Traditional Ecological Knowledge, Indigenous Burning Controversies, and Bringing Back "Good Fire" by the Amah Mutsun Tribal Band

AUTHOR: Thuy-Tien Bui

Over hundreds or thousands of years, Indigenous peoples have accumulated diverse knowledges of ethnobotany, ecology and many branches of the natural sciences through direct contact with the environment, learned experiences, and thoughtful studies passed down by generations. This traditional ecological knowledge, or TEK, is the guiding source for many cultural and land stewardship practices that have significantly altered the landscapes of today. In her book, "Tending the Wild," Kat Anderson describes how Native knowledge has been used to manage California's natural resources for millennia. These practices, such as cultural burning, were interrupted due to the oppression of Indigenous peoples during and following settler colonization. However, growing awareness is pushing for the revitalization of TEK and the use of Indigenous stewardship practices to manage resources and the environment in the face of anthropogenic climate change. In particular, the Amah Mutsun Tribal Band is leading initiatives to restore and maintain resilient ecosystems in Northern California by bringing back "good fire" informed by TEK.

California's plant life is notably diverse in species numbers and vegetation forms due to the state's variety of climates, soils, and topographies. The Native people of California depended on plant resources for their livelihood and used this biodiversity to their advantage. "In aboriginal California, women were the ethnobotanists, testing, selecting, and tending much of the plant world," Anderson explains (41). Vascular plants also accounted for more than half of the diet in most regions. From the consistent incorporation of plants into their daily lives and culture, Native people developed detailed knowledge of ethnobotany and plant biology. For example, the Luiseño harvested blackened seeds of wild cucumber for an oily ingredient used in paints (Anderson 50). Native people were also closely attuned with the cycles and optimal conditions for plants. They timed harvesting to obtain maximum benefits and knew in which conditions, such as soil types, they could find higher quality resources.

In addition to taking advantage of natural resources through collective experiences and studies, Native people employed diverse resource management techniques to "help nature along," such as burning, pruning, tilling, sowing, irrigating, and weeding. To initiate burns, Indigenous peoples used methods called "drilling" and "percussion." Drilling refers to "the rotating of a slender wooden shaft in a hole in a stationary board called the hearth," while percussion was "striking two objects together, such as two stones, to create sparks" (Anderson 136). Historian Pam Mendelsohn recorded that "indigenous fires had traditionally been set in bear-grass patches after the first heavy rain in October or November" (Anderson 313). This controlled burning of underbrush was vital to the fitness of bear-grass and generated stronger, thinner, and more flexible leaves that were beneficial for basket-making. For the Mono, the ancient practice of burning deergrass increases the plant's flower stalk production and removes the accumulation of thatch that can inhibit plant growth (Anderson 314).

Indigenous people practiced controlled burning for a variety of reasons in addition to enhancing the quantity and quality of plant resources. Deliberate burning "enhanced feed for wildlife; controlled the insects and diseases that could damage wild foods," and cleared landscapes for facilitated travel, increased visibility for game hunting and caring for children (Anderson 136). It has been shown that pruning and burning vegetation increases the value of forage for wildlife, resulting in higher numbers of large game animals post-fire. Fire also encourages the reproduction of young, tender shoots which are more edible and nutritious for deer and other vegetation-browsing wildlife. By clearing view-obstructing shrubs, Native peoples created better visibility to hunt game and watch for their small children.

Indigenous knowledge of fire also stemmed beyond how fire benefitted plant physiology to how fire interacts with variables in the environment for purposeful results. It is thought that frequent, low-grade burning by Indigenous

communities drove vegetation scale changes, often homogenizing the landscape and maintaining plant species, such as oak groves, that are highly beneficial in Indigenous culture. This frequent burning "sustained a park-like landscape with grass and scattered oak trees, and chaparral has invaded these areas since burning was suppressed after Spanish colonization in the 19th century" (Timbrook et. al 1982). Vegetation type-conversion from dense woody shrubland to lower fuel volume grassland also reduced fire hazards near settlements. Native people also understood that removing shrubs and ladder fuels could protect mature pinyon trees from fire. "They also pruned back low-lying branches that could catch fire and removed dead and fallen limbs" (Anderson 316). In fact, this strategy of fuels reduction is widely used as a forest management practice to prevent the risk of wildfires today.

However, the efficacy of cultural burning as a form of land stewardship has a long history of misunderstanding, debate, and criticism. The "pristine myth" perpetuated the white man's romanticized view of wilderness as pristine, undisturbed land that fostered an overabundance of natural resources and was free of human presence (Warren 229). This view erased the presence and culture of Indigenous peoples, by expelling them from the land to create a desired humanless wilderness and by ignoring the complexities and existence of their cultural practices that have, in fact, altered the so-called "pristine" environment. When Indigenous impacts on the land were realized, settler-colonial values and the pristine myth gave rise to views that Indigenous land practices were uncivilized, haphazard, and not rooted in science.

As a result of the view that fire was destructive to valuable commercial forest resources, the United States established the U.S. Forest Service in 1905 and began to embrace fire suppression policies by 1910. Ron Goode, Tribal Chairman of the North Fork Mono Tribe, describes this as Euro-American settlers bringing their "philosophical beliefs and their fear of fire (Goode 25). The Great Fire of 1910, which burned over 3 million acres in Montana, Washington, and Idaho in just two days, had a profound impact on new national fire policies (National Wildfire Coordinating Group). A policy of complete fire suppression was instituted to prevent fires and suppress active fires as quickly as possible. Subsequent, more strict policies became known as the "10 a.m. policies" because they mandated that all fires must be put out by 10 a.m. the next day. As other land management agencies followed suit with this campaign, fire became practically eliminated from the landscape.

In an essay on Indigenous burning, Geography and Planning professor, Don Hankins, notes that by 1910, "California Indian populations were at an all-time low. Indigenous burning traditions became increasingly scarce, and in some areas the knowledge of fire was maintained only through older generations sharing accounts of their family's and community's use of fire" (Hankin 31). Although fire suppression was at an all-time high, some ranchers, farmers, and timbermen "continued to apply fire in more remote areas or on private lands" (Hankin 31). Families of sheepherders, cattlemen, and timbermen learned how to burn from Indigenous practitioners and saw how fire benefitted their range and forest lands. They lit fires to "open meadows and keep down brush in the forest understories. These fires increased the numbers of palatable grasses and forbs for grazing animals" (Anderson 119). This sparked controversy among "light burning" advocates like ranchers and "no burning" advocates like government officials who had pushed for fire suppression and eventually prevailed.

More recently, attitudes have shifted from denying to acknowledging the functionality of Indigenous burning, but questions have been raised about the degree to which controlled burning has altered landscapes. "A myth of human manipulation everywhere in pre-Columbus America is replacing the equally enormous myth of a totally pristine wilderness" (Barrett et al. 2005). A review by Barrett et al. speculatively argues that historical fires were primarily caused by lightning ignition and not by deliberate Indigenous burning. The authors contend that assertions of Indigenous peoples creating extensive ecological impacts through purposeful fire is based on a scant historical record and is largely overstated. "Most oral history and biological evidence of fire use has been irretrievably lost with the passage of time," and since early travelers did not recognize lightning as a major cause of fires in the West, "many Euro-Americans might have therefore erroneously attributed fire to Indians" (Barrett et al. 2005). Geography scholar Thomas Vale also posits the same argument. He insists that the contemporary emphasis on a "humanized" landscape by Native peoples is overstated, and that "large parts of the United States, particularly in the American West, may have been essentially natural, their landscapes characterized by processes of nature rather than people" (Vale 1998). Both parties assert that, based on physical records, lightning ignited fires were well capable of maintaining most fire regimes of much of the United States and that Indigenous burning is not as frequent as other scholars make it out to be.

However, experts such as Kat Anderson, John Keeley, Rob Cuthrell, Stephen Pyne, and others, argue differently. The arguments by Barret, Vale, and others fail to acknowledge landscape scale vegetation changes along the coast, where there is a low incidence of lightning fires due to the moist climate and topography. Analy-

ses by Anderson support that the burning regime was very frequent in many areas in order to obtain a continuous supply of quality plant resources (Anderson and Morrato 1996). This suggests that the frequent fires along the coast were not caused by lightning and are attributed to anthropogenic burning instead. The Coastal Ranges of California also had high population densities of Native Americans, and Keeley explains that, "Natural fire frequencies are not high enough to maintain these landscapes in habitable mixtures of shrublands and grasslands but such landscape mosaics are readily produced with additional human subsidy of ignitions" (Keeley 2002).

Paleoethnobotanist Rob Cuthrell explains that based on archaeobotanical evidence of Indigenous burning practices, it is expected for coastal terraces to be dominated by woody vegetation types under a lightning fire regime, but that was not observed. This indicated that the observed vegetation cover in his study was an outcome of anthropogenic burning (Cuthrell 2013). Environmental historian Stephen Pyne also maintains that "the modification of the American continent by fire at the hands of [Native Americans] was the result of repeated, controlled surface burns on a cycle of one to three years" (Pyne 1982). It is important to note that, although many burns were controlled, "Burning also resulted from malice, play, war, accident, escapes, and sheer fire littering" (Pyne 2001)

Furthermore, it is widely accepted today that fire is a necessary disturbance in many ecosystems. "Not only do many California species survive fires, but some require fire in order to complete their life cycle or to remain vigorous" (Gutierrez and Orsi 1998). Fire has been reasoned to help shape approximately three-fourths of California's vegetation. Many different ecosystems, such as chaparral and lower montane forests, are adapted to fire as a disturbance. Plenty of chaparral species germinate after a fire stimulates the growth of heat resistant seeds and recycles nutrients in the soil. Some pine and oak species are adapted to light fire, and species with serotinous cones require the heat from higher severity fires for seed dispersal
As a consequence of decades of fire suppression, significant amounts of dead biomass have accumulated on the grounds of forest, woodland, and grassland ecosystems. This has predisposed fire-prone ecosystems to more severe and out-of-control fires since there is excess fuel that can readily burn. Many forest ecosystems in California are adapted to frequent low-severity fires, which naturally helps maintain fuel loads and cycle nutrients for encouraged growth. However, with fire excluded from the landscape, "more natural fire cycles were missed" resulting in altered fire regimes, dramatic increases in forest tree density, and the suppression of saplings in the understory (Keeley 2008). This accumulation of mature trees poses dangerous threats of catastrophic fires since fire can more easily climb up ladder fuels and into the canopies of close-knit trees, creating the high-severity crown fires that headline the news today (Stephens and Ruth 2005).

Cultural burning by Native Americans was affected by U.S. fire suppression policies both directly and indirectly. During the period of fire suppression mandates, Indigenous burning and religious ceremonies were strictly prohibited, causing a loss of knowledge through lack of the practice. Indirectly, fire suppression policies also created dangerous conditions to perform cultural burning in the present because of the potential of fires to grow out-of-control in dense vegetation. "The vitally important traditional management practice of regular burning is no longer possible in many areas because of government prohibitions and the buildup of fuels from fire suppression" (Anderson 318)

The effects of full fire suppression are now realized, and there is an imperative to adopt management strategies that will help correct the effects of decades of misguided policy. With the goal of re-establishing historical fire regimes and reducing fuel loads to minimize the risk of intense fires, federal and private land managers are looking to prescribed burning and Indigenous knowledge. In response to its growing wildfire problem, California passed a law in 2021 that affirmed Indigenous rights to cultural burns. The bills give protection to controlled burn practitioners by removing liability and covering suppression costs if a burn should get out-of-control (Smith 2021). Still, prescribed fires are carefully thought through and performed only under favorable conditions — cool temperatures, high humidity, and low wind speeds.

This was good news for the Amah Mutsun Tribal Band and their goal to reinstate tribal stewardship of their lands surrounding Quiroste Valley. Today, the Amah Mutsun Tribal Band is composed of "approximately 600 people who are direct descendants of several Mutsun-speaking tribal groups dispersed to the San Juan Bautista and Santa Cruz missions" (Hannibal 2016). Because the Amah Mutsun have been separated from their ancestral lands for a long period of time and their treaty with the federal government was never ratified, they are not recognized as a sovereign tribe by the United States. However, they are recognized by the state of California as a Tribal Government (Hannibal 2016).

In Quiroste Valley, woody vegetation such as Douglas fir and coyote brush have encroached on grassland species that are culturally significant for the Amah Mutsun. Ancestors of the Amah Mutsun Tribal Band regularly practiced cultural burning to encourage grassland species as well as the growth of understory species in conifer forests, such as hazelnut — a rare and ethnobotanically important species in Quiroste Valley today.

Fire as a stewardship tool remains greatly respected by the Amah Mutsun. "Fire is sacred and used as a prayer. A spiritual fire is placed in the middle during ceremonial dances, and carries our prayers up to Creator. Fire is used as a light, and used as a land management tool," explains Tribal Chairman Valentin Lopez. Lopez also expresses how fire is connected to spirituality, culture, and the environment: "A special ceremony is held when cultural burning in oak woodlands. Smoke helps purify the trees. Smoke chokes out pests in trees, and therefore aids in production of acorns."

The Amah Mutsun Land Trust (AMLT) is an initiative that was established to access, protect, and steward lands that are integral to Amah Mutsun culture and identity. With this goal in mind, the Amah Mutsun Tribal Band is working in collaboration with academic researchers and state agency professionals to revitalize TEK and bring "good fire" back to the landscape. A hope is that fire can be managed more effectively if "Indigenous stewardship and cultural knowledge around fire is more widely accepted and implemented by land managers" (Atencio 2020). AMLT is engaged in an Inter-Tribal Fire Network to foster better relationships with federal and state land management agencies as well as with other California tribes.

Native Stewardship Corps is utilizing TEK in their adaptive management strategies to restore the resiliency and sustainability of natural systems. Native stewards are gaining experience with prescribed burns as Type-II Wildland Firefighters and participate in Prescribed Fire Training Exchanges that are hosted by the Kuruk and Yurok tribes. "These trainings emphasize the stewardship of cultural resources and build key working relationships and coordination with many land management organizations" (Atencio 2020). For performing prescribed burns, "A section of land is segmented into burn units and planned to burn when conditions provide for a low-intensity burn. Cultural burns generally occurred in the late fall and or early spring. Up to ten sections each, varying in size from a few acres to a whole mountain side, composed a cultural burn management area," explained Lawrence Atencio, a Native Stewardship Corps field manager (Atencio 2020).

The long-term plan at Quiroste Valley is to revive the practice of burning the landscape and restore a diverse array of culturally significant plants, including hazelnut, red maids, California lilac, white root sedge, purple needlegrass, California oatgrass, blue wild rye, and native barley (Hannibal 2016). The work at Quiroste Valley Cultural Preserve served as the catalyst for creating a range of partnerships including Pinnacles National Park, University of California at Santa Cruz Arboretum, and the nonprofit Pie Ranch in Pescadero.

Climate change is increasing the frequency of destructive wildfires, impacting Native communities by way of erosion, landslides, and loss of cultural resources. For Indigenous people, cultural resources are not only tangible resources, but every aspect of the environment — the air, the mountains, those buried beneath, and those who inhabit it. Revitalizing TEK and supporting tribes through partnerships and collaboration, while also ensuring that they are the ones leading the way, is a necessary step forward for Indigenous sovereignty and ecological restoration. Tribes are seeing severe declines in natural resources firsthand, and these consequences are challenging Indigenous ways of life. However, by acting now and forging strong partnerships, there is still hope for a more sustainable future. "It took generations for this land to come unraveled and it will take seven generations to heal it. We don't expect to get this done immediately but we must fulfill our obligation to Creator," said Chairman Lopez.

Indigenous peoples have faced countless challenges throughout their history: colonization, racism, exclusion, genocide, and fire suppression to name a few. They have persisted throughout time, and so has their appreciation for and intimate relationship with the natural world. California is currently being threatened by more frequent and severe wildfires that threaten the vitality of people, resources, animals, and the environment. "Wildland fire knows no boundary and taking care of Mother Earth requires a coordinated effort, and as Honorable Chairman Valentin Lopez says, "Indigenous stewardship must lead the way" (Atencio 2020).

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