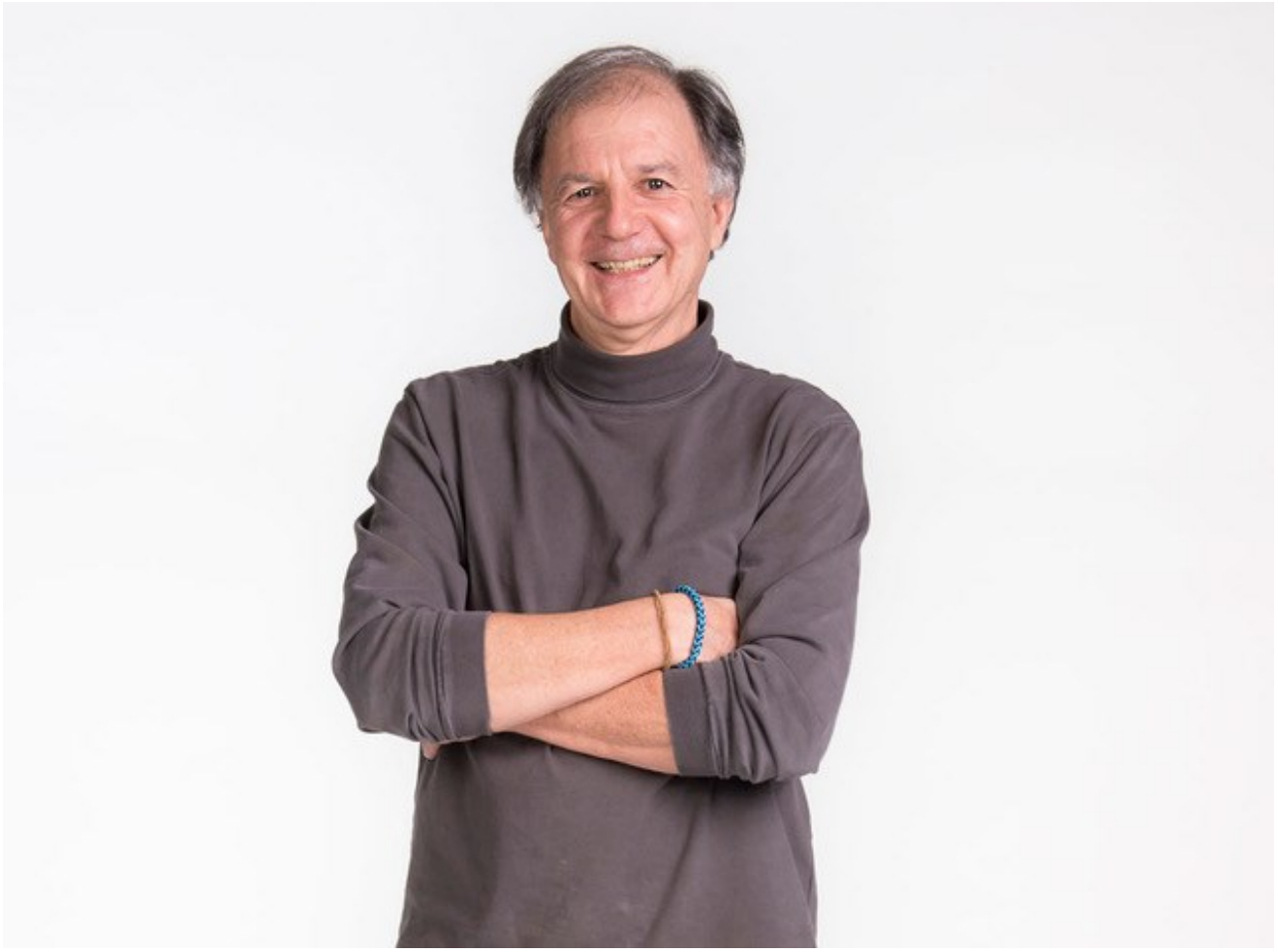
George Nicholas, Ph.D., Simon Fraser University



George Nicholas, Ph.D., Simon Fraser University

Converging or Contradictory Ways of Knowing: Assessing the Scientific Nature of Traditional Knowledge

By: George Nicholas, Ph.D.
Department of Archaeology, Simon Fraser University
Burnaby, BC

April 24, 2018

Sometimes viewed as relatively new, Traditional Knowledge (TK) is, in a sense, as old as humanity. Generally speaking, TK and its variants —Indigenous Knowledge, Traditional Ecological Knowledge, Native Science—represent the accumulated knowledge of a particular group, developed over centuries or millennia, that is derived from their

observations of, and experiences in the world. TK is often transmitted orally across generations, and can have many forms, including technology, land-use practices, stories, spirituality, foodways, and artistic expressions.[1]

In recent years, the Traditional Knowledge of Indigenous peoples has provided Western scholarship with opportunities to extend their understanding of the world in new and often exciting ways. Long a familiar element of anthropology and ethnobiology, TK is increasingly gaining the attention of the "harder" sciences, such as geology, biology, and climatology.

However, Western science, as we might call it, has an uneasy alliance with TK and Indigenous oral histories, and approaches it with a wariness sometimes deserved, sometimes not. On the one hand, these often-unique sources are valued when they support or supplement scientific evidence. This is evident with the use of Inuit knowledge (Qaujimajatuqangit) in climatological research[2], and Maori Knowledge (mātauranga Māori) in tsunami studies[3].

When the situation is reversed and TK challenges scientific "truths," then its utility may be questioned. This skepticism is not limited to the sciences. When archaeological excavations were conducted at the Little Bighorn Battleground in the 1980s[4], the results challenged some conventional accounts of the battle and confirmed what Lakota and Cheyenne oral histories long held – something that initially was met by skepticism by some historians.

In this paper I discuss examples of convergence and contradiction between Western and Indigenous Knowledge systems. And then some of the challenges and opportunities these offer.

Situating this perspective

I am an archaeologist and I seek to understand the history of ancient peoples over the broad sweep of time, based on material culture and empirical evidence. One focus of my work is the archaeology and ecology of wetlands, which have figured prominently in human affairs for hundreds of thousands of years[5].

But I am also an anthropologist who has worked with and for Indigenous peoples for 30 years, while also seeking to understand their values, beliefs and perspectives. I thus often find myself situated between two different ways of knowing the world – which can be uncomfortable but always informative.

Second, a few words about words. In the presentation I use such terms as "Western Science," "Indigenous Knowledge," and so on. I recognize that science is a method or means to systematic study of the world, including the smallest bits of it, through observation and experimentation to find the best explanation. And this description holds regardless of culture, as noted in this delightful definition that accompanies a child's

drawing of “a scientist” on the November 1994 cover of American Scientist, which includes this description[6]: “A scientist is someone who strives for knowledge. "Scientists try to make the unknown known”—an apt description to covers both indigenous and western societies.

I note the same for "knowledge," which is information put to use. Nonetheless, in this type of cross-cultural discussion, using the qualifiers of “Western” and “Indigenous” is a necessary convenience.

Finally, I am using broad brush strokes in this talk, so important distinctions between Indigenous societies are ignored in some of my comments.

The Firehawks' Story

Late last year, I was asked to start writing on heritage-related issues for The Conversation-Canada, an online news magazine. I saw this as an opportunity to engage with a non-academic audience for a change, and to share my knowledge and experiences in aid of helping readers be more aware of and make more decisions about heritage issues.

In mid-February, I wrote a piece on Traditional Knowledge[7] that used as its springboard Bonta et al.s’ recently published report of birds in northern Australia, which had received considerable attention in the media.[8] They reported kites and hawks intentionally picking up burning branches to spread wildfires, which enabled them to locate more prey. Importantly, the authors acknowledged that the observations they compiled appeared to correlate with knowledge and ceremonies of the local Aboriginal peoples. Turning from this in the article, I then explored how local knowledge can complement western science.

The topic clearly has a strong public appeal— my article has been wildly popular, now having been read more than 200,000 times. But some of the reaction to the piece has been surprisingly negative, which I find interesting, and which I return to later.

Convergence

Let me start by offering some examples of congruence between Traditional Knowledge and Western Science. Some of these suggest that some oral traditions may include observations of geological events for considerable time. For example:

• in Australia, accounts of sea-level rise over 7,000 years ago are reflected in the stories of 21 coastal Aboriginal communities.[9] These appear to correlate, at least roughly, with the final separation of the Australian and New Guinea land masses at the end of the late Pleistocene;

• in the western United States, there are tribal accounts of landslides and volcanic eruptions. Klamath oral traditions refer to events that seem to correlate with the eruption of Mt. Mazama 7,600 years ago;[10] and

• in coastal British Columbia, the ancient practice of clam gardens—rock-walled beach terraces built for thousands of years to aid in harvesting and increase yield— was rediscovered by archaeologists on the basis of knowledge preserved by just a few elders.[11]

There is also specific information about particular plants. In the Plateau region of British Columbia, the Secwepemc depended heavily upon balsamroot and an array of other plants for their purported medicinal properties to treat wounds, infections, urinary and digestive tract disorders, and other conditions. A phytochemistry study of 68 plant species[12] used by the Secwepemc to identify anti-microbial properties, conducted by Kelly Bannister, determined that 88 percent of the plant species tested had antibacterial activity; 75 percent had anti-fungal activity, and 25 percent percent had anti-viral activity. This is a strong correlation between local knowledge of plant properties and lab-based results.

Contradiction

Can Traditional Knowledge be wrong, at least in not being supported by material evidence, or is contradictory to what is known by other means? Yes. Here are three examples:

• the Navajo of the American Southwest are considered by archaeologists (and also their neighbors) to be a relatively recent immigrant to the region but have claimed a relationship to earlier traditions and sites;[13]

• in British Columbia, I have been told by several elders that their ancestors always lived in what are called pithouses (semi-subterranean structures) along the rivers and that they always harvested salmon. Yet the archaeological evidence indicates that that way of life is restricted to the last 4,000 or 5,000 years; and

• in Quebec, archaeologist David Denton worked with Cree elders to locate the place where the Cree had fought off a group known as the Nataawaaua several thousand years ago and buried their remains.[14] The Cree elders were confident of the location, but excavation failed to identify them. Was the story wrong? Were they in the wrong place? Had the bones dissolved in the acidic soil?

These examples speak to the challenges of interpreting oral accounts. Why are they wrong (if indeed they are)?

Archaeologist Ronald Mason accepts that oral traditions can be as valid as scientific statements about the past and should be treated equally. But also notes these cautions:

1. Contingent as they are on memory, the veracity of oral traditions must be regarded as highly dubious;
2. Oral traditions reflect the concerns of their contemporary reciters more than conditions and events of the past;
3. Oral traditions are emic and, thus, on their own grounds, largely impervious to external challenge.
4. Typically, parts if not all of oral traditions are regarded by their believers as sacred, not be freely accessed by outsiders potentially at odds with the tradition keepers. [15]

Native American Roger Echo-Hawk has also explored the relationship between oral traditions and archaeology[16] and is no less critical. He notes there are three possibilities to consider:

1. A narrative may be accurate and unadorned account of ancient historical events or information carefully passed down through generation.
2. A narrative could have been created at some point in the past as an entertaining fiction or for other non-historical purposes; or
3. A narrative could contain some historical information that has been encrusted with fictional trappings.

Ever pragmatic, Echo-Hawk, also points to a means – indeed a scientific means—to evaluate such accounts:

Test 1 – the oral tradition is a group account and contains only vague chronological indicators relative to the historical event
Test 2 – the oral tradition is presented as an historical account.
Test 3 – the account can be verified through evidence gathered from non-verbal independent sources (such as archaeology).

Is the lack of congruence a problem? Not to those Indigenous peoples who are satisfied with their knowledge of the world. For example, Murdena Marshall, a prominent Mi'kmaw scholar states, "You belief in proof, we believe in oral traditions. We need to let those two work together to reach a common ground… For me I did not need archaeology, anthropology or geology to prove who I am or where I came from. My oral traditions, which are part of my everyday life, told me so a long time ago."[17]

Back to the Conversation

Originally published in The Conversation, my article was picked up by Smithsonian.com, and many other online sites worldwide. On some of these publication outlets, readers have the opportunity to post comments. The majority have been positive but some clearly have taken exception to the article. For example, here are some negative responses on the Smithsonian website:

"I think the Smithsonian should not have published such an extreme postmodernist and anti-science article."

"This was an astoundingly bad article that a good science editor should have blocked. The author is clearly knowledgeable about his field but lacks a clear understanding of the scientific method. A rewrite focusing on the area of expertise would create a fascinating article but instead a series of anti-science and postmodernist rants have been passed off as fact despite being riddled with fallacies and misunderstandings."

"Without the unnecessary anti-science it would have been a good article."

“The Smithsonian has gone new-age and the anti-science, regressive Left is apparently thriving there, to our shame. Partisans on the other end of the spectrum will be pleased to have one more example of the Left's idiocy to point to, though the rest of us are merely deprived of another formerly credible source of knowledge.”[18]

In addition to other transgressions, I’m accused of being anti-science. Yet, I am a scientist and there is nothing in that article that is a critique of science. I wrote only of TK being complementary, and I don’t see how it can be read as threatening or trying to lessen the value of Western Science. I don’t shy away from criticism, but it appears that some responders read into the piece what wasn’t there, pointing to misunderstandings about the nature of TK.

It is also important to point out that Western Science can be wrong. There is, of course, the famous Pons-Fleischmann cold fusion experiment[19] in 1989 that has never been replicated. There has also been a steady stream of contrary opinions offered by scientists over the years about eggs, caffeine, alcohol and so on being good or bad for you. And different realms of science or scholarship—geology, archaeology, genetics, linguistics—may offer different accounts of events, such as the timing and nature of the human colonization of North America, for example.

Science has always been plagued by bias, sample contamination, and even data falsification – but this doesn’t render science bogus. The same holds for TK, which may be affected by its own problems in some manner but also seeks to correct itself.

Conclusions

My final point is that engagement with Indigenous Knowledge can actually improve scientific endeavors in two ways.

The first is by increasing objectivity. If science as we know it is practiced only by a fairly homogenous group—a group whose values and interests are largely shared and unquestioned—then adding Indigenous methods, theories, and ways of knowing increases diversity and forces greater objectivity, which is always welcome.[20]

The second is by providing alternative explanations of observed phenomena or predicted reactions. Here I suggest that the use of multiple-working hypotheses incorporating Traditional Knowledge-derived evidence can push biologists, ecologists, geologists and others toward unanticipated conclusions, which is certainly one desired outcome of good science.

Here, I quote my late colleague Bruce Trigger. While he is writing of my own discipline, the point that he makes is relevant to the sciences: “The greatest obstacle to making progress in archaeology is intellectual complacency. Without the ability to imagine alternative

explanations, archaeology languishes. On the other hand, without the opportunity and determination to test ideas, imagination is of little value."[21]

Western Science and Traditional Knowledge represent different but often complementary epistemologies, histories, and knowledges of the world. What many Indigenous people already acknowledge, these ways of knowing are best linked, not integrated. In this way, each can contribute to the other in respectful, mutually beneficial ways.

Note: A version of this paper was originally given as a plenary address to the Association of Professional Biology Conference, Richmond, BC. (April 5, 2018). I thank Pamela Zevit for the invitation to develop that presentation.

Recommended Readings

Cajete, G. 2000. Native Science: Natural Laws of Interdependence. Clear Light Publishing, Santa Fe, NM.

Henige, D. 2009. Impossible to Disprove Yet Impossible to Believe: The Unforgiving Epistemology of Deep-Time Oral Tradition. History of Africa 36:127-234.

Martindale, A. 2006. Methodological Issues in the Use of Tsimshian Oral Traditions (Adawx) in Archaeology. Canadian Journal of Archaeology 30(2):158-192.

Nicholas, G.P., and N.M. Markey. 2014. Traditional Knowledge, Archaeological Evidence, and Other Ways of Knowing. In Material Culture as Evidence: Best Practices and Exemplary Cases in Archaeology, edited by R. Chapman and A. Wylie, pp. 287-307. Routledge Press, New York.

Turner, Nancy. 2014. Ancient Pathways, Ancestral Knowledge: Ethnobotany and Ecological Wisdom of Indigenous Peoples of Northwestern North America. McGill-Queen's University Press, Kingston, ON.

George Nicholas, Ph.D.
Professor, Department of Archaeology
Simon Fraser University
Burnaby, British Columbia V5A1S6

nicholas@sfu.ca
778-782-5709
http://www.sfu.ca/archaeology/faculty/nicholas.html
http://www.sfu.ca/ipinch/

[1] Traditional Knowledge Fact Sheet. IPinCH.
http://www.sfu.ca/ipinch/sites/default/files/resources/fact_sheets/ipinch_tk_factsheet_march2016_final_revised.pdf

[2] Laidler, G.J. (2006) Inuit and Scientific Perspectives on the Relationship between Sea Ice and Climate Change: The Ideal Complement? Climate Change 78: 407-444. https://slideheaven.com/inuit-and-scientific-perspectives-on-the-relationship-between-sea-ice-and-climat.html
[3] King, D.N.T., J. Goff, and A. Skipper. 2007. Māori Environmental Knowledge and Natural Hazards in Aotearoa-New Zealand, Journal of the Royal Society of New Zealand 37:2, 59-73. https://www.tandfonline.com/doi/abs/10.1080/03014220709510536
[4] Fox, Richard, A. 1993. Archaeology, History, and Custer's Last Battle: The Little Big Horn Reexamined. University of Oklahoma Press, Norman.
[5] 2012. Toward an Anthropology of Wetland Archaeology: Hunter-Gatherers and Wetlands in Practice and Theory. In The Oxford Handbook of Wetland Archaeology, edited by R. Menotti and A. O'Sullivan, pp. 761-778. Oxford University Press, Oxford.
[6] American Scientist, November 1994. Notably, the caption continues with "Without our inventors and researchers we would be living in the woods like bears."
[7] https://theconversation.com/its-taken-thousands-of-years-but-western-science-is-finally-catching-up-to-traditional-knowledge-90291
[8] Bonta, M., Gosford, R., DZ. Eussen, N. Ferguson, R. Loveless, and M. Witwer. 2017. Intentional Fire-Spreading by "Firehawk" Raptors in Northern Australia. Journal of Ethnobiology 37(4): 700–718.
[9] Nunn, P.D., and N.J. Reid. 2015. Aboriginal Memories of Inundation of the Australian Coast Dating from More than 7000 Years Ago. American Geographer 47(1). https://www.tandfonline.com/doi/abs/10.1080/00049182.2015.1077539?journalCode=cage20
[10] Duer, D. 2002. A Most Sacred Place: The Significance of Crater Lake among the Indians of Southern Oregon. Oregon Historical Quarterly 103(1): 18-49. http://www.jstor.org/stable/20615207
[11] Groesbeck, A.S., K. Rowell, D. Lepofsky, and A.K. Salomon. 2014. Ancient Clam Gardens Increased Shellfish Production: Adaptive Strategies from the Past Can Inform Food Security Today. PLoS ONE 9(3): e91235. https://doi.org/10.1371/journal.pone.0091235
[12] Bannister, K.P. (2000) "Chemistry rooted in cultural knowledge: unearthing the links between antimicrobial properties and traditional knowledge in food and medicinal plant resources of the Secwepemc (Shuswap) Aboriginal Nation," unpublished dissertation, University of British Columbia.
[13] Thompson, K.F., and R.H. Towner. 2017. Navajo Archaeology and a Century of Alternative Navajo History," in Oxford Handbook of Southwest Archaeology, edited by B.J. Mills and S. Fowles. Oxford University Press, Oxford.
[14] Denton, D. 1997. Frenchman's Island and the Nataawaau Bones: Archaeology and Cree Tales of Culture Contacts," in At a Crossroads: Archaeology and First Peoples in Canada, edited by G.P. Nicholas and T.D. Andrews. Burnaby, BC: Archaeology Press, Simon Fraser University.

http://archpress.lib.sfu.ca/index.php/archpress/catalog/book/42
[15] Mason, R.J. 2006. Inconstant Companions: Archaeology and North American Indian Oral Traditions. University of Alabama Press, Tuscaloosa.
[16] Echo-Hawk, R.C. 2000. Ancient history in the New World: Integrating Oral Traditions and the Archaeological Record in Deep Time. American Antiquity 65(2): 267-290.
[17] Marshall, M. 2011. L'nuit'si: Mi'kmaw Tribal Consciousness. In Ta'n Wetapeksi'k: Understanding from Where We Come, edited by T. Bernard, L.M. Rosenmeier, and S. Farrell Eastern Woodland Publishing, Truro, NS.
[18] https://www.smithsonianmag.com/science-nature/why-science-takes-so-long-catch-up-traditional-knowledge-180968216/ For both this and the original Conversation article (note 7), scroll to the bottom of page for readers' comments
[19] https://en.wikipedia.org/wiki/Cold_fusion
[20] This argument is made by Alison Wylie regarding women in science in her 1997 article, Good Science, Bad Science, or Science as Usual? Feminist Critiques of Science. In Women in Human Evolution, edited by L. Hager, pp. 29-55. Routledge, New York.
[21] Trigger, B.G. (2003) Artifacts and Ideas. Transaction Publishers, New Brunswick, NJ.