2017-2018 California Wildfires
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Overview

A series of record-setting wildfires burned through California in 2017 and 2018, drawing global attention and raising complex issues surrounding land management, corporate and government responsibility, and climate change. This recent series of massive wildfires began in October 2017 with a cluster of fires in the area north of San Francisco Bay. The fires were driven south and west toward Santa Rosa, before swinging northward with a change in the winds. The largest of these fires, the Tubbs Fire, burned a relatively modest 14,895 ha, but 5,642 structures were lost and 22 people were killed, setting a new record for destruction by a fire in the state. In December, the Thomas Fire struck southern California, sparked by power lines operated by Southern California Edison knocking together in high winds. A massive mobilization of firefighting resources struggled to protect communities as hot, dry Santa Ana winds coming down off of the mountains pushed fire toward the coast. When it was finally contained a month later, 1,063 structures had been lost and two people were killed. Heavy rains in January caused massive mudslides in burned-out areas, killing 21 more people and destroying another 129 homes. At 114,078 ha, the Thomas Fire was the state's largest fire in recorded history.

In July 2018, another major firestorm broke out in coastal northern California. Several massive fires combined into what was known as the Mendocino Complex. With 280 structures lost and one death, the Mendocino Complex caused less human suffering than the Thomas or Tubbs Fire, but set a new record for total area burned at 185,800 ha. In November of that year, the Camp Fire struck farther inland in northern California after a faulty power line ignited some vegetation. The Camp Fire burned only 62,053 ha, but at 18,804 structures burned and 86 people killed, it became by far the deadliest and most destructive fire in the state's recorded history. The near total destruction of the ironically-named town of Paradise became iconic of the state's wildfire problem. Following the fire, Pacific Gas and Electric, which owned the power line that started the fire, filed for bankruptcy and instituted a program of preemptive blackouts on high fire risk days. At the same time as the Camp Fire burned in the north, the Los Angeles area suffered from the Woolsey Fire, which destroyed 1,643 structures and killed three people in the course of burning 39,234 ha. Among the locations lost were the homes of celebrities like Miley Cyrus and Neil Young, and film locations such as the sets of *The Bachelor* and *The Bachelorette*.

Background

Rather than focusing on single fire events, fire ecologists use the concept of the fire regime to analyze changes in fire at the landscape level. A **fire regime** is the typical frequency, seasonality, and intensity of fire experienced in a place. Historically, most of northern and central California has had a high frequency, low intensity fire regime. This means that fires occurred often (perhaps once every five years), but burned relatively lightly, usually just consuming dead and downed material on the forest floor. The shrublands of southern California, known as the chaparral, historically experienced a high frequency, high severity fire regime, with fires consuming the entire upper story on a regular basis as well. The fire regime of an area is a function of both biophysical factors such as climate, terrain, and major plant species, as well as

human land management activities. Changes to these factors lead to changes in the fire regime, which in turn impacts life in the affected landscape. These factors also provide leverage for deliberate attempts to alter fire regimes in pursuit of various land management objectives.

The story of California's changing fire regimes begins with the removal of indigenous people from the landscape as Euro-American settlers took over the region. Prior to colonialism, California was home to around 500 tribes, most of which practiced a way of life based primarily on hunting and gathering. In California as elsewhere in the world, hunter-gatherer peoples rely heavily on skilled use of fire to encourage the growth of desired plants, facilitate hunting, and protect resources from destructive wildfires. Because human presence in California goes back to before the most recent glacial cycle, human activities have been an integral part of the region's ecosystems as they developed.

The Euro-American economy that arrived in the nineteenth century was a capitalist system that required constant expansion into new geographical regions and increasing appropriation of land and resources in order to fuel continued accumulation of profits. This required both removal of indigenous people themselves (in order to make the land available for Euro-American use), and the extinguishment of indigenous fire use practices. From the late nineteenth to the early twentieth century, forestry experts working for the federal and state governments derisively referred to indigenous fire use (and similar practices carried out by poor white and black Americans) as "Paiute forestry," implying that it is the product of ecological ignorance and unsuited to a civilized modern society.

For most of the twentieth century, fire was thus regarded as a wholly destructive force, threatening both economic assets such as timber, and human habitation in areas near wildlands. The U.S. Forest Service and the California Department of Forestry (later renamed the California Department of Forestry and Fire Protection, or Cal Fire for short) instituted a policy of fire suppression. All fires were to be put out as soon as possible after being detected, and both deliberate and accidental ignition of fires was to be stamped out. This policy received a boost in the 1940s from two developments: access to military surplus equipment such as aircraft after World War 2, and the launch of a long-running series of public service announcements featuring Smokey Bear. The effect of the suppression policy was to allow the buildup of fuels in forests where wildfires would otherwise have consumed them, resulting in much larger and more destructive fires when they finally do burn.

A crucial development affecting fire management in industrialized countries like the United States was the growth of exurban populations over the second half of the twentieth century into the twenty-first and the resulting development of "wildland-urban interface" landscapes. **Exurban** areas are those lying beyond the suburbs of an urban area that still retain close economic connections to the urban core. Populations in the urban core of U.S. cities peaked around 1950, then subsequently shifted away from cities in a movement demographers refer to as the "population turnaround." This turnaround was driven by a variety of factors. These included improvements in the highway sector and expanded access to cars, fears of urban pollution and crime, desire to access environmental amenities, rising housing costs in cities, longer lifespans creating longer periods of retirement while still able to live independently, and racist opposition to living next to, and paying taxes to support services for, people of color.

Exurban settlement produced a landscape known among fire researchers as the **wildland-urban interface** (WUI). The WUI is defined as a landscape in which human settlements abut undeveloped lands. WUI areas have heightened risks for starting fires, as human activities are the principal source of ignition in most areas. These ignitions include cigarettes, electrical

malfunctions, improperly extinguished campfires, vehicle sparks, and deliberate arson. More importantly, the proximity of housing to vegetation-covered lands puts those homes at risk when a fire burns that vegetation. Thus the principal fire "problem" in the US shifted from a concern with protecting timber and water resources in wildlands, to protecting human lives and property in WUI areas.

While the WUI has been growing in all parts of the industrialized world, it has been particularly prominent in California. In part this has been due to population growth, as the US population has seen a shift toward southern and southwestern "sun belt" states and away from the northeastern "rust belt." California settlement patterns have also been influenced by the state's image as a place of luxury and leisure. California is known for its mild climate and has associations with the glamor of the Hollywood movie industry, which has drawn people to pursue the "California dream" in the suburbs and exurbs. Finally, California's housing affordability is among the worst in the nation (Joint Center for Housing Studies 2019). Housing shortages and extremely high rents and purchase prices in major cities like Los Angeles and San Francisco have contributed to pushing lower-income and middle-class residents into exurban areas.

The advent of neoliberal economic systems in the later decades of the twentieth century has brought about further changes in the way that fires are experienced and managed. The federal Healthy Forests Initiative of 2002 and its successor the **Healthy Forests Restoration Act** (HFRA) of 2003 clearly illustrate this new approach to fire. HFRA was championed by President George W. Bush as his signature environmental accomplishment, and passed the Republican-controlled Congress with bipartisan support but mostly Democratic opposition. California's deadly Cedar Fire of 2003, among other major western wildfires, was cited by proponents as evidence of the need for the law.

A key component of HFRA is deregulation. Neoliberalism has at its core a critique of centralized, top-down government control. In the case of wildfire, HFRA's proponents argued that forest management projects that could remove fuels and thus reduce the risk of fire were being held up by excessive "green tape," that is, burdensome and counterproductive environmental regulations. HFRA addressed this by granting exemptions and fast-track status to fuel reduction activities. Critics such as the Sierra Club charged that this provision was simply a way to expedite logging on public lands, and that the resulting forestry projects would do little to reduce dangerous fuels.

Another component of neoliberalism is the idea that the market can be used to solve problems, rather than being a source of problems that requires regulation to rein in its destructive tendencies. In the case of wildfire, we can see this in efforts under HFRA to encourage the production and marketing of small-diameter timber. Logging typically prefers large-diameter trees, but these are the least important fuels for a wildfire, as large, solid trunks do not burn easily. Some studies have indicated that logging can actually increase the danger of fire, for example by removing large trees but leaving behind discarded branches ("slash") and opening up the canopy for the growth of smaller trees (e.g. Naficy et al. 2010). Other research disputes these conclusions (e.g. Safford et al. 2012), and much seems to depend on the specific logging techniques and the characteristics of the affected ecosystem. In any case, developing a market for smaller-diameter wood would make it profitable for logging companies to remove more easily burned materials, thus harnessing the capitalist system to reduce fire danger.

Another component of neoliberalism is shifting responsibility for one's own fate to individuals and communities. At the community level, HFRA created a system of **Community**

Wildfire Protection Plans (CWPPs). A CWPP is to be developed by a range of stakeholders within a community (which can range from a neighborhood to a county in scale), ideally coming together through a participatory process to agree on defining areas of high risk and developing policies to address that risk. CWPP creation built on a series of other participatory fire management initiatives introduced in the 1990s and 2000s, such as the national FireWise Communities program and the California Fire Safe Councils. These initiatives involve community groups coming together to learn about and promote best practices for protecting homes from wildfire.

State and local regulations and the insurance industry have also played roles in shifting responsibility for fire safety to homeowners and communities. Increasing major fires across the country have strained insurance company finances. These companies have in turn begun to consider tying rates and availability of coverage to individual homeowner activities to reduce their home's risk from fires, in addition to the fire risk at the landscape scale. Some victims of the 2017 and 2018 fires have been denied insurance coverage if they rebuild in the same area. Many local governments have also stepped in to mandate similar fire safety measures. These home fire safety recommendations include removing vegetation from around the home, building the home's exterior from fire-resistant materials, providing a source of water for firefighters, and improving the accessibility of the driveway to firefighting vehicles.

The neoliberal move toward decentralized responsibility, and the increasing recognition by fire ecologists of fire's positive role in the ecosystem, have created opportunities for indigenous people to bring back traditional fire use practices. Numerous tribes and bands in California have formed partnerships with state and federal authorities to carry out burning within their territories. California has become a world leader in re-establishment of indigenous fire, but the scale of dispossession over the preceding centuries is so great that a relatively small percentage of land is under indigenous fire management at present.

Neoliberalism is also associated with privatization of industries, utilities, and services owned and operated by the state. While state, federal, and local firefighting services have not been privatized, the twenty-first century has seen the rise of a parallel system of private firefighting services operated by insurers. These private firefighters target protection to the property of customers, typically the extremely wealthy. News reporting on these private firefighters saving the WUI home of Kim Kardashian and Kanye West garnered public attention, and outrage, during the Woolsey Fire. Advocates argue that private firefighters take some of the burden off of public firefighters and enable customers to be certain their home will be protected, while critics charge that private services create an unequal two-tier system and get in the way of public fire service operations.

Privatization has also been a topic of debate with respect to the utility system in California, with the state's two major power companies being under private management. The promise of privatization is that market forces will push companies to be more efficient in serving customers. In practice, critics charge that privatized utilities neglect maintenance and cut corners to control costs, while focusing on earning profits for investors. On the other hand, market advocates argue that most of their problems can be blamed on burdensome and inefficient oversight by the state's Public Utilities Commission. Whatever the cause, PG&E and SoCal Edison both report extensive problems with outdated equipment and inadequate trimming of vegetation growing near it, raising fire risks.

Finally, wildfire in California is being shaped by climate change. Climate change has made California warmer and thus made fires more likely to start and harder to control (Williams

et al. 2019). This is especially noticeable with respect to nighttime low temperatures, which are rising faster than daytime temperatures. Firefighters often rely on the cooler night to create opportunities to get fires contained. Climate change is also worsening drought conditions in California, which dries out fuels and makes them more susceptible to burning. Moreover, climate change is lengthening the summer fire season in California, with snow melting earlier in the spring and rain arriving later in the fall. The Thomas Fire, for example, burned at a time when California would normally have seen the winter rains bring a lowering of fire danger. Nevertheless, it remains difficult to tie specific fire events to climate change, and some researchers have cast doubt on the climate-fire link in southern California in particular. Southern California is a region that has always had a high frequency, high intensity fire regime. In a fire regime like that, there is less room for a factor like climate change to increase the amount of burning. In contrast, in an area whose historical fire regime left larger vegetation untouched because fires were generally cool, climate has the potential to increase the severity of fires by enabling that larger vegetation to burn as well. Northern California's forests would fall into this second description.

Wildfires can also be a contributor to climate change, as wildfire smoke contains substantial amounts of carbon dioxide and other greenhouse gases. Under a stable fire regime, carbon released by burning would be removed from the atmosphere again when the ecosystem re-grew. But in a fire regime shifting toward higher intensities and/or higher frequencies, long-stored carbon may be released through burning, but not recovered before the next fire. Burned areas also have a lower albedo than unburned ones, meaning that they absorb more of the sun's energy.

Social, Political, Economic, and Environmental Impacts

The most immediate impacts of these fires have been the loss of life and property during the blaze. The town of Paradise, which was hit by the Camp Fire, provides a clear illustration of the immediate effects. The fire caught many residents of Paradise by surprise, and a massive hurried evacuation jammed the roads out of town. Residents who were unable to get out hid in storm drains and other makeshift shelters. Evacuees spent nervous weeks waiting to be allowed to return and see if their home had survived. Most of those who lost their homes moved to neighboring Chico, sending housing prices soaring. Some residents found themselves living in camps, unable to find permanent housing. The media gave outsized attention to Paradise because of its near total destruction, its role as a filming location for numerous movies, and its ironic name. In the aftermath of the fire, residents pledged to rebuild their community. However, rebuilding efforts have struggled due to inadequate insurance and relief aid payouts, traumatic memories of the fire, bureaucratic obstacles, and residents deciding it would be easier to move elsewhere. The town's population declined from 26,000 to 2000, and a crowd-sourced Google map shows displaced residents living all across the country (Hagerty 2019). A year later, most businesses in the town remained closed.

Displacement of residents from burned areas has worsened California's housing crisis. California's coastal urban areas have experienced extremely high housing costs and severe housing shortages. This has been one factor pushing people into exurban areas, in search of affordable housing. The loss of homes in fire-affected areas has forced those residents into the already overcrowded housing market. Many people have remained without adequate housing for years after a fire, especially if their insurance coverage was inadequate or payouts were delayed.

Several of the major recent fires in California have been blamed on faulty electrical transmission equipment, in particular the hugely destructive Camp Fire. Pacific Gas and Electric (PG&E), who owned the responsible equipment, reached an $11 billion settlement with insurance companies for losses incurred in 2017 and 2018. The scale of liability pushed the company to file for bankruptcy in January of 2019, in order to limit losses from further claims. This was the company's second bankruptcy in the twenty-first century, following a 2001 filing that was prompted by an inability to cover the costs of buying out-of-state electricity. SoCal Edison also faced insurance claims for its role in sparking the Thomas and Woolsey fires, ultimately paying out $360 million.

Facing strong criticism over its role in the Camp Fire, in 2019 PG&E instituted a system of precautionary blackouts in areas with elevated fire danger. Just one blackout, in late October 2019, affected some 850,000 customers around the San Francisco Bay area (Woodward 2019). These blackouts caused significant disruption to life in the affected areas in a society that has become increasingly dependent on a steady supply of electricity, and created uncertainty due to the blackouts' indefinite length. Additional criticism focused on the unequal impacts of the blackouts, as poorer residents have less ability to recover e.g. by replacing food that spoiled when left unrefrigerated. People with disabilities were also heavily impacted, as many medical devices and assistive technologies require electricity. PG&E's struggles with safety and maintenance of its equipment have led to calls from some to have the private utility company taken over by the state (Garofoli 2019) – a reversal of the privatization that usually occurs under a neoliberal approach to policy.

In the larger picture, the California wildfires have become a rhetorical resource for debates over environmental management. They have been cited as proof of longstanding political agendas on both the right and left.

From the political left, the California wildfires have been repeatedly invoked as a warning about the effects of anthropogenic climate change. Where some effects of climate change are slow or subtle, such as sea level rise, a wildfire has an immediacy and drama that makes it a compelling illustration of the danger of climate change. For example, Senator and 2020 presidential hopeful Bernie Sanders tweeted "The record-breaking wildfires in California have everything to do with climate change. We must confront the reality that climate change is already destroying tens of thousands of lives, and take concrete steps to avoid its worst consequences" (Cama 2018). And fellow candidate Senator Elizabeth Warren concurred that "Climate change is driving devastating wildfires across California—and these fires will only grow more dangerous and destructive until we act to stop the climate crisis." Individuals skeptical of climate change have condemned these sorts of statements as inappropriately politicizing a tragedy.

On the political right, some of the most prominent rhetorical use of the California fires has come from President Donald Trump. For example, he tweeted "The Governor of California, @GavinNewsom, has done a terrible job of forest management. I told him from the first day we met he must 'clean' his forest floors, regardless of what his bosses, the environmentalists, DEMAND of him. Must also do burns and cut fire stoppers" (Borenstein 2019). Trump's tweet fits into a larger neoliberal narrative about forest fires, similar to the one invoked by the previous Republican President, George W. Bush, in proposing HFRA. In this narrative, destructive fires are primarily the result of an excessive buildup of fuels, which in turn are the result of environmental regulations that put wildland areas off-limits to active human management. The solution is then to streamline both mechanical removal of fuels (e.g. by logging and small-

diameter timber harvesting) and controlled burning. Trump also blamed environmentalists for restricting access to water that could be used to fight the fires. Fire service leaders have, however, stated that a lack of water has not been a major impediment to firefighting in California. Trump also repeatedly threatened to cut off federal disaster aid to California if the state did not change its fire management policies (Daniels 2019), though critics have pointed out that much of the affected land is under federal control. Trump's attack on environmental laws for restricting water access echoes longstanding complaints by thirsty agricultural companies in the state about regulations that require minimum water flows in rivers for ecological purposes.

The debate between those who blame climate change and those who blame environmental regulations is not limited to the United States. In Australia, Deputy Prime Minister Michael McCormack blamed "some pure, enlightened and woke capital city greenies" for inhibiting fuel management and trying to turn the conversation to climate change, after severe fires threatened the city of Sydney in 2019 (Baker 2019). Australia has experienced a similar wildfire problem to the US, albeit with some unique national circumstances, as illustrated in the sidebar about the 2009 "Black Saturday" fires and the 2019-20 east coast fires.

Geography Matters

Death, property loss, and ecological harm from major wildfires occur at the intersection of several geographies. As a fire burns spatially – from the ignition point outward to adjacent places – it encounters landscapes formed by a variety of geographical processes.

- The geography of fuels shapes how a fire is able to spread from one place to another, and the intensity with which it will burn as it goes. A fire in a northern California pine forest will burn differently from one in the southern California chaparral.
- The geography of land use is a major influence on the geography of fuels, with land clearance, logging, indigenous management, and wilderness preservation each having distinct impacts on the volume, condition, and connectivity of fuels.
- The geography of physical terrain shapes how quickly fire will move – fire spreads more rapidly moving up-slope – and how easily firefighters can access certain points.
- The geography of weather plays a major role as well. All of the highly destructive recent fires were driven by hot, dry winds coming down out of the Sierra Nevada or Coast Ranges. Weather patterns also carry smoke to areas more distant from the fire, impacting air quality for a larger population.
- The geography of urban and exurban settlement puts people and property into harm's way or keeps them out. There are important differences made by settlement geography at the micro scale of the individual property, the meso scale of the neighborhood or development, and the macro scale of the metropolitan area.
- The geography of transportation networks can facilitate, or inhibit, evacuation from a fire as well as access by firefighters.
- The geography of power generation and distribution has become a critical factor in California with blame for major fires falling on companies like PG&E. The locations of electrical equipment provide a map of potential ignition points, and the connectivity of the network shapes the distribution of preemptive blackouts on high fire danger days.

Because of the complexity of these geographies, it is important to avoid simple single-cause narratives about fire. The shape of the fire problem, and its most effective solutions, may vary

considerably between northern and southern California, not to mention other parts of the United States or the world.

The intersecting geographies of fire produce highly unequal impacts. Research has demonstrated that poor communities and communities of color are at elevated risk from wildfires (Davies et al. 2018). Housing costs have pushed marginalized communities into fire-prone areas, and left residents without resources to adequately prepare for fires. Once a fire occurs, marginalized communities also have greater difficulty in affording to rebuild. The complex and bureaucratic aid process presents a further roadblock for marginalized people who lack the knowledge and resources to navigate the process. Undocumented immigrants are at particular risk, because they face denial or even deportation if they seek aid or shelter during or after a fire. Prisoners – who are disproportionately people of color – have been employed for as little as $2 a day by Cal Fire to fight fires. But upon release, their criminal records prevent many of these people from finding work as firefighters. Gender also affects people's experiences with fire. Firefighting is a highly gendered occupation, and at the household level it is common for men to insist on taking a "protector" role in facing the fire while women bear primary responsibility for taking care of children, the elderly, and other dependents.

The California fires also provide an important illustration of the role of scale. Surveying the major proposals to prevent a repeat of the disaster, we see an important divide over the proper scale at which to address the problem. Fire services like Cal Fire recommend that homeowners implement a variety of hazard reduction measures, such as clearing vegetation and replacing flammable roofing materials, that focus on the hyper-local scale (see https://www.readyforwildfire.org/). Advocates of this approach present images of neighborhoods in which one house burned to the ground while its neighbor remained standing to illustrate the impact of such individual actions. These recommendations can be scaled up to the community level with local laws mandating fire-safe practices, which many California communities have adopted.

President Trump's tweets place the focus at the scale of the state of California. He points to state-level land management and environmental policies as the key problem. Other critics have charged that PG&E's problems with preventing ignitions are a product of California's utility regulations. A national-scale perspective highlights the role of national policies of fire suppression in creating a buildup of fuels in forests. The national scale is also where we find suggestions that processes of exurban growth are to blame, as these stem from the American capitalist model and produce WUI landscapes across the country.

Finally, pointing the finger at climate change shifts our focus to the global scale. While the specific impacts of climate change vary from location to location, they are the product of a systemic global change. While California may be relatively progressive in lowering carbon emissions, and the United States as a whole lags, ultimately the global problem of climate change requires a global solution.

Key Players

Bush, George W.
California
California Department of Forestry and Fire Protection (Cal Fire)
Pacific Gas and Electric (PG&E)
Southern California Edison (SoCal Edison)
Trump, Donald

US Forest Service

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