Indigenous Fire Stewardship

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Synonyms

Cultural burning; Indigenous fire stewardship = Indigenous fire management; Indigenous people = Aboriginal people; Traditional Fire Knowledge = Indigenous Fire Knowledge

Definition

Indigenous fire stewardship (IFS) is the use of fire by various Indigenous, Aboriginal, and tribal peoples to: (1) modify fire regimes, adapting and responding to climate and local environmental conditions to promote desired landscapes, habitats, species, and (2) to increase the abundance of favored resources to sustain knowledge systems, ceremonial, and subsistence practices, economies, and livelihoods. IFS is the intergenerational teachings of fire-related knowledge, beliefs, and practices among fire-dependent cultures regarding fire regimes, fire effects, and the role of cultural burning in fire-prone ecosystems and habitats.

History of Indigenous Fire Stewardship

Indigenous fire stewardship, synonymous with Indigenous fire management (Minstry et al. 2016), spans thousands of years by many cultures across the world. Over millennia, through changing climatic conditions among many different ecosystems, Indigenous peoples have used fire out of necessity to survive, adapt to local environmental conditions, promote desired habitats and species, and to increase the abundance of favored resources and landscape conditions.

Climatically, there are fire-prone ecosystems on nearly every continent that evolved natural fire regimes regionally (Bond et al. 2005). Within many of the fire-prone ecosystems, Indigenous adaptations for burning and resultant cultural fire regimes, as coupled socio-ecological systems, reflected their need to "learn to live with fire" (Spies et al. 2014; McWethy et al. 2013). Spatially, Indigenous fire stewardship practices had the highest influence around settlements, their wildland-urban interface (e.g., permanent villages, seasonal camps) and travel corridors (i.e., trails and roads) that linked with more intensively managed habitats containing food, material-fiber/basketry, wildlife/prey, and other desired resources (Turner et al. 2003).

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Frequent and diversified Indigenous burning coupled with natural ignitions reduced fuel loading, which often lowered the intensity and resultant severity of subsequent fires. As such, burning increased the proportion of fire-adapted vegetation (biodiversity) and heterogeneous habitats (mosaics) which greatly reduced the threat of and impacts of non-desired wildfires (Mistry et al. 2016).

Every fire-prone ecosystem can have changes in seasonal weather and landscape conditions that foster extreme fire behavior (Bond et al. 2005; McWethy et al. 2013). Among Indigenous cultures extreme fire events were experienced over time, and communities learned how fire affected their society and environment. Central to Indigenous fire stewardship was the cultural ability to mediate and reduce extreme natural fire events by adapting to changing climatic and environmental conditions. A knowledgeable Indigenous fire community understands the threats, impacts, and benefits of fire under a range of environmental and sociocultural circumstances. Indigenous fire knowledge holders are familiar with climatic cycles, ignitions sources, fire behavior, and landscape factors, such as how the topography and vegetation/fuels contributed to the natural fire regime and associated landscape fire effects (Huffman 2013). Multigenerational observations of fires and cultural dependence on a range of burned habitats for various resources reflected Indigenous understandings and knowledge of fire regimes.

In many of the fire-prone ecosystems described above, cultural fire regimes differ from natural fire regimes with Indigenous cultures having developed sophisticated burning practices (Huffman 2013). Indigenous fire stewardship created cultural fire regimes by influencing and diversifying the frequency, seasonality, extent, locality, intensity, and resultant severities of fires (Lake et al. 2017). The continuum from a more natural (e.g., nonhuman ignitions such as lightning) to cultural (increased human fire use) fire regime was reflected in the extent and magnitude of Indigenous fire stewardship. On some continents for particular regions, those ecosystems had less or more influence by cultural burning over millennia (McWethy et al. 2013). In many landscapes, the higher density of Indigenous settlements resulted in increased influence of the cultural fire regimes.

Traditional fire knowledge (Huffman 2013) is essentially Indigenous fire knowledge. Traditional fire knowledge is fire-related knowledge, beliefs, and practices that have been developed and applied on landscapes for specific purposes by long-time inhabitants according to Huffman (2013). A growing number of Indigenous peoples and some international entities (e.g., United Nations) are discontinuing the use of "traditional" due to misunderstandings and mischaracterization of what is traditional today in a modern context. Indigenous knowledge is the broader aspects of individual, family, and community's cultural learning, understanding, and beliefs regarding metaphysical and biophysical relationships of people and their environment. Such knowledge encompasses a wide range of historical and contemporary relationships Indigenous peoples have with the world – including fire.

In Indigenous cultures, resilience is considered as a holistic concept – everything is related (Berkes and Ross 2003; Turner et al. 2003). Indigenous peoples believe they have a responsibility passed down from their Creator to be stewards of the land. In relation to wildland fire – physical, mental, emotional, and spiritual health are tied to the health of the Earth. Many Indigenous cultures cannot be resilient without a healthy landscape to exercise cultural fire-related practices on.

Indigenous fire stewardship encompasses the wide range of political, economic, ecological, social, and cultural objectives for burning. The rational for and objectives of fire use can be similar but also can greatly differ between Indigenous peoples living in various fire-prone ecosystems (Huffman 2013). Even within a similar ecosystem, such as the temperate Pacific forests of Western North America (Turner et al. 2003) or the tropical Amazonian forests (Mistry et al. 2016), each Indigenous group will have their own diversified reasons for fire use and manners in which they adapted to and modified fire regimes.

Indigenous Fire Stewardship (IFS) Today

There are differences in the ways in which cultural burning was practiced historically under Indigenous fire sovereignty and governance compared to modern fire governance and management. The colonial worldview was that fires were destructive to the timber supply and dangerous to communities (Pyne 2007). The process of colonization, in most instances, has severely limited Indigenous fire stewardship practices (Kimmerer and Lake 2001; Mistry et al. 2016; Lewis et al. 2018). Colonial fire management has limited and reduced the frequency, seasonality, extent, and magnitude of cultural burning through fire suppression policies and regulatory authorities (Murphy 1985; Timbrook et al. 1993; Murphy et al. 2007; Christianson, 2015; Lewis et al. 2018). The legacy of colonization on Indigenous fire knowledge from genocide, forced removal, relocation, and acculturation efforts to westernize Indigenous peoples has substantially limited cultural burning (Eriksen and Hankins 2014). However, many Indigenous communities are at high risk to destructive wildfires. For example, in Canada 60% of First Nation reserves are within or intersect the wildland-urban interface (McGee et al. 2019). Many Indigenous peoples desire to reinstate cultural burning while recovering and rejuvenating IFS in a modern context (Lewis et al. 2018). Recovery of Indigenous fire stewardship is closely linked with the broader societies' ability to understand that they are living in fire-prone ecosystems, learn from Indigenous fire-dependent cultures, and increase support of collaborations for wildland fire research, management, and fuel reduction practices with Indigenous peoples (Eriksen and Hankins 2015; Lake et al. 2017).

Decolonizing wildland fire management could increase meaningful inclusive participation of Indigenous peoples with jurisdictional governance, decision-making authority, and fire use. In the majority of countries globally, with the exception of a few Indigenous-governed territories, the dominance of fire management is conducted and enforced by state/national agencies, which utilize centralized fire management structures developed from historical colonial processes. Power for decision-making on local fire management is often held by more distant nonlocal entities (Eriksen and Hankins 2014, 2015).

Current governance efforts to be more inclusive of Indigenous fire stewardship tier to existing authorities, laws, tenure/land rights, and the rights of Indigenous peoples to exercise cultural fire practices. Many Indigenous peoples are employed seasonally as wildland firefighters, increasing their exposure to western fire management practices of fighting fire, rather than living with fire (Carroll et al. 2010; Christianson et al. 2013). The return and revival of Indigenous fire knowledge and stewardship practices with modern wildland fire governance and management could assist society with learning to live with fire and integrate strategies to protect communities from detrimental wildfires. The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (United Nations 2007) supports cultural practices like burning. Specifically, Article 31(1) of the UNDRIP states that Indigenous peoples have the right to maintain, control, protect, and develop their cultural heritage, traditional knowledge, and traditional cultural expressions, as well as the manifestations of their sciences, technologies, and cultures. The article also reaffirms Indigenous people also have the right to maintain, control, protect, and develop their intellectual property over their cultural heritage and traditional knowledge and for traditional cultural expressions.

Sovereign Indigenous fire use conceptually is a culturally decentralized form of governance where fire use, the choice and the authority to burn, resides with the individual, family, clan, band, or tribe/nation. Among many Indigenous cultures, burning was and is a coordinated effort among smaller groups, but collectively these groups use fire based upon long-term evolving stewardship practices with fire-prone ecosystems for landscapes that have similar habitats and valued resources. Contemporary case studies are used as regional examples to demonstrate the

diversity of Indigenous fire stewardship globally for different continents, countries, and fire-prone ecosystems (for more extensive summaries, see Huffman 2013 and Christianson 2015).

Featured Regional Examples

United States/Pacific West

The Klamath-Siskiyou bioregion in the Pacific west of the United States is a highly topographically and floristically diverse area that has Indigenous peoples with different languages and genetic histories. Over millennia, these ancestral divergent Indigenous groups formed tribes which adapted to and modified fire regimes developing complex and rich cultures until American colonization in the mid-1800s. After over a century of American governance which promoted mostly fire suppression (Busenberg 2004; Stephens and Ruth 2005), there now are newly developed collaborations with Indigenous communities. The Karuk and Yurok Tribes are reinstating Indigenous fire stewardship practices among different jurisdictions: tribal, federal, and private lands. Several projects, such as the Western Klamath Restoration Partnership (Lake et al. 2018), and the Nature Conservancy's Training Exchange (TREX) are supporting local coordination and mobilizing multi-entity crews to conduct hazardous fuels treatments and cultural burns (Fig. 1). The current planning strategies and practices focus on treatments in and around communities (WUI), along travel/road systems, and on strategic landscape features – such as ridges – where fire historically was used and can be more easily managed to achieve resource objectives today.

Canada/Western Provinces

Indigenous peoples in Western Canada have used fire since time immemorial, generally as low-intensity burns in the early spring or late fall to achieve certain cultural objectives (Fig. 2). The most important resources were the early succession species that appear soon after a fire, such as wildlife, grass seeds, legumes, berries, and bulbs (Lewis 1982, 1988). Fires were also used to increase the growing season – spring fires resulted in the warming of the soils and melting of frost, thus allowing the growing season of plants to begin earlier (Lewis 1982). Fire was also used to reduce risk to the settlement areas and ceremonial sites. Old deadfall forests were burned in the spring because it was safer to burn the forest than risk a fire caused by lightning in the summer. In Canada burning was outlawed and replaced with a centralized system that aimed to suppress all forest fires to initially protect watersheds and timber values (Lewis 1978). Burning practices of Indigenous peoples continued hidden in the background, but never at the scale it had been formerly.

Indigenous Nations in British Columbia in particular are increasingly active in their efforts to return cultural burning practices to their traditional territories (Fig. 3). Lytton First Nation continues to use fire on their territories; however, the scope has decreased in both size and application (Lewis et al. 2018). Several reasons for burning have become less common (e.g., foodstuff amelioration), but debris control and hazard (fuels) abatement are now the predominant motivators for fire use. Xwisten Nation, Shackan Indian Band, and the Yunesit'in governments are currently involved in projects to revitalize cultural burning practices. Elders and fire keepers in each nation remain highly knowledgeable about cultural burning practices, including specific knowledge about fuel conditions, weather, fire behavior, and intended cultural objectives such as engaging in cultural burning and land-based activities (e.g., berry picking, fishing, hunting) (for an example, see Xwisten Nation et al. 2018).

South America/Amazonia

The Amazonian bioregion of South America is one of the most biologically and culturally diverse areas in the world. Climatic and geographic diversity – from lowlands to high mountains – across rivers, savannas, and rainforests, and Indigenous fire stewardship practices all influence fire regimes. Biological diversity, in particular the different habitats occurring within several ecosystems, has developed from Indigenous land use practices. Similar to other regions of the world, colonization and non-Indigenous

Indigenous Fire Stewardship, Fig. 1 Klamath River TREX October 2015 Yurok and Karuk ignitors cultural burning in the WUI to achieve multiple objectives. (Photo credit: F.K. Lake USDA Forest Service/Karuk Tribe)

Indigenous Fire Stewardship, Fig. 2 Métis spring fires to improve muskrat habitat at Cook Lake in N-28 Trapping Zone, near Cumberland House, Saskatchewan. (Photo credit: Renee Carriere)

governance and resource extraction efforts have greatly marginalized the capacity of Indigenous fire stewardship. Recent conservation efforts have involved promoting Indigenous tenure and land rights and acknowledge the benefits of Indigenous fire stewardship on biodiversity and other valued resources. Current efforts among nongovernmental organizations, state government programs, and local Indigenous groups are working to reduce deforestation contributing to greenhouse gas emissions, promote more sustainable forest management, and increase the capacity for managing wildfires that have been and are threating communities (WUI and remote Indigenous villages) and result in catastrophic habitat conversion from climate-induced large-scale uncontrollable wildfires (Mistry et al. 2016). Satellite imagery depicts that Indigenous lands have the lowest incidence of wildfires, which contribute to maintaining carbon stocks and enhancing biodiversity. Acknowledgment of Indigenous peoples' role

Indigenous Fire Stewardship, Fig. 3 Fire Keeper Pierre Krueger, Penticton Indian Band, conducting a cultural burn in the Nicola Valley, British Columbia." (Photo credit: A.C. Christianson, CFS)

in fire management and control is limited (Mistry et al. 2016). For example, uses of fire by the Wapishana and Makushi people of the South Rupununi, in Guyana, are applicable to the WUI by preventing the buildup of flammable fuel which include: safety (cleaning paths, clearing around houses, chasing away dangerous animals (jaguars, snakes, and mosquitoes)); protection (preventing large fires entering forest islands, farming areas, palm areas, homes, no-go zones); fighting large hazardous fires when approaching (fighting fire with fire); and burning potentially dangerous overgrown swamps and savannas (Mistry et al. 2016: 3-Table 1). Government-supported programs that include local Indigenous engagement with fire-related projects are emphasizing continued and increased Indigenous stewardship to achieve broader national and local values and objectives.

Australia/Northern Territory

The Northern Territory of Australia is biologically an Aboriginal culturally diverse area. Climatic and geographic diversity – from coastal lowlands to interior mountains – across rivers, savannas, dry forests, and deserts, and Aboriginal fire stewardship practices all influence fire regimes. Ecological diversity, in particular the different habitats occurring across several ecosystems, has evolved from Aboriginal land use practices. Similarly to other regions of the world, colonization and non-Aboriginal governance and resource extraction efforts have greatly marginalized the capacity of Indigenous fire stewardship. Recent conservation efforts, promoting Aboriginal tenure and land rights, acknowledge the benefits of Indigenous fire stewardship on biodiversity and other valued resources (Whitehead et al. 2003). Current efforts among nongovernmental organizations, national park government programs, and local Aboriginal groups are working to reduce greenhouse gas emissions caused by large-scale uncontrollable wildfires, increase sustainable resource management, and address capacity for managing wildfires that have been and are threatening communities (WUI and remote Aboriginal villages). Government-supported programs that include local Indigenous engagement with fire-related projects are emphasizing continued and increased Indigenous stewardship to achieve broader national and local values and objectives. Across Australia, the FireSticks Alliance Indigenous Corporation supports Indigenous fire stewardship by seeking to restore fire as a cultural practice conducted on traditional country,

therefore not governed under contemporary colonial fire management prescribed burning programs or restrictions.

Moving from Fire-Adapted Communities to Fire-Dependent Cultures

How can society learn to live with fire? Most countries with a "fire problem" have programs which emphasize fire risk reduction practices (e.g., fuel treatments), building and structural fire safety, preparing for wildfires (Paveglio et al. 2014, 2016), and prioritize fire suppression. Indigenous communities hold teachings and practices, such as cultural burning, that can serve to reduce risk while at the same time meeting cultural objectives (Huffman 2013; Eriksen and Hankins 2014, 2015; Lewis et al. 2018). Generally, such efforts as the fire-adapted community program emphasize broader fire-safe practices (Paveglio et al. 2014, 2016). Central to each Indigenous group though are the unique aspects, or elements, of them being fire-dependent cultures (see Huffman 2013). A fire-dependent culture is a collective group or society of people who have a high degree of reliance and need for specific attributes of fire to promote and create landscape conditions that support their economies and livelihoods, contribute to the creation and maintenance of ecosystem services while protecting them from adverse wildfire impacts, and foster postburn habitat conditions for valued resources. When placed in the local ecosystem and Indigenous cultural context-integrated (fire risk reduction) fuel treatments, cultural burning and managing wildfires to achieve resource objectives increase the resilience and resistance of vegetation species that have multiple ecosystem services (Berkes and Ross 2003; Turner et al. 2003). For example, Indigenous community preferences for drought-tolerant and fire-adapted trees, shrubs, and understory plants that constitute "fuel" are often important cultural keystone species of local habitats that provide wildlife habitat, foods, materials for fiber and basketry, and medicinal resources. Each region, ecosystem, and habitat in which a community is residing (i.e., WUI) has the potential to be managed through intervention actions to reduce the risk of detrimental fires and expand the use of prescribed/cultural burning or managing wildfires under a range of conditions where suppression resources can protect life, property, and resources in some areas or manage the fire to promote desired postfire effects in others. To this effort, for Indigenous communities such approaches reinstate practices that transition from being fire-adapted communities to being more fire-dependent cultures.

The effects of wildland fire impact all aspects of society and Indigenous communities in multifaceted ways. In many countries, national funding authorities often prioritize the WUI (Stephens et al. 2009). Many Indigenous and rural communities, with less human population densities, are evaluated or ranked against more urbanized economically market-valued jurisdictions when funding for fire risk reduction (fuels) treatments and when wildfires occur regarding the allocations of resources for types of values at risk (Lafortezza et al. 2015; Steelman 2016). As detailed above, Indigenous fire stewardship and cultural burning can both benefit the local community (WUI) and be of benefit to the larger society. The ways in which this can occur are alignment of local rural/Indigenous values and interest, e.g., promoting more resilient fire-adapted drought-tolerant vegetation that has recreational, scenic, conservation, or intrinsic value to society, but also serving to promote critical habitat of culturally valued wildlife, plant, and fungi species. Indigenous community interest to expand the seasonality, frequency, and extent of burning will rejuvenate fire-related knowledge and practices while having the effect of reducing the potential of detrimental wildfires at severe weather- or climate-induced conditions (Huffman 2013).

Cross-Cultural Fire Stewardship

In today's climate and existing fuels conditions around and in the WUI, cross-cultural fire

stewardship which integrates western or global science with Indigenous/local knowledge and best management practices, like Indigenous fire stewardship with landscape restoration strategies, can serve to protect communities and increase the social acceptability of fire use (Lake et al. 2018). Efforts to empower and promote IFS can serve the needs of local Indigenous communities and the interest of the broader society. Even if non-Indigenous residents living in fire-prone ecosystems don't know of or use the fire-adapted drought-tolerant plant species for food, materials, or medicines, they will still benefit from having that vegetation in the WUI. Although non-Indigenous members of society are not dependent on postburn habitats for a range of resources to perpetuate their cultural knowledge systems and practices, they will still be the beneficiary of IFS that promotes water security, reduce the threat of catastrophic wildfires, and increase the resilience of their environment to climate- and fire-related risk factors.

There are many challenges to reinvigorating Indigenous fire stewardship, even internally in Indigenous nations. Some Indigenous youth and some community leaders became more critical about the use of fire from more regular contact with state natural resource management officials and environmental organizations that promoted antifire discourses (Mathews 2006; Eloy et al. 2018). As non-Indigenous colonial settlers, unfamiliar with wildland fires culturally, have moved into fire-prone ecosystems, social influence is changing Indigenous values to focus more on fire prevention and suppression that can have the effect of making the wildfire problem in the WUI worse – "deferred risk" (Christianson 2015; Mistry et al. 2016). Many younger Indigenous people have been critical of Indigenous fire use, largely due to a loss of knowledge, declining fire-based cultural practices, and environmental education programs focusing on fire control governed by state resource managers. Indigenous fire knowledge and stewardship practices are threatened. Few Indigenous communities are rejuvenating fire – where active efforts are underway to both recover or to share knowledge in landscapes in which Indigenous fire stewardship was once the norm (Huffman 2013). Rejuvenating Indigenous fire stewardship and cultural burning practices in the short term is not easy or straightforward when colonial settled and westernized Indigenous communities have lost the wisdom developed over millennia of generations of living with fire. There also remains a lingering fear to use fire, due to liability and laws enforced by the colonial state/nation legal systems. Additional risk to rejuvenating IFS include institutionalized management programs that may replace the complexity and contingency of Indigenous fire management. The institutionalization of Indigenous fire stewardship can fail to recognize it is characterized by diversity of objectives and sometimes opportunistic burning throughout the year which are linked to various social, ecological, and spiritual purposes. IFS can also buffer the impacts of extreme climate variability and produce habitat mosaics that support landscape biodiversity (Mistry et al. 2016).

Cross-References

- Bushfires
- Fire History
- Fire Regime
- Forest Fire
- Ignition Sources
- Landscape Fire Ecology
- Prescribed Burning

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