press). This also will be discussed in more detail below.

The search for alternate terms for TEK is difficult, however, given the holistic nature of this form of understanding. Any term which is given to it tends to limit it in some way. Nevertheless, various alternatives have been proposed. Among these are “Traditional Knowledge,” “Ethno-Science” and “Indigenous Knowledge” (Deloria 1992, Grenier 1998, Wolfe et al 1992). For the purposes of the SOLEC 2000 gathering itself, the term “Naturalized Knowledge Systems” (NKS) was used, as described by Henry Lickers (1997b).

For the moment, TEK continues to be the most widely used and recognized term in discussions on the subject. For that reason, it will also be the term used in this report, although its limitations have been noted. Perhaps a more all-encompassing term will come to replace TEK in the future.

### **What is TEK?**

As reflected in the debate over the title itself, there is considerable controversy in the field of TEK as to exactly what is referred to when one uses the term or its alternatives. Not surprisingly, Aboriginal and non-Aboriginal people hold contrasting views on what the concept actually entails. Academics and Western-trained researchers generally view TEK as a “body of knowledge,” with a strong bias towards labeling it as a product or commodity (see e.g. Berkes 1993 and 1999, Johnson 1992, Nakashima 1993). The following quotes indicate this Western academic view of TEK as a *noun*, something whose boundaries can be readily delineated and which can be packaged for general consumption. According to Berkes (1999, 8) TEK is:

...a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living things (including humans) with one another and with their environment.

According to Nakashima (1993, 99), TEK is simply, “the knowledge of Native people about their natural environment.”

From an Aboriginal viewpoint, TEK is conceptualized as both more than and different from Western definitions. Native understandings of TEK tend to focus on *relationships* between knowledge, people, and all of Creation (the “natural” world as well as the spiritual). TEK is viewed as the process of *participating* (a *verb*) fully and responsibly in such relationships, rather than specifically as the knowledge gained from such experiences. For Aboriginal people, TEK is not just about understand-

ing relationships, it *is* the relationship with Creation. TEK is something one *does* (LaDuke 1999, McGregor 2004a).

Equally fundamental from an Aboriginal perspective is that TEK is *inseparable from the people who hold it* (AFN 1995, Roberts 1996). As stated by Roberts (1996, 115), "Capturing a single aspect of traditional knowledge is difficult. Traditional knowledge is holistic and cannot be separated out from the people. It cannot be compartmentalized like western scientific knowledge."

This means that, at its most fundamental level, one cannot ever really "acquire" or "learn" TEK without having undergone the experiences originally involved in doing so. This being the case, the only way for TEK to be utilized in environmental management is to involve the people, the TEK holders. This is a process which has not yet received sufficient attention. The field to date has focused more on gathering and documenting, using social science methods, those aspects of the knowledge base that are considered of value to external non-Native interests. These TEK fragments, where they are used at all, are frequently applied with minimal if any Aboriginal involvement. From an Aboriginal view, such misappropriation of TEK is disrespectful and potentially dangerous (Lickers in Lukey 1995). Once separated from its original holders, TEK loses much of its original value and meaning. Moreover, there are no guarantees that the controls that once came with the knowledge to keep it safe as well as useful will still be applied.

Concepts of TEK are gradually changing as more Aboriginal people gain a voice in the environmental arena. For example, it can be seen internationally at least that TEK, in addition to referring to knowledge, has also come to include (in conceptual terms if not in practice) the innovation, creation, and transmission of TEK (see Grenier 1998, RAFI undated, WIPO 2000).

### **Barriers to TEK Use: Hurdles to be Overcome by SOLEC**

The divergence of Western from Aboriginal views on TEK has had a huge impact on how TEK is "gathered," "documented," and then "applied" in resource and environmental management. "Accepted" tools for working with TEK are derived from the Western scientific tradition, especially in terms of its acquisition. This has led to a host of other problems, including the issue of intellectual property rights (see WIPO 2000). Many barriers thus exist to the effective use of TEK (see Berkes 1999, Freeman 1993, Johnson 1992, Nadasdy 1999, Stevenson 1999, and Wolfe et al 1992 for discussions). Three main problems of importance to SOLEC are noted briefly below:

- Aboriginal peoples are not accorded sufficient *meaningful par-*



*ticipation* in studies and other work which should and in some cases does attempt to use TEK. As TEK is not separable from the people, the meaningful involvement of the people is necessary in order to utilize TEK in environmental work.

- Aboriginal people and their knowledge are viewed as *objects* suitable for *study* rather than as *people* for *working with*. It is time to begin building positive long term relationships with Aboriginal people rather than simply studying them and their knowledge at the mercy of project-by-project funding.
- Aboriginal people have little *control* over how the knowledge they share will be used. Such knowledge can be (and has been) used against its original holders at a later date or otherwise misused. Again, meaningful involvement of Aboriginal people is required for TEK to be implemented effectively.

In general terms, it is important to realize that the work of SOLEC is designed and undertaken using Western science-based frameworks and paradigms. Adherence solely to this framework is a significant barrier to the use of TEK. SOLEC has a particular focus on bio-physical and biochemical information. In more recent years, however, SOLEC has broadened its scope to include wider views of the Great Lakes ecosystem. This understanding is reflected in its development of “societal indicators” of ecosystem health. This broadening of focus represents a significant opportunity for Aboriginal people in expanding the concept of what constitutes a healthy ecosystem. Aboriginal people have a holistic understanding of the environment and ecosystems. One of the main strengths of their knowledge systems lies in a balanced approach that automatically includes societal aspects as part of the ecology of relating to Creation. This balanced approach, taken for granted for millennia by Aboriginal people, is just beginning to be recognized and explored by the Western scientific community.

The barriers confronted by TEK on the interface with Western-derived environmental management will pose challenges for SOLEC in its attempts to involve Aboriginal people. However, there are also many opportunities for the meaningful participation of Aboriginal people and their knowledge, and SOLEC has made use of one of these through its inclusion of an Aboriginal agenda in the year 2000 conference.

### **TEK and SOLEC: Why the Status Quo Won't Work**

The Native environmental professionals who attended SOLEC 2000

made a number of observations based on their experience at the conference. These observations, which serve as an informal evaluation of the SOLEC process from an Aboriginal perspective, are summarized below. Before proceeding with these observations, however, it should be recognized that little if any success has been achieved in addressing these issues in the subsequent SOLECs (2002 and 2004), both of which I participated in. If anything, Aboriginal participation in the process since 2000 has decreased. At the 2004 SOLEC, while there were a number of Aboriginal participants, there were no longer any plenary sessions or workshops specifically relating to Aboriginal issues or TEK. The issues highlighted below, therefore, all remain outstanding.

### **Lack of Aboriginal Representation**

Aboriginal representation at SOLEC was seen to be lacking in the following ways:

- given that there are sixty-three First Nations in the Great Lakes Basin in Canada alone, the handful of Native people who attended SOLEC 2000 is not representative of Aboriginal concerns
- those Native people who were present were not necessarily TEK holders
- the range of Aboriginal interests represented was minimal in comparison with the range of non-Native interests represented

### **Exclusion of First Nations Interests**

Response to the, albeit limited, Native presence at SOLEC 2000 was felt by participants to be frequently less than welcoming. During workshops presented by non-Native researchers, environmental agency staff seemed unaware of the potential value of Aboriginal contributions to the process. Non-Native researchers appeared too ready to dismiss Native concerns raised, and seemed to have little experience working with Aboriginal people. Non-Native presenters seemed to assume sole ownership of specific aspects of the SOLEC process such as indicator selection, and sometimes became defensive when challenging questions were raised by Native participants. The Native participants agreed that little can be accomplished until a greater respect is afforded TEK and Aboriginal input.

### **Lack of Trust**

A level of trust sufficient to make Elders and other TEK holders comfortable sharing their knowledge does not yet exist between First Nations and various government agencies. This problem is made worse by continuing power imbalances between Canadian/American and First

Nation governments.

### **Indicator Selection**

While participants stated that the indicator selection process had been well done insofar as it went, they identified the following key problems:

- exclusion of Aboriginal input into the existing indicator set (see discussion above) or possibly into a separate parallel set designed by First Nations people
- lack of consideration of atmospheric sources of Great Lakes contamination
- focus on end-point monitoring instead of on source monitoring and control, which raises such issues as end-point safety standards (e.g. levels of contamination in fish considered safe for human consumption) which are based on non-Native populations with much lower rates of fish consumption than found in Aboriginal populations
- focus on monitoring delays the need to exercise political will to act on pollution sources.

### **SOLEC: A Process Already Underway**

As with the indicator selection process, the Native participants observed little room for Aboriginal ownership of any significant aspect of SOLEC. TEK is being approached as an “add-on,” to be “incorporated” or “integrated” into the existing Western scientific framework. For reasons discussed earlier, this will not lead to successful TEK application in SOLEC.

### **Biodiversity Investment Areas (BIAs)**

The philosophical dilemma was raised concerning the decision to effectively classify one area as more important than another, when the health of any area depends upon the health of all the others. Still, many First Nations participants expressed interest in contributing to BIA projects, especially since many of these more “pristine” areas are located on or near reserves.

### **SOLEC: Potential Benefits to First Nations?**

All Native participants shared the view that the SOLEC process has the *potential* to benefit First Nations, depending on how it is undertaken. First Nations could benefit from increased capacity to carry out Western scientific studies, given that there was an equal respect for Aboriginal knowledge by non-Native researchers.

The above observations provide numerous insights into the difficulties associated with trying to incorporate an entirely different world view in the form of TEK into an existing non-Native framework. In response to this, the Native environmental professionals suggested alternatives involving a more “parallel” process, whereby Native and non-Native undertakings exist separately, yet side-by-side and in partnership with each other. A primary example of this concept is the “co-existence” model, discussed further below.

### **Co-Existence: A New Government - First Nations Relationship**

This topic represents the culmination of the central theme on which this article is based: developing recommendations as to how government agencies on both sides of the Canada/US border can work together with Ontario Great Lakes First Nations (and Tribes in the US) for the long-term sustainability of the Great Lakes basin. All of the Aboriginal representatives agreed that First Nations support the achievement of this goal. They, after all, rely upon a healthy Great Lakes ecosystem as a direct source of food and other resources. The problem is, as was repeated earlier, that the current process has been created without Aboriginal input and therefore leaves little room for Aboriginal viewpoints which challenge the current system. What is proposed, therefore, is that a “co-existence” model replace current efforts to “incorporate” or “integrate” Aboriginal knowledge into a non-Native initiative.

Far from being a new idea, co-existence is a concept that has its roots in the way that numerous First Nations had originally hoped to work with the “newcomers” when they first arrived on this continent. Depicted in the Two-Row Wampum belt of the Haudenosaunee, the concept permits each side to retain its integrity through undertaking its own process according to its own world view. At the same time, the two sides share information and work in partnership on issues of common concern. SOLEC 2000 participant James Ransom, then Director of the Haudenosaunee Environmental Task Force, describes this concept as follows (Ransom in McGregor 2001):

One of the goals of SOLEC 2000 was to establish protocols for the partnership of western science and TEK in the work of SOLEC. A 500-year old treaty between the Haudenosaunee (Six Nations or Iroquois Confederacy) and the Dutch provides a framework for how this partnership can move forward. The Kuswantha, or Two-Row Wampum Treaty belt is made of two rows of purple wampum beads, and these two rows have the spirit of the Haudenosaunee

and Dutch. There are three rows of white wampum beads separating the two purple rows. These three rows symbolize peace (respect), a good mind (equity), and the power of a good mind (empowerment).

The meaning behind the Two-Row Wampum Treaty is that the two purple rows symbolize two vessels traveling down the river together. One, a birch bark canoe, is for the Haudenosaunee. The other, a ship, is for the Dutch. The purpose of this treaty is that both vessels are to travel this river together, side by side, but with each People in their own vessel. The vessels are to help each other from time to time as people are meant to do.

The Two-Row Wampum Treaty is a mutual recognition on the part of the parties that they represent two different societies, as symbolized by the canoe and ship. If you use the intent of this treaty as a metaphor for the SOLEC process, it becomes readily apparent that an opportunity exists for a partnership of TEK and western science. First Nations/Tribes can represent the canoe, and the federal, state, and provincial environmental agencies can represent the ship. Their respective knowledge systems or sciences become tools to help the partnership between Peoples.

The Two-Row Wampum Treaty calls for cooperation between the vessels (helping each other from time to time) to serve a common interest: the river, the natural world. Today, the canoe and ship share a common interest in the SOLEC process, the Great Lakes Basin Ecosystem and the need to restore and maintain it for future generations.

This is a long-term, mutually beneficial relationship, where each side respects the other's world view and their right to live accordingly. Rather than suffering because one side does not follow the ways of the other, each side is enriched by the contrasting perspective that the other brings to any discussion. First Nations are calling for this type of working relationship with government agencies in a variety of settings (e.g. treaties, self-government negotiations, consultation programs). Though an old idea, it offers a model for new and much more positive First Nations/government agency relationships (see Ransom and Ettenger 2001 for more detail).

The Two-Row Wampum belt is supplemented by a later belt, known as the Friendship Treaty belt. The two belts go together, describing different aspects of the relationship. The Friendship Treaty belt depicts two figures holding hands, with the idea being that Native and non-Na-

tive people are linked together, and that it is their responsibility to assist one another as they travel through life together. SOLEC 2000 participant Dan Longboat of the Department of Native Studies at Trent University, describes it this way (Longboat 2000, pers.comm):

...their responsibility is that they never let go of one another, that they always uphold peace, they always uphold friendship and respect for one another. They help one another, almost like family...it's not an adversarial thing, it's not just a peace thing, it's more than that. It's the whole idea of well-being together and that they give mutual support and assistance to one another.

Each people is thus expected to retain its own identity while being strengthened through the support of the other.

Interestingly, international collaboration on Great Lakes issues is originally the result of transboundary treaty agreements between Canada and the US which go back to the 1800s. Unlike the Canada/US treaties which continue to be upheld, treaties with First Nations that stem from that time, such as those depicted in the belts discussed above, are frequently not seen as binding. The move to co-existence will require significant efforts to restore good faith among all parties.

### **TEK and SOLEC: Recommendations for Co-Existence**

The primary purpose of this article is to provide the foundation of a strategy for improving relations between Aboriginal and non-Aboriginal interests in the Great Lakes Basin with the long-term goal of facilitating greater sustainability in the Great Lakes ecosystem. Towards that end, the First Nations representatives at SOLEC 2000 developed a set of recommendations to facilitate the establishment and maintenance of long-term, mutually beneficial relationships. The principles behind these recommendations, though developed at the time for a specific purpose, can guide relationship-building between Aboriginal and non-Aboriginal parties interested in sharing knowledge in a wide variety of circumstances. Key aspects of these recommendations are stated as follows:

- Equitable, long-term and mutually beneficial partnerships should be established between interested Aboriginal and non-Aboriginal parties based on a co-existence model such as that described by the Two-Row Wampum of the Haudenosaunee. Such partnerships would enable the involved parties to share information, including scientific knowledge and TEK, on a mutually beneficial basis.
- Binding instruments such as Memoranda of Understanding

(MoU) should be negotiated to ensure the long-term commitment of all parties and should enshrine the principles of peace, a “good mind,” and strength/empowerment between the committed parties. They should also reflect existing government commitments to principles contained in international agreements, such as Canada’s and the United States’ commitments to the Convention on Biological Diversity, of which Article 8(j) focuses on the importance of:

- preserving and maintaining TEK;
  - promoting TEK’s wider application;
  - involving Aboriginal people in meaningful ways in decision-making processes, and
  - equitably distributing benefits arising from the sharing of TEK.
- Long-term, stable funding sources should be established to ensure the development of First Nations capacity to contribute meaningfully to established partnerships. This will ensure that the best results possible are achieved in all areas and will help to “level the playing field” in terms of information availability.
  - The unique status of First Nations should be recognized in the development and maintenance of partnerships. This includes the need to negotiate on a Nation-to-Nation basis, accounting for the fact that First Nations continue to hold Aboriginal and Treaty rights.
  - Cultural Sensitivity Training Programs be established for government and/or other agency staff who can be expected to come into contact with Aboriginal peoples as part of their official duties. This training should be organized in partnership with First Nations and be delivered by Aboriginal people. Financial resources should be set aside by the respective governments for this training.

## **Conclusions**

While the above recommendations were developed for the specific purpose of defining a new relationship between Great Lakes First Nations and Environment Canada, they can be taken as applicable to any Great Lakes and other First Nations establishing relationships with a variety of Canadian and American government agencies.

In the 8 years since SOLEC 2000, there have been three additional SOLECs (Cleveland in 2002, Toronto in 2004, and Milwaukee in 2006),

and although there has been some progress made in terms of how TEK is considered under the SOLEC process, meaningful First Nations participation remains elusive. Changes in governments in the both the United States and Canada have meant that implementing significant change (and obtaining the steady funding required to do so) has been additionally challenging. However, a key improvement in Great Lakes management, as influenced by the SOLEC process, is the official recognition of Traditional Ecological Knowledge in the 2007 *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem*. This agreement calls for “Science Based Management [to] provide advice to establish management priorities, policies and programs based on best available science, research and knowledge including traditional ecological knowledge” (EC & OMOE 2007). Although it is too soon to see how this agreement will influence practical-level work with First Nations in the Great Lakes Basin, it marks the first time that TEK has been recognized in a joint agreement between Canada and Ontario.

The primary goal of First Nations in the Great Lakes Ecosystem in any case remains the same: the establishment of long-lasting, mutually respectful and mutually beneficial relationships to replace existing ad-hoc and reactionary “consultation” processes. The recommendations listed above, while only a starting point, represent a set of concrete steps which can be taken towards the achievement of this goal. The degree to which this goal is successfully attained will be indicative of the degree to which long term sustainability in the Great Lakes Basin and other resource management arenas is achieved.

### References

- Agrawal, Arun  
 2002 Indigenous Knowledge and the Politics of Classification. ISSJ 173:287-97.  
 1995 Dismantling the Divide Between Indigenous and Scientific Knowledge. *Development and Change* 26:413-39.
- Assembly of First Nations (AFN)  
 1995 The Feasibility of Representing Traditional Indigenous Knowledge in Cartographic, Pictorial or Textual Forms. Ottawa, ON: National Aboriginal Forestry Association and National Atlas Information Service. 39 pp.



- Assembly of First Nations (AFN) and Inuit Circumpolar Conference (ICC)  
1991 Traditional Ecological Knowledge and the Environmental Impact Assessment Process: A Preliminary Research Prospectus. A report for the Canadian Environmental Assessment Research Council. Ottawa, ON: AFN and ICC. 23 pp.
- Berkes, Fikret  
1999 Sacred Ecology: Traditional Ecological Knowledge and Resource Management. Philadelphia, PA: Taylor and Francis. 209 pp.  
1993 Traditional Ecological Knowledge in Perspective. In: Inglis, J. (ed.). 1993. Traditional Ecological Knowledge: Concepts and Cases. Ottawa, ON: International Program on Traditional Ecological Knowledge and International Development Research Centre. pp.1-9.
- Deloria, Vine, Jr.  
1995 Red Earth, White Lies: Native Americans and the Myth of Scientific Fact. Scribner, New York, NY. 286 pp.  
1992 Ethnoscience and Indian Realities. *Winds of Change* 7(3):12-18.
- Environment Canada & Ontario Ministry of the Environment  
2007 2007 Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem. Her Majesty the Queen in Right of Canada & Queen Printer Press for Ontario. Ontario. Pp. 50
- Environment Canada  
2004 Highlights of Accomplishments in the Great Lakes. <http://www.on.ec.gc.ca/greatlakes/default.asp?lang=En&n=7CB9D131-1>  
2000a Great Lakes Water Quality Agreement. <http://www.on.ec.gc.ca/glwqa/facts-e.html>  
2000b SOLEC '98. <http://www.on.ec.gc.ca/solec/solec98-e.html>  
2000c SOLEC 2000. <http://www.on.ec.gc.ca/solec/solec2000-e.html>
- Environment Canada and United States Environmental Protection Agency (USEPA)  
2000 State of the Lakes Ecosystem Conference (SOLEC): What is SOLEC? [http://cfpub.binational.net/solec/intro\\_e.cfm](http://cfpub.binational.net/solec/intro_e.cfm)

## Forest Stewardship Council (FSC)

- 2003 Policy and Standards: FSC Principles and Criteria of Forest Stewardship. [http://www.fsc.org/en/how\\_fsc\\_works/policy\\_standards/princ\\_criteria/5](http://www.fsc.org/en/how_fsc_works/policy_standards/princ_criteria/5).

## Freeman, Milton

- 1993 Traditional Land Users as a Legitimate Source of Environmental Expertise. In: Williams, N., and Baines, G. (eds.). *Traditional Ecological Knowledge: Wisdom for Sustainable Development*. Canberra, ACT: Centre for Resource and Environmental Studies, Australian National University. pp. 153-161.

## Grenier, Louise

- 1998 *Working with Indigenous Knowledge: A Guide for Researchers*. Ottawa, ON: International Development Research Centre. 115 pp.

## Johnson, Martha. (ed.)

- 1992 *Lore: Capturing Traditional Environmental Knowledge*. Ottawa, ON: Dene Cultural Institute and the International Development Research Centre. 190 pp.

## LaDuke, Winona

- 1999 *All Our Relations: Native Struggles for Land and Life*. Cambridge, MA: South End Press. 241 pp.

## Lickers, F. Henry

- 1997a *Perspectives I: Statement to the Chiefs of Ontario Working Group on Nationhood and Sustainability*. In: *Chiefs of Ontario Working Group on Nationhood and Sustainability: Framework Document*. Adopted by Resolution 97/20, Special All Ontario Chiefs Conference, Thunder Bay, Ontario, October 16, 1997. Toronto, ON: Chiefs of Ontario. pp. 29-35.
- 1997b *Can't See the Forest for the Trees: A Native American's Perspective*. In: Baker, N. (ed.). *Biodiversity: Toward Operational Definitions*. The 1995 Plum Creek Lectures. Missoula, MT: School of Forestry, The University of Montana. pp.39-53.

## Lukey, Jackie

- 1995 *Native and Non-Native Perspectives on Aboriginal Traditional Environmental Knowledge*. [unpublished major paper]. Toronto, ON: Faculty of Environmental Studies, York University. 69 pp.

McGregor, Deborah

- In press Traditional Ecological Knowledge: An Anishinabe-Kwe Perspective. *Atlantis Women's Studies Journal Special Issue: "Indigenous Women: State of Our Nations."* Mount St. Vincent University. 12pp.
- 2004a Traditional Ecological Knowledge and Sustainable Development: Towards Co-existence. In: Blaser, M., Feit, H., and McRae, G. (eds). *In the Way of Development: Indigenous Peoples, Life Projects and Globalization*. New York, NY: Zed Books; Ottawa, ON: International Development Research Centre. pp. 72-91.
- 2004b *Coming Full Circle: Indigenous Knowledge, Environment and Our Future*. *American Indian Quarterly* 28(3/4).
- 2001 *Linking Traditional Ecological Knowledge and Solec: Summary and Final Recommendations* [unpublished report]. Toronto, ON: Environment Canada - Ontario Region and Chiefs of Ontario. 25 pp.
- 2000a *From Exclusion to Co-Existence: Aboriginal Participation in Ontario Forest Management Planning*. [doctoral thesis]. University of Toronto, ON. 254 pp.
- 2000b *The State of Traditional Ecological Knowledge Research in Canada: A Critique of Current Theory and Practice*. In: Laliberte, R., Settee, P., Waldram, J., Innes, R., Macdougall, B., McBain, L. and and F. Barron (eds.). *Expressions in Canadian Native Studies*. Saskatoon, SK: University of Saskatchewan Extension Press. pp. 436-458.

Nadasdy, Paul

- 1999 The Politics of TEK: Power and the "Integration" of Knowledge. *Arctic Anthropology* 36(1/2):1-18.

Nakashima, Douglas

- 1993 *Astute Observers on the Sea Ice Edge: Inuit Knowledge as a Basis for Arctic Co-Management*. In: Inglis, J. (ed.). 1993. *Traditional Ecological Knowledge: Concepts and Cases*. Ottawa, ON: International Program on Traditional Ecological Knowledge and International Development Research Centre, pp. 99-110.

Nakata, Martin

- 2002 *Indigenous Knowledge and the Cultural Interface: Underlying Issues at the Intersection of Knowledge and Information Systems*. *IFLA Journal* 28(5/6):281-91.

- Ransom, James and Kreg Ettenger  
2001 'Polishing the Kaswentha': a Haudenosaunee View of Environmental Cooperation. *Environmental Science & Policy* 4:219-228.
- Roberts, Karen  
1996 Circumpolar Aboriginal People and Co-Management Practice: Current Issues in Co-Management and Environmental Assessment. [conference proceedings]. Arctic Institute of North America and Joint Secretariat - Inuvialuit Renewable Resources Committees. Calgary, AB: Arctic Institute of North America, University of Calgary. 172 pp.
- Rural Advancement Foundation International (RAFI)  
undated Conserving Indigenous Knowledge: Integrating Two Systems of Innovation. United Nations Development Programme.
- Stevenson, Marc  
1999 What Are We Managing? Traditional Systems of Management and Knowledge in Cooperative and Joint Management. In: Veeman, T., Smith, D., Purdy, B., Salkie, F., and G. Larkin. (eds.). *Science and Practice: Sustaining the Boreal Forest. Proceedings of the 1999 Sustainable Forest Management Network Conference*. Edmonton, A: Sustainable Forest Management Network. pp.161-169.
- Tsuji, Leonard and Elsie Ho  
2002 Traditional Environmental Knowledge and Western Science: In Search of Common Ground. *Canadian Journal of Native Studies* 12(2): 327-360.
- Walpole Island Heritage Centre (WIHC) and Chreod Ltd.  
1997 Where the Waters Divide: Bridging Traditional and Modern Approaches to Environmental Management. The Experience of Walpole Island First Nation. <http://www.bkejwanong.com/waters.html>.
- Wolfe, Jacqui, Chris Bechard, Petr Cizek and David Cole  
1992 Indigenous and Western Knowledge and Resource Management Systems. University School of Rural Planning and Development, University of Guelph, ON. 40 pp.
- World Intellectual Property Organization (WIPO)  
2000 Draft Report on Fact-find Missions on Intellectual Property and Traditional Knowledge (1998-1999). <http://www.wipo.int/traditionalknowledge/report/contents.html>.

The Miwko? understand that to heal the delta, the reaches of the ecosystem are greater than that determined by western scientists, including species such as the Orca and the fisher, which reside in the ocean and mountains, respectively. Beyond highlighting the utility of these partnerships, the author calls for western science practitioners to respect the lifeways and perspectives of indigenous peoples. Traditional Ecological Knowledge: A Different Perspective on Environmental Health By: Nate Seltner Environmental Health Perspectives 19 January 2018 Key words: Tribal epidemiology, traditional medicine, Navajo <https://ehp.niehs.nih.gov/ehp2391/>

The authors highlight the value of Traditional Ecological Knowledge to Tribal epidemiology and medicine. The language of Traditional Ecological Knowledge is not the language of scientific discourse. Mutual understanding requires mutual respect, an investment of time, and a willingness on the part of Western scientists to accept that TEK is grounded in moral, ethical, and spiritual world views. It is a common misperception that, because of this grounding, TEK is somehow mystical or out of touch with reality. This set of papers makes a different case: that, on the contrary, TEK is eminently practical. Far from being a static body of knowledge, TEK must be highly adaptive if it is to serve the needs... PDF | On Oct 1, 2000, Jesse Ford published Traditional Ecological Knowledge, Ecosystem Science, and Environmental Management | Find, read and cite all the research you need on ResearchGate. part of Western scientists to accept that TEK is grounded in moral, ethical, and spiritual world views. It is a common misperception that, because of this grounding, TEK is somehow mystical. from the Ecological Society of America, Attention: Reprint Department, 1707 H Street, N.W., Suite 400, Washington, DC 20006. and emerging mandates for the incorporation of TEK into scientific research and environmental. The ecological knowledge of a given First Nation and that of Western science are derived from equally valid and authoritative cultural traditions, each having its own philosophical foundations, methods of validation, and communities of respected experts (Lertzman 1999, 2003, 2006). Thus, I juxtapose the term "etraditional Western science" (TWS) alongside TEK. The Scientific Panel in Clayoquot Sound constituted an unprecedented bridge between these esteemed traditions: the best of two cultural worlds. Ecosystem-based management emphasizes the paradigmatic nature of a shift in perspective from exploitive approaches of single sector, multiple use, or integrated resource management to one that is ecosystem based. Well, traditional ecological knowledge is a cumulative body of knowledge and belief systems in regards to how Indigenous Peoples utilize their resources, both historically, in the present, and even in the future. That knowledge is always adaptive to the circumstances " social-politically, social-culturally, economically, and even environmentally " around how these tribes' knowledge systems and social institutions operate. We have different forms of information, from the social scientists and fire scientists informing us about community and social values, and how we should think about resource management. Using those integrative knowledge systems, by bringing people together, we can try different strategies and learn to become fire adapted.