

What Do Indigenous Knowledges Do for Indigenous Peoples?

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Slightly revised 5-27-15

Forthcoming in "Keepers of the Green World: Traditional Ecological Knowledge and Sustainability," edited by Melissa K. Nelson and Dan Shilling.

Introduction: Indigenous Peoples, Planning and Knowledges

In this essay, I aim to engage with the broad community involved in conversations about the ways in which knowledge exchange can occur between Indigenous peoples' knowledge systems and the fields of climate, environmental and sustainability sciences. I will begin with an introduction that is longer than what I would normally write because I feel it is important that I lay out some of the context that matters to me. I will make some connections among concepts of self-determination, Indigenous planning, climate, environmental and sustainability sciences and Indigenous knowledges before I preview what will come in the rest of this essay. In the end, my argument is that scientists who seek to exchange knowledge with Indigenous peoples should not only understand what Indigenous knowledge systems can do for them but also have a sense of the significance of these knowledge systems for Indigenous governance today. Hence the question-based title of this essay: What do Indigenous knowledges do for Indigenous peoples?

The context I wish to share starts with the idea that a crucial facet of the self-determination of peoples such as Indigenous nations and communities is the responsibility and the right to make plans for the future using planning processes that are inclusive, well-informed, culturally-relevant, and respectful of human interdependence with nonhumans and the environment (Walker, Natcher, and Jojola 2013). For Indigenous peoples, the United

Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) affirms key aspects of *the right* to make plans. UNDRIP's Article 3 states that by virtue of the right to self-determination, Indigenous peoples "freely determine their political status and freely pursue their economic, social and cultural development" (United Nations General Assembly 2007). Moreover, UNDRIP's preamble affirms that "control by indigenous peoples over developments affecting them and their lands, territories and resources will enable them to maintain and strengthen their institutions, cultures and traditions, and to promote their development in accordance with their aspirations and needs." The Preamble also recognizes "that respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment" (United Nations General Assembly 2007).

As *Anishinaabe* people (*Ojibwe, Odawa, Potawatomi*), planning figures prominently in our societies as a responsibility and not just a right, as is true in distinct respects for many other Indigenous peoples (Jojola 2001). We have a widely respected core philosophy requiring us to consider the broader impacts of what we do now on the next seven generations after us (Benton-Benai 1988). And when we consider broader impacts, it is common to look at the world as interrelated in ways that some people outside the *Anishinaabe* world do not always grasp, such as the complex interrelation of human health, storytelling, gendered and intergenerational relationships, cultural and ceremonial life, the intimacy of human relations with plants, animals and entities (e.g. water), and the moral responsibilities that come with family, clan, and band memberships. One of the concepts *Anishinaabek* often use to describe this integrated conception of life is *bimaadizi* (verb) or "living in a good and respectful way" (Mitchell 2013). Though *Anishinaabe* language is made up mostly of verbs, some people also use the noun form, or

bimaadiziwin, in English language writing, since the noun form may be perceived as flowing better in English grammar and style.¹

Anishinaabe ways of life also stress the importance of future planning for being able to live adaptively throughout the year given metascale forces such as seasonal changes and shifting ecological trends that affect economies and trade, the availability of first foods and medicinal plants, and the timing of ceremonies (Clifton 1986). Anishinaabe and other Indigenous peoples have built up knowledges of how to live adaptively with nonhumans and the environment that are shared and imparted most often through oral and performative means, including stories, ceremonies, and intergenerational and family activities (e.g. hunting, Reo and Whyte 2012) . These knowledges represent valuable capacities for adaptation planning because they are community-based, and hence trustworthy (Scheman 2012; Werkheiser 2015). They also contain insights, conservation and environmental governance strategies, methods of analysis, and decision-making processes that arise from hundreds of years of collective memories, experiences and trial and error in adapting to number of metascale forces, from historic climate change to the transatlantic fur trade.

Though Indigenous peoples have rights and responsibilities to plan and useful knowledge for doing so, in the context of U.S. and Canadian settler states, long term planning for sustainability issues such as climate destabilization is challenging to put in practice for Ojibwe, Odawa and Potawatomi peoples and other Indigenous nations and communities sharing the region and beyond. As settler states are here to stay, they have instantiated and enforce laws, economic policies and practices of cultural and political domination that leave Indigenous peoples with little space to plan both creatively and practically about what to do in the future. Consider

¹ I tried to use English spellings of words in Anishinaabemowin (the language of the Anishinaabek) that can be identified by diverse Ojibwe, Potawatomi and Odawa people and people who work in relation to this language. I recognize that there are many accents and spelling systems, that I have mixed a few, and that some of the spellings I am using are in some ways the least similar to how members of my Tribe (Potawatomi) engage in English language spelling. Given I use these terms every day with family, friends and colleagues, I just tried to impart spellings people would recognize.

just a few examples. Settler states are often firm in their legal and policy commitment to enforce Indigenous jurisdictions as fixed and inflexible, such as treaty areas, reservation boundaries, subnational (e.g. state or provincial) borders and transnational boundaries (e.g. U.S./Canada) (Whyte 2014; Marino 2012; Theriault 2013). One consequence in some cases is that Indigenous peoples cannot practically plan to shift their seasonal subsistence and economic activities if a valuable plant's or animal's habitat moves outside of a treaty area or crosses a transnational border. For settler states would oppose such plans as "illegal" even when the plans are within Indigenous ancestral territories, flow from established Indigenous commercial, subsistence and cultural practices and are consistent with Indigenous interpretations of the purpose of a treaty² or with the fact that some Indigenous peoples never consented in the first place to the instantiation of a transnational border bisecting their territories.

Or consider other planning issues stemming from how the weakening of Indigenous subsistence economies and trade networks creates incentives for Indigenous governments to engage with industries that they do not trust or feel are unsustainable. In one story I recently read from outside the Great Lakes, a former Inupiat mayor of the North Slope Borough in the Arctic describes the dilemma he faced when he ended up supporting an Arctic offshore drilling program, which he and his community believed posed unacceptable environmental risks to their waters and food system. He said he was torn on what plans to make because, as the article I read states, 95% of the borough's taxes come from oil and gas. Moreover, the production in oilfields typically relied on for revenue was in decline. According to him, "My biggest responsibility was maintaining the economic well-being of the borough and that largely has to do with maintaining oil in the pipeline" (Birger 2012).

² For example, some Indigenous peoples understand treaties as protecting their access to particular resources or ways of life, which is different from certain settler interpretations that see treaties as fixing a right occupy or perform certain activities within a certain area on a map (Stark 2010; Treaty Indian Tribes in Western Washington 2011; Andow et al. 2009).

Finally, the political and cultural domination of settler states affects internal affairs in Indigenous governments such as Tribes living in the U.S. sphere. Tribal officials often feel pressure from their electoral constituencies to focus on pressing issues including unemployment, violence against women and diabetes, among other issues. Governmental units, from environmental services agencies to cultural preservation departments, are often *silo-d*. That is, the units do not communicate or coordinate with one another even though they are responsible for addressing deeply interrelated issues such as the health and cultural impacts that occur when a subsistence and ceremonially-valuable fish population is contaminated with hazardous chemicals. These units are usually severely under-funded and employ staff whose time gets spread thin as staff members juggle multiple projects. There can also be unnecessary divisions separating Tribal lawmakers, bureaucrats and staff from elders, traditional and subsistence harvesters and gatherers, and spiritual and cultural leaders. For example, Tribal staff often have to find ways to satisfy federal grant requirements and metrics that may conflict with cultural and subsistence values held by elders, harvesters and spiritual leaders (Ranco et al. 2011).

The observations in the last few paragraphs arise from my work directly with Indigenous nations and communities sharing the Great Lakes region on climate change adaptation and sustainability planning and in my learning from Indigenous peoples in other regions about the challenges they are facing and how they are responding. This work ranges from facilitating the development of future climate change scenarios to writing and reviewing Indigenous adaptation plans to organizing dialogues connecting Indigenous governmental regulators, harvesters and community members with scientists and engineers of other nations and heritages. I also convene or contribute to projects that put forward ethical principles and guidelines for cooperation between Indigenous parties and parties of other nations and heritages on climate change adaptation, large-landscape conservation and environmental justice. As a Potawatomi person, it is one of my responsibilities to support the

planning efforts of Anishinaabek and other Indigenous peoples sharing the region on behalf of our continuance and resurgence as distinct and self-determining communities and nations. It is also my responsibility to share with and learn from others outside the Great Lakes region.

This brings me to the central topic of the essay, knowledge. A good planning process for any nation or community requires access to the most reliable and trustworthy sources of knowledge available for thinking about future scenarios and situations. Regarding climate change, for example, an array of different knowledges are needed: from variations in lake levels or shifts in the location of tree species in forests, to indicators Tribes should be monitoring to track climate change trends to health risks that are likely to be faced by Tribal members if they lose access to culturally and economically important inland wildlife, to how Tribal urban infrastructure, such as storm water management systems, will react to more intense precipitation events. We also need knowledge of the different adaptation strategies that specific Indigenous communities or nations have already in their repertoires of capacities, as well as the strategies that must be developed in collaboration with neighboring counties, towns, cities, states and federal agencies (Grossman and Parker 2012). For the purpose of planning, many Indigenous peoples rely on their own knowledges of how to live adaptively with nonhumans and the environment that I described earlier in this section. Yet the work being done in a range of climate, sustainability and environmental sciences is also valuable for Indigenous planning. Many Indigenous peoples and organizations already employ their own scientific staff and use the research of federal agencies and academic institutions for learning about how to improve and evaluate environmental protection and conservation planning.

While considering the role of climate, environmental and sustainability sciences in Indigenous adaptation planning, I found that professionals in these fields had already been writing for some time about the value of *Indigenous knowledges* for their work relating to planning and supporting the decisions of leaders and public

officials. Indeed, Indigenous persons and persons of other nations and heritages were creating quite a buzz in these fields about the value of exchange with Indigenous knowledges systems, which they refer to under a number of names, including “indigenous knowledge” (IK), “traditional knowledge” (TK), “indigenous knowledge of the environment” (IKE), “traditional ecological knowledge” (TEK), and “Native science” (Cajete 1999, Berkes 1999, Burkett 2013, Agrawal 1995). Here, I refer to all such English-language concepts as *Indigenous knowledges*, which is short for Indigenous knowledge systems. For the people in these fields, knowledge exchange is important because Indigenous knowledges possess lessons, principles, and practices that can teach peoples of other heritages and nations about living sustainably (Nelson 2011). Indigenous peoples have local knowledges of the properties or behavior of particular plants and animals (Turner et al. 2011), ecosystem services (Alessa, Kliskey, and Williams 2010), or the tracking of local environmental change (Reidlinger and Berkes 2001). The United Nations’ report, *Our Common Future*, states that Indigenous peoples “are the repositories of vast accumulations of traditional knowledge and experience,” and that “larger society... could learn a great deal from their traditional skills in sustainably managing very complex ecological systems.” (World Commission on Environment and Development 1987, 114-115).

Here in this essay, however, I want to share another part of the story that is often not discussed in detail in science literatures on Indigenous knowledges: the value of Indigenous knowledges for us, the members of Indigenous peoples, for our own planning, especially in relation to *today’s* climate destabilization ordeal that is entangled with the problems we have with settler states. I have found that scientists often appreciate what I will call here the *supplemental-value* of Indigenous knowledges—the value of Indigenous knowledges as inputs for adding (i.e. supplementing) data that scientific methods do not normally track. In the domain of supplemental-value, Indigenous people’s planning processes will improve, in turn, by having access to the supplemented and hence

improved science. But it is also the case that Indigenous knowledges have *governance-value*. That is, they serve as irreplaceable sources of guidance for Indigenous resurgence and nation-building. Scientists should appreciate governance-value because it suggests that for some Indigenous peoples in knowledge exchange situations, we need to be assured that the flourishing of our knowledges is respected and protected. I hope to make the case for why it is important for scientists who work with Indigenous peoples to understand governance-value in the hopes that this understand will improve their approaches to knowledge exchange with Indigenous peoples.

Supplemental-Value and Indigenous Knowledges

Articles in climate, environmental and sustainability sciences literatures tend to articulate concepts of Indigenous knowledges in ways that stress the value for supplementing scientific methods, or supplemental-value. Consider just a few examples (of many available) mostly from climate and sustainability sciences. In 2012, the United Nations Educational, Scientific and Cultural Organization and the United Nations University published *Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation*. The report states, “Indigenous observations and interpretations of meteorological phenomena have guided seasonal and inter-annual activities of local communities for millennia. This knowledge contributes to climate science by offering observations and interpretations at a much finer spatial scale with considerable temporal depth and by highlighting elements that may not be considered by climate scientists” (Nakashima et al. 2012, 8, see also, Reidlinger and Berkes 2001). The value of Indigenous knowledges rests on their capacities to fill in gaps in certain scientific methods such as a lack of local or historical data.

The report also mentions that Indigenous knowledges can expand the sorts of things that scientists consider in their research methods. For example, Weatherhead et al. describe work in Clyde River, Nunavut, in the Arctic. Inuit hunters claimed that it was

becoming harder to predict the wind from day to day (i.e., wind persistence). The hunters' observations looked to a number of features, including changes in the formation of seasonal ice crusts, animal behavior, sea-ice conditions, and in snow forms. Climate scientists disagreed with the hunters. The weather station only observed changes in wind direction or wind persistence in northeast winds (Weatherhead et al. 2010). Some of the difference, it turns out, was attributable to the fact that the weather station was in a stationary, flat area; hunters instead were traveling far and wide within complex landscapes, and were paying close attention to certain snow and ice features as a matter of safety. This spurred the scientists to put in more weather stations across the landscape, especially in hunting areas, and to engage in constant comparison between weather station data and Inuit hunters' observations. The collaboration has improved the information that hunters have access to about shifting conditions that matter to their subsistence hunting and safety (Weatherhead et al. 2010), which certainly helps to improve their capacity to plan.

Examples such as *Weathering Uncertainty* and that documented by Weatherhead et. al 2010 describe Indigenous knowledges in ways that most climate and other scientists can digest and also relate to their approaches to research. Yet Indigenous knowledges originate in completely different cultural-linguistic contexts from those many scientists are used to. Indigenous peoples may report their observations in language that is not empirically useful or acceptable to scientists because the language ascribes agency or spirituality to animals and plants, resources such as water, or ecosystems. Or Indigenous peoples may be perceived as embedding and enacting their observations within stories, ceremonies or prophecies that scientists do not understand. Preston Hardison describes how Indigenous peoples may use English-language terms such as “good mind, guardianship, customary law, cosmovision, reciprocity, obligations and relations” to represent aspects of reality that scientists would describe using totally different concepts such as “information, economics, intellectual property, common heritage,

public domain, secular knowledge and open knowledge” (Hardison 2014). Sometimes scientists see little value when Indigenous knowledges are expressed in ways that are less akin to how scientists already describe the world. The Arctic Climate Assessment, for example, is clear that “Indigenous knowledge is far more than a collection of facts. It is an understanding of the world and of the human place in the world...The emphasis on the cultural aspects of indigenous knowledge in this assessment is not intended to detract from the great utility it has in ecological and environmental research and management” (Arctic Climate Impact Assessment 2004). In the Assessment, then, certain aspects of Indigenous knowledges are signaled out as valuable for science.

Yet others working in climate science have emphasized that the linguistic-cultural contexts and expressions of Indigenous knowledges are precisely what scientists should value, especially those working on scientific approaches to planning, management and policy in relation to climate change, sustainability/resilience and conservation. Maxine Burkett offers the following positions about what she refers to as “Indigenous environmental knowledge (IEK)”.

This chapter has discussed the increased interest in IEK as an alternative to Western resource management. The foundational worldview that forms the specific management tools prescribed in IEK are more relevant to the complex and ever-changing natural system that we have so deeply disturbed. In addition, IEK was oriented toward resilience for present and future generations. Instead of looking at the specific management tools, investigating and advancing the worldviews that spawned those tools and methods would be the most effective approach to the law and policy of climate change adaptation. Indeed, drawing on both the management practices and the knowledge and worldview on which they are based—while understanding the governance mechanisms behind them—may speed up the process of designing

alternative resource management systems (Burkett 2013, 118).

For Burkett, it is precisely the culture that generates the value of Indigenous knowledges for scientific approaches to planning, management and policy. The value of Indigenous knowledges here concerns lessons about “governance mechanisms.” This value is discussed by many Indigenous scholars, including Ronald Trosper. In his work, he shows how the potlatch culture of some Indigenous peoples in the Pacific Northwest of North America can be translated into key governance principles intelligible to sustainability scientists interested in resilience, such as “high grading is not allowed, consumption has an upper bound, and there is always concern that ecosystem health should be maintained” (Trosper 1995). Trosper argues that principles like these allow a society to buffer, self-organize, and learn in response to environmental issues (Trosper 2009). Such principles offer climate, environmental and sustainability sciences touchstones for thinking outside of the laws and economic policies of settler states such as the U.S. or New Zealand.

All the examples discussed in this section express ways of characterizing Indigenous knowledges as having a *supplemental-value* for scientists. Indigenous knowledges are often seen as associated with particular members of a community, such as hunters or ceremonialists, whose activities generate data and insights that can be used by scientists to improve scientific research. Or, on more of the policy end, Indigenous peoples have knowledges about how institutions can *fit* ecosystems in ways that can generate more effective research on policy. The predominance of supplemental-value in the literature helps to frame scientists’ expectations about what will happen when they reach out to work with Indigenous peoples. It makes interactions an issue primarily of human subjects research ethics. That is, scientists seek to make sure that if they interview elders or access any Indigenous peoples’ archives that they do not impose risks on the individuals interviewed or the people

affected by public release of archives. Here, Indigenous persons or archives of Indigenous knowledges are sources of information. Climate, environmental and sustainability scientists usually argue that Indigenous peoples today can benefit from such knowledge exchange because Indigenous peoples will gain access to the improved information and research for use in their own Indigenous planning processes.

Indigenous Knowledges and Governance-Value

There is another conversation about climate, environmental and sustainability sciences and Indigenous knowledges with which I am far more familiar. Many Indigenous peoples initiate this conversation as a way to support their own planning to prepare for sustainability issues such as today's climate destabilization ordeal (Walker, Natcher, and Jojola 2013). In these cases, Indigenous peoples invoke Indigenous knowledges as having an irreplaceable value as a guide for structuring how they will prepare for, adapt to and mitigate future sustainability issues. I will discuss some examples that, as in the previous section, come from a wide range of Indigenous peoples. Before moving on to these examples, I will describe more of what I mean when I refer to Indigenous peoples' governance today. In the space I have here, I can only give a brief and rather abstract glimpse of how I understand governance to give readers a sense of where I am coming from when I return to discussing Indigenous knowledges later in this section. Though my initial treatment of governance may be abstract to some readers, I provide multiple examples to illustrate the relationship between knowledge and governance in this section's major content.

I understand Indigenous governance according to two related conceptual constellations: *resurgence* and *collective continuance*, both of which are expressions of *collective self-determination*. Collective self-determination refers to a group's ability to provide the cultural, social, economic and political relations needed for its members to pursue good lives. By my lights, *resurgence* involves thinking about collective self-determination while grasping the full impact of

systems (or structures) of settler-colonialism on Indigenous living today and into the future. Concepts of the impact of settler-colonialism and resurgence have long histories in Indigenous scholarship and advocacy, especially Indigenous writings on gender and feminism and Indigenous women's advocacy (Maracle 1996; Ross 1998; Chrystos 1995; Calhoun, Goeman, and Tsethlikai 2007; Goeman 2013; Smith 2005; LaDuke 1999; Allen 1992). Mishuana Goeman and Jennifer Denetdate, reflecting on the legacies of Indigenous feminist work, write that "the structures of our lives as Native women and men are shaped by racism, sexism, and discrimination. We strive to recover our former selves and push toward creating better future selves by reclaiming Native values, which have seen us through multiple traumas, including land dispossession and the loss of our freedoms" (Goeman and Denetdale 2009, 9). Jeff Corntassel, in dialogue with Taiaiake Alfred, claims that "When considering how colonization systematically deprives us of our experiences and confidence as Indigenous peoples, the linkages between colonialism, cultural harm, and the disintegration of community health and well-being become clearer. Furthermore, this is a spiritual crisis just as much as it is a political, social, and economic one" (Corntassel 2012, 88). Resurgence, then, concerns acting in ways that "reclaim and regenerate one's relational, place-based existence by challenging the ongoing, destructive forces of colonization" (88). Leanne Simpson claims that "Resurgence happens *within* Indigenous bodies and through the connections we make to each other and our land. That's how we strengthen ourselves within Nishnaabeg intelligence" (Simpson and Coulthard 2014).

Place-based, embodied existence is important in the theory of resurgence because it points to ways of life in which Indigenous peoples do not depend in morally problematic or unjust ways on the resources and recognition of surrounding settler states. That is, such existence unburdens Indigenous peoples from having to trust the supply chains of settler states to provide healthy and safe food for Indigenous children, rely on settler legal and juridical frameworks

for equal representation and protection of Indigenous women from sexual violence and murder and depend on settler notions of citizenship to define one's own and one's community's Indigenous identity, among other oppressive forms of dependence (Goeman 2013; LaDuke 1999; Coulthard 2007; Coulthard and Alfred 2014). Governance can therefore be seen as a resurgence of Indigenous peoples' self-determination using "on the ground strategies" that establish a range of capacities for land-based collective self-determination, from greater economic independence to psychological (spiritual) awakening. These strategies are guided by anti-imperialist philosophies flowing from Indigenous peoples own knowledges, resources and heritages as wellsprings of practical forms of collective self-determination (Simpson 2004; Napoleon 2013; Coulthard 2006; see also this a related account of "heritage" in Figueroa 2001).

Resurgence, for me, is in dialogue with the goal of collective continuance, which I have used to discuss Indigenous adaptation to climate change. Collective continuance is an Indigenous community's capacity to be adaptive in ways sufficient for the livelihoods of its members to flourish into the future. Adaptation refers to "adjustments that populations take in response to current or predicted change" (Nelson et al. 2007, 397). The flourishing of livelihoods refers to both Indigenous conceptions of (1) how to contest hardships imposed by settler-colonial structures, (2) how to pursue comprehensive aims at robust living, like building cohesive societies, vibrant cultures, trustworthy sources of useful knowledge, strong subsistence, place-based and commercial economies, and ensuring peaceful relations with a range of neighbors of other nations and heritages, (3) and how to make difficult decisions when circumstances require tradeoffs, such as having to choose whether to put limited resources into job creation through the coal industry or invest instead in the environmental and cultural protection required for rekindling place-based supply chains for food and medicines. Given (1), (2) and (3), Indigenous collective continuance is a way of understanding Indigenous governance as a community's aptitude for

making adjustments to current or predicted change in ways that contest settler-imposed hardships, bolster robust living, and observe balanced decision-making processes capable of dealing with difficult tradeoffs (Whyte 2013).

Together, resurgence and collective continuance create a rendition in broad strokes of what Indigenous governance means to me. Governance refers to the sphere where we discuss community-based institutional means, strategies and processes that are needed for Indigenous peoples to make plans for the future about what to do in response to metascale forces such as climate destabilization and the dominance of settler states. Both conceptual constellations refer to the importance of collective capacities belonging to and stemming from Indigenous peoples for achieving successful governance. Collective capacities include land-based practices and vibrant cultures, among many others. Both concepts also acknowledge how Indigenous peoples continue to adapt in relation to settler-colonialism and are adopting emerging means, strategies and processes for planning. So Indigenous collective capacities are always in dialogue with emerging practices that respond to challenges of today and the future. For example, the resurgence of a land-based practices may be guided by an Indigenous peoples' traditional ecological knowledge of how to care for plant habitat rooted in traditions going back hundreds of years, but use "Western" scientific tools for monitoring the impacts of pollution or warming on the plant population.

This bring us to the issue of Indigenous knowledges. The theories of resurgence and collective continuance suggests that Indigenous knowledges are collective capacities that can provide trustworthy and useful knowledge for planning that supports collective self-determination in the face of metascale forces. That is, Indigenous knowledges are capacities Indigenous peoples can use to facilitate their own governance. Indigenous knowledges are not backward-looking repositories of information that were more relevant to historic or waning Indigenous ways of life. Instead, they have a special value in Indigenous planning efforts that is different

from the supplemental-value of Indigenous knowledges for scientists I described in the previous section. In what follows, I will consider some examples of how Indigenous knowledges are being used in planning processes by Indigenous peoples and organizations today to deal with sustainability issues. Exchanges with different sciences figure prominently in each case.

The first example of Indigenous knowledges and governance is from the Karuk Tribe in Western North America, in what is now referred to by most people as California. Karuk living heritage involves longstanding relationships of interdependence with a range of foods, from deer to huckleberry. Historically, these foods were enhanced through intentional, systematic fire regimes. In one study, about three quarters of the species Karuk people used for food or cultural practices were enriched in some way by fire (Norgaard 2014). The Karuk also cultivated careful knowledges about how to steward the ecological conditions needed to maintain healthy fish populations, especially salmon, which figure importantly in Karuk diets. Yet earlier in the 20th century, the U.S. government agencies, such as the Forest Service, banned Karuk burning and paved the way for the damming of the river systems, which essentially presented an immediate challenge to the continuance of the Karuk food system. Regarding fire, Norgaard claims that

The exclusion of fire from the ecosystem has a host of interrelated ecological and social impacts including impacts to cultural practice, political sovereignty, social relations, subsistence activities, and the mental and physical health of individual tribal members. In addition, Karuk tribal members are negatively impacted by the effects of catastrophic fires and intensive firefighting activities that in turn result from fire exclusion. (Norgaard 2014).

In response to these challenges, the Karuk have recently engaged in a project funded by the North Pacific Landscape Conservation Cooperative to rekindle their own burning practices and salmon

stewardship to stimulate the Karuk economy, address nutritional, health and other food/dietary related problems, and adapt to climate change impacts that threaten to further weaken Karuk access to their foods (ITEP 2014).

Importantly, the project is focused on Karuk *knowledge sovereignty*, and outlines a system for expanding the use of Karuk knowledge that was curtailed by settler-colonialism. The plan involves establishing practices that will strengthen the transmission of Karuk knowledge within the Tribe (such as through improving intergenerational relationships and increasing youth involvement in environmental management), remove external policy and jurisdictional roadblocks to putting this knowledge in practice on Karuk ancestral lands, and ensure that external policies of the U.S. settler state are favorable. For the Karuk, knowledge sovereignty is not just a knowledge exchange between the Karuk and outside scientists. It involves first strengthening the use and transmission of knowledge within the Tribe, the capacity to use Karuk knowledge in as many of the parts of the landscape as needed, and to ensure that U.S. settlers cannot threaten the flourishing of Karuk knowledges. Any scientist working with the Karuk must understand how this work fits into the larger idea of Karuk resurgence and collective continuance, which can be looked at as a kind of value for the sake of governance (Norgaard 2014, Norgaard, Reed, and Van Horn 2011, Wotkyns 2013).

Lake Sturgeon is an important subsistence species of the Little River Band of Ottawa Indians in what is now referred to as Michigan, yet in the 20th century, the Lake Sturgeon population was basically eliminated through settler over-harvesting, dams, stocking rivers with non-native fish species for sport fishing, and environmental change. By the early 2000s, less than 40-50 fish per year came to spawn in one of the major rivers, the Manistee. The Tribe believes that restoring certain native species, such as Lake Sturgeon, is important for strengthening the resilience of the region for withstanding climate destabilization, not just in the sense that native species are always tied to ecological resilience, which can be

questioned on various scientific grounds, but that some native species also have existence value and can motivate people to be better stewards. With this goal in mind, the Tribe used its own knowledge about how people lived with sturgeon, sturgeon life cycles, and the genetic make-up of sturgeon in relation to certain families and clans, to engage with biologists and Tribal members and others living within the watershed in a sustainability project aimed at restoring Lake sturgeon and bringing together the entire watershed around the goal of sustainability (Holtgren 2013; Holtgren et al. 2014).

One key activity was the Tribe started a cultural context group made up of a diverse range of Tribal members and biologists that would develop goals and objectives for restoration. Biologist Marty Holtgren describes the cultural context group as facilitating “a voice [that] was an amalgamation of cultural, biological, political, and social elements, all being important and often indistinguishable” (135). Holtgren discusses how the goal was to “restore the harmony and connectivity between [Lake Sturgeon] and the Anishinaabek and bring them both back to the river.” According to Holtgren, “Bringing the sturgeon back to the river has an obvious biological element, however, restoring harmony and connectively between sturgeon and people was steeped in the cultural and social realm. Each meeting began with a ceremony, and the conversation was hold over a feast” (Holtgren 2013, 136). Ultimately, the Tribe established a riverside rearing system for protecting young sturgeon before they can be released each Fall. The sturgeon release involves a public ceremony in which now up to 600 people attend, of all nations and heritages in the region, and learn about the importance of sturgeon for the watershed. The program is based on relationships with government, non-profit, and community partners in the watershed, and the integration of scientific and Indigenous knowledges of sturgeon. *Ottawa* knowledges, then, played an enormous role in structuring the scientifically informed pursuit of the Tribe’s governance in the region (Holtgren 2013; Holtgren et al. 2014).

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR), in what is now referred to by most as Oregon, has developed a "First Foods" framework for guiding their governance of climate change adaptation (CTUIR 2010). The Umatilla Tribe has a traditional knowledge system that they refer to as "food associated culture," which is a complex web of stewarding, harvesting, storing and sharing a range of foods in connection with social, cultural, political and economic life. Additionally, the CTUIR are addressing the importance of gendered knowledge when it comes to traditional foods. The Tribes' Comprehensive Plan includes a foods category referred to as "Women's Foods," which include berries and roots over which some women in the Tribe take on stewardship responsibilities. The Plan claims that there is a problematic separation between gendered knowledge and environmental management. For example, the plan does not emphasize enough the plants for which some women are the primary caretakers (CTUIR 2010). To address the gap, the Tribe has carried out women's food assessments, and women take leadership in asserting their knowledge to support sound management decisions (Shippentower 2014). Here, the importance is not in focusing on ideal roles for Indigenous women. Rather, in Umatilla life today, women are out on the land stewarding, harvesting and sharing these foods and have a right and responsibility to participate in planning (Shippentower 2014).

In one presentation, I heard about how women's Indigenous knowledges of plants guides how the Umatilla Tribe structures climate change adaptation planning (Shippentower 2014). The presentation described this knowledge as a "cultural, economic, and sovereign benefit of the CTUIR." In the planning process, it is precisely the women's knowledge that structures scientific research that seeks to learn more about "population and habitat management" and the effectiveness "natural resource policies and regulatory mechanisms." An interesting example involved the Tribe's using ArcGIS in conjunction with and guided by women's knowledge "to develop a landscape level model that combines derived geographic

information with field inventory data to identify habitat that support 5 food plants; preserve, manage and restore gathering, locations throughout the Ceded lands for Tribal Members... and Provide direct knowledge for assessing climate change” and determining “climate change strategies” (Shippentower 2014).

The Climate and Traditional Knowledges Workgroup (CTKW) formed several years ago and is made up of Indigenous persons, Indigenous government staff, and experts in very sensitive issues involving the sharing of Indigenous knowledges (CTKW 2014). The CTKW developed a set of Guidelines through a collaborative effort with funding support from individual Indigenous governments and several U.S. agencies. The group came together to respond to problems associated with the fact that Indigenous peoples who seek to use their knowledges in the ways described earlier do not have adequate protections for doing so. For example, in the case copyright (a grant of a temporary monopoly by a government to provide economic incentives to individuals or firms for innovation), the law is key in defining what counts as in the public domain. Yet Indigenous knowledges are too often considered part of the public domain since they may be believed too old for there to be any reason to protect them today and they are often not written down. Because of a Supreme Court decision in 2001 (Department of Interior v. Klamath Water Users Protective Assn), Indigenous peoples are unable to share sensitive knowledge or information privately with the US on a government-to-government basis; for any exchanges are subject to Freedom of Information Act (FOIA) requests (Williams and Hardison 2013). Another issue concerns the idea of “The Common Heritage of Mankind,” which claims that some kinds of knowledge are so valuable to all of humanity that that value overrides any particular value they may have to the nations and communities who created and need to use these knowledges.

These issue pose problems for Tribes because their sharing Indigenous knowledges with scientists can disclose risks to Indigenous governance. For example, telling scientists about Karuk fire management may disclose the location of sacred sites or

medicinal plants. Or other Tribes sharing some aspects of Umatilla women's knowledge may disclose the locations of subsistence plants that people outside the Tribe may wish to plunder. Deborah Parker of the Tulalip Tribe, for example states, that "Protecting cultural knowledge is an ongoing challenge, on many levels. Parker relates a local issue that illustrates one part of the problem. 'We have a place where people like to go fishing. It's a place where human remains have been found. The tribe has put up signs—'Private Area, for Tribal Members Only'—but others come in and constantly tear down the signs. It's really been a battle. They have no idea of sacred areas, places that need to remain untouched" (Wotkyns 2013). The Guidelines for Considering Traditional Knowledges in Climate Change Initiatives seeks, among other things, to provide guidance for scientists. The Guidelines emphasize that the importance of Traditional knowledges for governance means that each Indigenous peoples gets to define what Indigenous knowledge is for them in the course of collaboration. Moreover, Indigenous peoples, as collectives, set the rules for the sharing of Indigenous knowledges, including what knowledge can be shared and who is authorized to share it and in what form. The Guidelines also reference important strategies for ensuring that scientists especially can collaborate with Tribes in ways that do not pose risks of knowledge exchange. The Guidelines are geared to ensure that Indigenous knowledge is protected because of its value for Indigenous governance, from resurgence to nation building (CTKW 2014).

In these examples, Indigenous knowledges have what I would call *governance-value* for Indigenous peoples.³ Governance includes a range of planning pursuits of Indigenous collective self-determination involving research development, knowledge transmission, environmental regulation, and building education and awareness. Indigenous knowledges can serve to organize governance at all levels as capacities supporting resurgence and collective continuance. Indigenous knowledges are also a unique form of

³ See also Scheman's notion of "sustainable epistemology" (2012) in relation to the concept of governance-value.

knowledges that can be disrupted if they are no longer practiced. Many of the projects just described seek to protect the practice of Indigenous knowledges within Indigenous communities and nations. Here, then, Indigenous knowledges are irreplaceable capacities that can guide Indigenous governance as an adaptation to meta-scale forces including settler-colonialism and environmental change. The idea of sharing or exchanging Indigenous knowledge cannot be separated from the process of protecting knowing and the practices associated with knowing. This is not to say that Indigenous knowledges are the only capacities, but that they are special capacities in that they are tailored to particular lands and peoples and are trustworthy from a community standpoint.

What do Indigenous knowledges do for Indigenous peoples? Supplemental-Value and Governance-Value

I think the question posed by the title of this section (and essay) is an important one for scientists in fields oriented toward sustainability, climate change and other planning areas have to ask themselves. In the discussion of supplemental-value, we do not know what Indigenous knowledges do for Indigenous peoples beyond how improved science can be used by Indigenous peoples in a trickle down sense. But governance-value is different. First, as governance-value, the knowledges are associated with Indigenous capacities for resurgence and collective continuance. Therefore, their primary value is tied to the well-being of living and future Indigenous persons, families, communities and nations. Sometimes Indigenous well-being conflicts with scientific aspirations to add to the public domain of global scientific knowledge. Second, as governance-value, Indigenous peoples are concerned about protecting their own internal capacity to cultivate, transmit, remember, and exercise Indigenous knowledges. This is so regardless of what persons and organizations of other heritages and nations do. That is, we need to have *knowledge sovereignty* regardless of what scenarios the settler society throws at us. Third, Indigenous knowledges can actually guide scientific research; it does not have to

be the other way around. That is, Indigenous knowledge is not just something individual people do that generates knowledge useful to science as a byproduct. Indigenous knowledges are about governance in the form of resurgence and collective continuance that can organize scientific studies on behalf of addressing sustainability issues. Fourth, Indigenous peoples determine, in a given case, how Indigenous knowledges should be defined and how they should be shared.

Assuming they agree with some of my points, climate, environmental and sustainability scientists may take away from this essay that it is important for them to learn about Indigenous governance-value if they are going to engage in appropriate forms of knowledge exchange with Indigenous peoples. That is, scientists need to understand how they may or may not fit in to emerging Indigenous governance in terms of resurgence and collective continuance. This is part of my truth here. From my perspective, it is also true that scientists first need to understand the governance-value of how they understand their own positions in relation to Indigenous peoples. That is, when a scientist, working for an institution such as Arizona State University, approaches an Indigenous nation; the scientist comes across as participating in the interests of the U.S., or the state of Arizona, or the corporations who donated some of the research money. While the scientists themselves may not agree with the agendas or ideologies of those settler sovereigns or business interests, they are inextricably acting on their behalf *in some way* in according to the perspectives of many Indigenous peoples. So, for example, if a scientist treats Indigenous peoples as primarily interviewees through a cooperatively funded program, that may completely ignore that that Indigenous peoples is really trying to do something such as what the Karuk Tribe is doing with knowledge sovereignty or the Umatilla Tribe with the women's food assessment. Such treatment comes across as reflecting scientists' privileging of their own governance agenda without showing respect for Indigenous governance. To be more respectful, the scientists would have to ensure that Indigenous

peoples have the time and space to be able to strengthen their internal knowledge systems, protect key aspects of their knowledge from going public, and influence the design of scientific research to suit the guidance they receive under their Indigenous knowledges. In theory but also in some of my experiences, all of these considerations can very much change the approach, structure and outcomes of cooperation between scientists and Indigenous peoples on long term planning projects.

So, what do Indigenous knowledges do for Indigenous peoples? Indigenous knowledges have governance-value for Indigenous peoples as an integral part of how our nations and communities plan for the future. The responsibility and right to plan for the future is a key component of collective self-determination and enshrined by important documents such as UNDRIP. Whereas many scientists and people of other heritages and nations have good ideas for the value of Indigenous knowledges in terms of their own research—or supplemental-value—they also need to reflect on how acknowledging the governance-value of Indigenous knowledges for Indigenous peoples may impact their approaches to knowledge exchange. Such acknowledgement should lead scientists to consider how Indigenous peoples' interpret the governance value of the scientists' own goals and research approaches.

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