

# Linked through Story: Natural Science, Nature Writing, and Traditional Ecological Knowledge

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*Traditional ecological knowledge (TEK) has become topical in discussions of natural history as a key component of environmental research, education, and practice. Likewise, contemporary nature writing has drawn on it to illuminate and critique Western values, practices, and beliefs. This paper explores the function of narrative in the mythological and classification systems of tribal peoples as well as in Western science, arguing that story may provide a useful way of understanding and linking traditional ecological knowledge with scientific and literary natural history. The argument draws on Claude Lévi-Strauss's analysis of the differences between scientific and mythological thinking, Martin Buber's doctrine of relationships, and Barry Lopez's ideas about the interaction between landscape and narrative.*

**Citation.**—Tallmadge, J. 2011. Linked through story: Natural science, nature writing, and traditional ecological knowledge. *Journal of Natural History Education and Experience* 5: 49-57.

*The natural world demands a response that rises from the wild unconscious depths of the human soul. – Thomas Berry (1999)*

Recent discussions about revitalizing natural history have crossed into fertile ground at the margins where normal science meets literature and anthropology. On the one hand is nature writing, which has enjoyed an extraordinary renaissance over the past three decades, and on the other is traditional ecological knowledge (TEK), which has been proven increasingly useful to designers of environmental research, education, and policy.

Contemporary nature writing has adapted the subject matter and methods of natural history to pressing ethical, moral, and even religious issues. TEK has deepened or qualified the results of conventional scientific inquiry. At a recent symposium convened by the Natural History Network, participants wondered how, apart from a congruence of results, TEK and Western natural history could be linked. This paper offers “story” as a basis for thinking about such a connection.

“Traditional ecological knowledge” has emerged as an umbrella term for the comprehensive, wholistic, local understandings and practices that indigenous people develop about the landscapes in which they live and

work (Pierotti and Wildcat 1998, Rinkevich et al. 2011). Despite manifest differences in geography and culture, such knowledge systems all rely on direct experience with the world to provide, test, and refine information: they are grounded in particular places at local scales; they consider humans as members of a larger community that includes both the material and the spiritual worlds; and they include moral, ethical, and religious considerations (Barnhardt and Kawagley 2005).

TEK has much in common with Western ecological science, including direct field observation, testing, systems of classification, and, often, corresponding results, but it differs in its wholistic world view, local focus, and inclusion of spiritual and moral concerns that Western science normally eschews in favor of the arts or humanities. Most significantly, however, both kinds of system rely on stories. This is particularly evident in TEK, which is transmitted through personal narrative as well as myth, that is, through both individual and communal stories.

But story is deeply at work in Western science as well. The very term “natural history” embodies the notion of story. A history is a record of what happened; it presupposes characters, setting, themes, and a sense of unity or significance, as well as a historian, that is, a storyteller. The qualifier “natural” further sets a marker between the subject at hand (“nature”) and other kinds

of history, such as sacred history or human history, which can be further subdivided into categories such as religious, political, cultural, military, intellectual, and so forth.

Natural history is commonly understood as the practice of observing wild creatures in their native habitats, classifying them, and studying their origins, behavior, and interrelationships. This sort of activity has been practiced by humans for ages. As Lévi-Strauss (1966) observes, following Durkheim and Mauss (1963), all cultures develop elaborate and sophisticated systems for classifying natural phenomena. Likewise, story appears to be a universal activity. Its processes, features, and dynamics, like those of language itself (grammar, syntax, vocabulary), transcend cultural differences.

Indeed, story is the oldest and most enduring technology that humans have devised for constructing, preserving, and transmitting knowledge. It is still the primary way that humans make sense of the world. What can account for its universality and persistence? Lopez (1989) says that a story reveals truth as a pattern rather than a proposition. He relates these patterns to ecological relationships in the landscape and accounts for the salubrious and healing effects of story in terms of connecting these facts to the “inner landscape” of the listener. Sometimes, Lopez (1990) writes, a person needs a story more than food to stay alive. The Inuit word for storyteller, *isumataq*, means “a person who can create the atmosphere in which wisdom shows itself” (Lopez 1986). With respect to landscape, Lopez further observes (following Yi-fu Tuan) that “it is precisely what is *invisible* in the land that makes what is merely empty space to one person a *place* to another” (Lopez 1986). He is referring here to memories, both individual and social, that link people to the landscape. Both these and the ecological relations that give the landscape its coherence are invisible, manifested only through their effects.

But story can make them visible, and a moment’s reflection suggests that the things that matter most, that give life its flavor and quality – the things that really lead to happiness, well-being, and a sense of purpose – are not material things like wealth or possessions, but rather relationships, which cannot be weighed, measured, or grasped with the senses. Relationships can certainly affect the physical world, but they are not material things in themselves; in that sense, they are not phenomena and they don’t exist in the same way that objects of scientific inquiry do. They can’t be directly seen or touched, but they have dramatic effects.

A relationship can be thought of as a series of transactions or exchanges unfolding in time. Ecological relationships are ongoing exchanges of energy, nutrients, and information among neighboring organisms and their habitat. Likewise, human interpersonal relationships are exchanges that transpire over time. They may be invisible, but they endure and manifest through their effects a persistent character, like standing waves in a stream. They also radically determine the quality of a person’s life. That, I believe, is why people invented stories: to make relationships visible and tangible so that they could be remembered, studied, understood, shared, and preserved. Because stories reveal truth as a pattern rather than a proposition, they can overcome differences of thought and character “by creating a space that contains both, as ecosystems provide niches for mortal enemies” (Tallmadge 1997). Or, as Lévi-Strauss (1967) puts it, myth provides “a logical model capable of overcoming a contradiction.”

Few thinkers have pondered relationships more deeply than Martin Buber (1970), who maintains that life consists of more than experience and instrumentality alone. Humans are relational beings, and their relations can occur in one of two modes, which he calls I-It and I-Thou. I-It relations are those of subject and object, while I-Thou relations are person to person. The former creates the world of experience, the latter the world of “presence” or encounter. In life, people move back and forth between these two modes. Buber says, further, that such relations can arise in three areas: life with nature, life with human beings, and life with spiritual beings. Natural science, I would suggest, concerns itself primarily with the first, natural history with both the first and second, and mythology with all three. Story links them all; it is their common ground.

With respect to science, historian R.G. Collingwood (1945) argues that because science reports on the world as it is observed, recording and interpreting experience, it must be considered a historical discipline. Experimental science records and interprets what has been experienced under controlled conditions; it aspires to objectivity, validates observations by their replicability, and tests interpretations by their predictive success. Lévi-Strauss (1966) adds that science works by metonym, whereby a single event is taken to represent an entire class of events that, in turn, reflects the operation of abstract and changeless “natural laws.” From this perspective, the ideal story is one in which the observer is rendered fully transparent, or even absent altogether, and the preferred idiom is mathematics. As Galileo (1615) argued to the Grand Duchess Christina, the Book of Nature cannot be read by the uninitiated, for it is written in the language of geometry.

Of course, modern science is only about four hundred years old and is thus, as Lévi-Strauss (1966) points out, considerably younger than both natural history, which dates back at least to Pliny and Aristotle (Fleischner 1999), and to the kind of thinking that he calls “the science of the concrete,” which is not only practiced by so-called primitive peoples but is also responsible for all the great arts of civilization produced during the Neolithic. It is not that modern science represents an evolution or progress in thought from traditional ecological knowledge, but rather that there are “two parallel modes of acquiring knowledge.”

Whereas science works by metonym, mythical or “savage” thought operates by metaphor; it introduces order into the universe by connecting and classifying things according to their resemblances. As historian Michel Foucault (1973) observes, this type of thinking dominated Western natural history until the epistemological revolution of the seventeenth century. Previously, every conceivable kind of information about an animal or plant was included, not only structure and behavior, but food or medicinal value, methods of hunting, gathering, and preparation, occurrence in myth and scripture, literary treatments, symbolism, iconography, significance in dreams, taste, color, odor, texture, and so on. Hidden properties were revealed by surface resemblances or “signatures.” In the seventeenth century, however, natural histories began excluding most information of this kind in favor of structure, a move that coincided with the invention of the microscope and the ascendancy – thanks to Galileo, Newton, and Descartes – of mathematics, geometry, and a mechanical worldview. Linnaeus based his classification system on mechanical structure combined with a hierarchy modeled on feudal society with its kingdoms, classes, orders, and families, and Darwin added the final, temporal dimension necessary to link them all in a grand narrative.

Epistemologically, then, it can be said that natural history in an age of science has been streamlined for the sake of consistency: a certain order has been achieved, but at the expense of variety and plenitude in what is considered relevant. However, three essential, archetypal features remain: observation, classification, and story. There is always a human experience, an encounter with the world; there is always a way of linking experiences; and there is always a narrative, which means both a plot and a storyteller.

Because natural history begins in the field, with direct observation, it cannot achieve the kind of mathematical precision and predictive efficacy of exact, lab-based

sciences. Controlled conditions are really impossible; natural history really takes place in the wild. Moreover, the observer is always a factor; everything gets filtered through his or her subjective consciousness. Objectivity and replicability are limited at best; a positivist stance cannot be maintained. Instead, the naturalist must practice what I have elsewhere called a “disciplined subjectivity” (Tallmadge 2000). The principles of taxonomy not only provide a framework for ordering the world but also sharpen perception: it becomes easier to see when one knows what to look for. However, because the observer is always a person, never a “transparent eyeball,” what he or she reports is also to some degree a witness, that is, a story that embodies beliefs and values as well as facts.

I believe that this accounts for the vigor and immediacy of seventeenth and eighteenth century works of natural history, such as those of Bartram, Jefferson, or Humboldt, which firmly established a literary genre as well as a method of field-based descriptive science.

In these histories, there are always two principal characters, the organism and the naturalist, each of whom occupies a different kind of time. Organisms are presented as types rather than individuals, and their life histories are representative rather than particular. The time they inhabit is diachronic, because change and growth occur, but also ahistorical, in that there is no progression. Unlike human history, which proceeds linearly from the past into the future as a succession of irreplicable individuals and events, the life history of a species repeats itself until extinction in a kind of “eternal return.” This might be called Edenic time, midway between human time and eternity (mythic time, dream time, or the time of the gods). This in-between time makes natural history especially adhesive to issues of value and belief as well as to facts. It accounts, I think, for the surprising vitality and versatility of the genre, which has become one of the most active and creative domains of contemporary American literature, certainly as much if not more so than the novel.

In his excellent study of Thoreau’s debt to this tradition, John Hildebidle (1983) succinctly describes natural history writing as “informal, inclusive, intensely local, experiential, eccentric, nativist, and utilitarian, yet in the end concerned not only with fact but with fundamental spiritual and aesthetic truths.” He explains how Thoreau colonized a “subliterary” genre to serve his own agenda of moral reform, social critique, and personal discovery, thereby elevating it to a position of real influence on subsequent thinkers and writers. In the years since World War II, natural history became a preferred vehicle for American writers to address great

issues of the day, including conservation (Leopold 1949), religion (Dillard 1974), politics (Abbey 1968), human rights (Williams 1991), human health (Carson 1962), industrial civilization (Snyder 1990), and the recuperation of traditional ecological knowledge (Nabhan 1982, Nelson 1983, Lopez 1986). Nature writing now occupies a place in between the sciences and the humanities, a sort of ecotone where questions of natural fact interface with questions of value, belief, and expression, and where the globally ascendant culture of Western Europe can meet the wisdom of native peoples on common ground.

How, then, does story figure in the recuperation of traditional ecological knowledge for a twenty-first century practice of natural history? Buber's three kinds of relationships might be diagrammed as in Figure 1.

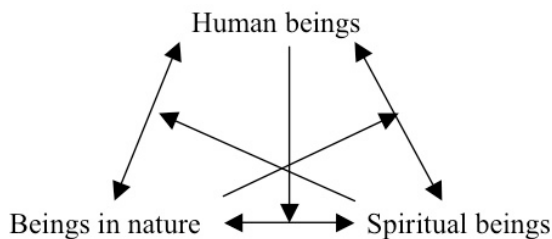


Figure 1. Arrows point from the protagonist to the other actor or actors (after Buber 1970).

Science, as noted above, concerns itself mainly with beings in nature whereas natural history concerns itself with beings in nature as seen through human eyes. But mythic or “savage” thought, according to Lévi-Strauss (1966), concerns itself equally with all three and embraces all pathways shown in the diagram. He cites a wealth of examples to support the contention that so-called primitive people pay close attention to everything they experience in the world and apply themselves with equal dedication to classifying and interpreting it so as to introduce order into the universe. He demonstrates that the great Neolithic discoveries of agriculture, metallurgy, pottery, and the like could not have come about by chance, but only as a result of relentless and focused experimentation. Beings in nature were discovered to be useful because they were interesting, and they were interesting because they were first known, that is, classified. Intellection preceded useful discovery, and this intellection was based upon “meticulous attention directed entirely upon the concrete,” that is, upon the facts of the world as directly perceived rather than filtered through a mesh of theory or abstract ideas (Lévi-Strauss 1966).

Lévi-Strauss illustrates this attention with a famous analogy to drivers on a highway. Each pays close attention to the other cars and reacts instinctively to any slight change in their speed or direction, according to an unconscious yet rigorous system that assigns meaning to each variation. The aim is to keep moving and avoid an accident, that is, to stay alive, and this requires that each driver be able to interpret the behavior of the others consistently and effectively. This means that driving behavior must be classified and interpreted; in other words, it must be converted into a system of signs. Lévi-Strauss points out that this system arises “naturally” from each driver’s attention to the others, not from any divine revelation or *a priori* thought process.

Just so with people who depend on their environment for everything they need to live and therefore spend as much time and energy studying it as one would spend learning to fly a jet plane. Richard Nelson was initially surprised at how diligent and meticulous his Inupiaq teachers were in their hunts, until he realized that hunting was their *work* (Paul 1992).

Lévi-Strauss (1966) demonstrates that such close attention, motivated by necessity, naturally results in symbolism, myth, and ritual. “Savage” thought takes the facts of experience as given and, using metaphor, combines them into meaningful arrays. “Classifying,” he concludes, “has a value of its own, whatever form the classification may take. . . . The thought which we call primitive is founded on this demand for order.”

To make clear the distinction between this kind of thinking and modern science, Lévi-Strauss offers another famous analogy. Unlike the engineer, who solves problems by using standard materials and applying them according to universal principles, the native thinker improvises solutions with whatever objects present themselves. He or she is more like a French handyman, or *bricoleur*, who must make do with stuff lying ready to hand around the house. Native thought, which gives rise to myth and ritual, is a kind of intellectual *bricolage*. It may achieve practical results that rival or exceed those of the scientist or engineer, but that is not its primary aim; it aims, rather, to order the universe and thereby render it intelligible.

In this way, Lévi-Strauss’s analysis helps explain why TEK does not separate the natural world from the social or the spiritual sphere: all are embraced in one overarching system of thought that is articulated, preserved, and conveyed in stories. There is, in this system, no “nature” but only one realm, in which all beings participate. Modern science is sometimes compared to a vast cathedral under construction, where

all the blocks must fit perfectly and support one another; any block that does not fit must be rejected, or the whole must be redesigned. On the other hand, TEK, as Figure 1 suggests, can be more accurately thought of as a *web* of relationships that stories make visible.

Contemporary nature writing, which grew out of natural history as writers began addressing larger spiritual, aesthetic, and moral issues, has begun to reach out to traditional ecological knowledge as well, lifting up two kinds of stories that might be called anecdotal and mythical. The first takes place in the recent past and involves particular animals, people, or places. For example, Barry Lopez (1989) describes an evening spent with native hunters at Anaktuvuk Pass, listening to a story about a man who was hunting a wolverine from a snow machine and was caught off guard when the animal ambushed him, knocking him over before he could draw his rifle; the wolverine could have bitten the hunter but did not, just looked him in the eye and walked away.

Similarly, Keith Basso (1987) describes how “wisdom sits in places” for the Western Apache: every feature of their landscape is invested with morally and socially powerful memories that can guide or admonish when transmitted by a story, as for example by a grandmother to an erring granddaughter during an evening meal. Mythic stories, in contrast, take place in sacred time, either in the remote past, in another world, or at the time when this world was coming into being. Their actors are spirits, demiurgic beings, or animals in their archetypal mode, as in Coyote stories for example. In these stories, the animal is always both the archetypal being and any particular animal one might encounter. Both kinds of stories serve to connect people with each other and with their environment, something that contemporary nature writing also strives to accomplish.

It may be asked why nature writing exists at all, why it arose in the first place, and why it is needed. Along with wilderness, nature, and “the environment,” it is not something found among people who live closely with the land. Unlike story, language, or classification, it is not universal. Rather, it seems symptomatic of a peculiar alienation in late industrial civilization. In today’s America, many people live isolated and separated from the ecosystems that sustain them, and so not only do they know very little about these ecosystems but have no incentive to learn. Today I enjoyed a breakfast of toast with butter and jam, sliced cheese, a half grapefruit, and a cup of coffee: the toast was made from Montana wheat, the jam came from Maine blueberries, the coffee was grown in Central America, the cheese was made in Vermont, and the

grapefruit was raised in Texas. Certainly it could be said that I have ecological relations with all these diverse landscapes, but it is an *impersonal* ecology in contrast to the very personal and immediate relations that native people have with the places where they live and work.

Nature writing is also important because it offers a common ground on which science and traditional ecological knowledge can meet and fertilize each other. Most modern societies have forgotten so much that their forebears learned from centuries of devoted study and observation of the living world. Local medical, nutritional, and spiritual knowledge has disappeared as the world has grown more Westernized, industrialized, and globalized. An extinction of knowledge is proceeding as rapidly as the extinction of experience mourned so eloquently by naturalist Robert Michael Pyle (1993).

Finally, the stories of nature writers and stewards of traditional ecological knowledge can help preserve a sense of wonder and mystery in the Creation. If modern societies are alienated, it is something they’ve done to themselves. Someone once said that humans are self-domesticating animals; perhaps they are self-alienating as well. Theologian Thomas Berry (1988) warns that more and more people seem to have grown “autistic” with respect to nature; philosopher David Abram (1996) says that they have gone “deaf” to the more-than-human world. How is it possible to become lost in one’s own home? Every culture that gropes toward sustainability in a time of globalization will need all the help it can get. Their storytellers will need every kind of voice and every kind of experience to create the atmosphere where wisdom can show itself.

## References

- Abbey, E. 1968. *Desert Solitaire*. Simon & Schuster.
- Abram, D. 1996. *The Spell of the Sensuous: Perception and Language in a More-than-Human World*. Pantheon.
- Barnhardt, R., and A.O. Kawagley. 2005. Indigenous knowledge systems and Alaska native ways of knowing. *Anthropology and Education Quarterly* 36: 8-23.
- Basso, K. 1987. “Stalking with stories”: Names, places, and moral narrative among the Western Apaches. Pages 95-116 in D. Halperin, editor. *On Nature: Nature, Landscape, and Natural History*. North Point Press.

- Berry, T. 1988. *The Dream of the Earth*. Sierra Club Books.
- Berry, T. 1999. *The Great Work*. Bell Tower.
- Buber, M. 1970. *I and Thou*. Translated by W. Kaufmann. Charles Scribner's Sons.
- Carson, R. 1962. *Silent Spring*. Houghton Mifflin.
- Collingwood, R.G. 1945. *The Idea of Nature*. Oxford University Press.
- Dillard, A. 1974. *Pilgrim at Tinker Creek*. Harper's Magazine Press.
- Durkheim, E., and M. Mauss. 1963. *Primitive Classification*. Translated by R. Needham. University of Chicago Press.
- Fleischner, T.L. 1999. Revitalizing natural history. *Wild Earth* 9(2): 81-88.
- Foucault, M. 1973. *The Order of Things*. Vintage.
- Galilei, G. 1615. *Letter to the Grand Duchess Christina*. In S. Drake, translator and editor. 1957. *Discoveries and Opinions of Galileo*. Doubleday Anchor Books.
- Hildebidle, J. 1983. *Thoreau: A Naturalist's Liberty*. Harvard University Press.
- Leopold, A. 1949. *A Sand County Almanac*. Oxford University Press.
- Lévi-Strauss, C. 1966. *The Savage Mind*. Translated by G. Weidenfeld. University of Chicago Press.
- Lévi-Strauss, C. 1967. *Structural Anthropology*. Translated by C. Jacobson. Doubleday Anchor.
- Lopez, B. 1986. *Arctic Dreams*. Charles Scribner's Sons.
- Lopez, B. 1989. *Crossing Open Ground*. Vintage.
- Lopez, B. 1990. *Crow and Weasel*. North Point Press.
- Nabhan, G.P. 1982. *The Desert Smells Like Rain*. North Point Press.
- Nelson, R.K. 1983. *Make Prayers to the Raven: A Koyukon View of the Northern Forest*. University of Chicago Press.
- Paul, S. 1992. *For Love of the World: Essays on Nature Writers*. University of Iowa Press.
- Pierotti, R., and D. Wildcat. 1998. Traditional ecological knowledge: The third alternative. *Ecological Applications* 10: 1333-1340.
- Pyle, R.M. 1993. *The Thunder Tree: Lessons from an Urban Wildland*. Houghton Mifflin.
- Rinkevich, S., K. Greenwood, and C. Leonetti. 2011. Traditional Ecological Knowledge for Application by Service Scientists. US Fish and Wildlife Service Fact Sheet. Available: [http://fws.gov/nativeamerican/graphics/TEK\\_Fact\\_Sheet.pdf](http://fws.gov/nativeamerican/graphics/TEK_Fact_Sheet.pdf)
- Snyder, G. 1990. *The Practice of the Wild*. North Point Press.
- Tallmadge, J. 1997. *Meeting the Tree of Life: A Teacher's Path*. University of Utah Press.
- Tallmadge, J. 2000. Toward a natural history of reading. *ISLE (Interdisciplinary Studies in Literature and Environment)* 7(1): 33-45.
- Williams, T.T. 1991. *Refuge: An Unnatural History of Family and Place*. Pantheon.

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