TRADITIONAL ECOLOGICAL KNOWLEDGE

What is TEK?

To begin working with the knowledge held by indigenous communities, it is important to first understand what this knowledge is all about and the terms used to describe it.

> There are many terms in use to describe the body of expertise and knowledge held in indigenous communities. Among these are indigenous knowledge, traditional ecological knowledge, indigenous science, ecological wisdom, and many others. None is wholly adequate or satisfactory. (Inuit Circumpolar Conference <http://www.inuitcircumpolar.com/tek.htm>)

> Traditional [Ecological] Knowledge [TEK] or indigenous knowledge uses the information, advice and wisdom that has evolved over centuries of living as part of the environment. [TEK] is a valuable source of environmental information that allows communities to realize their own expertise, and apply their own knowledge and practices to help protect their way of life. (Minerals Management Service, Alaska OCS Region, *Traditional Knowledge* <http://www.mms.gov/alaska/native/tradknow/>)

> Recently, the Inuit of Nunavut have recognized the many levels of attachment between Inuit culture, language, and knowledge and now use the term Inuit Qaujimajatuqangit or IQ. (Inuit Tapiriit Kanatami <http://www.itk.ca/>)

People in a community who are closely connected to the local surroundings are often the first to notice environmental change. This is because their knowledge is derived from long-term observational data maintained through an oral tradition. It is for this reason that the knowledge held by the community needs to be reflected in local classrooms.

> When we think of something or discover a new fact, we also think of all the interconnections between that fact and everything else. And so it is with our science: it is going to be connected to everything within our culture. (Inuit Tapiriit Kanatami <http://www.itk.ca/english/itk/departments/enviro/tek/enviro_knowledge.htm>)

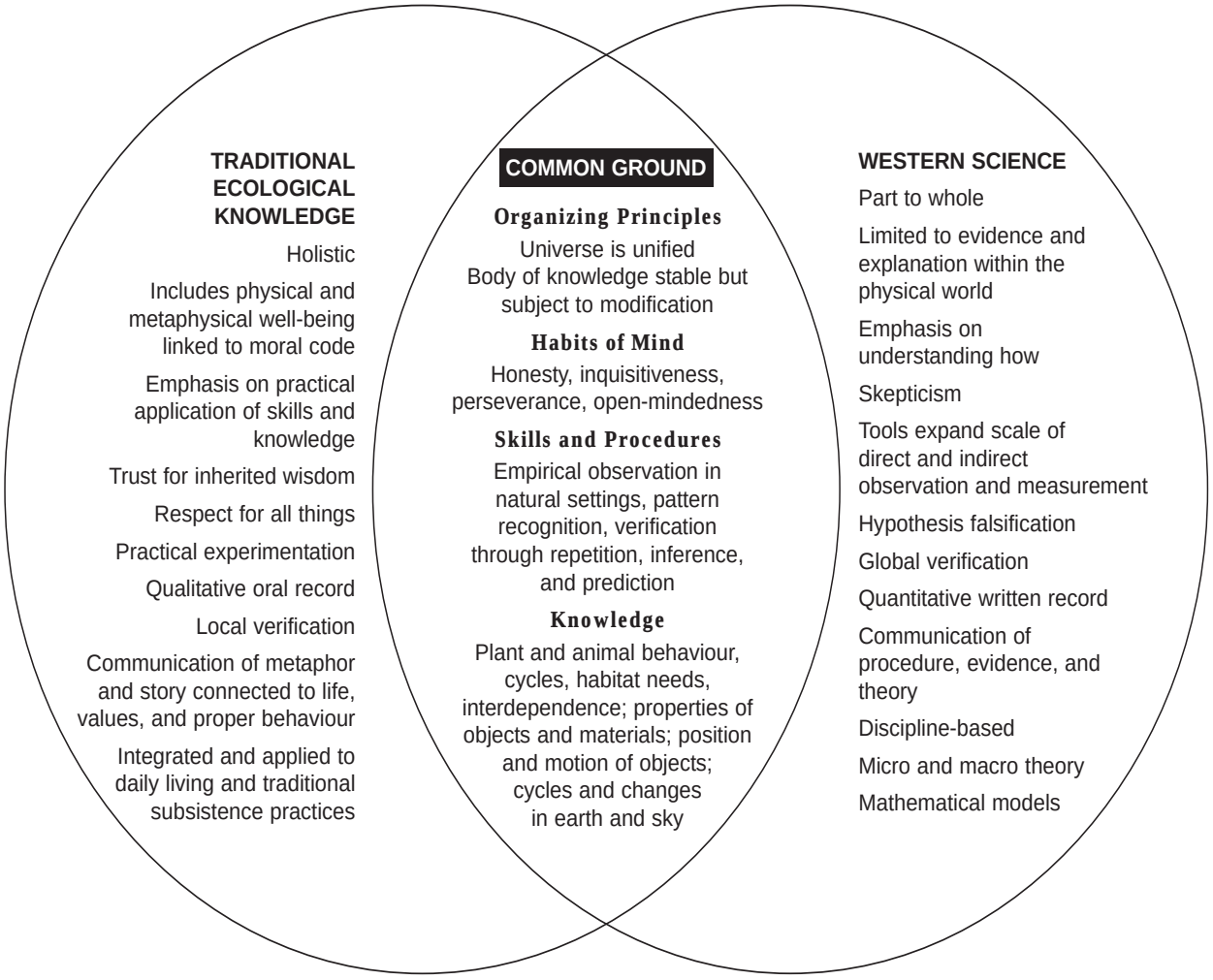
Traditional ecological knowledge (TEK) has been defined as "…the knowledge base acquired by indigenous and local people over many hundreds of years through direct contact with the environment. It includes an intimate and detailed knowledge of plants, animals, and natural phenomena, the development and use of appropriate technologies for hunting, fishing, trapping, agriculture, and forestry and a holistic knowledge, or 'worldview' which parallels the scientific disciplines of ecology" (Inglis, 1993, vi). TEK is similar in many respects to the long-term observational data that have been referred to as natural history. Natural history has contributed to the formation of environmental science, ecology, biology, geology, and geography. Two factors have resulted in a decreased emphasis on this type of data collection. One factor is the emerging importance of "hard data" (quantitative) as part of the scientific method, as opposed to the more qualitative approach of observational data collection. In addition, long-term studies are costly and funding for scientific research is limited.

While various terms can be used to describe the knowledge held by a community, for the purposes of this document the term *traditional ecological knowledge* (TEK) will be used.

TEK and Science

In order to work with TEK and science, it is important to understand their similarities as well as their differences. The following diagram helps to highlight these.

The Shared Characteristics of Traditional Ecological Knowledge and Western Science*



* Adapted, by permission, from Sidney Stephens, *Handbook for Culturally Responsive Science Curriculum* (Fairbanks, AK: Alaska Science Consortium and Alaska Rural Systemic Initiative, 2000) 11. The handbook is available on the Alaska Native Language Network website at <http://www.ankn.uaf.edu/handbook.pdf>.

Berkes (1993, 4) summarizes the differences between Western science and TEK in the following manner:

1. TEK is mainly qualitative
2. TEK is intuitive
3. TEK is holistic
4. TEK is moral
5. TEK is spiritual
6. TEK is based upon empirical observations and accumulation of facts by trial and error
7. TEK is based upon data gathered over a long period of time in the same area

Aboriginal governments value TEK and recognize that it establishes a baseline of information on the local environment. Baseline ecological information is a complete data set of the local environmental ecology and is essential for the maintenance of an environmental monitoring program. However, to date, communities have not had members educated in a system that values local knowledge. Incorporating TEK into the science classroom provides a foundation that validates the local TEK along with Western science.

Community control over the documentation of baseline ecological information is becoming recognized as a crucial component of a system that can identify the effects of human activities on the local environment. Prior to any large development project, Canadian environmental law requires the corporate sector to conduct an Environmental Impact Assessment (EIA). During this process, investigations are conducted to examine the possible environmental impact of a proposed project. Aboriginal communities have created their own programs to monitor the social implications of a development project and possible effects on traditional hunting and fishing grounds and sacred spaces (for example, the Traditional Knowledge Policy of the Northwest Territories government). Refer to Appendix 2 for more details on how TEK is being used in environmental management.

Why Incorporate TEK?

The video *Sila Alangotok—Inuit Observations on Climate Change* provides a model of how scientists can work with community members to incorporate TEK or local knowledge along with scientific knowledge to gain a better understanding of our environment. This reflects a growing awareness among Western scientists of the value of TEK and increased efforts to link it with science, particularly in the area of environmental management.

There are also many opportunities within the science classroom to incorporate and validate other knowledge systems. The *Handbook for Culturally Responsive Science Curriculum* (Stephens, 2000, 7) acknowledges that a culturally responsive curriculum

- recognizes and validates what children currently know and builds upon that knowledge toward more disciplined and sophisticated understanding from both indigenous and Western perspectives
- taps the often unrecognized expertise of local people and links their contemporary observation to a vast historical database gained from living on the land

- provides for rich inquiry into different knowledge systems and fosters collaboration, mutual understanding, and respect
- creates a strong connection between what students experience in school and their lives out of school
- can address content standards from multiple disciplines

While TEK information is not readily available in books and is specific to a local area, teachers are encouraged to incorporate TEK into science classrooms by

- inviting local people to share their knowledge about the local environment, both past and present
- discussing sites within a community or the surrounding area that may contain significance to which only the community would be sensitive
- emphasizing the value of long-term (diachronic) data, a form of information not often present in Western scientific methodology; the combination of traditional ecological knowledge with Western science techniques can only complement each other

Science Teaching and Science, Technology, Society and the Environment (STSE) Issues

STSE focuses on having students make sense of their everyday life and developing decision-making abilities that will serve them well in the present and in the future. In STSE lessons, teachers create a "need to know" attitude in students that can lead to the exploration of scientific concepts and logical reasoning skills (Aikenhead, 1999, Unit 3). Skills development in STSE is in the identification of issues, identification of stakeholders on a given issue, development of action-oriented decisions, and evaluation of the impacts of various decisions. All these skills are necessary for analyzing the complexity of STSE issues and making reasoned decisions.

Much Canadian research has been conducted on the development of educational strategies related to STSE (Aikenhead, 1980; Aikenhead, 1991; Aikenhead, 1992; Orpwood, 1985; Pedretti, 1997; Pedretti and Hodson, 1995). To incorporate TEK with Western science, development of decision-making skills is vital.

Many decision-making models are available for student use in the classroom, including the one provided in *Senior 2 Science: A Foundation for Implementation* (Manitoba Education, Training and Youth, 2001, 11–12). The Blackline Masters section in this document provides another model for the decision-making process (see BLMs 1a and 1b). This model (Aikenhead, 1999, 310–312) involves generating possible alternatives, identifying their associated values, prioritizing alternatives, and choosing and justifying an action.