Pathways for a more smoke-resilient California

Connecting public health and forest management

CCST
CALIFORNIA COUNCIL ON SCIENCE & TECHNOLOGY

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Expert Briefing | Jan. 8, 2024

Sunset smoke on the Stanislaus National Forest, Calif. | Colby Jackson, BLM

Summary Points

California's future is expected to be smoky as wildland fires become more common.

Exposure to wildland fire smoke adversely impacts human health by increasing the risk of respiratory, cardiovascular, and other adverse health outcomes.

CCST's recent study[1] on wildland fire smoke found a growing body of research suggesting that forest management to improve forest health can be designed to also reduce adverse smoke impacts and benefit human health.

Through interviews, CCST's study found that many health sector organizations would value engaging with the forest management sector to help mitigate the harms of wildland fire smoke but they require avenues for collaboration and more information on the potential benefits of forest health to human health.

Cross-sectoral collaborations can help make California more smoke-resilient.

Smoke in California

Prior to Euro-American settlement, smoke events were frequent in California. It is estimated that more than 4.5 million acres across the state burned each year from a combination of naturally ignited wildfires and cultural fires intentionally ignited by Indigenous tribes to manage landscapes.

During the 20th century, smoke events in California were small and uncommon, as fire suppression policies and prohibitions against Indigenous cultural burning practices greatly reduced the annual acres burned.

Recently, large smoke events have become more common, as climate change and degraded forest conditions are now fueling wildfires that regularly exceed our suppression capabilities and produce widespread harmful levels of smoke.

California's future is expected to be smoky as climate change increases the risk of large uncontrolled wildfires and evolving management strategies promote more prescribed and cultural fires to restore forest health, reduce wildfire risk, and achieve other beneficial outcomes.

[1]CCST and Blue Forest (2023). "The Human Health Benefits of Improving Forest Health in California." https://ccst.us/reports/the-human-health-benefits-of-improving-forest-health-in-california/

Disaster Resilience

Ongoing, complex, and intersecting disasters—including climate change, extreme heat, power outages, and the COVID-19 pandemic—are radically disrupting the ways in which Californians live and work. CCST is committed to delivering science and technology advice to improve our resilience to disasters, reduce harm, and improve the lives of all Californians.

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Pathways for Mitigating the Health Impacts of Smoke

Forest and Fire Management

Forest and fire management can help control how fires burn, which in turn can affect how much smoke is produced (**emissions**) and how smoke plumes spread away from fires (**dispersion**). For example, management practices that promote fewer acres of high-severity fire and more low- to moderate-severity acres can help reduce smoke emissions per acre of fire. Management that promotes less uncontrolled fire and more intentional fire can help ensure fires burn during weather conditions that carry smoke away from populations.

Public Health Interventions

Public health interventions can help reduce **population exposure** to harmful levels of air pollution whenever smoke plumes disperse into populated areas. For example, encouraging fewer outdoor activities can mean fewer people exposed to smoke. Improving building weatherization and distributing air filters can mean people are exposed to lower amounts of smoke. Ensuring people have adequate supplies of asthma inhalers and other medications can mean fewer health complications when people are exposed to smoke.

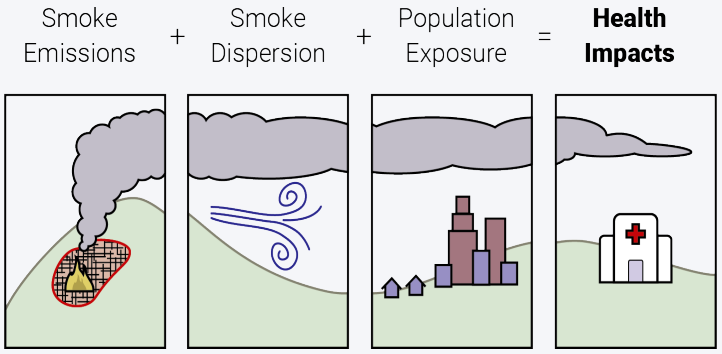

Figure. Diagram of the main factors contributing to how badly wildland fire smoke negatively impacts human health.

Source: Figure 8 from CCST and Blue Forest (2023)

Smoke Resilience In-Depth

Improving local smoke data

Existing air quality monitors are primarily located in areas with larger population centers and higher levels of anthropogenic air pollution. Many smaller or more rural communities that are regularly affected by wildland fire smoke lack local air pollution monitoring. These same communities are also typically located in areas with complex terrain where smoke concentrations can vary substantially between the many valleys and ridgelines. As a consequence, many communities lack accurate data on their local exposure to smoke.

Kerri Vera of the Tule River Tribe is partnering with researchers from Stanford University to deploy air monitors within the local airshed to better understand how smoke is impacting Tribal communities. High quality, local smoke data will help the Tribe develop effective and culturally appropriate interventions to increase the smoke resiliency of the community.

Restoring Good Fire

California's diverse landscapes have evolved to withstand — and depend on — fires to maintain healthy ecosystem functions. Restoring beneficial fires (prescribed fires, cultural fires, and managed wildfires) to fire-deficit forests can help improve forest health and reduce the risk of uncontrolled destructive wildfires. Beneficial fires also produce smoke, which could be harmful to human health. However, beneficial fires burning in healthy forests are expected to result in fewer smoke health impacts than uncontrolled wildfires burning in degraded forests.

Bethany Hannah with the nonprofit Climate and Wildfire Institute is working with researchers from the University of California system, prescribed and cultural fire practitioners, and state policymakers to expand the use of intentional beneficial fire in California, such as the planned 3300-acre, landscape-scale prescribed fire in the Teakettle Experimental Forest.

Restoring Good Smoke

Wildland fire smoke in the right place and at the right time can also benefit human health. Smoke is a tool that has been used by Indigenous peoples since time immemorial to help manage natural resources including traditional foods. For example, the intentional introduction of smoke from cultural fires to oak woodlands can help to manage beetle pests and protect acorn crops, sustaining a staple food. The intentional introduction of smoke along rivers in late summer reduces sun exposure, lowering water temperatures and allowing salmon populations to thrive.

Dr. Deniss Martinez of UC Davis is working with Indigenous communities across California to restore cultural fire practices to the landscape, helping to reduce the harms of wildland fire smoke while also promoting smoke benefits.

Protecting Public Health

Wildland fire smoke can travel far from the source fire and impact many more people than the fire itself. As a consequence, urban populations with little wildfire risk can still be severely impacted by smoke from fires burning hundreds of miles away. Public health interventions can help limit population exposure to smoke and reduce health impacts. Examples include limiting time spent outdoors, wearing properly-fitted N95 masks, and creating indoor clean air spaces.

Matt Wolff with the San Francisco Department of Public Health is working with researchers from UC San Francisco to identify simple, low-cost building weatherization interventions to help prevent smoke intrusion into homes, helping to make San Francisco's urban communities wildfire smoke ready.

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