AMERICAN INDIAN KNOWLEDGE: WHY INDIGENOUS PARTICIPATION IS ESSENTIAL FOR EFFECTIVE U.S. CLIMATE POLICY

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INTRODUCTION

For American Indians, the effects of climate change are neither geographically nor temporally distant. Through subsistence-based livelihoods and cultures, indigenous people have traditionally experienced more direct contact with nature, which has made them the first to undergo the consequences of climate change (Jackson, in Brancaccio's *Now* on PBS, 2007, as cited in Nisbet, 2009, p. 21; Parker et al., 2006, p. 2; N. Kennedy-Howard, personal communication, February 28, 2011; *Newswise*, 2006). Furthermore, the mobility restrictions imposed on American Indians through the reservation system make adaptation disproportionally difficult (Glunz, as in Weinhold, 2010). Once again, American Indians are experiencing a removal from their land, but this time it is the land that is changing, leaving tribes with severely altered forms of what they had come to know throughout generations (Wildcat, 2009, p. 4). These changes bring dire consequences. American Indian communities are among the poorest in the United States, with a poverty level of 27% in 2006, more than twice the national level of 13% in the same year (National Center for Education Statistics, 2008). Climate change will worsen this economic disparity, as well as spiritual (Wildcat, 2009, p. 110), social, political, and environmental dynamics and problems (Crate & Nuttall, 2009, p. 11). American Indians' relationship to the environment is a major aspect of tribal sovereignty and identity (National Congress of American Indians, 2009, p. 15; Wilkins, 2007, pp. 180-181), and in altering the geography and thus affecting rights in the areas of subsistence, economics, culture, and intellectual property, climate change is a human rights issue (Crate, 2009, p. 1). As such, American Indians must be afforded a voice in the decision making process.

In this paper, I investigate the American Indian experience with climate change by exploring three questions: What are the specific perspectives that American Indian

environmental knowledge can offer the climate change dialogue? Where are the spaces for interaction among U.S. science, policy, and indigenous knowledge? Where and how are American Indians working toward gaining a voice in U.S. climate policy? I strive to discover aspects of the current system that can be leveraged or altered to secure meaningful and lasting change in conditions that are perpetuating both climate change and the disenfranchisement of American Indians. I argue for the inclusion of American Indian knowledge and participation in climate dialogues traditionally dominated by U.S. scientists and politicians. The Indian voice in this issue is both a right and an asset, and there are conceptual and pragmatic spaces where indigenous and Western knowledge can and should be integrated, in order to form environmentally, socially, and economically sustainable solutions to climate change.

I break Chapter One into three sections: The first provides background on my research, explaining simplifications I had to make as well as pitfalls I sought to avoid. In the second I explain the main features of American Indian knowledge and outline how they contrast with various aspects of Western knowledge. In the third I identify constructive intersections for integration and collaboration on the ideological and practical levels, with special attention to community level considerations.

In the first section of Chapter Two, I examine key players in the federal government that are involved in American Indian environmental affairs and are potential spaces for collaboration among science, policy, and indigenous knowledge. The second section is a case study of five groups that have significant American Indian representation and an explicitly-stated interest in climate change issues.

The main method I used in my research was a detailed analysis of primary, secondary, peer reviewed, and gray literature sources. In addition, I spoke with experts and leaders in

anthropology, development, and environmental fields for both general advice on the subject as well as insight into groups' specific programs and initiatives. I would have liked to have traveled and spent time with a group that is taking action on these issues, in order to gain a better understanding of context-specific conditions and dynamics, but in Washington, D.C. I observed and talked with leaders, participants, and affected individuals in meetings I attended with native and non-native representatives. Hearing opposing voices would have been informative, but I doubt that there exist many groups or individuals that blatantly state an opposition to American Indian participation; rather, bureaucratic complications give opponents an easier and quieter way to stifle progress. Another limitation on my research was time; with more time I could have deepened my analysis of both the theory and the practice surrounding American Indian climate change issues.

This paper is intended to raise awareness of the problems and solutions connected to American Indians' experiences with climate change. It is intended for American Indians, the environmental community, policymakers, scientists, and interested general readers. I do not provide detailed information about the science and politics surrounding climate change, assuming that the reader has some knowledge of the well-researched aspects of the subject. This paper is intended to shed light on American Indian understandings of and efforts in climate change and sustainability issues, and to touch on other challenges experienced by Indian communities and the ways in which collaborative climate change solutions affect a wide array of issues. Ultimately, I hope to transform the climate change policymaking process into one that includes American Indian perspectives, resulting in adequate support of tribal communities and producing comprehensive solutions to climate change and a space for American Indian empowerment.

CHAPTER 1: Different Forms of Knowledge

It is clear that our disagreements about climate change have little to do with the science and a great deal to do with ourselves (Baskin, 2009, p. 1).

Foreword – Stereotypes and generalizations

In this paper, my goal is to present a clear argument for the inclusion of American Indian knowledge and participation in climate dialogues traditionally dominated by U.S. scientists and politicians. While making this argument, I understand the traditional pitfalls of glossing over the diversity of American Indian cultures and romanticizing the indigenous relationship with nature. I do not pretend to believe that all American Indians are concerned about the environment or climate change, but for the purpose of this SRP, I often refer to American Indians as a single group when I am describing traditional concepts or relationships with nature. To avoid projecting my own biases onto this chapter's description of American Indian traditional understandings of and interactions with the environment, I draw heavily from reliable sources who are involved with climate change and are either American Indian themselves (such as Dr. Daniel Wildcat and Vine Deloria, Jr.) or who have worked closely with native peoples (such as Dr. Susan Crate.) The complexity and diversity within the "American Indian" label and even within tribes led me to abandon a focus on tribes or regions for my case studies in Chapter Two. Instead, I examine groups with significant American Indian representation that explicitly state their interest in climate change.

I recognize that science, policy, traditional ecological knowledge, and U.S. cultures are also complex, diverse, and multifaceted, but for the purposes of this SRP, these are also areas to which I refer broadly, while striving to include explanations or citations supporting the simplified characteristics. The first purpose of this SRP is to confront the assumptions and

lifestyles that have contributed both to environmental unsustainability/climate change and to social marginalization of indigenous peoples in the United States. The second purpose of this SRP is to examine other ways of thinking and acting regarding environmental and social systems, and to identify ways in which indigenous and mainstream knowledge can interact to constructively address the social and environmental issues surrounding climate change in the U.S.

In confronting these challenges, it is important to acknowledge one of the most famous critiques of the American Indian stereotype of natural environmental steward: Shepard Krech III's *The Ecological Indian* (1999). In this book, Krech (1999) describes the two predominant stereotypes attributed by European-Americans to American Indians throughout time: the Noble Savage (the ethical Indian who lives at peace with nature) and the Ignoble Savage (the wild, harmful, "uncivilized" Indian) (p. 16). Krech (1999) explains the problems with the Noble Savage stereotype: "At first a projection of Europeans and European-Americans, it eventually became a self-image. American Indians have taken on the Noble Indian/Ecological Indian stereotype" (p. 27). Krech (1999) finishes this claim with a reference to Raymond Williams' 1976 *Keywords: A vocabulary of culture and society*:

> Yet its relationship to native cultures and behavior is deeply problematic. The Noble Indian/Ecological Indian…masks cultural diversity. It occludes its actual connection to the behavior it purports to explain. Moreover, because it has entered the realm of common sense and as received wisdom is perceived as a fundamental truth, it serves to deflect any desire to fathom or confront the evidence for relationships between Indians and the environment. (p. 27).

Williams' book explains the evolving and sometimes divergent variety of meanings of certain English words. The word Krech points to in Williams' book is "equality," which Williams describes as meaning both equality of conditions (i.e. no human must be held higher than another) and of opportunity (no human has a special privilege over another, but if he takes advantage of equally-available opportunities, he can elevate himself to an improved condition) (1976, pp. 117-118). I interpret Krech's connecting his statement to Williams' "equality" as emphasizing the problems with advocating for blindness to diversity within cultural groups. When one sees equality as a universal truth and allows this idea to overshadow depth and diversity, he robs groups of the complexity that is inherent in every culture, race, and creed.

I agree with Krech's view that that American Indian traditional ecological knowledge differs greatly from the Western worldview (1999, p. 212) and that blaming environmental problems on Western society and portraying Indians as flawless environmental stewards victimizes Indians and sets them up for failure and blame (p. 216). At this point it is important to reiterate the necessity of making simplifications in this paper. I outline the dominant cultural trends and characteristics, and by no means am I claiming that they are exclusive or exhaustive. The purpose of this paper is not to assess the degree of truth or potential implications of the self-stereotyping described by Krech, but it is important to acknowledge the long history of stereotypes attributed to American Indians, in order to recognize the existence of a complex history of identity and relationship dynamics that underlie any analysis of the current American Indian experience with climate change.

Krech (1999) states that "native people have often favored the extraction of resources, storage of waste, and other development projects – even those with a serious potential environmental impact – if they can gain control over them" (p. 219). Krech hits the nail on the

head in this statement, though perhaps not in the way he intended. I see this statement as just as much a commentary on social marginalization as it is one on American Indians' attitudes toward the environment. American Indians have been disenfranchised, and it makes sense that a marginalized group wants to reclaim control where it can. I cannot assume and am not assuming that were American Indian groups not marginalized, they would choose to develop in an environmentally sustainable way, but it is a failure of the current system that this self-determination has been denied and that people are forced to be opportunistic in regaining a sense of empowerment. In this paper I argue that we can all do better: Environmental stewardship, social empowerment, and economic development are not mutually exclusive; by tapping into this other way of thinking and living, we can enrich the climate change debate and alleviate social and economic disparities.

The American Indian perspective – Necessary for success

American Indian knowledge

In addition to deviating from the perspective of the majority of Americans that climate change is a distant phenomenon, American Indians traditionally do not share the dominant American idea of "nonhuman nature." This is a common trait found in indigenous-environmental relationships. "Almost universally, one encounters an ethic of nondominant, respectful human-nature relationship, a sacred ecology, as part of the belief component of traditional ecological knowledge" (Berkes, 2008, pp. 252-253). This worldview is a holistic and integrated perspective (Grim, 1998; Maynard, 1998, p. 4; National Congress of American Indians, 2009, p. 15) that accounts for both the material and symbolic elements of life (Grim, 1998). Traditional ecological knowledge is important to the development of an interdisciplinary

approach to climate change policy in the United States. The American Indian long-term experiential, holistic, and land-based way of knowing provides insightful understandings of the "nature-culture nexus" (Wildcat, 2009, p. 99). Nature and culture are inseparable, and one's identity is inextricably tied to the place he lives (Wildcat, 2007; Wildcat, 2009, pp. 11, 106, 111, 138; National Congress of American Indians, 2009, p. 15). Deloria explains this connection through the equation Power + Place = Personality, explaining "power" as the life essence of the universe, and "place" as the myriad relationships within. Thus, the equation means that the universe is not general and abstract, but rather alive and personal, requiring that all beings form and maintain relationships. (Deloria & Wildcat, 2001, p. 23). Wisdom and spirituality are tightly woven into the indigenous principle of deep respect for nature. Wisdom is achieved through generations of respectful, observant, collaborative relationships between humans and nature (Wildcat, 2007). These relationships include observations of the night sky, which provide models for American Indian lifestyles and are important to Indians' understandings of correlation and correspondence. Able to recognize connections among elements, Indians focus on observing and understanding related aspects rather than establishing clear sequences; connections rather than causalities form the basis for Indian understanding of the world. (Deloria & Wildcat, 2001, p. 26). Indians also recognize their responsibility to the Creator to care for their environment (Maynard, 1998, p. 71), and because they understand the necessary diversity of life experiences and environments, there have been no tribal clashes stemming from religious disputes (Wildcat, 2009, p. 59). "The Indian system requires a prodigious memory and a willingness to remain humble in spite of one's great knowledge" (Deloria & Wildcat, 2001, p. 22). The Menominee worldview illustrates the American Indian respect for nature, rooted deeply in belief and culture. The tribe believes that humans were once animals, that every object has a living spirit (Wildcat,

2009, p. 89), and that land belongs to the tribe as a whole, with every member sharing in the responsibility to protect (Trosper, 2007, as cited in Wildcat, 2009, p. 90).

One of the most vital messages of traditional ecological knowledge is that worldviews are important. (Berkes, 2008, p. 252). Climate change policymaking is a multi-stakeholder (Karl, Melillo, & Peterson, 2009, p. 158; King et al., 2007, p. 12; Nisbet, 2009; Selin & VanDeever, 2007, p. 15; USGCRP & Subcommittee on Global Change Research, 2009, p. 13; US EPA, 2010, p. 68), multi-disciplinary (Crate & Nuttall, 2009, p. 17; King et al., 2007, p. 12; Stern, 1992, p. 277) effort that must be sustained over the long term (Karl, Melillo, & Peterson, 2009, p. 158) and must respond to social necessities (King et al., 2007, p. 11). It is impossible to constructively address this issue and plan for the future without including the integrative and place-based principles and understandings of American Indians.

Contrast with Western ways of thinking

Western and indigenous perspectives are generally separated by three major categories of knowledge: substantive (western general versus indigenous technical knowledge,) methodological and epistemological (western systematic knowledge versus indigenous common sense,) and contextual (western general versus indigenous place-based knowledge) (Agrawal, 1995). Specifically, indigenous knowledge contrasts with Western science in its emphasis on individual situations and phenomena, as opposed to the establishment and application of general laws. Indian knowledge is focused on the specific, not on generalizations and extrapolations that form standardized models of knowledge. (Deloria & Wildcat, 2001, p. 21).

> While we live in a society today rich in ideas, images, and ideologies, what we lack and desperately need is practical knowledge about living well brought about by a lifetime of

attentiveness to something other than our own human-produced culture. (Wildcat, 2009, pp. 48-49).

Whereas science is focused on resolving or explaining that which deviates from established norms, American Indians accept these exceptions and maintain a "sense of wonder at the behavior of nature" (Deloria & Wildcat, 2001, p. 21). In this way, and because this knowledge has been accumulated over centuries or longer, American Indian knowledge is often able to accept phenomena that Western science misses because of its temporal and doctrinal restrictions (Deloria & Wildcat, 2001, p. 28). Western culture perceives time as a linear function, nature as a force to be controlled, and economic worth as the measure of value. The American Indian perspective differs on all three fronts. Rather than think in a linear fashion, American Indians understand circular pathways and patterns (Wildcat, 2009, p. 56, 97). Instead of controlling nature, Indians observe and learn from it (Deloria & Wildcat, 2001, p. 27; Wildcat, 2009, p. 97). One perspective offered by native traditions is the inherent worth of nature, unconnected to economic value (Wildcat, 2009, p. 64), although like all groups, American Indians use nature for economic purposes as well (Wilkins, 2007, p. 180). While the West defines civilization through human control of nature, material goods, and economic systems that turn nature into resources (Wildcat, 2009, pp. 63-64; Worster, 1977, Gadgil & Berkes, 1991, as cited in Berkes, 2008, p. 252), Wildcat (2009) calls for a different approach: "Resources" should instead be referred to as "relatives" (p. 64); the world system of which humans are a part should be regarded as full of life, made up of family members with unique understandings (p. 136). In a similar vein, alternative energy should instead be called natural energy, so as not to define it as a deviation from the norm, but rather to acknowledge it as a purer condition itself (N. Kennedy-Howard, personal communication, February 28, 2011).

American Indians' understanding of and humility toward nature is apparent in the adaptation mechanisms practiced by the Sioux and other indigenous groups along the Missouri River. These groups worked with the flood cycles, making their permanent dwellings far from the banks but setting up temporary camp nearer the river during periods of less rain, a stark contrast to the U.S. Army Corps of Engineers' strategy of damming rivers. (Wildcat, 2009, p. 119). Developing these sorts of strategies requires a deep understanding of the functions, relationships, and significance of the natural world.

> The indigenous ingenuity – or, as Haskell Indian Nations University graduate Curtis Kekahbah of the Kaw Nation called it, the indigenuity: the ability to solve pressing life issues facing humankind now by situating our solutions in Earth-based local indigenous deep spatial knowledges – of tribal peoples constitutes a practical merger of knowing with doing. (Wildcat, 2009, p. 48).

Wildcat (2009) challenges individuals to understand the temporal and spatial complexity of their impact. American Indians have much to teach on this subject, and one instructive worldview is the seven generations model, which puts relationships and actions into a larger context. Human actions should be shaped by both the preceding and the following three generations, demonstrating attentiveness to the past and sensitivity to the future. (Wildcat, 2009, p. 126). American Indian natural intelligence, described by Wildcat (2009) as having "good sense," observing and learning from the natural world, and understanding the earth as an interconnected system, relates closely to the Western notion of complex adaptive systems (pp. 124-125). These aspects of indigenous assessments support Wildcat's (2009) advocacy for the RICH – relationships in complex harmony – model, which he considers superior to KISS – keep

it simple, stupid (p. 124). Wildcat (2009) again highlights the contrast between indigenous and Western attitudes and actions in his call for

> *homeland maturity*: life-enhancing knowledges emergent from experience in the rich contours of the nature-culture nexus, a maturity that shows we respect our Mother Earth and the rich diversity of life that we humans are one small, but important, part of." (p. 139).

The idea of the "American spirit" reflects many worthy ideals; freedom, democracy, progress, and basic human rights are just a few of the fundamental aspects of U.S. ideology. However, it is dangerous to think of these values as exclusively American or only true in one form. The ideas of freedom and democracy were active in the United States long before the Founding Fathers arrived (Joseph, 1995, p. 26). Wildcat (2009) claims that indigenous North Americans have a chance to exemplify this rich tradition of democracy through independent decisions to protect the environment (p. 63). The American idea of progress can also be problematic. While technology is not inherently evil (Wildcat, 2009, p. 128), it is not neutral, and the often-frantic push forward and blind acceptance of new innovations can lead to unfortunate social and environmental casualties. Indians have observed:

> The four elements of fire, water, earth, and air…are being destroyed and misused by the modern world. Fire gives life and understanding, but is being disrespected by technology of the industrialized world that allows it to take life such as the fire in the coal-fired power plants. (Maynard, 1998, p. 70).

The American commitment to human rights is important to monitor and enforce, but it is just as important to remember the flipside of rights: responsibilities. Wildcat (2009) describes

indigenous realism as "accept[ing] our inalienable responsibilities as members of the planet's complex life system, as well as our inalienable rights" (p. 9).

Examining foundational American principles in a new light clarifies the ways in which different forms of knowledge can interact to offer a deeper perspective. While American culture and politics seem to be inherently pitted against developing an effective climate policy, through the American Indian applications of freedom, democracy, progress, and rights and responsibilities, it is apparent that when extended to nature, these values are conducive to developing successful strategies for a healthy, holistic future.

Constructive intersections for American Indian and Western knowledge

Like other forms of knowledge, science should be seen as "practice and culture;" scientists work from within a particular context to form ideas, tools, and other products (Agrawal, 1995, p. 21). Although demonstrating fundamental differences, Western and indigenous knowledge also embody many opportunities for constructive collaboration. These positive interactions that are useful for climate change policy development occur on both the ideological and the practical levels.

Ideological intersections

Similarities exist between traditional knowledge and Western ideas surrounding sustainability (Berkes, 2008, p. 240). Deloria and Wildcat (2001) assert that sometimes seemingly foreign ideas in American Indian cultures correspond closely to scientific understandings. For example, an important concept that runs as deep as the creation stories in American Indian tradition is the "completion of relationships" (p. 23). This refers to the moral

obligation to follow through with relationships, essentially advocating for a conscious awareness of the impacts of one's actions (Deloria & Wildcat, 2001, p. 23), a fundamental principle shared by the science of sustainability. Other Western ideologies with potential for positive interaction with indigenous knowledge are the Gaia Hypothesis, as it illustrates all elements of life as part of a complex organic system (Deloria & Wildcat, 2001, p. 57), and new political ecology, which focuses on the nature-human relationship and includes issues such as power dynamics and inequality (Goldman & Schurman, 2000, pp. 568-570). Understanding both Western and indigenous ideology creates opportunities for growth. While scientists ask questions such as "How does it work?" and "What is its use?," tribal elders also explore what the artifact or phenomenon means (Deloria & Wildcat, 2001, p. 63). Wildcat (2009) sees an effective convergence point in "a deep spatial experiential body of knowledge complemented by scientific information and knowledge" (p. 15). Generations of indigenous methods of observation have formed a well-developed capacity for anticipation, filling a hole in the Western realm of understanding, which is based on controlling, rather than observing nature (Deloria & Wildcat, 2001, p. 27). Understanding and anticipating earth systems' actions and reactions shed light on current changes in the earth's behavior.

Practical intersections

The overlaps between Western and traditional frameworks have practical applications as well. Research projects are good places for collaboration, and one of the top six priorities for the U.S. Global Change Research Program's (USGCRP's) future climate change research strategy (as outlined to the USGCRP in 2009 by the National Research Council Committee) is to structure the program based on "scientific-societal issues," in order to better understand human

interaction with climate change and other environmental activity (U.S. Global Change Research Program, & Subcommittee on Global Change Research, 2009, p. 7). Conservation programs and investigations of local ecologies are just a few examples of areas that are enriched by indigenous languages, which convey a long oral history of ecological knowledge that has been passed through generations (Native Peoples Native Homelands Climate Change Workshop II, 2009). Several fields and project areas, including agriculture (Warren et al., 1995, as cited in Berkes, 2008, p. 240), agroforestry (Dove, 2002, as cited in Berkes, 2008, p. 240), soil and water conservation (Reij et al., 1996, as cited in Berkes, 2008, p. 240), and environmental assessment (Reid et al, 2006, as cited in Berkes, 2008, p. 240) lend themselves to incorporating both indigenous and scientific strategies.

Western and traditional uses of technology are other opportune areas to exercise Western-indigenous complementarity. This not only requires that Western scientists understand tribal issues, but it also entails the development and involvement of "a generation of Native scientists, engineers, and planners who under[stand] the tools of science and technology and [possess] the ability to evaluate this knowledge within the context of our tribal worldviews" (Wildcat, 2009, p. 130). This complex understanding helps integrate technology into a system that consists of unique people and places (Wildcat, 2009, p. 130). "Local knowledge can supplement the explanatory power of global climate change models, and provide grounded information on the actual impacts. Local responses to the impacts, in turn, provide insights about adaptations" (Berkes, 2008, p. 177). There are several examples of ways in which groups are working toward integrating traditional knowledge with Western technology, such as GIS marine protected area mapping (Aswani & Lauer, 2006b, as cited in Berkes, 2008, p. 240), satellite tracking (Huntington et al, 2004, as cited in Berkes, 2008, p. 240), and weather forecasting (Roncoli &

Ingram, 2002; Raj, 2006, as cited in Berkes, 2008, p. 241). Traditional technology examples include agricultural systems and techniques based on natural and cosmic cycles, fruit harvesting based on the observation and understanding of natural signs, and the utilization of different types of wood for different bow performances (Deloria & Wildcat, 2001, pp. 58-59).

Community level considerations

It is important to be informed and culturally sensitive both when applying indigenous knowledge to Western frameworks and when integrating technology and scientific information into tribal communities (B. Gough, personal communication, February 19, 2011). Working at the community level requires both the involvement of scientists who work closely with tribes to understand strategies and methods that are appropriate for the particular community (B. Gough, personal communication, February 19, 2011) and effective training of tribal members on data collection and reporting (Maynard, 1998, p. 67). Dr. Susan Crate, author and Assistant Professor of Human Ecology at George Mason University, highlights the importance of each of these places and activities as a small but complete entity in itself, rather than seeing it as a piece of a larger puzzle (S. Crate, personal communication, March 2, 2011), a perspective that reflects Wildcat's (2009) emphasis on place-based solutions and understandings.

Community level work is necessary for bringing actors together to form solutions to climate change, but it is not without great challenges. It takes time and resources to establish and follow through with these long-term commitments. When working to bring make community voices heard, logistics can be difficult, due to limited resources for organizational and transportation costs. Additionally, tribes do not have someone who is able to devote himself exclusively to climate issues; climate coordinators usually have several other jobs as well. (B.

Gough, personal communication, February 19, 2011). Yet since the early 1990s, two trends have occurred that have bolstered indigenous knowledge exposure: increased international interest, and a greater variety of communications media (Berkes, 2008, pp. 251-252). A good strategy for communicating local traditional ecological understandings and frameworks of climate change is to harness the media and attention already available, with the goal that this "foot-in-the-door" approach will lead to greater understanding and opportunities with time. Communities are an important component of successful initiatives, but in order to take advantage of these opportunities, groups that already enjoy political and scientific influence must partner with tribal leaders to develop appropriate frameworks for collaboration and secure the resources to enhance the diversity of native community voices.

CHAPTER 2: Key Spaces and Forces for Change

As we prepare to face the challenge of climate change, we not only want a seat at the table, we want to participate in discussions about research, sustainable economies and the energy to fuel them, and environmental adaptation. We want to be involved in designing research (Wildcat, 2009, p. 19).

Significant functional linkages between the scientific and policy communities concerned with issues of climate change and variability, and the Native community stakeholders are only beginning to be forged (Maynard, 1998, p. 5).

In this chapter I examine spaces for interaction among science, policy, and indigenous knowledge in the United States, outlining opportunities that involve the federal government. I then look at specific groups with significant American Indian representation that are taking action on climate change in the U.S.

Opportunities involving the federal government

Bureau of Indian Affairs

The Bureau of Indian Affairs (BIA) is the primary body charged with managing the administration of federal policy on Indian issues (McCarthy, 2004, p. 5). Established in 1824, the BIA currently works with the 565 federally-recognized tribes and operates under the mission of improving quality of life, developing economic opportunities, and fulfilling trust responsibilities (U.S. Department of the Interior, Indian Affairs, 2011). With roughly 10,000 employees (McCarthy, 2004, p. 16), the BIA is composed of many offices, including the Office of Indian Energy and Economic Development, and the Division of Natural Resources (U.S. Department of the Interior, Indian Affairs, 2011). Within the Office of Indian Energy and Economic Development (IEED), there are five divisions, one of which is the Division of Energy and Mineral Development. This division features a green jobs initiative, which works "with

tribes on over 50 projects that include solar, wind, biomass, geothermal, and hydropower" (Manydeeds, n.d.). "Over 100 tribes have the energy capability needed to sustain a 5-50 MW power generation facility, providing great economic opportunities for both tribes and private industry" (Manydeeds, n.d.).

These statistics and projects seem promising, but the BIA has been the target of a great deal of criticism from a variety of stakeholders, including the BIA itself (McCarthy, 2004, pp. 5-6), which in 2000 apologized for "'the fact that the works of this agency have at various times profoundly harmed the communities it was meant to serve'" (Gover, 2000, p. 161, as cited in McCarthy, 2004, p. 6). Possibly the most frequent criticism directed at the BIA is that of its management of tribal lands: The states are unhappy that they are not able to tax or regulate these lands, while the Indians are unhappy that approval for land development is an inexplicably lengthy process (McCarthy, 2004, p. 85). Some tribal members jokingly refer to the Bureau as "Bossing Indians Around" (McCarthy, 2004, p. 6).

In 1996, tribal representatives brought the class action lawsuit known as *Cobell* against the federal government, to fight Individual Indian Money (IIM) trust fund mismanagement (Panoff, 2004, p. 517). The District Court and D.C. Circuit Court found that the Department of the Interior had indeed failed to fulfill its fiduciary obligations (D.C. Cir., 2001, as cited in McCarthy, 2004, p. 145), but there was no settlement until December 2009, 13 years after it had been brought to court (*Great Falls Tribune*, n.d.). *Cobell* prompted a complete restructuring of the BIA, with the goal to improve organization and management and emphasize Indian self-determination and self-governance (Department of Interior Comprehensive Trust Plan, as cited in McCarthy, 2004, pp. 152-153). The Comprehensive Trust Management Plan Version 1.0 was adopted in 2003 but "is intended to be a DOI working document…[which] is not intended

to, and does not, create any legal right or benefit…enforceable by a party against the United States" (Department of the Interior, 2003, p. iii).

Despite the intense criticism, when the BIA has been on the verge of dissolution, there has always been resistance from tribal communities, often through the National Congress of American Indians, perhaps because the BIA represents the federal government's promise to uphold tribal sovereignty and American Indian well-being (McCarthy, 2004, pp. 8-9). This is a difficult balance, as tribes want the protection and aid provided by the trust relationship, but they do not want government supervision of management strategies (McCarthy, 2004, p. 138). The U.S. Commission on Civil Rights determined that to improve the relationship between the BIA and American Indians, federal agencies must better understand American Indians' "unmet needs," improve the administration of resources and programs, and encourage tribal self-governance. The Commission postulates that tribes will then be able to take on a greater leadership role, not only in managing resources, but also in reforming the BIA. (U.S. Comm'n on Civil Rights, 2003, as cited in McCarthy, 2004, p. 159).

The BIA and American Indians have a long history and a relationship that carries a great deal of both symbolic and pragmatic weight. As the BIA is currently evaluating this relationship and focusing on American Indian self-determination, this is the ideal time to push for climate change policy reform. Although the BIA is a massive entity, there are opportunities in the Office of Indian Energy and Economic Development and the Division of Natural Resources to develop collaboration opportunities. In implementing the green jobs initiative, it is important to ensure that tribes are afforded a voice in how these opportunities are developed and carried out in different communities.

Congress

Congress has the most responsibility for American Indian natural resources, as it is the main trustee established in the U.S. Constitution (Wilkins, 2007, p. 180). In addition, Congress has served as "a pivotal policy arena in which climate science, sector capacity, and policymaking have been intertwined forging national climate policies" (Park, Xinsheng, & Vedlitz, 2010, p. 2). Thus, directly influencing Congress through lobbying, electing representatives, and contributing to campaigns (Wilkins, 2007, pp. 193, 199) seems to be a key leverage point for influencing perhaps the most powerful component of the system. However, historical and current relationships between American Indians and the national government make this a complicated area. Wilkins (2007) explains that while gambling operations have increased the influence of some tribes on national political affairs, this greater presence in the federal arena has the potential to undermine tribal sovereignty (p. 195), creating a catch-22 for Indian development. The main demand on the American system by Indians is justice, in contrast to the African American Civil Rights Movement, which demanded equality and acceptance (McCulloch, 1989, p.3; Deloria, as in Wilkins, 2007, pp. 196-197). However, there are important aspects of the Indian-Congressional relationship that can be utilized to achieve greater autonomy and thus greater justice. Although Indians have not demonstrated strong partisanship (and are Democratic-leaning if anything) (Wilkins, 2007, p. 203), Seneca Nation President Robert Odawi Porter points to the Republican House of Representatives as an opportunity to take advantage of shared values to achieve greater self-governance. Republicans traditionally value minimal government involvement and thus support efforts that increase the self-reliance of the citizen base. Republicans also traditionally support private partnerships, a strategy perhaps viewed as even more favorable in the midst of the economic crisis that has restricted the amount of

available government resources. President Robert Odawi Porter of the Seneca Nation took advantage of the wide Indian audience at the Tribal Lands and Energy Forum to present his legislation package that calls for greater autonomy of Indian nations. Citing the aforementioned characteristics of the House and the economy, Porter explained opportunities for reducing the restrictive, complicated bureaucratic relationship between Congress and the tribes. He claimed that undoing, rather than "fixing," the existing structural regulations provides greater opportunities for Indian economic, environmental, and cultural development, enabling tribes to assume more active decision making roles and private partnerships while freeing Congress of certain obligations that involve time and money for tribal programs. (National Congress of American Indians, 2011b). Several of the seven bills that Porter presented address either land authority or business activity (Porter, 2011). As American Indian climate change involvement directly relates to environmental governance and employment and investment opportunities, Porter's bills provide relevant focus and means for climate collaboration opportunities.

Reducing bureaucratic obstacles is also an important part of National Congress of American Indians President Jefferson Keel's January 2011 State of Indian Nations Address. Keel rejects the government's definitions of eras characterizing Indian activity, including "the recent promise of the self-determination era" (Keel, 2011). Instead, he declares the current age as defined by Indians for Indians, an "Era of Recognition," "Era of Responsibilities Met, or of Promises Kept," an era characterized by achieving a truer manifestation of the relationship between tribes and the federal government outlined in the Constitution. The foundations for this era have been laid by the hard work of American Indians and the self-determination era's redefinition of the federal-tribal relationship, as well as the economic crisis. Keel supports the House of Representatives' reading of the Constitution, seeing within it a reaffirmation of tribal sovereignty. He recognizes

both success and further opportunities for fulfilling potential, and he calls for clean energy development and a removal of the obstacles preventing access to opportunities and resources for development initiatives, specifically pointing to the tangled bureaucracy relating to tribal land management. "The Indian nations can do the work if the federal government will clear the way for us to exercise our liberty and thus make a new era and a more perfect union." (Keel, 2011).

EPA

As a body that works at the crossroads of U.S. environmental science and policy, and with offices at the regional level, the Environmental Protection Agency (EPA) is a space for tribal knowledge to interact with regional and national priorities to include the American Indian voice in climate policy. The EPA's National-Tribal Science Council (TSC) is made up of EPA representatives from each major regional office and the headquarters office (17 total,) tribal representatives from each EPA region with federally-recognized tribes, and an Alaska Native representative (11 total) (U.S. Environmental Protection Agency, National EPA – Tribal Science Council, 2011, p. 1). In the National Tribal Science Priorities Framework and Instruction Guide, the TSC outlines tribal affairs focus areas, with the purpose of understanding environmental issues important to American Indians, in order to devote part of the EPA budget to working on these issues (p. 1). Initiated in 2002, a series of discussions and workshops resulted in the release of eight priorities in 2006: "habitat loss, contaminated precipitation, biological stressors, environmental triggers for respiratory distress with a special emphasis on mold, pharmaceuticals in wastewater, dioxin and dioxin-like compounds, persistent bioaccumulative toxics source reduction, and endocrine disruptor chemicals (EDCs)" (p. 1). The TSC is now working on refining a new set of issues, to be released in July of this year (p. 1). (U.S. Environmental

Protection Agency, National EPA – Tribal Science Council, 2011). While working directly with tribal representatives is a positive aspect, this project is problematic because the focus areas are national in scope. According to Wildcat (2009) and other advocates for indigenous inclusion on environmental issues, the American Indian environmental experience is place-based. Establishing regional, rather than national, priorities would yield a more accurate picture of environmental needs and opportunities. The current model runs the risk of promoting inefficient spending and time allocation, achieving minimal results at best; the EPA's work with tribal issues should be improved to gain effectiveness.

The EPA also directly addresses tribal issues from an environmental justice perspective, an important focus for understanding a large part of the American Indian social-environmental experience and thus climate change involvement opportunities. After forming the Office of Environmental Justice in 1992, the EPA created the National Environmental Justice Advisory Council (NEJAC) in 1993, "in order to obtain independent advice and recommendations from all stakeholders involved in the environmental justice dialogue" (Moore & Robinson, 2010). This advice informs the EPA on how to appropriately include environmental justice focus areas in "programs, policies, and day-to-day activities" (Moore & Robinson, 2010). When assessing environmental justice issues across the country, the EPA Office of Enforcement and Compliance Assurance (OECA) utilizes the Environmental Justice Strategic Enforcement Assessment Tool (EJSEAT) "to consistently identify areas with potentially disproportionately high and adverse environmental and public health burdens.…[The data is organized into] four indicator categories: 1) environmental, 2) human health, 3) compliance, and 4) social demographics" (U.S. Environmental Protection Agency, Compliance and Enforcement, Environmental Justice, 2011). The EPA stipulates that this tool is still in the development stages, intended only for use within

the agency (U.S. Environmental Protection Agency, Compliance and Enforcement, Environmental Justice, 2011). In May 2010 the NEJAC released a report outlining advice and recommendations to Administrator Jackson regarding EJSEAT's screening approaches, identifying areas for improvement, guiding principles for use, and situations where the standardized tool is appropriate and where it is inappropriate (U.S. Environmental Protection Agency, Compliance and Enforcement, Environmental Justice, National Environmental Justice Advisory Council, 2010). The report explains that EJSEAT is not a sensitive enough mechanism for understanding American Indian environmental justice issues; if it is used, tribes must actively participate in the process. Data on tribal environmental justice issues exists, but it has not been efficiently processed, due to lack of communication among different federal agencies and between agencies and tribes. The NEJAC points to the National Environmental Information Exchange network, which provides for online information sharing and includes states, tribes, and the EPA, as a way to compile tribal environmental data sets. The NEJAC hopes that this network will alleviate suspicion on the part of tribal governments with regard to sharing information. Also, it must be taken into account that because of the Urban Relocation program in the 1950s and 1960s, many Indians were moved to cities, often to low-income areas. These groups should be identified and assessed for environmental justice issues, a process that can be aided by Census data. To conclude the evaluation of American Indian environmental justice assessment, the NEJAC report states that

> tribal nations should be the FIRST to be consulted when assessing these impacts. Tribal data should be respected as a reflection of the tribes' sensitivities to environmental protection of their lands, cultural resources and treaty rights. As such, EPA would be affirming Tribes' inherent rights to and management authority over tribal resources,

which is in support of EPA's own Indian Policy (EPA recognizes Tribal Governments as sovereign entities with primary authority and responsibility for the reservation populace.) (U.S. Environmental Protection Agency, Compliance and Enforcement, Environmental Justice, National Environmental Justice Advisory Council, 2010, Appendix E).

The report indirectly but accurately defines the balance between efficiently compiling diverse sources of data and maintaining sensitivity regarding specific areas or situations. It demonstrates the NEJAC's understanding of the importance of open communication and information-sharing, while distinguishing among different needs and contexts, achieved by directly involving tribes and acknowledging the limitations of a standardized data-gathering system. Fostering open communication with tribes regarding environmental justice issues is essential for understanding how to develop climate change collaboration. However, there is the risk that this data will be streamlined into an exclusively national policy regarding American Indians, akin to the focus of the TSC. Again, the EPA should capitalize upon its regional offices to maintain sensitivity to the diversity of impacts and opportunities regarding American Indian environmental justice and climate change involvement across the country.

NASA

The National Aeronautics and Space Administration (NASA) is another federal agency that works with tribes and is a nexus of U.S. science and indigenous knowledge. In 2006 NASA and the American Indian Higher Education Consortium (AIHEC) announced a joint summer research program designed to promote native students' pursuit of science and engineering careers (Alexander & West, 2006). NASA also recently gave $3.3 million to Tribal Colleges and Universities to enhance science, technology, engineering, and mathematics (STEM)

opportunities (Washington & Trotta, 2010). This effort is part of the NASA Office of Education's Minority University Research and Education Program (MUREP) for the Tribal Colleges and Universities Project (TCUP) (Washington & Trotta, 2010), which works specifically with tribal academic institutions to train students and faculty in research and educational programs related to NASA fields and areas of interest (Langhoff, Bradford, & Gary, 2010, p. 3-4). In October of 2009, NASA Ames hosted the workshop "Improving Minority Institution Collaborations at NASA," in which one of the main goals was to determine how NASA could create stronger partnerships, communication, and collaborative activities with minority institutions (Langhoff, et al., 2010, p. v). In addition to working with Indians and other minority groups, NASA has devoted a great deal of resources to climate science. "In 2004, NASA's spending on climate science exceeded all other Federal agencies, combined" (Jackson, n.d.). Merging its involvement in climate change and American Indian affairs, in 1998 and again in 2009, NASA co-sponsored the Native Peoples-Native Homelands Workshops, which brought together tribes from across the U.S. to discuss regional and national climate issues of importance, producing a detailed report in the case of the 1998 workshop, and each producing a declaration to U.S. policymakers. Integral to this process was Nancy Maynard, Senior Research Scientist at the Goddard Space Flight Center, who has taken initiative in connecting NASA with American Indian activities. NASA is a member of the Interagency National Climate Assessment Task Force (INCA Task Force,) charged with planning and executing the National Climate Assessment, a process initiated by the Global Change Research Act of 1990 that requires that every four years an assessment be presented to the President and Congress (U.S. Global Change Research Program, Interagency National Climate Assessment Task Force, 2011). Maynard

explains the moment of realization that she experienced during an NCA regional stakeholder assessment meeting at the University of North Dakota in 1998:

> 'There were two Native Americans who spoke at the workshop and I was horrified to realize Native peoples had been left out of the whole equation…I'd never heard the Native perspective on the issue before and it hit me like a lightning bolt: Where has the science community been? The Native philosophy and practice is to look at the earth as a whole system -- the way NASA scientists look at the world.' (Crawford, 2000).

It was this observation that led to the workshop later that year. The holistic worldview that Maynard describes is an important foundation for NASA's involvement in climate science and its partnership with native communities. As a federal agency, NASA also has a strong connection to the U.S. policy arena, giving its partnerships with American Indian communities great potential for achieving progress in collaborative climate change policymaking.

American Indian groups engaged in climate change initiatives

In addition to spaces, themes, and bodies that bring groups together to work on climate change issues, there exist powerful, distinctly American Indian-based efforts. This section examines several groups with significant American Indian representation that are involved in climate change in different ways.

Intertribal COUP

Formed in 1994, Intertribal Council on Utility Policy (Intertribal COUP) connects Northern Plains tribes and facilitates discussions and workshops on subjects such as energy and climate change. Intertribal COUP also produces policy recommendations, operating under the

assumption that economic, social, and environmental conditions can be improved through developing and supporting clean energy initiatives in Indian Country. (Intertribal Council on Utility Policy, 2009). One of Intertribal COUP's concentrations is straw-bale housing, with an emphasis on the potential for climate change mitigation and adaptation, cultural restoration, American Indian employment, and national energy crisis alleviation. Employing passive design and local resources, straw-bale housing is less energy intensive than conventional materials and designs, thus lowering the carbon footprint of the housing sector in Indian Country. Straw-bale houses regulate indoor temperature, demonstrating promise as an adaptation mechanism to temperature extremes caused by climate change. (B. Gough, personal communication, February 19, 2011). Gough explains the cultural importance of straw-bale housing, as it is a return to American Indians' construction of their own homes, in contrast to the current system of importing prefabricated homes into reservations. The Earth-friendly design of straw-bale housing will reduce dependence on unsustainable sources of energy, and the use of local materials will decrease environmental impacts from production and shipping, thus contributing to the mitigation of the nation-wide problems of energy dependence and climate-changing pollution. (B. Gough, personal communication, February 19, 2011). In addition to the straw-bale housing initiative, Intertribal COUP advocates for developing wind power sources in Indian Country, highlighting the prerequisites of job creation, training, and investment policy legislation (Intertribal Council on Utility Policy, 2009). Wildcat (2009) claims that plain-based wind power is the energy of the future, but he stipulates that certain reforms must be made, pointing to the federal production tax credit (PTC,) which creates a disincentive for tribal clean energy development (p. 94). The PTC gives tax credits to private investors in wind energy, but since Indian business on Indian land cannot be taxed, this establishes a comparative disadvantage for

Indian wind energy investment (Wildcat, 2009, p. 94). Intertribal COUP concentrates a great deal of its efforts on federal policy reform (N. Kennedy-Howard, personal communication, February 28, 2011), working to reduce these obstacles and increase opportunities for American Indians to develop clean energy on tribal lands.

NCAI

The National Congress of American Indians (NCAI) was formed in 1944 to protect the rights of tribal governments, and it continues to be a uniting force for tribes across the country today. Two top priorities are "environmental protection and natural resources management." (National Congress of American Indians, 2011a). NCAI's dedication to these issues is apparent in a resolution it released for the first annual meeting between President Obama and tribal leaders (National Congress of American Indians, 2009). Included in this resolution are provisions for natural resource and economic development on tribal lands (p. 9), the inclusion of tribes in state- and federally-sponsored programs to improve energy efficiency in houses and other buildings (p. 14), and environmental protection on native lands (pp. 15-16). The NCAI recently held the Executive Council Winter Session, which brought together representatives from U.S. Congress, nongovernmental organizations, and tribes from across the country, in order to discuss a wide array of topics, including energy and the environment. The draft table of issues distributed in the Tribal Lands and Energy Forum that outlined "legislative and administrative solutions" for tribal energy development detailed issues relating to the priority categories of "streamlining or eliminating federal processes, removal of fees, building tribal institutional capacity, access to electricity, transmission, tribal renewable energy development, tax and finance, and energy efficiency" (National Congress of American Indians, 2011b). The U.S.

Department of Energy Director of the Office of Indian Energy Policy and Programs Tracey A. LeBeau explained the priorities and initiatives of her newly-formed Office, emphasizing both community and large-scale efforts, in coordination with such groups as the Department of Agriculture, the Department of the Interior, and the Department of Commerce, to ensure that proper and adequate resources are available to tribes. LeBeau's priorities center on technological and financial issues, transmission issues, clean energy development, carbon sequestration, and capacity building. LeBeau outlined her plans to hold several roundtable discussions between March 16 and April 14, 2011 throughout the U.S. to identify tribes' main challenges and policy priorities, and she mentioned the Department of Energy National Tribal Summit, which is to take place in Washington, D.C. on May 5 of this year. LeBeau explained that as her Office is new, it can be truly created; there are no existing programs, and thus there is space for an integrative program-building process. (National Congress of American Indians Executive Council Winter Session, Tribal lands and energy forum, The Westin, Washington, D.C., February 28, 2011).

IEN

The Indigenous Environmental Network (IEN) was formed by indigenous members at the community level to tackle matters of environmental and economic justice. IEN's goals include capacity building for indigenous communities to establish methods for environmental, health, and life-form protection; the acknowledgement and affirmation of indigenous knowledge and respect for natural systems; the identification, support, and encouragement of environmentally-friendly lifestyles; the involvement of youth and elders; a voice in policies that impact indigenous peoples; and the protection of the human right to hold cultural and spiritual beliefs and practices. The Network outlines a wide array of indigenous justice issues, including mining,

toxins, and water. It promotes the Native Energy & Climate Campaign, which empowers native participants to gain political influence regarding conventional and clean energy and climate decision making, and the Protecting Mother Earth Gatherings, which were the meetings on environmental justice issues from which IEN was created. (Indigenous Environmental Network, 2012).

Honor the Earth

Honor the Earth is focused on improving environmental and economic conditions in Indian Country through activities such as the Energy Justice Initiative, which strives to secure local infrastructure, and the Building Resilience grant-making initiative, which gives financial support to efforts creating an environmentally-friendly Indian Country economy (Honor the Earth, n.d.). Honor the Earth works to finance community based groups, combat environmentally-harmful activities, and support environmental projects (N. Kennedy-Howard, personal communication, February 28, 2011). With the goal "to build a just, green economy in Native America" (Honor the Earth, n.d.), the organization works with communities that desire its assistance (N. Kennedy-Howard, personal communication, February 28, 2011), operating under the principles of grassroots development and non-imposition.

TCUs

Tribal Colleges and Universities (TCUs) are an important convergence point for science and indigenous knowledge (Maynard, 1998, p. 6; Wildcat, 2009, pp. 128, 138), connected and supported by the American Indian and Alaska Native Climate Change Working Group (Wildcat, 2009, p. 138; Topping, 2010) and the American Indian Higher Education Consortium (AIHEC)

(Topping, 2010). The TCUs provide the opportunity for indigenous land and climate knowledge to be afforded inclusion and value in geosciences education and research activities (Wildcat, 2007). Native students are in the unique position to apply their ability to think holistically from an indigenous perspective to the scientific models surrounding climate issues (Wildcat, 2007). The American Indian and Alaska Native Climate Change Working Group is dedicated to making TCUs the source of American Indian climate change influence, apparent in its implementation of a program in which students will document elders' observations of the climate (Topping, 2010). The national government also supports TCU cooperation through the White House Initiative on Tribal Colleges and Universities, which is conducted and financially supported by the Department of Education (Topping, 2010).

Strategies for collaboration

Honor the Earth, Intertribal COUP, IEN, and the International Indian Treaty Council (IITC) released a policy paper to inform the national government about climate issues in Indian Country and recommend certain decisions and actions (Honor the Earth et al., n.d.). In the paper, the groups request that the federal government consult Honor the Earth, Intertribal COUP, and IEN on the issues of "energy production, resource extraction, [and] housing and energy efficiency," in order to include American Indian representation in decision making, pointing to the harmful legacy of "exploitation and energy injustice." (Honor the Earth et al., n.d.).

DISCUSSION

In this paper I have explained the separation and potential for integration of Western and indigenous knowledge, highlighting current spaces and efforts for collaboration on climate change decision making. Sustainable initiatives must occur on all levels, but the common requisite is the maintenance of an open mind and an understanding of the diversity of human needs, conditions, and interactions with the natural world. Developing this understanding takes time, and it requires that all stakeholders engage in true conversation. There are several themes and opportunities that tie different levels together and encourage collaboration across sectors.

Energy

An important theme is the development of sustainable energy. President Obama recently announced his objective to generate 80% of electricity in the U.S. from clean energy sources by 2035 (Gough, 2011). Indian Country is ideal for realizing these renewable energy resources and involving local communities in developing a sustainable base (Keel, 2011; Gough, 2011; Jones, Hendricks, & Madrid, 2011). Tribal lands account for only 5% of U.S. land, but they hold 10% of the nation's conventional energy potential, along with great renewable energy potential (Gough, 2011). It is estimated that tribal lands could produce 535 billion kWh/year of wind power generation and 17,000 billion kWh/year of solar electricity generation, which is roughly "4.5 times total U.S. annual generation" (Honor the Earth; Intertribal Council on Utility Policy; Indigenous Environmental Network; International Indian Treaty Council, n.d.). (I interpret this as referring to total U.S. annual electricity generation, including both renewable and nonrenewable sources. These calculations make sense, based on information from the U.S. Energy Information Administration, 2011). Secretary of Energy Steven Chu recognizes the

potential, recently pledging $10 million for clean energy and energy efficiency programs on tribal lands (Keel, 2011). Keel (2011) sees the energy movement as a major opportunity for tribal development through employment and economic growth. Gough (2011) echoes this, explaining that benefits from clean energy investments on tribal lands will extend to the entire nation, through the conservation of water and the reduction of emissions, as well as the protection of citizens from the shocks of rising oil prices. Gough (2011) identifies an important additional benefit: the development and support of a spirit of innovation and a culture of positive action. However, clean energy cultivation is not without difficulties. One of the main challenges is transmission. Many of these energy sources are found in areas of the United States that are considered to be "the middle of nowhere," making distribution difficult (M. McCluer, American University Washington Environmental Workshop class visit to the Energy Efficiency and Renewable Energy division of the Department of Energy, March 16, 2011). However, in the spirit of true place-based solution-seeking, while developing these other forms of energy, the U.S. should be working on changing the nature of its energy distribution. Instead of operating on a national grid system, the country should decentralize to regional systems that take advantage of the different types of regional energy available. Neil Rossmeissl, of the Energy Efficiency and Renewable Energy division of the Department of Energy, explains that wind power is available along the coasts and in the west, solar energy has great potential in the west, and biomass opportunities lie in the plains and farmland regions of the country (American University Washington Environmental Workshop class visit, March 16, 2011). Working on a regional level is a chance to adopt the indigenous model of working with nature, rather than capturing and moving it. In this way, renewable energy is an opportunity for both ideological and practical

applications of indigenous knowledge, and it is an ideal space for the interaction among indigenous knowledge, science, and technology.

Development

Another theme that brings groups together on climate issues is development. Climate change collaboration is an opportunity to alleviate the high poverty levels in American Indian communities (National Congress of American Indians' Capitol Hill legislative reception, National Museum of the American Indian, Washington, D.C., March 1, 2011). For true development to be achieved, however, affected communities must be involved from the beginning and throughout all stages of the process. True collaboration entails questioning assumptions and worldviews, and working with American Indians will necessitate three "difficult discussions:" human and ecological history and the notion of their separation, definitions of the issues, and the way in which environmental justice is understood (Wildcat, 2009, p. 19). Climate change decision making is a chance for native and non-native citizens to move forward together, but in order to build effective solutions, it is necessary to openly acknowledge historical processes that have caused the indigenous and national environmental and economic situations to become what they are today. In addition, acknowledging assumptions is important to recognizing the ways that different groups approach the issues surrounding climate change and understand the concepts of environmental justice.

> Survival in the face of human assault, natural disaster, or deprivation has been a conscious concern of indigenous peoples (Grim, 1998)… [I]ssues of diversity and economic exploitation are central to any discussion of indigenous traditions and ecology as many of the indigenous peoples, their cosmologies, and ritual practices…are actually

> in danger of being extinguished by absorption into mainstream societies and by destruction of indigenous homelands through resource extraction (Grinde & Johansen, 1995, as cited in Grim, 1998).

In acknowledging and discussing these issues, "scientists, policy makers, and entrepreneurs" may find that the process can at times cause feelings of discomfort (Wildcat, 2009, p. 19), but this is necessary for achieving a realistic point of view and a true foundation for collaboration.

Wildcat (2009) identifies three "lifeways issues" that are areas for future research on native involvement with climate change: "dwellings, food, and decision making" (p. 115). The issue of dwellings relates to the economic, environmental, and spiritual problems experienced by American Indians. The houses built across tribal lands and the nation are often energy inefficient and "unimaginative…embody[ing] the boxlike categories that dominate the human mindscape today." (Wildcat, 2009, p. 115). Homes should instead be built with an understanding of "the broader landscape, solar, wind, and microclimate features of their environment," concepts that can be informed by traditional native architecture (Wildcat, 2009, p. 116). The issue of residential construction on tribal lands should not be mistaken for a luxurious occasion to incorporate aesthetically-pleasing native designs that also achieve environmental bonus-points. In certain areas there is a real housing crisis (Tribal Council Representative, personal communication, March 1, 2011).

> Roughly 90,000 Indian families are homeless or under-housed; more than 30% of reservation households are crowded and 18% are severely crowded. Roughly 16% of Native American homes are without telephones, while only 6% of non-Native households lack telephone service . . . Fewer than 50% of homes on reservations are connected to a

> public sewer system. (U.S. Comm'n on Civil Rights, 2003, p. 50, as cited in McCarthy, 2004, p. 126).

By designing units that take advantage of passive design and local materials, tribes can improve economic and livelihood security, as well as environmental protection (Gough, personal communication, February 19, 2011).

Patterns of food production and consumption invite another reflection on the dominant cultural norms that have led America to this unsustainable lifestyle, impacting both human and environmental health (Wildcat, 2009, pp. 121-124). "Indigenizing" the American diet will help develop a healthier lifestyle while connecting people and places (Wildcat, 2009, p. 123). This means understanding food as a reflection of ecological diversity, rather than an economic commodity (Wildcat, 2009, p. 122). Corn, beans, and squash are examples of traditional indigenous foods that are high in protein and were helpful for Europeans fighting sickness and starvation (Wildcat, 2009, p. 122). Making positive changes in personal consumption and "mov[ing] away from the agribusiness model of food production" (Wildcat, 2009, p. 121) will help increase food security and decrease emissions caused by mass production and shipping.

Wildcat's (2009) third area for further research, decision making, is the crux of this paper. By directly addressing decision making as the heart of tribal involvement in policymaking, leaders will arrive at the core of the multifaceted issue of climate change that embodies environmental, cultural, political, scientific, traditional, and developmental implications and opportunities. Wildcat defines meaningful decision making as a process that incorporates "indigenous assessment," which embodies the native perspectives and frameworks mentioned in the previous chapter: the seven generations model, natural intelligence, and RICH (Wildcat, 2009, p. 124). There is a "growing recognition that much of reality is better

understood as complex dynamic interactions and processes not reducible to simplistic and deterministic cause-and-effect logic" (Wildcat, 2009, p. 125). Many forms of traditional American Indian knowledge have embodied this principle for generations; thus, it is informative to include American Indians in environmental assessment and decision making.

Facilitators of collaboration

The themes of energy and development are positive and necessary conduits for integrating Western and indigenous understandings of climate change on all levels. There are several groups that are actively bringing actors together to take advantage of opportunities such as these. In 2008, the Environmental and Energy Study Institute (EESI) hosted an event that brought groups together to present on straw-bale construction in Indian Country (Environmental and Energy Study Institute, 2008). Representatives from GreenWeaver, Inc., Intertribal Council on Utility Policy, and Development Center for Appropriate Technology, and a LEED AP presented on their knowledge of and experience with straw-bale housing, outlining its numerous environmental and economic benefits (Environmental and Energy Study Institute, 2008). Topping (2010) explains that environmental groups have played a role in fostering a recent increase in American Indian interest in climate change in the lower 48 states, citing the example of the National Wildlife Federation, which sponsored the Tribal Lands Climate Conference in 2006, bringing together leaders of over 50 tribes to talk about Indian climate change issues. Topping states that "[m]ost of the impetus on climate change, however, has come from scientists and activists within the Native American Community" (Topping, 2010), supporting Wildcat's (2009) emphasis on the importance of these actors (p. 130). Universities are another important arena for collaboration, as seen in Tribal Colleges and Universities' partnerships with three U.S.

institutions: Dartmouth, Stanford, and American. The nature and specific features of the partnerships vary among the different schools, but they generally enhance native students' access to accredited institutions, while offering unique opportunities such as internships or programs and methods of particular interest to native students. (Topping, 2010). The Institute for Tribal Environmental Professionals & Northern Arizona University maintains a website that posts "links to conferences, meetings, and other events related to tribes and climate change" (Institute for Tribal Environmental Professionals & Northern Arizona University, 2011). Groups such as EESI, the National Wildlife Federation, and university partners are examples of different pathways for opening the conversation among diverse groups interested in climate change.

CONCLUSION

The issues in this world are rarely black-and-white, although it would often be easier to see them as such. Categories and assumptions help to make sense of the incredible complexity, and while it is impossible and impractical to try to eliminate all personal worldviews and assumptions, it is imperative to recognize that biases are part of the natural human condition. Acknowledging and questioning perspectives is the first step to unlocking extraordinary possibility, and I have strived to do so on the issues of dominant American perspectives and lifestyles surrounding climate change dialogue and decisions. The purpose of this paper was to explain the necessity and desirability of understanding and encouraging American Indian perspectives in the U.S. climate change decision making process. The foundation of this journey is appreciating the world's holism. The interconnectedness of culture and nature requires careful attention to the social implications of decisions regarding the environment, as well as the environmental impacts of different social systems and norms. Climate change will necessitate a lifestyle shift, and if we act sooner, we can not only have more control over the form this takes, but we can also initiate creative solutions that are the integrated product of a diversity of forms of knowing and experiencing. The American Indian perspective offers unique ways of interpreting and understanding natural phenomena, as well as alternative lifestyles and reactions to the changes we are and will be experiencing.

In undertaking this research, I sought to answer three questions: What are the specific perspectives that American Indian environmental knowledge can offer the climate change dialogue? Where are the spaces for interaction among U.S. science, policy, and indigenous knowledge? Where and how are American Indians working toward gaining a voice in U.S. climate policy? I found that characteristics of the American Indian traditional worldview, such

as holism, attention to correlations, and a focus on the specific rather than the general, are fertile ground for collaboration with such Western ideas as sustainability and new political ecology. As climate change demands a human response that recognizes the complexity and correlations of natural and human systems, integrating technology and policy initiatives with American Indian understandings, strategies, and experiences builds a more socially and environmentally conscious way of framing the issue and developing solutions. This must be a two-way exchange, with well-informed representatives on both sides working to attain adequate logistical support for taking American Indian voices to the national sphere, and for delivering and receiving appropriate technology and capacity building in communities. There are many spaces for interaction related to different aspects of climate change mitigation and adaptation, such as agroforestry, soil and water conservation, and GIS mapping. Established national entities, such as the BIA, have potential for facilitating this constructive interaction, but they must depart from historical methods of top-down imposition and slow bureaucratic processes to instead work from within an organic, ground-up, context-specific framework. Groups with significant American Indian representation, such as Intertribal COUP, are working on clean energy and grassroots empowerment, to benefit American Indians and the nation as a whole. Clean energy provides the greatest opportunity for many tribes to be actively involved in climate change mitigation strategies, while improving economic conditions and social issues related to injustice and marginalization. There are many challenges associated with developing the clean energy supply in the U.S., but this systemic transformation must occur in order to achieve the scale necessary to make a positive impact against climate change.

The issues are more complicated than time and scope have permitted me to address in this paper. American Indians have myriad issues to manage, and many are not concerned with

environmental matters or climate change. U.S. politicians are also dealing with many issues and pressures from all sides. There are tribes that could be disadvantaged by the imposition of stricter climate laws. There are inevitably people within both the Western and native science communities who do not want to work together, and the logistics of coordinating the large number of federal agencies and other groups involved can be overwhelming. However, change is possible. There are countless examples of people who have tackled seemingly-impossible issues, often doing so through identifying a point of leverage, and basing strategies and methods around that particular issue, in the end achieving positive change that extends beyond the original focus. For example, 2004 Nobel Peace Prize winner Wangari Maathai founded the Green Belt Movement in Africa, which promotes tree-planting. In doing so, it also works toward women's empowerment, sound governance, and "cultures of peace" (The Green Belt Movement, n.d.). I consider clean energy development, particularly that of wind and solar power, as American Indians' point of leverage in climate change, and it is encouraging to see that groups such as Intertribal COUP are working to turn such opportunities into reality. The National Congress of American Indians is an important space for tribes to connect with each other and national government officials, as I observed in the Executive Council Winter Session. However, from my limited perspective and experience, I feel that the advocacy for clean energy development must be made stronger and clearer, through forming coalitions and bolstering publicity.

This paper has woven together various themes that are central to issues of climate change and the American Indian experience, and I hope that it sparks increased understanding and productive action in the United States, improving cultural and environmental conditions through inclusive and context-specific climate change decision making processes. I envision a

worldview in which human and natural elements are intertwined, interacting in complex relationships while embodying unique place-based identities that are valued and respected. The Institute of American Indian Arts (IAIA) in New Mexico both teaches and lives these principles. Understanding that humans are impacting the earth at a heretofore unprecedented scale, the Institute is dedicated to evaluating human roles and relationships in the world, learning from the "diverse place-based knowledge of students, faculty and staff," and integrating sustainability into the school's community experience. IAIA President Dr. Robert Martin recently signed on to the American Presidential Climate Commitment, alongside thirteen other colleges and universities in New Mexico, encouraging the Essential Studies department to continue its culture of sustainability and inquiry into "connections to experience, culture, and ecological places." The department considers it a fundamental responsibility of higher education to engage students in a dialogue that investigates the relationship between "ecological places and cultural knowledge," as it encourages students to explore the dynamics of personal and collective history and future, context-based and global issues, and diverse forms of knowledge. "Higher Education has a unique responsibility to anticipate future challenges with climate change, and serve as a model and living/learning laboratory for solutions. IAIA can offer rich contributions to this dialogue and transition." (McDonnell, 2010). It is this recognition of the dual-identity of climate change as both a challenge and an opportunity that this paper seeks to illustrate, shedding light on historical trends and future visions, the interaction between culture and ecology, and the importance of respecting and honoring alternative understandings, lifestyles, and experiences.

I have analyzed these possibilities for climate change collaboration through the lens of natural resource management, development, and policy. It would be enriching and informative to see future research on other important aspects of American Indian-specific climate change

issues, such as environmental science, law, anthropology, or psychology. In addition, supporting native research and documentation of traditional environmental knowledge is important to establishing well-rounded understandings of the issues, and these and other projects appear to be well underway at educational institutions.

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