Sharing Knowledge: Traditional Ecological Knowledge, Scientific Knowledge and Climate Change

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August 1, 2011

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Socratic inquiry and experimental design endeavour to improve our understanding of the world around us. One of the key factors in experimental design is the desire to be objective when observing, reporting and interpreting data. Being that the human scientists' ability to actually be objective has been called into question in many studies prior to and including Pronin, Gilovich and Ross (2004), we have created various technologies to measure natural phenomena and have developed complex mathematical formulae to analyse the data we collect. The rationale behind objectivity is the removal of bias and anything "human" that can taint the sought after truth about the world. The feats that have been accomplished with this method of inquiry are phenomenal—people have walked on the moon, life has been cloned, and life has been created without a parent cell, to name only a few. We are constantly in awe of what we have and can accomplish with the use and application of experimental design. However, the problems that I see with this method of inquiry are twofold: 1. the goal of objectivity and subsequent removal of the human from the research and the natural world implies that people are not a part of the natural world and that there is one single truth that can and should be pursued and 2. our continued marvel at our scientific accomplishments has resulted in an overreliance on experimental design and Socratic inquiry to solve the problems that we have created with previous experiments and technologies; the particular problem I am alluding to is that of climate change.

The Western ideals of capitalism, the fruits of the Industrial Revolution, and the overconfidence in science has put the earth on a course of destruction that we may not be able to recover from. The line of thinking that has caused this problem—that science can enlighten us about anything and solve any problem—has been applied over and over since Socrates' time, and according to the Western proverb, insanity is "doing the same thing over and over again and expecting different results", so it would make sense that a different form of thinking is needed to solve the problem of climate change. Traditional Ecological Knowledge (TEK) is knowledge that has been obtained by Indigenous groups through their interactions and observations of the ecosystems (Berkes, Colding and Folke, 2000) in which they live and have lived since the Creator put them there; this knowledge is part of a holistic paradigm that includes the idea that change (in nature, people, etc.) is the rule, people have a spiritual connection with the earth, everything is alive, everything is interrelated, and all things are repeated and renewed (Leroy Little Bear in Simonelli, 2008 and Kimmerer, 2002). This paper seeks to describe the barriers to collaboration between scientists and TEK holders, and how and why TEK and science should be used together.

TEK is established in much the same way that scientific knowledge is—through observation (Huntington, 2000), however, collaboration between the holders of TEK and scientists is historically not very common for several reasons. TEK is more than just information as it is seen by the West, as defined earlier, and thus the holders of TEK are often very cautious when sharing information with people outside their culture because it may be objectified and thus misused and misunderstood (Huntington, 2000 and Marker, 1997). Information in Western culture is far more democratized (Bowers,

Vasquez and Roaf, 2000) than Indigenous Knowledge (the parent knowledge of TEK), such that almost any information one seeks is available on the internet—even information about building bombs. Information in Indigenous cultures tends to be held by the Elders and passed down in various ways to the younger generation when they are ready for this information (Howe, 1998). With "wannabes" appropriating information and performing indigenous cultural acts without permission or regard of the spirituality of the parent culture (Marker, 1997), it is easy to understand why the holders of TEK are hesitant to divulge information to outsiders, including scientists.

On the other side, scientists also have reservations about using TEK in their research and applications because the collection means are usually foreign to them, they may have a resistance to change, and they prefer to maintain the power over management decisions. Collecting TEK means employing interview techniques from social sciences to which scientists of the hard sciences are knowingly uninformed (Huntington, 2000), and so they avoid it. Scientists are also often reluctant to use TEK because it forces them to think within and use a paradigm that is foreign to them (Huntington, 2000), and this creates a new dimension for the research, of which they are not willing to, or do not have the time to adapt to. Using TEK means collaborating with different groups of people—social scientists, Elders, hunters, etc. and this means that the scientist must relinquish some control over the scope, direction, timeline, outcome and application of the research, and many are not willing to make this sacrifice (Huntington, 2000), and so again TEK is avoided by scientists who see this as a problem.

Huntington (2000) asserts that while relationships may be slow and difficult to grow in such cross-cultural interactions, the collaboration process proves valuable to both groups because it furthers the knowledge each group holds, and indirectly can result in better cultural relations. He says that:

> TEK should be promoted on its merits, scrutinized as other information is scrutinized, and applied in those instances where it makes a difference in the quality of research, the effectiveness of management and the involvement of resource users in decisions that affect them (1273).

Essentially, a resource, such as TEK, should not be avoided because it poses a logistical or philosophical challenge, if it means furthering knowledge and the wellbeing of people and the earth. As long as the process is respectful and built on trust, both groups can benefit greatly.

Most climate researchers see the Arctic as the “canary” for global climate change but very little research has been done in the area to create a baseline of historical records that the new data can be compared against (Riedlinger and Berkes, 2001). TEK can provide insight into past climate variability as climate history is built into the oral traditions (Riedlinger and Berkes, 2001) and traditional education systems of the Inuit which would provide scientists with parameters for norms in weather patterns and wildlife so they know when changes are outside the historical norm and could be the result of climate change.

Scientific research alone on climate change is general and nebulous (Jacobs and Bell, 1998 in Riedlinger and Berkes, 2001) and somewhat useless as a predictive or

adaptive tool until it is linked specifically with a region. TEK combined with data on the local level “can translate global processes such as climate change into local-scale understandings of impacts” (Riedlinger and Berkes, 2001, p 316). In this capacity, scientific data works with TEK to make predictions for the near and far futures of a particular region and attempt to anticipate changes and needs in flexibility and adaptations. For scientists, the application of local TEK can also help improve the understanding of local environmental processes and how they relate to climate change (Riedlinger and Berkes, 2001). Finally, the application and use of TEK at the local level can provide scientists with evidence to prove hypotheses or theories that are impossible to test on the global scale that climate change research tends to take place on (Riedlinger and Berkes, 2001). TEK and scientific research combined can greatly benefit both the advancement of knowledge and research on climate change in a particular region and globally, and it can be used by local populations to predict and prepare for the future.

Climate change is an undeniable fact in the Arctic. While scientists may still argue as to the cause, climatic changes that are well outside the norm parameters are revealed season after season in the Arctic by scientists and TEK holders alike. These changes are significant enough that they have begun to seriously impact the daily lives and traditional practices of the Inuit people who rely on the resources of the Arctic (Riedlinger and Berkes, 2001). These changes include dramatic changes in seasonal temperatures, precipitation, season length, winds, and the predictability of weather (Ford and Smit, 2004). These changes have impacted the Inuit’s ability to hunt, fish, and travel among other things. Another area particularly vulnerable and sensitive to

climate change is the African Sahel. A gross approximation of the African Sahel is the mid-latitude of Africa, north of the equator, and stretches from the Atlantic to the Persian Gulf (Nyong, Adesina and Elasha, 2007). Historically a region of varying rainfall, the duration and amount of rain in this region is becoming even more varied and less predictable, and this has been causing more severe droughts with fewer seasons of reprieve (Nyong, Andesina, and Elasha, 2007). These changes are causing more than the hardship of the Arctic, and are currently the cause of the famine due to consecutive years of drought being experienced by millions of people in Somalia, Ethiopia and Kenya (Red Cross, 2011).

Thanks to colonization, ecosystems that enjoy more moderate climates have been appropriated through various processes by non-Indigenous people, leaving the most extreme and sensitive climates on the planet to become the reserves given to the Indigenous peoples. The climate extremes of these ecosystems have rendered their inhabitants, human and non-human, very adaptive and flexible to change. Traditionally, farmers in the Sahel used mulches to moderate soil temperature, suppress parasites, and conserve soil moisture (Nyong, Adesina and Elasha, 2007). The advent and sale of genetically modified organisms, pesticides, herbicides and fertilizers to traditional farmers around the world, has seen traditional practices fall by the wayside (Shiva, 2011). The result has not been increased crop yields as promised (Shiva, 2011), but major changes in the ecosystems such that Elders cannot rely on their TEK to predict weather and related events (Riedlinger and Berkes, 2001). Coffee farmers in central America are beginning to use TEK from Africa, where coffee is indigenous, to grow crops that are healthier, more productive, and less destructive to the habitat (IPRN,

2011). Aboriginal groups in Australia used to employ controlled burns before the rains in order to ready the soil for the rainy season (IPRN, 2011), and likely prevent natural forest fires. With the depopulation of the Australian Aboriginal groups, these practices have fallen by the wayside and as such, soil has not been as fertile (IPRN, 2011) and recently, Australia has experienced some very devastating bush fires, which could be a combination of decreased rain and the loss of traditional practices.

Indigenous people are experts when it comes to the land that they inhabit. The plethora of information that they have as well as the paradigm from which this information comes is proving to be incredibly useful to whomever is willing to take the time to listen and learn respectfully. The empirical elements coupled with the holistic approach of Traditional Ecological Knowledge can prove useful to scientists and laymen alike as we develop an understanding of the local environments we exist in, how our climates are changing, attempt to adapt to these changes and possibly slow, stop and reverse human caused climate change.

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