

**The Use of Fire as a Tool to Enhance Traditional Foods among the Tribal Nations of the
Klamath Basin**

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Abstract:

The six federally recognized tribes of the Klamath Basin have depended on traditional foods for survival since time immemorial. Frequent, low-severity fires were implemented historically by tribal peoples to help enhance traditional foods and manage forest growth. For the Karuk Tribe, living in the Mid-Klamath region, over 75% of traditional foods were enriched by fire (Norgaard 2014). Due to the enactment of fire suppression as a national policy for almost a century, many tribal members today do not have access to traditional foods, negatively impacting biological and psychological health. The procurement of traditional foods requires detailed knowledge of the environment, and since the tribal peoples of the Klamath Basin retain a spiritual connection to their lands and foods, fire suppression risks the loss of spiritual practices, jeopardizes cultural identity, and weakens the tribal sovereignty of the Native American peoples in the region. I suggest that the ecological and social devastation currently being experienced in the forestlands of the Klamath Basin can be improved through a stronger integration of traditional ecological knowledge and community-based conservation.

Introduction

The Klamath Basin, encompassing over 15,000 square miles across eight counties between Northern California and Southern Oregon, is rich in biological diversity, cultural diversity, and competition for natural resources. The Klamath River, stretching the 400 miles of the basin, is a vein of life support for wildlife and humans, providing for human occupation of the area since time immemorial (Doremus & Tarlock 2008). In a location that has continuously been suffering from drought in recent years, the impending threat of wildfire each summer causes tense social relations. The Klamath Basin is home to six federally recognized tribes, but much of their ancestral land is either inaccessible or ecologically degraded and under federal control today. The tribal peoples of the Klamath Basin historically used low-severity fires for thousands of years to help manage forests and traditional food resources. Today, tribal burning is highly regulated and subject to tribal or federal government approval and permitting. Almost a century of fire suppression and exclusion on the landscape has resulted in dense, overgrown forests, which are unable to produce the traditional foods on which the tribal peoples have depended for thousands of years. The knowledge of how and when to procure and harvest traditional foods often includes detailed information about environmental management, while the preparing, eating, and sharing of traditional foods helps to solidify cultural identities and maintain traditional practices. Since much of the region is a designated food desert, lack of adequate access to traditional foods detrimentally impacts the biological and psychological health of the tribal peoples and risks the loss of traditional knowledge and cultural practices (Sowerwine 2012). Unfortunately, management of natural resources in the Klamath Basin often parallels societal power relations, leaving politically marginalized minorities with a disproportionately weakened influential capacity. In the Klamath Basin, fire exclusion from forest landscapes negatively impacts ecological and human health, causing a loss of biodiversity and strains to the cultural and emotional well-being of the tribal peoples; it is therefore critical to integrate traditional knowledge and tribal peoples into community-based forest management, in order to create both environmentally and socially conscious conservation strategies in the face of climate change.

Conceptualizations of Traditional Ecological Knowledge, Traditional Foods, and Food Security

The concepts of traditional ecological knowledge (TEK), traditional foods, and food security have become widely recognized academic buzzwords in the study of climate change, indigenous cultures, and ecology. However, the realities for the Native American peoples struggling with these issues often manifest very differently in daily experiences. In the Klamath Basin, natural resources from a tribal perspective have been mismanaged for centuries, leading to environmental, cultural, and economic degradation of the landscape in the 21st century. Being managed by the federal government and private companies throughout most of recent history has had serious consequences on the future sustainability of the basin. Often relying on generic apply-to-all methods of conservation, such as the implementation of nationally protected parks, in some cases biodiversity and ecological health have declined under federal

control. Conversely, the tribal peoples of the Klamath have developed specific patterns of knowledge regarding Klamath ecology after using its land to sustain their people since time immemorial. Meanwhile, since the tribal nations are still living in close relation to the land and natural resources, they also possess important knowledge of how the landscape is continuing to change in modern times. Such concepts, often referred to as “traditional ecological knowledge”, have only begun to be recognized by resource managers in recent decades.

Defining the concept of TEK has proven to be difficult, and unfortunately, lacking the appropriate cultural background or experience, many resource managers misinterpret and essentialize TEK, resulting in miscommunication and distrust between managers and tribal peoples. Although the study of “traditional ecological knowledge” has developed into a substantial field, the term itself is clouded with controversy and ambiguity, so it is important to decipher these somewhat abstract terms in an attempt to understand the practical applications of ecological knowledge in indigenous societies. Firstly, Ingold & Kurtilla (2000) argue that the term “traditional” may not be best suited for indigenous practices, since many of these practices are in a constant state of flux in response to changes in the environment. The term “traditional” is based on stereotypical symbols of isolation and stasis, whereas many indigenous practices are known by a way of practice, and go through generational regeneration, adapting to local and modern conditions. Secondly, the knowledge held by tribal members does not have to be overtly “ecological” for it to have environmental significance. TEK can be formed through language, stories, legends, folklore, and taboos, in addition to land management and subsistence practices. Finally, many aspects of TEK have incredible spiritual and emotional significance, and therefore TEK is not just a “knowledge” base, but is a way of seeing and interacting with the world, forming an integral part of many indigenous worldviews and cosmologies. Many authors attempt to compare and contrast TEK in relation to western science, but this often fails to recognize that TEK is a science in its own right and does not need to be validated through western science. Western science tends to emphasize peer-review and “empirical” observation, without appreciating the generations of observation and adaptation that is held within indigenous land management, in fact, “such delineation discounts the fact that the two heterogeneous systems of knowledge often overlap and inform each other” (Agrawal 1995). Fikret Berkes’ definition of TEK is one that is widely accepted and used: “a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment” (Berkes 1999). Nevertheless, in working with tribal peoples it is important to remember that no academic definition can truly capture the deeper spirituality and worldview that is evident in traditional ecological knowledge. More than land management, it is a way of living. From gathering foods with grandparents, to returning to sacred sites each year to pray, TEK permeates every aspect of life for many Native American people. In the Klamath Basin, discussions with elders, resource managers, and community members continuously gravitate around forest management and food security, with many people expressing concern that a lack of adaptive and traditional management has led to the demise of the region’s culturally valued food sources.

Having utilized the landscape of the Klamath Basin since time immemorial, much of the TEK held by tribal members is associated with the hunting, gathering, harvesting, preparing, storing, preserving, and eating of traditional foods. Usually consisting of foods that can be directly obtained from the surrounding environment, such as berries, roots, mushrooms, nuts, seafood, and meat, unmeasurable experience is needed to know when and how to procure food. These teachings are inextricably linked with the knowledge of how to best manage the forests and rivers to ensure the productivity and sustainability of foods for future years. The survival of the Native American people of the Klamath Basin is based on this intergenerational experience. Unfortunately, with much of aboriginal tribal lands in the basin currently owned by the federal government and private companies, traditional management has largely been excluded from the landscape for decades. Compounded by complexities arising from geographic isolation, poverty, and marginalization, much of the native population now lives in areas which are deemed as food insecure or as food deserts. Defined by the USDA as “a census tract with a substantial share of residents who live in low-income areas that have low levels of access to a grocery store or healthy, affordable foods”, food deserts disproportionately impact the native peoples of the Klamath (USDA). Whereas traditional foods have proven to be high in anti-oxidants and healthy oils, prevent chronic immune diseases, and improve cardiovascular function, many of the tribal peoples in the Klamath Basin are forced to rely upon unhealthy and expensive convenience stores for their daily nutrition (Lynn et al. 2013). In cities discussions of food security center around the “1 mile marker” and romanticized rooftop gardens, but the realities in the Klamath Basin are very different. Having to travel many miles to the nearest grocery store, food security discourse among tribal members will often lead to how to properly hunt a deer or catch a fish. In the absence of fresh, affordable, and healthy foods, it is more critical than ever to foster traditional foods in order to protect the biological, psychological, cultural, and community health of tribal peoples.

Food and Identity

Food items, recipes, and meals are important symbols of values, heritage, norms, and identity, and therefore food choices reflect personal relationships between the world and the individual. Centered around specific brands, histories, products, and methods of procurement, food provides an opportunity to perform and construct individual and collective identities. Examples are abundant and worldwide—from the “quintessentially Australian” Vegemite, and grits in the southern United States, to the symbolism of matzo ball soup within the Jewish religion, food choices help to solidify national, ethnic, and social identities (Guptill et al. 2013). Many tribes of the Klamath Basin were characterized by early anthropologists as “salmon and acorn people”, but traditional diets were much more diverse than this. Native American cultures share an especially prominent relationship with their food, since foods are not just a form of sustenance, they also provide connections to heritage and culture through the storytelling, ceremonies, harvesting, processing, and sharing of foods (Lynn et al. 2013). Furthermore, TEK regarding food sources often includes physical, emotional, psychological and spiritual considerations on both individual and community levels, and is strongly reinforced by the values of responsibility, reciprocity, and kincentricity revered by many Native American

tribal peoples (Lynn et al. 2013). Loss of access to traditional foods is not a problem that is solved by weekly trips to the local grocery store.

For the native peoples of the Klamath Basin, food is intricately woven with landscape management, cosmology, and social relations, forming an integral part of identity and worldview. Countless examples in published literature recognize that activities surrounding the acquisition, preparation, and enjoyment of traditional foods are an important “social glue”, which bring people together (Norgaard 2014). Passing along intergenerational knowledge, hospitality among communities, caring for elders, educating youth, and practicing culture are all such “activities” that are inseparable from the consumption of traditional foods. As Ron Reed, cultural biologist and spiritual leader of the Karuk Tribe states, “You can give me all the acorns in the world, you can get me all the fish in the world, you can get me everything for me to be an Indian, but it will not be the same unless I’m going out and processing, going out and harvesting, gathering myself...it’s not just a matter of what you eat. It’s about the intricate values that are involved in harvesting these resources, how we manage for these resources and when” (Norgaard 2014). Additionally, in retelling a version of the Karuk creation, Leaf Hillman demonstrates how traditional foods are intimately critical in understanding the entire Karuk worldview:

At the beginning of time, only the spirit people roamed the earth. At the time of the great transformation, some of these spirit people were transformed into trees, birds, animals, fishes, rocks, fire and air—the sun, the moon, the stars... And some of these spirit people were transformed into human beings. From that day forward, Karuk People have continually recognized all of these spirit people as our relatives, our close relations. From this flows our responsibility to care for, cherish and honor this bond, and to always remember that this relationship is a reciprocal one: it is a sacred covenant. Our religion, our management practices and our day-to-day subsistence activities are inseparable. They are interrelated and a part of us. We, Karuk, cannot be separated from this place, from the natural world or nature (Norgaard 2014).

When Karuk people consume deer, elk, berries, or fish, they are symbolically consuming the spirits of their ancestors and relatives. The bond between Karuk people and their traditional foods is sacred and spiritual, not replaceable. Therefore, when people are unable to access these resources, it can create an insurmountable threat to an individual’s sense of self (Norgaard 2014). As Yurok elder, Dale-Ann Sherman, told me whilst sitting around a campfire, “On a personal level I truly believe that the river and the fish are our identity. Our lives are intertwined with that- the rivers and the fish. We wouldn’t be Yurok if we didn’t have rivers or fish. We would be something else. Our identities would be changed. Our very way of thinking would be changed” (personal comm. Aug 2014). In the face of challenges such as federal management of tribal lands, fire suppression, and climate change, many tribal peoples throughout the basin are facing threats to their identities, livelihoods, health, knowledge systems, and ways of life because of an inability to harvest traditional foods.

Methods

Over the course of a year I have spent five months in the Klamath Basin during the months of June to August 2013 and 2014. Throughout this time I interacted with many people from various backgrounds, including federal scientists, non-governmental organizations, professors and staff from Humboldt State University and Southern Oregon University, community leaders, and tribal youth, students, elders, practitioners, leaders and scientists. Although my knowledge is based on the totality of my time in the region, the research and preparations for this paper were primarily based on my experiences during the summer months of 2014. My time in the Klamath Basin, both years, corresponded with fire season, and overwhelmingly, discussions of landscape, heritage, traditional ecological knowledge, and food security involved elements of fire management. In talking with federal scientists, community members, and tribal peoples, it quickly became apparent that fire is a critical yet misunderstood element of the landscape in the Klamath Basin. Fires unwillingly impact all of the people living within the Klamath Basin, with lightning posing a dangerous threat of wildfire for everyone in the region. Despite all of my interactions involving people with different backgrounds and experiences, strong emotional responses exhibited by all inspired me to research the relationships between forest management, fire, and traditional foods. The research on which this paper is based comes from published literature and conversations and interviews with people from the Klamath Basin. Interviewees include Don Gentry, current Chairman of the Klamath Tribes, Merv George, former tribal chairman of the Hoopa Valley Tribe and Supervisor of US Forest Service-Six Rivers National Forest, Ron Reed, cultural biologist for the Karuk Tribe, Dale-Ann Sherman, Yurok elder, and James Gensaw, Yurok language specialist, although I participated in informal conversations with many more. Nevertheless, I recognize that my research methods contain many limitations. I gained my data from a small number of interview participants and so their views and experiences should not be taken as a complete reflection of all peoples within the Klamath Basin. Additionally, my time within the region was limited. As a tribal member, the issues effecting my ancestral homeland take on personal significance, but I have spent a relatively short amount of time in the basin, and not consider myself an expert on issues in the Klamath Basin. However, I did attempt to engage with a variety of people from tribal and non-tribal backgrounds throughout the entirety of the basin, while including data from ecological, anthropological, sociological, and historical reports, and I believe that my experience in both tribal and academic frameworks gives me a unique perspective to be able to translate cultural experiences into scientific data and recommendations.

Results: Fire Exclusion and Food Insecurity

The biological health and diversity of the Klamath Basin, and the health of the native peoples, cannot be separated from understandings of Native American fire management on forest landscapes. In addition to being critical to cultural and spiritual practices, fire is a necessity in ensuring the food security of traditional foods to the tribal nations of the Klamath Basin. Historically, fire was used in the Klamath Mountains “(1) to promote production of plants for food (e.g acorns, berries, roots) and fiber (basket materials); (2) for ceremonial purposes;

and (3) to improve hunting conditions” (Skinner et al. 2006; Norgaard 2014). For example, over 75% of traditional Karuk foods and cultural use species are fire dependent (Norgaard 2004; Norgaard 2014). The Forest Service, who own much of tribal aboriginal territory in the basin, has implemented a policy of fire exclusion and suppression since the early 20th century. Ecologically, a century of fire exclusion has resulted in overgrown forests which are unable to produce foods, high fuel loads which increase chances of catastrophic fire, and poor habitat conditions for wildlife and tribal subsistence practices. Today, “because of the exclusion of understory burns on a more regular basis, whenever you get flame on the ground now you end up with an entire nuclear burn. Everything gets torched. The acorn trees burn up, the huckleberries, the Indian root, the food sources for the deer go away. When the landscapes are overgrown with fuels, that’s what happens” (Merv George, personal comm. Aug 2014). Such ecological degradation impacts cultural and subsistence activities and species, with tribal members today seeing a reduction in the quality and quantity of acorns and huckleberries, variations in the growth of basketry materials including hazel, willow, and bear grass, and an inability to access gathering and sacred sites and trails (Norgaard 2004; 2007; 2014). The exclusion of fire from the landscape therefore accumulates in a host of social hardships for tribal peoples, impacting their spiritual practices, risking the loss of cultural identity, worsening public health, and weakening tribal political sovereignty; additionally, for many people I spoke with, questions about forest management and fire suppression invoked deep emotional responses, demonstrating that relationships between foods, landscape, and individuals retain incredible importance to health and well-being.

Much research has been conducted on the lack of food security facing members of the Karuk Tribe (Lynn et al. 2013; Barr et al. 2010; Bowman 2008; Gates & Novell 2011; Norgaard 2014). For Karuk people, salmonids and acorns comprised over 50% of traditional diet (Lynn et al 2013; Norgaard 2014). Supplemented by an assortment of berries, mushrooms, roots, and game, all of which are enhanced by low severity fires, exclusion of native land practices, environmental degradation, remote location, and economic poverty have resulted in reduced access to traditional foods coupled with rocketing rates of health problems. Census tract information reveals that of the Karuk population, 21% suffer from diabetes and 40% from heart disease, while 42% receive food assistance (Lynn et al. 2013; Norgaard 2007). During the summer of 2014 I spent several weeks in Karuk territory, working closely with tribal members and food security researchers. For several days we searched for potential huckleberry gathering sites. Biologically, huckleberries need adequate winter precipitation and access to sunlight in summer to be productive, while gathering criteria dictates that sites need to be relatively flat and easily accessible. Although it depends on severity, fire and pruning can reinvigorate huckleberry growth by removing old stems, leading to more productive berry bushes 3-5 years post fire (Richards & Alexander 2006; Lake & Rossier, personal comm. July 2014). In the dry, fire-parched, steep, overgrown forests of the mid-Klamath, finding sites which were both easily accessible and productive proved to be difficult. After almost an entire day of unsuccessfully looking for huckleberry plots, cultural biologist Ron Reed gestured towards the forest around us and said:

Now you're getting some of our tribal perspective. This is what we experience when we try to go out gathering. This is your grocery store, your hardware store, your pharmacy... Here on the map you can see we are standing near a designated "wilderness" area, but this is not really "wild" at all, our people tended this land for thousands of years. This is a food desert, but not just for humans. People look around and see all this "wilderness", but they don't realize there's no food here- the deer and bears are starving and disappearing.

For Karuk people, the loss of traditional foods bares great social consequence. The percentage of Karuk families living in poverty is three times greater than the national average; this is a direct result of disruptions to Karuk culture and lack of fire and land management (Norgaard 2014). By suppressing fire from the landscape, tribal members loose access to gathering sites, which, after a century, risks the loss of knowledge of these sites, the loss of knowledge on how to implement fire safely and effectively, and jeopardizes the relationship to the landscape among younger tribal generations.

Many forest dwelling traditional foods are replenished by low severity controlled fires in addition to huckleberries. Kari Norgaard comprised a list of Karuk cultural use species that were enhanced by fire. Included with huckleberries, tan oak mushrooms, deer, elk, hazel, and grey squirrel, are tan oak, dwarf tan oak, white oak, canyon oak, and black oak trees (Norgaard 2014). The acorns produced by the tan oak tree are an emblematic example of a food source which retain spiritual significance and are consequently a harbinger of cultural identity. Acorns are a particularly valuable form of sustenance during ceremonial times. Ceremonies such as the Jump Dance are an act of world renewal. By praying for the animals, the rivers, the fish, and many more, the ceremony serves to fix the world, and many believe that the world would have long since failed without the continuation of the Jump Dance (Buckley 2002). Preparations for the Jump Dance, such as clearing the land and gathering foods, start 2 months in advance and all differences and disputes between community members are settled beforehand (Thompson 1991). During the 10 days of the ceremony, people fast, dance, pray, and live together, putting forth their energy for the continuation of a balanced, harmonized world. Although each tribe along the Klamath River has unique ceremonies, customs, and preparations, ceremonial times are often a reason for intercommunity and intertribal gathering. Many Yurok and Karuk tribal members fast for ten days before the Jump Dance in order to purify and cleanse their bodies before the ceremony. During this time, people who chose to fast are only permitted to consume simplistic grain-based meals and acorn water. As Yurok and Hupa elder, Clarence Hostler described:

You are only allowed to drink acorn water because acorns fall naturally from the tree. They are a gift. Through the foods that we eat we must consume death, from animals, fish, fruits, vegetables, everything. But acorns are not part of this. When you fast, you are trying to purify the death you consume through food. But because acorns fall naturally, you are allowed to drink acorn water. It does not impact your purity. Acorns contain all of the nutrients needed to sustain life- you don't need anything else.

Without adequate access to plentiful acorns, people fasting are at a much higher risk for health problems such as dehydration and malnutrition. Combined with hotter temperatures, this puts significant stressors on people fasting, and possibly endangers the entire ability for people to fast in the future. Without fasting, spiritual beliefs regarding concepts of purity and cleansing would change, greatly altering the worldview and symbolism held in the act of fasting and ceremony.

Already, tribal members are seeing changes in the availability of huckleberries and acorns due to the continuation of fire suppression. The need for fire in acorn harvests has been documented since at least 1916, when the infamous Klamath River Jack stated, "Fire burn up old acorn that fall on ground...Indian burn every year just same, so keep all ground clean, no bark, no dead leaf, no old wood on ground, so no bug can stay to eat leaf and no worm can stay to eat berry and acorn" (Norgaard 2014; Klamath River Jack 1916). Yet, a century later, tribal members are witnessing the conditions which Klamath River Jack forewarned. In studying the impacts of climate change on forests, Voggeser et al. (2013) state that a lack of frequent, low severity fire, coupled with low levels of precipitation, causes a reduction in acorn-mast production and an increase in susceptibility to insect damage and exotic pathogens (Perez-Ramos et al. 2010; Ortiz 2008; Voggeser et al. 2013). The traditional knowledge retained by tribal members has always recognized the relationship between fire and acorn harvests, but because of the lack of modern science to acknowledge this dynamic until recently, ceremonial participants, gatherers, and all tribal peoples suffer today. While in Karuk territory, many people relayed to me how it was becoming increasingly harder to gather acorns, and most of those they did find were usually inedible due to insect infestations and mold. One Karuk elder, LaVerne Glaze, became teary-eyed when discussing how gathering sites that she visited as a child with her mother and aunts are no longer able to produce food because the forests have become so overgrown. Ron Reed echoed her sentiment:

Without fire the landscape changes dramatically. And in that process the traditional foods that we need for a sustainable lifestyle become unavailable after a certain point...The reason we are going back to that landscape is no longer there. So the spiritual connection to the landscape is altered significantly. When there is no food for regalia species, what we depend on for food and fiber, when they aren't around because there is no food for them, then there is no reason to go there (Norgaard 2014).

Once again, it is apparent that alterations to foodscapes impact more than just subsistence. A lack of traditional foods directly degrades spiritual connections to the landscape. Furthermore, it impacts the ideologies of the tribal peoples of the Klamath Basin, who see fire, landscape management, human intervention, and biodiversity as containing inseparable, reciprocal relationships:

A lot of times associated with those acorn groves are riparian plants such as hazel, mock orange or other foods and fibers, materials in there that prefer fire. The use of those materials is dependent upon those prescribed burns. So when you don't have those prescribed burns it affects all that in a reciprocal manner. It's a holistic process where

one impact has a rippling effect throughout the landscape. We can only have that for a certain amount of time before the place becomes a desert without cultural burns (Ron Reed in Norgaard 2014).

When ideologies, worldviews, cosmologies, cultural practices, indeed entire lifeways are impacted, people experience deep, intergenerational trauma on psychological and biological levels.

Downey and Willigen's 2005 landmark study states that people exhibit a sense of personal powerlessness and chronic community stress with increasing proximity to environmental degradation. The tribal peoples of the Klamath Basin possess an inherent responsibility to care for their homeland, and mismanagement of forest landscapes creates emotional strain for people who are unable to care for their land, or use the land to provide food for their families. This creates threats to their identity as indigenous people. The inability to tend to ancestral homelands, initiate cultural burns, and access traditional foods are ongoing forms of cultural disruption (Norgaard 2007). For many, this is perceived as a form of cultural genocide and forced assimilation (Norgaard 2014; Sherman, personal comm. Aug 2014). Involuntarily depending on store-bought commodity foods, food-stamps, and government assistance raises larger concerns about government policies and tribal sovereignty. In the rise of potential climate change, it is more important than ever to recognize the validity of TEK regarding fire and forest management, and in doing so, both tribal communities and biodiversity can be strengthened.

Discussion: Tribal Sovereignty, Climate Change, and Community-Based Conservation

Discussions of landscape management and food security cannot occur without considering tribal sovereignty, climate change, and how management can be improved. It is important to recognize that tribal access to resources is inherently related to legal relationships between tribes and the federal government (Whyte 2013; Lynn et al. 2013). The 2001 Indigenous Environmental Networks' statement on food security states:

Government policies have allowed natural resource extraction and development activities that have historically destroyed and currently threaten subsistence foods, traditional and modern small-scale agricultural practices and other food systems in North America... depriving Indigenous peoples of their basic human right to food security. Governmental policies and development activities often put Indigenous and local communities into a state of poverty, malnourishment and hunger (IPBC 2001).

Although this statement can be generalized to indigenous peoples around the world, such consequences are evident between the U.S government and the tribal nations of the Klamath Basin.

In the Klamath Basin, with the implementation of national parks and forests and the plethora of federally owned land, many food-related subsistence activities, such as hunting, gathering, and burning, are now illegal in much of the ancestral tribal territories. Today, fire

management often excludes tribal peoples, and is managed by “rationalized bureaucratic agencies that disembed or remove social relations from local contexts of interaction...community knowledge, needs and values are easily overridden by a hierarchal decision-making structure based on outside expertise” (Carroll 2006; Norgaard 2014). As Ron Reed told me while looking for huckleberry patches, “We’re an environmental justice tribe. We’re too dependent on the Forest Service. We don’t have the ability to manage or access our territory because of the color of our skin, because of our political status...We don’t have control over our land- over 75% of it is government owned. We’re impacted by land management decisions, but we don’t have a say in them”. His words resonated with me. Although tribes need to maintain their culturally distinct practices in order to remain federally recognized, for the Karuk Tribe, who never had a treaty ratified by the US government and do not have a formal reservation, prolonged interference by government agencies on ancestral land threatens sovereignty because it impacts the ability to continue such cultural practices. Additionally, the intrusion and control of non-tribal federal scientists and firefighters over tribal territories diminishes tribal capacity throughout the basin. For example, Walt Lara, a Yurok elder and experienced tribal forester relayed to us how the creation of national parks and forests in the region separated tribal peoples from their gathering areas: “They put gates up around where I used to gather. Now I need a permit just to be Indian!” Yet, his statement, said somewhat in jest, exemplified that sovereignty exists and must be exercised on different levels. Even if a tribe retains political sovereignty as an independent nation, sovereignty must be practiced and respectfully upheld by each individual and their community. For many tribes in legal battles with the federal government, sovereignty is not necessarily given, but must be earned and proven. Each individual tribal member, through cultural practices such as hunting, fishing, gathering, weaving, and burning, has the ability to enact tribal sovereignty. Exclusion of tribal peoples from land management is particularly sensitive in the face of climate change, since as species are impacted by climatic changes, tribal claims and access to such species could be threatened with no legal precedence (Norgaard 2014). Therefore it is critical that the tribes of the Klamath Basin are involved with species monitoring and developing adaptive fire and forest management (Lynn et al. 2013). Great scientific knowledge is held among the tribal members of the Klamath Basin who live inseparably intertwined with their local environments. Strengthening political and individual sovereignty can not only deter some of the cultural and psychological stress being caused by a lack of involvement in land management, it can also aid the development of climate science research and mitigation.

Whereas most climate assessments attempt to make large-scale future predictions, tribal peoples in the Klamath Basin are experiencing the effects of climate change today. Unfortunately this knowledge and experience is often overlooked in federal climate assessments, as is proven by the lack of integration of tribal knowledge in mitigation strategies. “Responding to Climate Change in National Forests”, known as the USDA’s official nationwide “guidebook”, does not even acknowledge tribal peoples or traditional knowledge, despite most tribal lands being under USDA control. Tribal peoples have already documented an observed shift in species ranges of certain plants and animals (Rose 2010; Swinomish 2010), a northward shift in migration routes, changes in populations and densities of wildlife, decreases in culturally valued species, and increases in instances of diseases, pests, and wildfire severity (Lynn et al.

2013). In the Klamath Basin, tribal observations can be reasserted through ecological data. The Six Rivers National Forest has experienced an increase of 1 degree C (1.8F) over the last 75 years (Butz & Safford 2010). Located in the heart of Karuk territory, temperatures at the Orleans Ranger Station have increased by 2 degrees F since 1931, being mostly driven by an increase in nighttime temperatures, which have risen almost 4 degrees F during this period (Butz & Safford 2010). Meanwhile, forests throughout Northern California are experiencing an increase in wildfire activity due to changes in climate and land-use (Butz & Safford 2010). Westerling et al. (2006) state that large changes in moisture levels strongly correlate to advances in the timing of spring, which is significant since wildfires are more likely to occur in years with an early spring. Due to rising temperatures and changing moisture levels, both of which advance the timing of spring, combined with drought-stressed summers, wildfires are expected to increase in severity, intensity, and frequency (Mortiz et al. 2012; Flannigan et al. 2005; Voggesser et al. 2006). Conditions in acorn producing oak dominated forests in California are expected to grow increasingly warmer and drier over the next century (Kueppers et al. 2005; Voggesser et al. 2006). Ultimately, this means longer and more severe drought periods, which will result in longer fire seasons and spur the spread of invasive species (NWF 2011; Voggesser et al. 2006). Although climate projections contain many uncertainties, it is undeniable that climactic changes are already and will continue to impact the culturally valued resources of the Klamath Basin. Many strategies exist to address future climate predictions, but often these strategies do not consider traditional foods in their management schemes. This fissure in climate change research can be aided through the integration of traditional ecological knowledge (Lynn et al. 2013; Voggesser et al. 2013). Many studies suggest that indigenous peoples will experience the harshest impacts of climate change. Therefore, tribal peoples must be involved with leading adaptive, creative, and culturally sensitive climate mitigation initiatives. Since tribal peoples are deeply invested in the health of their environment, exuding values of responsibility and kinship, they could potentially establish some of the most holistic landscape management plans in response to climate change.

The concept of community-based conservation offers an alternative approach to biodiversity conservation to what is currently being practiced in the Klamath Basin. Whereas models of fortress conservation practiced by the federal government often fail to respect the rights and beliefs of indigenous cultures, community-based conservation (CBC) emphasizes the role of local people in decision making, providing an essential avenue for empowering indigenous communities. One facet of community-based conservation is integrating tribal nations and TEK into management. As previously discussed, tribes possess a unique worldview to be able to conceptualize and implement successful restoration efforts. However, tribal nations should be viewed as co-managers rather than as stakeholders. In addition to strengthening tribal sovereignty and improving conditions of social exclusion, biodiversity can flourish under self-determining tribal management. For example, the Indian Forest Management Assessment Team (IFMAT) was established to report on issues surrounding Indian forestry every 10 years. Since 1993, IFMAT teams have recorded constant successes when tribes retain significant roles in forestland management; regarded as “an exemplary model”, “IFMAT members remarked on numerous occasions how tribal forestry, when following a plan approved and periodically reviewed by tribal councils and stakeholders, was among the best

examples of multiple-use forestry in the nation...IFMAT III observed examples of tribal enterprises executing stewardship contracts on adjoining national forests, employing tribal members...improving the resilience of federal forests to drought, pests and fire events, and opening the forest canopy cover” (Salwasser 2014). The worldview and ideology of tribal peoples cannot be separated from the successful result of tribal landscape management. The way in which tribal peoples see the world and their place within it, including the use of native languages, inherently connects native peoples of the Klamath Basin to detailed and personal ecosystem diversity:

We’re a reflection of the land. The people who own the water now don’t live here. Their perspective is different. They as themselves never belonged to these rivers... In the Yurok language, we don’t own this land. Just like how you don’t own your children, you don’t own your regalia. It’s a whole different concept than most of America...What that means is that we take care of this land. When you do that, it gives you a responsibility. You don’t own your children, you take care of them... For Yurok people, we have a responsibility to this land, to make sure that this land is taken care of...In Yurok we don’t have a generic name for “tree”, there is no “tree” like there is in English... You say that’s a redwood tree, that’s an alder tree, that’s a pepperwood tree, that’s a maple tree, that’s an oak tree. In Yurok, there is no generic term for “squirrel”. We don’t say “that’s a squirrel”, we say that’s a flying squirrel, a grey squirrel, a pine squirrel, because when you give that thing a name it gives us a responsibility to look after that thing, to know what it is. It makes us more connected to our natural environment. When we get people who aren’t from around here, and they want to make decisions about our land, they don’t have the same kind of connection, they don’t have that responsibility (Dale-Ann Sherman, James Gensaw, personal comm. Aug 2014).

Tribes are more than just community members, they are sovereign nations and should be treated as such. To regard tribes as stakeholders disrespects tribal sovereignty and history (Hostler, J, personal comm. June 2014). When given the financial and political capacity to act as co-managers of the environment, both ecosystem and human health can improve. For example, through financial assistance the Karuk Tribe has been able to enact substantial measures to improve community food insecurity, including creating a native food curriculum for school children, fostering native community gardens and holding community workshops, while they also hope to be able to establish a native foods digital library and host seasonal youth camps. Meanwhile community based projects ensure that tribal members are involved with fuels reductions programs and are integrally involved with local management.

Nevertheless, with many private landowners and small towns spread throughout the region, the involvement of local communities is also critical in ensuring the success of forest, fire, and food management. Community members play a key role in tending to their local environments, which can hugely aid fire prevention and response, biodiversity levels, and climate change resilience, mitigation, and adaptation. Local community involvement can also alleviate the negative social impacts of fires by reasserting community capacity and improving the health and wellbeing of ecosystems and all native and non-Native communities. In the

Klamath Basin, community involvement has already spurred the creation of several organizations, including the Mid-Klamath Watershed Council, the Orleans-Somes Bar Fire Safe Council (<http://firesafesiskiyou.org/OrleansSomesBar/HomePage>), and the Salmon River Restoration Council (<http://www.srrc.org/>), all of which are taking tremendous, ground-breaking steps to work with tribes and protect their local environments through community involvement. Community-based conservation, however, also contains many limitations since compromises must be reached in order to protect both ecological health and community values, and so “the notion that community conservation can be assessed and validated or invalidated as a policy is flawed... to present it as a strategy that achieves both “community” development needs and biodiversity preservation objectives in full must be dismissed” (Adams & Hulme 2001). In many cases, relationships between stakeholders regarding high-value areas of natural resources are extremely contentious, and finding compromises can be extremely difficult. Sometimes, when agreeable compromises cannot be achieved, community-based conservation is not an effective management solution. Just as how the blueprint model of fortress conservation has continuously failed when generically applied, community conservation will also fail when regarded as a blueprint model. One of the complexities of CBC is that it must be molded to each specific situation, making standardization of management and policy extremely difficult. Since almost every case is different, CBC can manifest in a variety of ways, but ultimately requires the participation and cooperation of multiple stakeholders in order to succeed. The greatest strength of CBC is the ability to offer empowerment and self-determination to people where conservation needs have been prioritized over the livelihoods of local people. Although riddled with complexities, TEK could inform the initiation of CBC systems, which could provide political, legal, social, cultural and economic empowerment to the tribal communities of the Klamath Basin, leading to improved conservation techniques and the continuation of cultural practices into the future.

Recommendations

Tribal peoples need to be integrated into decision making in all realms. Inclusion in landscape management is only a small component in welcoming, instead of marginalizing, tribal nations into political and socioeconomic arenas as equal counterparts. Such progress cannot occur without the traditional knowledge held by tribal members being recognized as equally valid science. In order for fire to be used as a management tool to enhance traditional foods, tribal managers need to lead, not just assist with, fuels reduction, prescribed fire, and forest restoration initiatives. Outreach and education is vital. Tribal members should be invited to teach government employees and community leaders about the validity and usefulness of traditional knowledge, while such knowledge must be disseminated to tribal youth in order to be retained into the future. Tribal members maintain a huge repository of social agency which is weakened by a lack of political capacity. Tribes should be given the autonomy to enact new climate change mitigation strategies developed around sensitivity to cultural resources. In the Klamath Basin particularly, tribes can reassert their sovereign status through the implementation of unique, culture-specific restoration efforts. However, ecological restoration in the Klamath Basin cannot successfully occur without reconciliation between tribes and the

agricultural workers. Although much progress has been made in recent years, government agencies and community organizations can function as mediators between tribes and farmers. As previously stated, complex compromises will have to be reached by all parties, but the restoration of forestlands, enhancement of traditional foods, implementation of fire and fuels reductions, and climate change mitigation that is imperative to the future of the region must be poised as beneficial to all peoples of the basin.

Conclusion

The native peoples of the Klamath Basin historically used fire to enhance the productivity of forest foods. By implementing low-severity fires, the tribal peoples ensured fruitful production of foods such as berries, acorns, and mushrooms and improved hunting conditions, while also controlling levels of understory fuels. Consequently, both the forest ecology and health of the native peoples benefited from the implementation of frequent, low-severity fires and allowing the natural, lightning fire regime to function. Fire suppression has been enacted as a federal policy for a century, impacting the spiritual practices, cultural identities, and public health of the tribal members in the Klamath Basin. Through the federal control of tribal lands and the criminalization of traditional fire practices, the sovereign authority of the tribal nations is weakened. Climate change projections assert that the Klamath Basin is expected to grow hotter and drier in future years, lengthening drought and fire seasons, and hastening the onset of spring. The experiences of the tribal peoples demonstrate that climate change is a current and ongoing problem. Therefore, the integration of tribal knowledge and experience is critical in improving climate change mitigation and adaptive strategies. Conservation in the Klamath Basin could be improved by empowering communities to take leadership roles, instead of primarily basing conservation and restoration in the region on hierarchical top-down fortress management enforced by the federal government. In this way, tribes and local communities could take an active, participatory role in the management of their homeland environments. Fire needs to be re-implemented into the landscape to ensure the resilience of the basin to climate change, but further research is needed to conduct more fuels reduction projects and protect the lands and peoples from uncontained high-severity fires. Tribes should be an integral component of this research. Welcoming tribal nations as forestland co-managers has the potential to enhance forest diversity, traditional foods, social relations, and community health, while protecting the continuation of cultural practices, and strengthening the future ecological and social resilience of the Klamath Basin in the Northern California-Southern Oregon region.

Bibliography

- Adams, W & Hulme, D. (2001). Conservation and communities: Changing narratives, policies and practices in African conservation. In: *African Wildlife and Livelihoods: The Promise and Performance of Community Conservation* pp. 9-23. James Currey, London.
- Agrawal, A. (1995). Dismantling the divide between indigenous and scientific knowledge. *Development and Change*. 26(3)413-439.
- Barr, B., Koopman, M., & Williams, C. (2010). Preparing for Climate Change in the Klamath Basin. National Center for Conservation Science & Policy. The Climate Initiative.
- Berkes, F. (1999). *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Taylor & Francis, PA.
- Bowman, J. (2008). Effects of Environmental Injustice on The Quartz Valley Indian Community. *Quartz Valley Indian Reservation*.
- Buckley, T. (2002). *Standing Ground: Yurok Indian Spirituality, 1850-1990*. University of California Press. Berkeley, CA.
- Butz, R. & Safford, H. (2010). A summary of trends and probable future trends in climate and climate-driven processes for the Six Rivers National Forest and surrounding lands. *United States Department of Agriculture*. Pacific Southwest Region.
- Carroll, M.; Higgins, L.; Cohn, J. & Burchfield, J. (2006). Community wildfire events as a source of conflict. *Rural Sociology*, 71(2), 261-280.
- Doremus, H. & Tarlock, D. (2008) *Water War in the Klamath Basin: Macho Law, Combat Biology, and Dirty Politics*. Island Press, Washington DC.
- Downey, L., & Van Willigen, M. (2005). Environmental stressors: The mental health impacts of living near industrial activity. *Journal of Health and Social Behavior*, 46(3), 289-305.
- Flannigan M.; Amiro B.; Logan K.; Stocks B. & Wotton B. (2005) Forest fires and climate change in the 21st century. *Mitigation and Adaptation Strategies For Glob Change* 11:847-859.
- Gates, T., & Novell, M. (2011). Current Effects of PacifiCorp Dams on Indian Trust Resources and Cultural Values. Background technical report informing the secretarial determination overview report. *Department of the Interior*.
- Guptill, A.; Copelton, Denise, and Lucal, Betsy (2013) *Food and Society*. Polity Press: Cambridge, UK and Malden, MA.
- Indigenous Peoples Council on Biocolonialism (IPCB). (2001). Indigenous Environmental Statement on the Right To Food and Food Security.
- Ingold T., & Kurtilla T. (2000) Perceiving the environment in Finnish Lapland. *Body and Society*. 6(3-4):183-196.
- Kueppers L, Snyder M, Sloan L, Zavaleta S, & Fulfrost B (2005) Modeled regional climate change and California endemic oak ranges. *National Academy of Sciences USA* 102:16281-16286.
- Lynn, K; Daigle, J; Hoffman, J; Lake, F; Michelle, N; Ranco, D; Viles, C; Voggesser, G; Williams, P. (2013). The impacts of climate change on tribal traditional foods. *Climatic Change*. 120:545-556.
- Moritz MA, Parisien MA, Batllori E, Krawchuk E, Van Dorn J, Ganz DJ, Hayhoe K (2012) Climate change and disruptions to global fire activity. *Ecosphere* 3:49.
- National Wildlife Federation (NWF) (2011) Facing the storm: Indian tribes, climate-induced weather extremes, and the future for Indian country.
- Norgaard, K. (2005). The Effects of Altered Diet on the Health of the Karuk People.
- Norgaard, K. (2014). The Politics of Fire and the Social Impacts of Fire Exclusion on the Klamath. *Humboldt Journal of Social Relations*. 36:77-101.

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- Ortiz B. (2008). Contemporary California Indians, oaks and Sudden Oak Death (*Phytophthora ramorum*). Proceedings of the sixth California oak symposium.
- Pérez-Ramos I, Ourcival J, Limousin M, Rambal S (2010) Mast seeding under increasing drought; results from a long-term data set and from a rainfall exclusion experiment. *Ecology* 91:3057–3068
- Peterson, D; Millar, C; Joyce, L; Furniss, M; Halofsky, J; Neilson, R, & Morelli, T. (2011). Responding to Climate Change in National Forests: A Guidebook for Developing Adaptation Options. *United States Department of Agriculture*. Pacific Northwest Research Station. General Technical Report.
- Richards, R & Alexander, S. (2006). A Social History of Wild Huckleberry Harvesting in the Pacific Northwest. *United States Department of Agriculture*. Pacific Northwest Research Station. General Technical Report.
- Rose, K. (2010). Tribal climate change adaptation options: a review of the scientific literature. Seattle, WA: U.S. Environmental Protection Agency Region 10.
- Salwasser, H. (2014). Tribal forestry as a model for multiple-use lands. *Evergreen*. Spring 2014.
- Skinner, N., Taylor, A. H., & Agee, J. K. (2006). Klamath Mountains bioregion. In *Fire in California's ecosystems* (170-194). Berkeley, CA: University of California Press.
- Sowerwine, J. (2012). Enhancing Tribal Health and Food Security in the Klamath Basin of Oregon and California by Building a Sustainable Regional Food System. University of California, Berkeley. USDA Research, Education & Economics Information System.
- Swinomish Indian Tribal Community (Swinomish) (2010) Swinomish adaption action plan. La Conner, WA: Swinomish Indian Tribal Community.
- Thompson, L. (1991). *To the American Indian: Reminiscences of a Yurok Woman*. Heyday Books. Berkeley, CA.
- United States Department of Agriculture. Food Deserts.
- Voggeser, G.; Lynn, K.; Daigle, J.; Lake, F.; Ranco, D. (2013). Cultural impacts to tribes from climate change influences on forests. *Climatic Change* 120:615-626
- Westerling, A. L., H. Hidalgo, D. R. Cayan, & T. Swetnam. 2006. Warming and earlier spring increases western U.S. forest wildfire activity. *Science*.
- Whyte K (2013) Justice forward: tribes, climate adaptation and responsibility in indian country. *Climatic Change*.

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