

*Insight*

## **The Significance of Context in Community-Based Research: Understanding Discussions about Wildfire in Huslia, Alaska**

*[Henry P. Huntington](#)<sup>1</sup>, [Sarah F. Trainor](#)<sup>2</sup>, [David C. Natcher](#)<sup>3</sup>, [Orville H. Huntington](#)<sup>4</sup>, [La'ona DeWilde](#)<sup>5</sup>, and [F. Stuart Chapin III](#)<sup>2</sup>*

---

**ABSTRACT.** Community workshops are widely used tools for collaborative research on social-ecological resilience in indigenous communities. Although results have been reported in many publications, few have reflected explicitly on the workshop itself, and specifically on understanding what is said during a workshop. Drawing on experience from workshops held in Huslia, Alaska in 2004 on wildfire and climate change, we discuss the importance of considering cultural, political, and epistemological context when analyzing statements made by indigenous people in community workshops. We provide examples of statements whose meaning and intent were, and may remain, unclear, with descriptions of our attempts to understand what was being said by placing the statements in a variety of contexts. We conclude that, although workshops can be an efficient means of exchanging information, researchers should strive for multiple channels of communication and should be cautious in their interpretations of what is said.

**Key Words:** *Alaska; cross-cultural communication; indigenous knowledge; wildfire; workshops.*

---

### **INTRODUCTION**

Working with local residents has become an increasingly common component of biophysical and social-ecological system research in the Arctic. Projects on climate change (Nickels et al. 2002), sea ice (George et al. 2004), coastal erosion (Brunner et al. 2004), sustainability (Kofinas et al. 2002), and many other topics include some degree of interaction with and learning from local residents. Such interactions can take many forms, including the community workshop. The results of such workshops have been reported in many publications such as those just cited. Huntington et al. (2002) examined the structure of workshops in relation to exchanging information. However, little has been written about the interpretation of the discussions that take place in workshops. This paper attempts to address that gap, using examples from our experiences in Huslia, Alaska, on a project examining the human and ecological dimensions of wildfires.

A growing body of ecological and human dimensions research involves interdisciplinary collaborative projects that engage investigators from different academic disciplines in partnership with community members who have their own experiences and systems of knowing (Sillitoe 2004). Such collaboration offers substantial benefits, including enhancing the relevance of research with regard to local conditions and issues (e.g., Singleton 1998, Smith 1999), providing opportunities for researchers to understand local and traditional knowledge, providing opportunities for local residents to learn from scientists (e.g., Johannes 1981, Huntington et al. 2002), and developing conservation comanagement and other action plans that are beyond the reach of researchers, agencies, or community members alone (e.g., Berkes et al. 2000, Wondolleck and Yaffee 2000).

Although it is generally agreed that cross-cultural and interdisciplinary dialogue can enhance the pool of available knowledge, experiences, and values from which insights can be drawn (e.g., Stevens 1997, Ford and Martinez 2000, Weingart and Stehr

---

<sup>1</sup>Huntington Consulting, <sup>2</sup>University of Alaska Fairbanks, <sup>3</sup>Department of Anthropology, Memorial University of Newfoundland, <sup>4</sup>Alaska Native Science Commission, <sup>5</sup>Yukon River Intertribal Watershed Council

2000, Wiser 2001), it remains unclear as to how the cultural and personal perspectives of participants influence research outcomes. Whereas some perspectives are generally recognizable, such as differences in language, age, and gender (e.g., Gallagher 1986, Nuttall 1995), others are less apparent such as those reflecting different temporal and spatial perspectives (e.g., Natcher et al. 2004), epistemological assumptions, or individual and factional motivations (e.g., Briggs 1986, Morrow and Hensel 1992). Those cognitive and motivational differences can impede communication and lead to misinterpretation of research results, or they can enrich the research process, leading to mutual appreciation of the broader context (e.g., McCay and Jentoff 1996).

In this insight paper, we highlight the importance of considering cultural, political, and epistemological context by reporting our experience analyzing data in an interdisciplinary study of the role of fire in affecting the resilience of Alaska Native communities and the relationship between wildfire and human activity in the boreal forest of Alaska and the Yukon Territory. Contrary to the experiences of Mosse (2001), we have found that careful attention to local knowledge, together with sensitivity to the way such knowledge is presented publicly, can effectively redefine the relationship between community members and visiting researchers. This in effect has enabled us to avoid what Cooke and Kothari (2001) refer to as the parochial dimension of participatory research. Last, our findings reinforce the conclusions drawn by Guijt and Shah (1998) in that effective cross-cultural collaboration demands considerable reflexivity throughout the research process, one aspect of which is to seek a diversity of types of interactions.

Our paper begins with a description of the setting and the workshops themselves, including related interactions with community members. The discussion that follows addresses some of the complications we encountered while trying to interpret various statements made during the workshops, and the importance of understanding the context of such statements if one hopes to get the message. We conclude with observations on important elements in effective interpretation of workshop discussions, including a degree of caution on the part of the researchers.

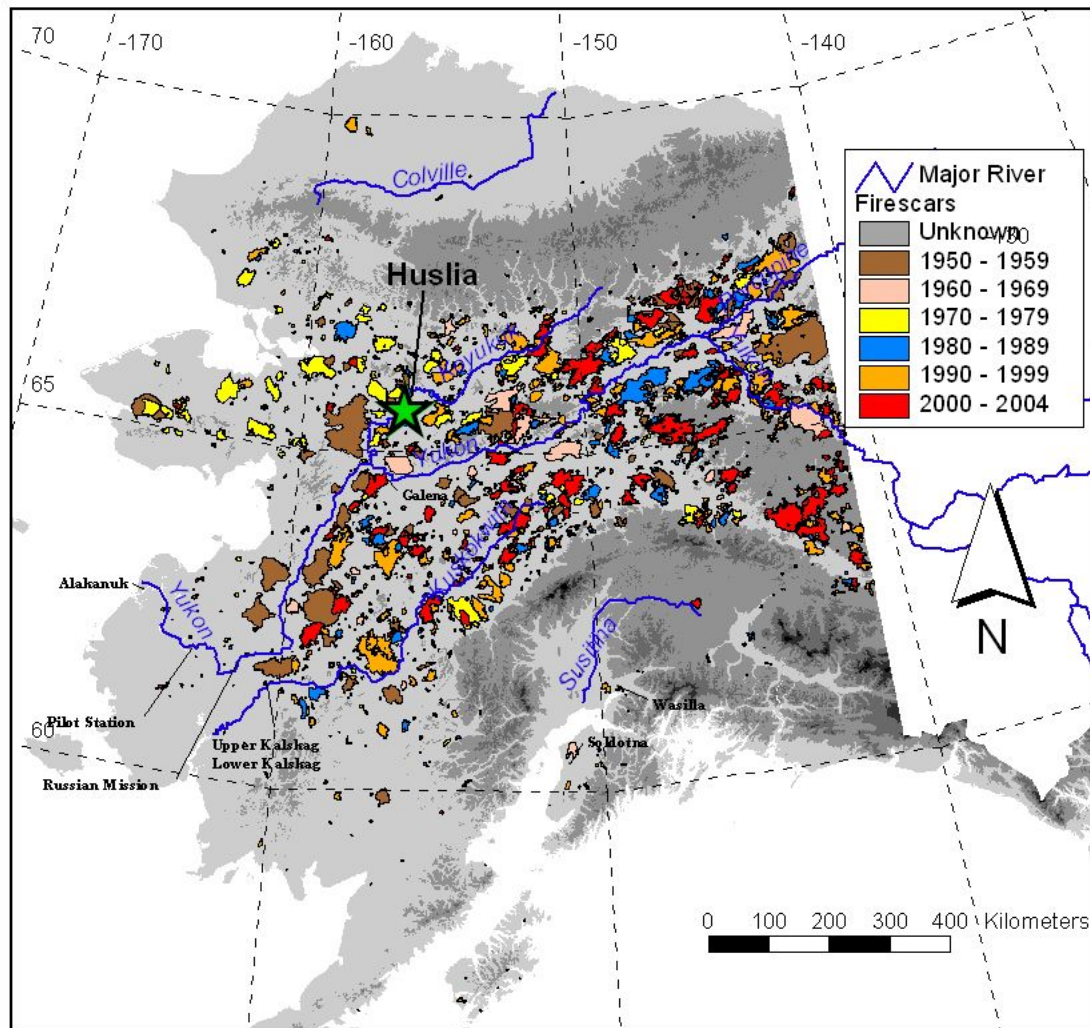
## BACKGROUND

Together with community partners, we are exploring the changing role of fire in the arctic-boreal climate system, particularly as it affects and is affected by human activities (Chapin et al. 2003). This analysis includes human influences on the boreal fire regime such as ignition and suppression activities, and the effects of fire on people, including the availability of ecosystem services, e.g., production of game, berries, firewood, etc. We are also examining the role of wildfire-fighting employment in the economy of rural communities, for example, in relation to subsistence activities. This involves an examination of the short- and long-term consequences of current fire policy on northern interior communities.

The experiences described here are from a series of visits and workshops in the Koyukon Athabascan village of Huslia (Fig. 1). In 2000, the community had 293 residents, of whom 274 were Alaska Native (U.S. Census Bureau 2000). It is located on the north bank of the Koyukuk River, approximately 467 km northwest of Fairbanks, within the Koyukuk National Wildlife Refuge. As shown in Fig. 1 (Nelson 1973), Huslia is in an area that is strongly affected by wildfire, although it is near the northwestern boundary of this fire-prone area. In 1949, the community was relocated from its former, frequently flooded site at Cutoff to the present-day location, an area known as Tsaatiyh dinaadakk' onh dinh or "where the forest fire burned the hill to the river" in Koyukon (Nelson 1983). Within a 32-km radius, large-scale fires burned in the late 1950s and 1970s. Aside from smoke inundation, Huslia was not directly impacted by the 2004 record-breaking Alaskan fire season.

A central figure in initiating and organizing these workshops and interpreting research results was research team member and co-author Orville Huntington, a Koyukon Athabascan, wildlife biologist with the U.S. Fish and Wildlife Service, vice-chair of the Alaska Native Science Commission, and long-time resident of Huslia. Co-author La'ona DeWilde, who was born and raised near Huslia and was at the time of the project a graduate student, was also a key part of data collection and interpretation. The other authors on this paper are nonlocal members of the research team and include Ph.D. scientists with expertise in ecology, anthropology, and interdisciplinary

**Fig. 1.** Map of fire history in interior Alaska showing the location of the village of Huslia.



analysis of people and resources in the Arctic. In addition to interactions during the workshops and with local residents at other times, all members of the research team contributed to informal, preliminary interpretations of the workshop discussions, allowing us to refine our understanding and, in the case of evening conversations during our stay in Huslia, identify areas for further discussion on subsequent days, or even subsequent workshops.

In May 2003, H. Huntington and O. Huntington jointly organized and led a workshop in Huslia, specifically focused on observations of climate

change. These discussions and the start of a project on wildfire led to a second workshop, in which all authors participated, held in Huslia in January 2004, and led by the two Huntingtons. This workshop also focused on local observations and traditional knowledge related to the impact of climate change in northern latitudes with an additional theme of the impact of climate change on wildfire and the impact of wildfire on plants, animals, and the community. More than 50 people of a range of ages attended this workshop from Huslia and neighboring Athabascan and Iñupiaq, i.e., Eskimo, villages, including roughly 20 high school students. A prominent

feature of this workshop was the intentional educational interchange that occurred between village elders and youth. Both workshops followed the Koyukon practice of allowing elders precedence, yet opening the floor for anyone to speak. Neither workshop had a fixed agenda, but both involved presentations by visiting scientists as well as open discussions. In attendance at both workshops were climate scientists and the vice president for academic affairs and research at the University of Alaska Fairbanks. In each of these workshops, information was recorded in notes by the research team and as high quality digital audio recordings.

In March 2004, several members of the research team conducted semi-structured interviews with fire fighters and elders in Huslia and attended the Alaskan Western Regional Subsistence Advisory Board meeting held in this village. This board compiles feedback from villagers in the region and makes recommendations for fish and game management. Our final workshop was held in Huslia in October 2004, again led by the two Huntingtons, and recorded digitally. Discussions focused specifically on wildfire, including perceptions of fire, traditional knowledge of fire ecology and ecosystem services, cultural beliefs and practices regarding fire, local perspectives on fire management, and the social and economic role of employment fighting wildfires. This workshop was attended by about 10 elders and experts from Huslia and neighboring villages, including the Athabascan village of Nikolai, located on the Upper Kuskokwim River. Also in attendance at this workshop were federal fire management officers, one with the Bureau of Land Management for the region and one for the Koyukuk National Wildlife Refuge, within which Huslia is located. Each workshop occurred over 2-3 d, and included opportunities for one-on-one discussions between researchers and workshop participants during breaks, shared pot-luck meals, and field trips.

The goal of these workshops was to engage local elders and others knowledgeable about fire in a collaborative, interactive, mutual-learning process with university scientists and researchers, community members, and representatives from fire management agencies (e.g., Huntington et al. 2002). The October 2004 workshop included a field trip to a nearby burned site. The workshops began with an extended period for introductions, giving participants a chance to learn about one another, and

included long breaks, and community dinners. Visiting researchers then gave presentations, and the ensuing discussions wove in and out of several related topics, allowing for an organic progression rather than one dictated by a particular group of participants or by a preconceived idea of what was important or likely to be of greatest interest. Members of the research team periodically offered summaries, directed discussion, and requested clarification. Local elders also periodically summarized their perspectives, highlighting topics that they wanted to communicate to high school students who attended part of the workshops, or to participants from management agencies.

Our research goal was to collect traditional knowledge regarding wildfire impacts on communities and ecosystem services. Therefore, we deliberately invited knowledgeable elders and/or trappers with experience of fire effects to participate in the workshop. Statements presented here were made by village elders who, in accordance with Athabascan tradition, are afforded great respect and not contradicted in public. We did not aim to conduct community-wide opinion surveys and, therefore, do not report a range of variability in research findings. Made in any setting, isolated statements may on the surface appear ambiguous or extreme to outside researchers and even to local residents. In a public setting in a village such as Huslia, questioning or challenging such a statement by an elder would be considered improper. Even asking for clarification may imply disrespect. Thus, pursuing the meaning of such statements required not only tact but also the opportunity to discuss what was said with local residents, especially research team members, outside of the public setting.

Each community workshop and village visit was informative in and of itself. Taken together, these community visits and workshops allowed the research team, including community members, to triangulate the information they heard and to begin to put statements into a cultural and epistemological context. The series of visits and interactions also allowed visitors and locals to get to know one another, and familiarity produced greater trust and openness over time. Although it may not be possible to entirely remove ambiguity, placing statements in a larger cultural and economic context will result in more robust interpretation of data, as we discuss next.

## DISCUSSION: THE IMPORTANCE OF CONTEXT

Although some of what we heard during interviews and in workshops could be interpreted straightforwardly (see Appendix 1 for examples of ecological and other information gathered during the workshops), other comments and statements seemed ambiguous or contradictory to the researchers. These apparent ambiguities underscore the importance of careful analysis and the interpretation of traditional indigenous knowledge within a larger political, spiritual, and epistemological context. As this case of human-wildfire interactions illustrates, the context in which fire is viewed has an important influence on perceptions of fire's impact and significance.

Our findings parallel those of Kendrick (2003). She emphasizes that the perceptions of government resource managers can be vastly different than those of indigenous resource users, regarding this as an opportunity for mutual learning and the development of innovative resource management processes. In her studies of *Rangifer*, caribou/reindeer comanagement in Alaska and northern Canada, Kendrick found that cross-cultural communication in studying social ecological systems that include indigenous people requires the development of mutual trust, which requires a degree of cross-cultural learning.

### Worldview

On the coarsest scale of analysis, we can consider how different participants view wildfire. Western scientists and resource managers tend to take a reductionist approach; in this case isolating fire as the theme of analysis and organizing topic of research. While recognizing that fires are connected to wildlife habitat, employment, smoke inhalation, and so on, in the research process we consider these ecological and social connections not necessarily in and of themselves, but by virtue of their connection to fire. Fire and its ecological and social impacts are the primary concern.

In contrast, workshop participants from Huslia and other villages tended to take a much broader view, regarding fire as just one part of the larger ecological and socio-political setting. In our discussions of fire,

for example, one elder mentioned land tenure, land status, and lack of local control of resources on at least two occasions. She summed up her feelings at one point by saying, "We need to follow Indian law, instead of always getting pushed around by Europeans." In this context, local inability to control fire policy on federal and state land, despite being affected by the consequences, was not an isolated phenomenon, but another instance among many in which local people lost the power to run their own lives (Berger 1985). Similarly, a question by researchers regarding the effect of fire on moose habitat led to a discussion of how low water levels in the rivers and a different pattern of melting in recent years have resulted in less ice scour along the riverbanks. The ice scour had been a source of disturbance, helping create good moose browse, but now other sources of disturbance are needed, such as flood or fire, to create productive habitat. For the Athabascans living subsistence lifestyles, fire was not the central concern, but one of many ecological, social, and political phenomena that impact their lives.

### "We hate fire": the political and interpersonal contexts of fire

In science, unexpected or surprising results are particularly interesting as they may indicate a need for theoretical or methodological innovation. In our workshops in Huslia, statements that surprised researchers were particularly challenging to interpret, requiring careful contextual consideration. The most striking example occurred when, in response to an open-ended inquiry about the economic and social impacts of fire fighting employment in rural communities, a respected elder said, "We hate fire." Members of the research team, including the locally resident researchers, were surprised to hear such a vehement and extreme statement, particularly as hatred is viewed as inappropriate in Koyukon culture.

At the time, the visiting researchers considered the political context to find meaning in this surprising statement. The elder's vehemence about fire may have been tied to her frustration about land tenure and ownership, and the inability of local residents to participate meaningfully in decisions about fire management on federal lands, that influence their livelihoods. As noted in the Appendix, these fires on federal lands sometimes burn shelter cabins,

upon which local people rely for safe winter travel, and trapping cabins, which local residents or their ancestors built long before land-tenure status was legally formalized in the region. Representatives from federal agencies that implement national fire policy and make decisions about fire management on lands that local people rely on for subsistence were at the workshop. When analyzed within the political context, this elder appeared to view our workshop as a platform to address managers about fire policy, rather than as an event specific to our research project.

Although analysis of this surprising statement in a political context seems plausible and reasonable, different interpretations of the statement's context further reveal the complexity of studying traditional indigenous knowledge. Careful analysis of the workshop's audio recording revealed a pause before the word "hate." Although the elder communicates fluently in English, it is not her first language. Visiting researchers wondered if this pause might indicate that she was searching for the right word to use, and that perhaps in the translation the connotations carried in English by the word "hate" were not shared in Denaaga, her first language. Instead, O. Huntington explained that such a pause is a way to add emphasis, to signal to the audience that something important is about to be said. The potential for divergent interpretations is clearly large.

Finally, we cannot overlook the social context of this statement. Within the two previous years, two community members had died in a cabin fire in Huslia. In addition, during the course of our workshop, there was a fire in one of the cabins in Huslia. Although no one was hurt, the collective effort of many community members was required to extinguish the fire. Although we are not certain of the total context of this elders' statements, it seems clear that interpreting her statement, strictly as an ecological one, i.e., that fire serves no useful function on the landscape, would have been a mistake.

### **"Some things you don't talk about": the spiritual and cultural context of fire**

In the Koyukon worldview, the spoken word has great power. It is often inappropriate to speak of sentient forces, and it is bad luck to speak ill of them,

lest they hear and take offense. At times it is inappropriate to speak of sentient forces at all. Fire is one such force, which in part explains our surprise at the negative statement discussed above. As we detail below, several aspects of the spiritual power of fire were discussed, but most notable was what could not be discussed. On more than one occasion, elders and respected community members responded to researchers' inquiries with the comment, "Some things you don't talk about." At one point there was an extended discussion about the personal struggles that elders and community members have experienced. Although they know that it is culturally forbidden to speak of a certain animal, phenomenon, or situation, they are compelled to do so to represent and defend Native perspectives on resource management issues that are dominated by western perspectives and procedures.

One elder told us of how she had been instructed not to speak of what a fire might do because speaking in that way might cause the fire to do exactly as she had said. Several people talked about using ashes to protect the food that is stored underground, because insects, mice, and other animals would not go through the layer of ash. Although this practice may have a physical basis, the same principle has a spiritual dimension as well, as seen in the practice of sprinkling ash around a house to provide protection from earthquakes and other misfortunes.

With the power of words and of fire in mind, a question that was asked of the scientists by a local resident about the effect of ash on fish takes on an additional dimension. There is a biochemical aspect to it, which scientists could address, but there is also a spiritual aspect regarding the way fire transmits its power through ash to water and across the landscape. The person who asked the question may have appreciated an answer about the biochemical effects had we been able to provide one, but may not have been completely satisfied with that answer. Similarly, the protection afforded by ashes to buried food may be recognized as spiritual as well as biochemical. Our initial inclination to identify only a biophysical explanation may have missed part of the point of the conversation.

## **“It all started when they put a man on the moon”: epistemological context**

Perhaps the most challenging aspect of partnering with indigenous communities and linking traditional ecological knowledge with western scientific knowledge is accounting for the diverse ways in which people see the world and the accompanying diverse beliefs about how we come to gain knowledge about the world. As this example illustrates, the ontology, i.e., how we see the world, and epistemology, i.e., how we gain knowledge about the world, of Native Alaskans differs considerably from that of western trained scientists. A true partnership requires mutual respect and the ability to create bridges between these differing worldviews.

A particular focus of the first workshop was local observations of climate change, which impacts northern latitudes acutely and is a topic of considerable interest in Huslia and in many other Alaskan villages. Although villagers' observations of the many local environmental changes occurring in recent years are consistent with scientific observations and findings around the state and the Arctic (Krupnik and Jolly 2002, ACIA 2004), some of their explanations of these changes are not. On several occasions, local participants described how a respected leader had predicted that substantial social and environmental upheaval would result from the Apollo moon missions (1969-1975). The moon has considerable power and significance in Koyukon cosmology. Tampering with the moon in the form of lunar space landings was disrespectful and inappropriate and could only lead to negative repercussions. DeWilde notes that there may be intergenerational differences, too, among the Koyukon, with younger generations having the same general perspective but perhaps adding physical explanations to spiritual ones. Because this prediction was made at the time of the moon landings and has been followed by climate and other environmental changes, the prediction has become an explanation.

The phenomenon of global warming and the potential role of humans are well known to Huslia residents. The moon landings do not simply fill a void left by the absence of other explanations. Indeed, the moon landings have a symbolic role, too, in relation to humankind's pursuit of technological and other forms of progress without

careful consideration of the consequences: landing on the moon was a boastful and arrogant thing to do to another spirit. Nonetheless, it can be difficult to reconcile the Apollo explanation with current scientific understanding of climate. Some visiting researchers, though not the climatologists, speculated on the role of rocket fuel and vapor in the stratosphere, seeking a physical explanation to connect the two. Others made the symbolic interpretation already mentioned, whereas some preferred to move on to another topic.

In this example, the invocation of Koyukon cosmology created a mismatch in the worldview between non-Native western scientists and local Native researchers and residents. This mismatch posed a challenge to communication and the sharing of ideas. It is unlikely that the local participants expected the visiting researchers to fully accept the idea that the moon landings were responsible for environmental disruption. At the same time, the fact that they mentioned the idea at all, and on more than one occasion, indicates they were trying to convey a point. The disruption caused by the modern way of life often arises in conversations with Alaska Natives. Although modern conveniences are appreciated, there is considerable concern for maintaining traditional language, stories, customs, and knowledge, and the social and other problems of being marginalized in the western world of today are all too real. The disasters that follow hubris are found across many cultures, and so the symbolic interpretation of the moon landings is no doubt part of what we were being told.

It is also likely that, whether we were expected to believe it or not, the local participants also wanted us to understand and respect the strong connections they see between human thought and action and the natural world that guide their interactions with the world around them. In this context, management actions such as prescribed fires have much broader implications for interactions between the community and the natural world than might be apparent to fire managers and researchers.

For the visiting researchers, the discussion about the moon landings could also be viewed as something of a test. Our reactions may have partly determined the degree to which the local participants wanted to continue to help us or take part in the discussion. Had we simply replied, “That’s ridiculous,” the workshop might have effectively ended. Had we sought purely physical explanations, we might have

been viewed as slow learners with a limited worldview. Had we accepted the explanation completely and abandoned other lines of cause or inquiry, we would probably have been laughed at. Huslia residents have their own expectations of how researchers work and think. We would at least like to think that the visitors' acknowledgment of the significance of the prediction and its importance in local cosmology helped make participants more comfortable discussing additional aspects of their worldview without fear of ridicule.

## CONCLUSION

In interdisciplinary, collaborative community workshops such as those described here, the challenge for each researcher or other participant is to identify and interpret the information of relevance without losing sight of the larger political, spiritual, and epistemological contexts in which that information is presented and understood. We are reluctant to offer prescriptive steps or to claim to have a fail-safe method for achieving this goal. Our experience does, however, suggest some useful approaches to keep in mind, as well as the need for caution on the part of the research team, including a degree of humility in recognizing that complete understanding is elusive.

One approach to capturing discussions appropriately is to begin the process of analysis and interpretation during the workshop itself so that those steps become part of the collaborative effort. In our most recent workshop in Huslia, we spent the final morning presenting to workshop participants and discussing tentative conclusions and papers that we might write, including this one. Another approach to help retain context is to take time and, ideally, to have more than one workshop or visit to the community. Community-researcher connections develop over time and need many opportunities to interact in different settings. The workshop, which included several breaks that often extended for half an hour or more, allowed for much informal interaction. The second workshop was accompanied by a field trip. We had evening gatherings, which provided a social setting in which people could better get to know one another. A single workshop can achieve a great deal, but repeated events allow relationships to develop further, trust to grow, and demonstrate a higher level of commitment to the

shared enterprise. Furthermore, variety in the types of interactions can help provide opportunities to hear from different people and in different contexts, to learn more about local context, and to obtain a broader range of information to help in overall interpretation.

The composition of the research team is clearly another key element of workshops. Having local residents as part of the research team greatly enhanced our introduction to the community as well as our ability to review and discuss what we had learned. Anthropological expertise and experience was also valuable, although most members of the research team had extensive experience working in rural or Native communities prior to the Huslia workshops. Those with limited experience in this regard benefited from some informal coaching prior to and during the workshops. Although neither local researchers nor anthropologists are perhaps strictly necessary for a successful workshop or similar interaction in a community, their skills and insights are important ingredients that need to be included in some fashion.

To truly listen to and understand traditional ecological knowledge, researchers must be able to navigate across the epistemological and practical differences and to recognize statements within their larger historical, political, spiritual, and epistemological contexts. Researchers and agency personnel tend to have a very narrow focus with specific goals, in this case specific to the impact of fire on the social-ecological system. However, the villagers have a much broader perspective on the entire social-ecological system, including its history and political landscape. When they speak of fire, they are also discussing the larger political, spiritual, epistemological settings of their lives and their culture. These topics are not merely academic interests, but vital to their daily lives. Respecting that larger context is a crucial element of success in community workshops.

*Responses to this article can be read online at:*  
<http://www.ecologyandsociety.org/vol11/iss1/art40/responses/>

---

## Acknowledgments:

*We thank the Arctic System Science program at the National Science Foundation for their funding of the*

*Human-Fire Interaction Project at the University of Alaska (Grant # OPP-0328282), the village of Huslia and the Huslia Tribal Council for their hospitality and help, the participants in our workshops for their willingness to share their knowledge and cultural context of wildfire with us, and Barbara Morehouse for insights and comparative experiences from the southwestern United States. We are also grateful to the editor and to the two anonymous reviewers whose comments helped us to improve the initial manuscript.*

---

## LITERATURE CITED

- Arctic Climate Impact Assessment (ACIA).** 2004. *Impacts of a warming Arctic*. University of Cambridge, Cambridge, U.K.
- Berger, T. R.** 1985. *Village journey: the report of the Alaska Native Review Commission*. Hill and Wang, New York, New York, USA.
- Berkes, F., J. Colding, and C. Folke.** 2000. Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10 (5):1251-1262.
- Briggs, C. L.** 1986. *Learning how to ask: a sociolinguistic appraisal of the role of the interview in social science research*. Cambridge University Press, Cambridge, UK.
- Brunner, R. D., A. H. Lynch, J. Pardikes, E. N. Cassano, L. Lestak, and J. Vogel.** 2004. An Arctic disaster and its policy implications. *Arctic* 57 (4):336-346.
- Chapin, F. S., III, T. S. Rupp, A. M. Starfield, L. DeWilde, E. S. Zavaleta, N. Fresco, and A. D. McGuire.** 2003. Planning for resilience: modeling change in human-fire interactions in the Alaskan boreal forest. *Frontiers in Ecology and the Environment* 1:255-261.
- Cooke, B., and U. Kothari.** 2001. *Participation: the new tyranny?* Zed Books, London, UK.
- Ford, J., and D. Martinez, editors.** 2000. Traditional ecological knowledge, ecosystem science, and environmental management. *Ecological Applications* 10(5):1249-1340.
- Gallagher, T.** 1986. Native participation in land management planning in Alaska. *Arctic* 41 (2):91-98.
- George, J. C., H. P. Huntington, K. Brewster, H. Eicken, D. W. Norton, and R. Glenn.** 2004. Observations on shorefast ice failures in Arctic Alaska and the responses of the Iñupiat hunting community. *Arctic* 57(4):363-374.
- Guijt, I., and M. Shah.** 1998. *The myth of community: gender issue in participation in development*. Intermediate Technology, London, UK.
- Huntington, H. P., P. K. Brown-Schwalenberg, M. E. Fernandez-Gimenez, K. J. Frost, D. W. Norton, and D. H. Rosenberg.** 2002. Observations on the workshop as a means of improving communication between holders of traditional and scientific knowledge. *Environmental Management* 30(6):778-792.
- Johannes, R. E.** 1981. *Words of the lagoon: fishing and marine lore in the Palau District of Micronesia*. University of California Press, Berkeley, California, USA.
- Johnson, W. N., T. F. Paragi, and D. D. Katnik.** 1995. *The relationship of wildland fire to lynx and martin populations and habitat in Interior Alaska*. U.S. Fish and Wildlife Service, Galena, Alaska, USA.
- Kendrick, A.** 2003. Caribou co-management in northern Canada: fostering multiple ways of knowing. Pages 241-267 in F. Berkes, J. Colding, and C. Folke, editors. *Navigating social-ecological systems*. Cambridge University Press, Cambridge, UK.
- Kofinas, G. P., and the communities of Aklavik, Arctic Village, Old Crow, and Fort McPherson.** 2002. Community contributions to ecological monitoring: knowledge co-production in the U.S.-Canada Arctic borderlands. Pages 55-91 in I. Krupnik and D. Jolly, editors. *The Earth is faster now: indigenous observations of Arctic environmental change*. Arctic Research Consortium of the United States, Fairbanks, Alaska.
- Krupnik, I., and D. Jolly, editors.** 2002. *The earth*

*is faster now: indigenous observations of arctic environmental change.* Arctic Research Consortium of the United States, Fairbanks, Alaska, USA.

**Lewis, H. T.** 1980. Indian fires of spring: hunters and gatherers of the Canadian forest shaped their habitat with fire. *Natural History* 89(1):76-83.

**McCay, B. J., and S. Jentoff.** 1996. From the bottom up: participatory issues in fisheries management. *Society and Natural Resources* 9:237-250.

**Mosse, D.** 2001. People's knowledge, participation and patronage: operations and representations in rural development. Pages 16-35 in B. Cooke and U. Kothare, editors. *Participation: the new tyranny?* Zed Books, London, UK.

**Natcher, D. C.** 2004. Implications of fire policy on Native land use in the Yukon Flats, Alaska. *Human Ecology* 32(4):421-441.

**Natcher, D., C. Hickey, and S. Davis.** 2004. The political ecology of Yukon forestry: managing the forest as if people mattered. *International Journal of Sustainable Development and World Ecology* 11:343-355.

**Nelson, R.** 1973. *Hunters of the northern forest.* University of Chicago Press, Chicago, Illinois, USA.

**Nelson, R.** 1983. *Make prayers to the raven.* University of Chicago Press, Chicago, Illinois, USA.

**Nickels, S., C. Furgal, J. Castleden, P. Moss-Davies, M. Buell, B. Armstrong, D. Dillion, and R. Fonger.** 2002. Putting a human face on climate change through community workshops: Inuit knowledge, partnerships, and research. Pages 300-333 in I. Krupnik and D. Jolly, editors. *The Earth is faster now: indigenous observations of Arctic environmental change.* Arctic Research Consortium of the United States, Fairbanks, Alaska, USA.

**Nuttall, M.** 1995. Critical reflections on knowledge gathering in the Arctic. Pages 21-36 in D. L-Jacques, M. I. Nagy, and L. Miller-Wille, editors. *Aboriginal environmental knowledge in the north.* GETIC, Laval University, Quebec, Canada.

**Morrow, P., and C. Hensel.** 1992. Hidden dissension: minority-majority relationships and the use of contested terminology. *Arctic Anthropology* 29(1):38-53.

**Sillitoe, P.** 2004. Interdisciplinary experiences: working with indigenous knowledge in development. *Interdisciplinary Science Reviews* 29(1):6-23.

**Singleton, S.** 1998. *Constructing cooperation: the evolution of institutions of comanagement.* University of Michigan Press, Lansing, Michigan, USA.

**Smith, L. T.** 1999. *Decolonizing methodologies: research and indigenous peoples.* Zed Books, London, UK.

**Stevens, S., editor.** 1997. *Conservation through cultural survival: indigenous peoples and protected areas.* Island Press, Washington, D.C., USA.

**U.S. Census Bureau.** 2000. Available online at: <http://factfinder.census.gov>.

**Weingart, P., and N. Stehr, editors.** 2000. *Practicing interdisciplinarity.* University of Toronto Press, Toronto, Ontario, Canada.

**Wiser, G. M.** 2001. Transparency in 21st century fisheries management: options for public participation to enhance conservation and management of international fish stocks. *Journal of International Wildlife Law and Policy* 4(2):95-129.

**Wolfe, R. J., and R. J. Walker.** 1987. Subsistence economies in Alaska: productivity, geography, and development impacts. *Arctic Anthropology* 24(2):56-8.

**Wondolleck, J. M., and S. L. Yaffee.** 2000. *Making collaboration work: lessons from innovation in natural resource management.* Island Press, Washington, D.C., USA.

## **APPENDIX 1.** Examples of Ecological and Other Information Gathered During the Workshops

The workshops were a useful forum in which to learn local knowledge of traditional fire use and how fire affects the ecosystem, access to resources, and the village economy. While some of our findings are novel, much of the information and traditional knowledge that we learned from Athabaskan elders and other local residents could be interpreted in a more-or-less straightforward manner, consistent with scientific understandings of fire use, ecological effects of fire, and mixed subsistence economies (Johnson et al. 1995, Lewis 1980, Wolfe and Walker 1987). Most results will be presented in other papers from the overall project, but here we offer four brief summaries as examples.

### *Ecological Effects of Fire*

Under some conditions fire can enhance local ecosystem productivity. In areas that have experienced multiple and low-intensity burns, for example, berry and plant production are enhanced, improving habitat for browsers such as moose. Burned trees that remain standing are a good source of firewood. The margins of burned areas create unique habitat that is particularly important for species diversity.

It was also noted that very intense fires or areas that have been burned over during consecutive years often result in the destruction of local fisheries due to high levels of ash falling into lakes and rivers. Community members expressed concern over the possibility that high levels of ash and smoke results in the suffocation of fish and water, seeking additional information from the researchers (see section on Spiritual Context).

### *Transportation and Infrastructure Effects of Fire*

According to community members, one of the most direct effects of fire is the challenge of accessing post-burn areas and trying to harvest the resources found in those areas. If fire-breaks or access routes have not been cut in the area during fire fighting, exposed or upturned tree roots and fallen trunks make travel nearly impossible.

The growth of vegetation following fire can be extremely dense, inhibiting travel and making an area inaccessible to both hunters and game. One participant compared travel through these areas to “driving along a rabbit trail through a jungle.” In some cases, residents have tried to re-burn an area many times to thin the thick shrub birch, but have been unable to start a burn hot enough.

Also of concern was the loss of trapping and shelter cabins. In many cases these cabins have been used for generations and store valuable supplies such as fishing gear, traps, stoves, snowshoes, and survival gear as well as items such as fish traps from earlier generations that have cultural and sentimental importance. In fact, the items stored in cabins may be much more valuable than the cabins themselves. For safety reasons, it is particularly important to protect shelter cabins from fire. When they have been burned, it may be difficult to secure the necessary funds and permits to rebuild them, posing a substantial risk to winter travelers.

### *Economic Effects of Fire*

Wage income is critical to meet the costs of equipment and supplies (e.g., boats, snowmachines, fuel, guns, ammunition, fish nets, etc.) needed for subsistence hunting and fishing. Local residents noted that, because employment opportunities are scarce in rural villages, emergency fire-fighting (EFF) plays an important role in supporting subsistence activities. Fire-fighting wages are not, however, always beneficial to the communities. They can lead to negative impacts, such as increased purchase and use of alcohol.

In addition to fire suppression activities, hazard fuel reduction programs are being implemented around

some Interior Alaskan communities. With funding from the National Fire Plan, these projects provide the dual function of reducing fire risk around homes, fuel depots, cemeteries and other important cultural sites as well as providing more stable, longer-term employment than on-demand EFF work. While the need for fuel reduction is widely recognized and local employment highly desirable, there is also concern that cutting fire lines around villages may open up unwanted access to non-local hunters.

### *Intentional Burning*

In contrast to other interior Alaska groups where controlled burns were used seasonally to improve moose and muskrat habitat (Natcher 2004), Huslia residents found no need to use fire to change the land. Their location at the edge of the boreal forest, together with the disturbance that occurs naturally with river breakup in the region, leaves little or no need to use fire to create additional landscape diversity. Fire was used, however, on a smaller scale, for example to safeguard winter food caches from potential scavengers (see below for further discussion of this point). Ashes continue to be spread on tent flooring to impede insect pests.

Huslia residents also understand the beneficial properties fire can have when introduced into the environment through controlled means, as is demonstrated by the villages willingness to work with the U.S. Fish and Wildlife Service to burn the shoreline of nearby Three-Day Slough. The effects of this experimental, prescribed burn will be assessed in terms of its overall impact on moose and muskrat habitat. However, Huslia residents are equally aware that controlled fires can have detrimental and unanticipated effects. For example, in the Kobuk and Noatak region to the northwest of Huslia, human-induced fires unexpectedly forced bears to move to the coast.

---