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**Wolves and Ravens, Science and Ethics:  
Traditional Ecological Knowledge Meets  
Long-Term Ecological Research**

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After many years of studying the relationship between wolves and moose on Isle Royale we learned there is a special relationship between wolves and ravens. The presence of ravens influences the size of wolf packs: wolves living in larger packs each get more food because they lose less food to scavenging ravens. They do this by eating a moose so quickly that ravens have little time to scavenge. The details are fantastically complicated, and while wolves in larger packs must share their food among their brothers and sisters, parents and offspring, that sharing is not so costly as losing food to scavengers. So ravens have something to do with explaining why wolves live such intensely social lives – a trait otherwise rare among carnivores. What an astonishing connection. The value of a connection like this lies in its ability to generate wonderment and care for nature. When we decide that the purpose of science is to generate wonder about nature, rather than to control nature, we will not be far from a relationship with nature that can flourish for all time and generations.

Adapted from Vucetich, 2010

Similar to other academic disciplines, philosophy is divided into subdisciplines, specialties. Epistemology is the study of the nature of knowledge, the various ways we might come to know something, and the explanations for why some bit of information might be true or false. Metaphysics is the study of the nature of being and our assumptions about what humans are in relationship to nature, as well as what nature is in relationship to humans (for example, are humans and nature one and the same, related, distinct, something else – and why?). Ethics focuses on questions of value, proper conduct, right and wrong, good and bad, arguments about what we ought to do, how we ought to live, who or what possesses direct moral standing, and what constitutes a good life.

When we combine all three of these elements we use the term *worldview* to refer to that package of beliefs. Our interactions with the world are a reflection of that worldview. A change in worldview, therefore, pulls a thread connected to our interactions with the world.

Scholarship on Traditional Ecological Knowledge (TEK) often seems focused on the epistemological dimension of philosophy. This scholarship often posits that Native peoples have special ways of knowing, not because they possess some extra sensory organ, but because of their long tenure in, and attention to, a given landscape (e.g., Menzies, 2006). This scholarship also attempts to demonstrate how those different epistemologies, or ways of knowing, lead to different information and different assumptions about the ecological systems we study.

But do we sometimes fail to have the full conversation about TEK? That is, is our interest in TEK merely an epistemological interest, merely an inward-looking and fairly obtuse discussion about the possible plurality of ways of knowing, or is there really something more important at stake here, something this conversation, at times, alludes to, but fails to specify? Given how excited undergraduates in our Philosophy of Ecology classes are about discussing TEK, and given how bored they tend to be in our epistemology courses, it seems unlikely that interest in TEK is merely an interest in comparative epistemology.

Interest in TEK likely has far less to do with epistemology and even metaphysics, and far more to do with perceptions about an ethical shift or the overall worldview we believe is necessary for healing our relationship with nature. Romanticized or not, many people glimpse – and admire – in TEK the ethically inclusive worldview that seems to flow naturally from prolonged land tenure, persistent observation, and a set of virtues, including respect, humility, empathy, and care. Moreover, these people see in Native traditions and worldviews the possibility of an inclusive environmental ethic. By “inclusive environmental ethics” we mean what modern environmental philosophers refer to as the attribution of intrinsic value or direct moral standing to the more-than-human world. This nonanthropocentric moral system signals a fundamental challenge to our current dominate Western relationship with nature.

A fear exists, however, that Western Scientific Ecological Knowledge (SEK) and the Western worldview are so fundamentally different from TEK and a Native worldview that the emergence of an inclusive environmental ethic from within the traditional Western worldview is all but

impossible. This concern is illustrated, for example, when TEK is defined in stark contrast to SEK (e.g., Cleveland, 2009). One origin of this concern might have to do with the perceived lack of ability within Western culture to extend direct moral standing to the nonhuman world. While the centrality of the direct moral standing, or personhood, of the nonhuman world is obvious in Native American ethics (see Callicott and Nelson, 2004), it is certainly far less obvious in Western ethical and cultural traditions. Western ethics and culture, however, leave plenty of room to assign personhood to at least some nonhumans. This possibility manifests itself not only in contemporary theories in environmental ethics – from the zoocentric to the ecocentric – but also in contemporary legal conversations asserting the personhood of at least certain nonhuman animals (Siebert, 2014), and even in contemporary writing by ecologists (see, for example, an essay on the personification of wolves by Vucetich, 2013).

Another source for the belief that TEK and SEK are fundamentally distinct, and that an inclusive ethic cannot evolve within Western culture, might be the perceived purpose of science in each tradition. In 1605, an architect of Western science, Francis Bacon, famously claimed in his *The Advancement of Learning* that the purpose of science was “for the glory of the Creator and the relief of man’s estate.” While the motivations of Western science have become considerably more secular since Bacon, the central focus of SEK is taken to be that knowledge is valuable for its own sake and for manipulating the world around us for the purpose of material gain for humans. That purpose is so taken for granted that we no longer even recognize it as an answer to the question, What is the purpose of science? This situation is problematic because the most important difference between TEK and SEK might be the answer to that question. To understand the purpose of SEK one must first understand his or her metaphysical beliefs, which include the belief that many things in the nonhuman world are persons, relatives, and community members. With that metaphysic, the purpose of TEK is to better understand those persons so that they can be related to in a manner that honors concern for the interests of those nonhuman persons.

By analogy, the purpose of TEK is akin to the purpose of the courtship a couple might go through on their way to becoming marriage partners, i.e., to better understand those persons so that they know how best to care for each other, not how to sustainably extract the most out of each other. Pierotti and Wildcat, for example, discuss the purpose of ecological science from an American Indian perspective, especially when

Native peoples are asked, “What good is the work that you do?” The authors write,

This question contains the hidden assumption that if what we do does not directly benefit human beings in some way it is without value. We often answer that our work teaches us more about the other members of our community and how to live with them, but most people of Western heritage appear confused by this answer, and do not understand this point. In contrast, if we give this answer to Native American elders, they are completely satisfied, for they understand implicitly what we are trying to accomplish, and its significance to humans. (Pierotti and Wildcat, 2000: 1339)

The attribution of personhood to the land or to nature might be challenging for the Western mind, though we see it evolving. In the following sections, we comment on what might occur within the Western tradition if the nature of personhood were to change.

#### Connections Between SEK and TEK

One point of connection between SEK and TEK that might seem obvious turns out to be false. That false point of connection suggests itself by first recognizing that the Indigenous and Western worldviews (at least recent ecologically informed Western worldviews) both believe we should relate to nature properly because human well-being is intimately connected to nature’s well-being. Moreover, much research in the SEK framework is intent on, motivated by, and successful at understanding those connections. However, it would be incomplete, inaccurate, and likely insulting to limit the value of TEK to this value only, or to suggest this as the main point of ethical connection between TEK and SEK. This would be akin to citing the ability to perform household chores or the benefit of an income tax write-off as the sole, or even main, value of one’s children.

For the interest in ecological connections to be a genuine point of connection between SEK and TEK, those connections would have to be sought not only for the purpose of maintaining human welfare, but also for maintaining the welfare of nature – i.e., for the sake of nature – itself. The importance of connections is captured, we believe, in the paragraph that opens this essay, describing the amazing connection between ravens and wolves.

A second genuine point of connection between SEK and TEK may be found in the ethical virtue of humility. In TEK, humility is necessary for relating to nonhuman persons – necessary because they *are* persons. Humility is also important for Indigenous cultures because they view

nature as not only personified, but also as powerful and unpredictable. SEK, in certain modes, also recognizes that nature is powerful and unpredictable. That idea is well captured by ecologists’ appreciation for ecological surprises (Doak et al., 2008), tipping points (Dakos and Hastings, 2013), and synergistic interaction (Valiente-Banuet and Verdú, 2013). Some members of the SEK scientific community understand that those conditions require, and even inspire, a sense of humility. As Doak et al. (2008) point out with regard to ecological surprises, “[T]he extent and frequency of major ‘surprises’ in ecological systems argue for substantial humility about our predictive abilities” (953).

That the natural world is complex and inherently unpredictable is not a new idea in the history of Western science. In his classic book *On Growth and Form*, the father of mathematical biology, Sir D’Arcy Thompson (1917), wrote: “It is the principle involved, and not its ultimate and very complex results, that we can alone attempt to grapple with” (643). While that sentiment has been embraced by many (though certainly not all) scientists, it has not been consistently highlighted in our relationship with nature, especially by those who apply scientific knowledge to decisions about how we relate to nature.

#### Connections Between TEK and LTER

Our relationship with land cannot heal until we hear its stories. But who will tell them?

Robin Wall Kimmerer (2013)

The most basic epistemological difference between TEK and SEK may be that TEK is premised upon knowledge born through long tenure in a place, while SEK tends to be largely focused on short-term observations. Within SEK we mainly think in limited time spans. In 1994, ecologist Robert May summarized the obsession with the short-term within modern Western ecology. Of some 308 ecological studies reviewed, the mean duration was only 2.5 years. Of 749 studies published in the journal *Ecology* in the 1980s, only 1.7 percent lasted more than five years.

Even in SEK, however, there are exceptions to this short-sightedness. The US National Science Foundation sponsors two programs of relevance here. Both the Long-Term Ecological Research (LTER) network, which consists of twenty-four designated sites around the country, and the various forms of LTER in the Long-Term Research in Environmental Biology program, recognize the unique value of LTER. Both LTER and

TEK at least appear similar for being place-based and committed to the long-term. But LTER also has an unmet potential to reflect an ethical outlook like that glimpsed in TEK.

While SEK is certainly capable of demonstrating connections and humility, LTER is especially valuable for highlighting the importance of connections and the need for humility. Perhaps the most important point of connection between TEK and SEK is manifest in LTER. In particular, one of the most important features of TEK is the assignment of personhood to the landscape and many denizens of the landscape. It is the notion of non-human personhood that seems so difficult for many Westerners to grasp, and therefore for SEK to embody. An idea, however, born of the Western mind, might be critical for understanding that kind of personhood. That idea is "sense of place" (SOP), a concept that has been developed by scholars such as Tim Cresswell and Yi-Fu Tuan, among others. Moreover, sense of place is also a powerful (though too often implicit) foundation of LTER. An SOP is formed when the natural history, culture, and geography of a place commingle in our minds and form the stories – lyrical stories and scientific stories – that define a place. Connections between TEK and SEK might be found through SOP. Within SEK, LTER seems a particularly reliable way to discover SOP. Making these connections, however, would require a larger community of scholars to become familiar with existing ideas pertaining to SOP and to further solidify those ideas in a way that would facilitate SOP's connection to ecological science and environmental ethics.

Though LTER is not typical within SEK, it can be seen as a critical means for helping us discover an SOP by revealing the connections that allow for the story of a place to be told, to be wondrous, to spark the appropriate ethical attitude toward a place. While it is certainly true that good scientific knowledge is important for developing a "healthy" relationship with the land, a relationship leading to the flourishing of humans and the land also requires a proper ethical "attitude" toward both humans and the land. We should recognize that science in general (and LTER in particular) can contribute something important to both necessary elements for flourishing. Since an important part of SOP is storytelling, and since places usually only share their stories over long periods of time, it takes time to get to know a place in order to tell its story. Among SEK, perhaps only LTER can provide this unique contribution to sense of place and hence provide an ethical parallel to TEK within the Western cultural tradition.

In the fall of 1936 (and again in 1937–1938), ecologist and ethicist Aldo Leopold (who worked squarely within the SEK framework)

traveled to the Rio Gavilan in northern Mexico. During this trip, Leopold glimpsed land that was "a picture of ecological health"; that experience complicated his Western perception of land dominated by, he now saw, sick soil and impoverished biota; and that crystallized his ethical focus on the preservation of the "integrity, stability, and beauty of the biotic community." This experience forever altered Leopold's sense of place – both those familiar places now understood as less healthy than they could be, and places like the Rio Gavilan. LTER is likewise primed to develop and deliver those stories of connections, images of harmed or healthy land, a revised sense of place, and to therefore contribute to an inclusive ethic.

In an essay, "Song of the Gavilan," inspired by that episode, Leopold wonderfully articulated an expression of how a Western scientist can understand the importance of sense of place.

The song of the waters is audible to every ear, but there is other music in these hills, by no means audible to all. To hear even a few notes of it you must first live here for a long time, and then you must know the speech of hills and rivers. Then on a still night, when the campfire is low and the Pleiades have climbed over rimrocks, sit quietly and listen for a wolf to howl, and think hard of everything you have seen and tried to understand. Then you may hear it – a vast pulsing harmony – its score inscribed on a thousand hills, its notes the lives and deaths of plants and animals, its rhythms spanning the seconds and the centuries. (Leopold, 1966: 158)

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