Los Angeles Fire Workshop: Causes, Consequences, Visioning

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Workshop Logistics Review

We gathered 35 researchers and practitioners in Pasadena on April 17, 2025 to reflect on the January Los Angeles firestorms. As a working premise we emphasized that these new types of urban fire events are distinct from wildland and Wildland-Urban Interface (WUI) fires in terms of causes, behavior, fuel types, social-environmental dynamics, and consequences. We had a welcome and introduction followed by 3 panel presentations, each panel then had a breakout group and synthetic discussions directed to uncertainties associated with the causes, consequences, and visions for adapting to these new urban fire regimes. On April 18 a smaller group toured the Eaton fire scar with five stops that illustrated challenges for developing recommendations for urban fires. Notes were taken by ~5 note takers during the panels, breakout groups, and discussions. In synthesizing the nearly 100 pages of notes, we considered uncertainties associated with urban fires along multiple axes of biophysical and socio-economic dimensions that spanned a range of spatial and temporal scales. This is the first comprehensive report from the workshop. An appendix includes biographies of all workshop participants.

Major Lessons

We organized the information that was gelaned and dynamics within an urban fire cycle that covers pre-fire conditions, fire operations-behavior-impacts, response and recovery, restoration and rebuilding, and future risks. Key overarching topics covered include:

- *Role of urban vegetation on fire dynamics and structure loss requires more information and research*: In contrast to vegetation-driven wildfires within forest and chaparral ecosystems, e.g. WUI intermix homes, where vegetation adjacent to buildings can increase the risk of structure loss, vegetation in urban fires may have a secondary role. Many attendees noted that clearly some structures with vegetation in zone 0 did not burn while adjacent structures without vegetation did burn. In many cases, trees were consumed or scorched because of the adjacent burning e house but most trees and shrubs did not appear to have contributed to the house burning. Even species that are widely expected to contribute to burning, including cypress and eucalyptus species, in multiple cases did not burn even when fires were nearby. It is possible that well-watered, properly maintained vegetation provides protection from structure ignition by embers. Misinformation about defensible space

- *Importance of reducing ignitions especially during red flag days*: Stopping ignitions during red flag days is a key pathway to preventing disasters. Santa Ana winds spanned the entire central-southern California coastal region and fire spread similar to the Los Angeles fire storms would have been likely following ignition in multiple communities from Monterey to the Mexican border. Strategies for reducing ignitions need to include infrastructure, especially utilities, community engagement, and increased awareness. Ignition risks associated with batteries in vehicles and flammable wooden structures and materials near homes may need more consideration.

- *Approaches to urban fire suppression need improved tools and coordination*: Urban fires such as those occurring during the Los Angeles firestorms as well as Lahaina HI and Louisville CO present major challenges for suppression. Traditional wildland and municipal fire suppression approaches are not well suited for large urban fires. Cal Fire and federal agencies are not traditionally an urban fire agency. A consideration of "stay and defend" may be appropriate in some cases but may also come with large risks to individual residents and professional fire-fighting. More numerous, smaller, nimble fire engines and emergency volunteer crews might have improved response and suppression efforts.

- *Better coordination across federal-state-municipal resources / plans is needed*: While urban fire suppression presents a major challenge across agencies during an emergency, better coordination throughout the fire cycle is needed to prevent ignitions, reduce risks, and ensure appropriate long-term response and recovery efforts. Comments were made that investing in proactive, pre-fire home hardening is more cost effective than incurring post-fire recovery and rebuilding costs.

- *The role of insurance will increasingly affect urban planning, housing developments and fire risks*: Without question insuring homes and businesses against the risks of fires is reaching major challenges. The challenges of insurance companies to obtain reinsurance also contributes to the capacity for insuring against disasters. In part these challenges reflect the inability to adequately estimate risks but as well the affordability of paying for appropriately priced insurance. The involvement of government, both in regulating insurance industry and serving as insurer, i.e. California FAIR plan, creates a hybrid public-private partnership that needs better tools.

- *Displacement and gentrification processes may be high post-fire*: diverse, working-class predominantly black and Hispanic neighborhoods of Altadena that have existed in these areas for decades, but were never "at-risk" from fire, but now are at a high risk of long-term displacement and gentrification. Already lots are being sold and are at high risk of changing the community.

- *Socio-economic / race play a large role in urban fire cycle dynamics*: Fire suppression, evacuation warnings, preparedness, and post-fire responses differed among communities that in many aspects were consistent with demographic inequities. As one example, the availability of private fire fighting was limited to wealthy communities. As another example, evacuation warnings and security post-fire were strikingly different between Altadena and Pacific Palisades communities. Ensuring equity in preventing disasters is an important cornerstone of developing more sustainable cities.

- *Paradox of water*: Access to water is essential throughout the urban fire cycle. Issues with water pressure, water demand-scarcity, and availability are well known problems during WUI and urban fire events since adequate water is needed for fire suppression. At the same time, a new challenge will be that well irrigated vegetation may also be connected to reduced fire risk and trajectories. Droughts can impact urban water availability, ordinances can limit water use, and this will influence fuel moisture loads for non-irrigated vegetation. Achieving goals for drought tolerant vegetation, which generally receives limited irrigation, and fire smart plants, which need irrigation is a challenge. A more thorough characterization of water dynamics at multiple time scales, and proper vegetation selection, is needed to better reduce urban fire disasters.

- *Urban design plans will benefit from more strategic thinking*: While fire risks can not be eliminated, improved urban design and building practices provide a powerful tool for reducing the potential for disasters. Opportunities are available in building construction, building arrangement, use of greenspaces as buffers, and accessibility to fire suppression. City ordinances determine how and what trees can be planted. In post-disaster examples, building codes are commonly waived in order to rebuild quickly and

facilitate a perceived return to normal. Comments were made on how to retrofit greater Los Angeles with its long history of prioritizing single family detached housing and mobility by private vehicles. Additionally, it is unknown how the exemption of environmental regulations might affect retrofitting as well as long-term human health due to the yet unknown impacts of urban soil pollution effects on human mortality.

- *Mistrust*: Throughout the entire fire cycle many people are basing their perspective and actions from diverse information sources. Increasingly, government and academic sources of knowledge are viewed with suspicion and there is a tendency to want to play "the blame game". This can lead to actions that heighten risk and negative consequences. While people trust different authorities, they also need a consistent message based on evidence and authorities need to better build relationships with diverse people.

Causes of Urban Fire Disaster

The urban fire disaster reflected both a combination of biophysical, societal, environmental and technological factors. Certainly weather conditions, including "whiplash" type dynamics of wet and dry periods over the preceding years, as well as high winds from the Santa Ana event contributed to elevated risks of fire spread following ignition. The ignition of urban fires are most frequently caused by humans, through processes spanning arson, negligence with burning materials, or unplanned ignitions from infrastructure. At longer time-scales, disjunct approaches and coordination across federal, state, municipal, and private activities for urban fire preparation, suppression, and response contributed to the disaster. A general expectation of reduced priorities associated with ensuring fire safety also contributed to fire disaster. There will be differences in vulnerability across social groups due to a variety of factors.

Consequences of Urban Fires

Consequences of urban fires are wide-ranging in nature and reflect immediate effects to long-term changes. Consequences vary in their location – with impacts differing from house to house within the burn area depending on degree of burning. The consequences of fires in Altadena and Pacific Palisades provides a striking example of differences in how urban fires affect cities and communities. More widely, consequences can propagate outside the burn area to include downwind or downstream areas affected by pollution, flooding, or land movement. Some consequences are immediate effects of burning while others may last decades associated with contamination or altered neighborhood structures. These consequences directly affect residents, fire fighters, broader communities at regional, state, and national scales.

Many consequences are related to health implications from the fires – from the worst cases of fatality during the event to potentially acute and chronic morbidity issues from pollutants in the air, water, and soil. Many of the pollutants are poorly characterized and reflect the diverse materials found in buildings, vehicles, and infrastructure. The fires release VOCs, heavy metals and PFAS into the soil. After it rains there is waterway and reservoir pollution. The pollutants may lead to legacies of unknown duration and assessing safety of both water and soils following fires is challenging as fire's effect on water chemistry is not a "one size fits all". Mental health issues arising from the trauma of the event itself and subsequent displacement and loss of community or even schooling.

The process of rebuilding and restoration following the fire is another source of extensive consequences. The ongoing housing crisis places a challenge on residents and finding affordable housing immediately after the fires exacerbates this regional problem. A consistent concern is the potential for displacement and gentrification of affected areas. Areas like Altadena have strong economic pressures that favor

gentrification and changes to communities. Rebuilt communities will likely to be more affluent and less diverse. As part of rebuilding, there will be shifts in housing type, size, structure and infrastructure planning. There will also be emerging problems with restoration efforts and changes in ecological processes, as new vegetation is planted and grown that may not provide the same benefits or have the same resources from previous communities. The community character is also likely to change. Not separate from the loss of the physical aspects of communities, like structures, are the intangible components of a community such as the social relationship among neighbors, and the memories, rituals, and meanings people have of their neighborhoods and towns. Alongside physical components, these intangible aspects give definition to a community and contribute to defining a successful recovery process.Connected with both the health and rebuilding consequences, urban fires can have enormous economic consequences. The financial toll of the Los Angeles fires are still uncertain but estimates reach up to $40 billion in costs from physical rebuilding, community connectivity, fire fighting, long-term health. Comments were made that the majority of post-fire economic costs are related to human health. A systemic challenge with fire disasters is complexities and uncertainties in the costs and who pays, which further contributes to the "blame game". The question of having the developers pay was brought up. A panelist laid out the fact that currently energy consumers are paying but if the developers are taking the risky actions, then they should pay the costs. In some cases, these costs lead directly to job creation and workforce development. The economic impacts of urban fires are likely to extend to the insurance industry with consequences to affordability of housing, building requirements, and further system-level effects.

Finally, an insidious consequence of the fire may be further degradation of trust in government and academic sources. Comments were made that southern CA has the greatest number of firefighting resources anywhere, yet the disaster still happened; also Cal Fire and US Forest Service are in "the business" of fires. Already we have growing levels of mistrust and diverse sources of communication. Providing accurate and community-relevant information on risks and needed actions may be further challenged in response to the fire event and rebuilding process.

Visions for Increasing Resilience to Urban fires

Different people have different visions of what urban resilience to fire means, how to prepare, and how to respond and adapt. Thus in part, engaging across multiple stakeholders is essential for developing desired urban landscapes. Communities at the grassroots/neighborhood level need to be engaged as well as multiple government agencies and a variety of private sector entities. Academic research can provide opportunities for assessing plans and identifying scenarios and will have its greatest impact through co-development activities. Nevertheless, we can reduce fatalities / injuries / community loss / infrastructure loss associated with urban fires.

A key component of urban resilience visioning is developing community engagement plans. Incorporating communities into these conversations throughout the recovery processes and public planning would mean learning how to establish democratic processes within recovery planning and projects and understanding the dynamics of engaging communities before and after disasters. Homeowners and residents, particularly those from certain communities or sociodemographic groups are not typically involved in post disaster resilience plans in terms of building structures but are intimately affected by decisions. Implementing democratically structured community resilience planning would also contribute to rebuilding trust between agencies and communities.

As part of a vision, we need better approaches for science communication. Overcoming public confusion, mistrust of science, misinformation and mistrust does not disenfranchise alternate values and desires but

can lead to more agreement on what is real. Addressing sources and engagement with misinformation is a clear need. In part this includes identifying pathways for engaging stakeholders with defensible data and interpretations. Community education efforts can include awareness and behavior change regarding messaging on defensible space, evacuation needs, preparedness. Moving the perspective away from a narrative on natural disasters (i.e., there is no such thing as a "natural disaster")to one that places people and their activities as central to fires and their consequences is needed. This communication with the public can then help develop improved policies to reduce and mitigate risks.

Greater proactive investments in prevention is needed at the home, local and regional scales. These in part need to develop community based approaches to risk reduction. More community engagement would help prevent fires and develop policies to enhance recovery efforts. As part of investing for prevention is adopting a Safe-to-fail (rather than Fail-safe) perspective – living with and adapting to fire as urban burning risks can't be completely eliminated. Building plans and home hardening requirements that would reduce the risk for building fires and spreading of fires. This could include use of alternate building materials, structural design and homeowner assistance subsidies. This also includes approaches to landscaping that may feature well irrigated, well maintained vegetation close to buildings and well irrigated green infrastructure throughout neighborhoods.

In developing a more robust vision we have a need for better science tools. There is a persistent lack of information – both fundamental uncertainties as well as communicating what is known / best practices. We need better data and maps that characterize risk at granular and holistic levels. We need better models that estimate risk and can predict fire spread. We don't have adequate home fuel models but a few people are working on creating one. More research needed for burn probability models. We need to develop systems or models that consider community needs like in reforestation. These improved models could work across scales and evaluate the entire fire cycle. There is a large need for qualitative research and in-depth interviews with people experiencing the risk. These studies could include focus groups with communities as well as engaging first responders and policy makers.

Pathways forward

What is needed next? The workshop identified several pathways for activities going forward. We identified a series of products directed to academic, community, and government audiences. We also identified opportunities for continuing to support activities that enhance resilience and adaptation to urban fire disasters.

From an academic perspective, there are clear opportunities to expand research networks and engage collaboratively. Many uncertainties surrounding urban fires are ripe for investigation spanning technological aspects of the built environment, ecological dynamics, and community agency. Research is needed that integrates across these domains as well as spanning a range of spatial and temporal scales.

At the same time engaging with community members, NGOs and government agencies is a high priority to communicate risks, uncertainties, and strategies for coping with urban fires. Key audiences to target include Blue Ribbon Commissions as well as affected community residents. One key strategy is creation of one-page fact sheets that can provide immediate information and link to more online resources. These fact sheets could span many topics. Complementing fact sheets, a series of short format video resources could also reach broad audiences. Both products could be structured to reach targeted government, NGOs and community members – an opportunity exists to facilitate two-way interactions between these groups. In facilitating more interactions, an "ask an expert" platform could be useful for stakeholders to ask

questions that are vetted by experts. Finally, focus groups could be a useful tool to learn more about community concerns as well as provide opportunities to communicate resources to key informants.

In supporting research and communication activities a variety of underlying activities would be useful. A common online repository that would facilitate sharing and collaboration would have high value. The cross-disciplinary Global Wildfire Collective or the LA Urban Center Webpage are such examples that are currently up and running. In supporting communications, an updatable list of reporters who are interested in covering urban fires could provide a valuable resource. Finally, staff support to ensure immediate launching of activities and their continued maintenance is a high priority.

To achieve the goals from the workshop funding mechanisms need to be identified. Traditional venues, including federal agencies or many state agencies remain import resources but in the immediate future their capacity to make commitments is uncertain. At the California state level, the rollout of Proposition 4 resources could be a key avenue for funding, especially as the Governor's Wildfire Resilience Task force is highly receptive to urban fire issues. Other sources of funding may include philanthropic organizations or other non-profit organizations, with the Department of Angels being one example specific to southern California. Corporate donors may be an untapped source of funds including building industry associations and the urban land institute. Individual legislators may also be helpful, especially in the context of federal or state earmarks.

List of Attendees with Bios

Organizers: Darrel Jenerette (UC Riverside) and Francisco Escobedo (USFS)
Support: Ariana Firebaugh Ornelas (UC Riverside), Lindsey Zakopal (UC Riverside), Miranda Buckley (UC Riverside), Sahar Foruzan (UC Riverside); Carl Norlen (USGS), Jacob Cecala (USFS)

In order to facilitate collaboration and communication between workshop attendees we invite you to find your name (listed alphabetically by first name) and write a bio blurb about yourself and your expertise under your name (1 to 2 sentences).

Alexandra Syphard
Conservation Biology Institute
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Bio: Alexandra is a research scientist who has spent more than two decades analyzing the drivers and impacts of landscape change, particularly focusing on wildfire risk in California and other Mediterranean ecosystems. She has concentrated intensely on factors influencing structure loss to wildfire and identifying the best approaches for balancing fire risk reduction with biodiversity conservation.

Carl Norlen
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Bio: Dr. Carl Norlen is a Physical Scientist and Presidential Management Fellow with the USGS National Land Imaging program and is currently working with Francisco Escobedo at the USDA Forest Service Pacific Southwest Research Station. Carl is studying the landscape-scale impacts of urban fires on California communities using a combination of remote sensing and socioeconomic data.

Carlos Moran
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Bio: Carlos Moran is the Executive Director of North East Trees (NET), a Los Angeles-based nonprofit dedicated to advancing environmental justice, climate resiliency, and community greening in historically underserved neighborhoods.

Chris Shogren
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Bio: Dr. Christopher Shogren is an environmental horticulture advisor for UC Cooperative Extension in Los Angeles County. As an advisor, he provides expertise in pest management of

ornamental plants and water use issues (affecting the development and maintenance of the urban forest).

Clarissa Boyajian
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Bio: Clarissa works for the City of Los Angeles' Office of Forest Management (OFM) providing urban forestry and data analysis technical expertise. OFM is responsible for long-range urban first planning, internal cross-department coordination, collaboration with researchers and other government agencies, and functions as the City's urban forest technical expert. Clarissa's background includes nonprofit and volunteer management, urban forest management plan consulting, and a masters of environmental data science.

Darrik Carlson
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Bio: Darrik is Cal Fire's Regional Urban Forester for Los Angeles and Ventura Counties

Dave Calkin
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Bio: Dr. Calkin studies core components of the wildland fire management system. From planning and fuels management to decision making during incidents to post-fire recovery – he strives to understand risk and identify risk-management strategies that can increase safety and minimize economic loss to fire across landscapes, organizations, and phases of management.

Drew Ready
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Bio: Drew Ready is Senior Project Manager at the Council for Watershed Health, a Certified Arborist, Water Conservation Specialist, and Watershed Coordinator with over twenty-five years of experience in the fields of arboriculture, urban forestry, native plant horticulture, ecological restoration and sustainable landscape design and installation. Drew manages watershed projects including an extensive effort remove invasive Arundo donax from the LA and San Gabriel Rivers. Drew is former chair of the LA County Weed Management Area and currently serves on the Upper San Gabriel Watershed Area Steering Committee for the Safe Clean Water Program, the advisory board CityPlants, and is Deputy Director of Altadena Green.

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Eric Wood
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Bio: I am an Associate Professor of Avian and Urban Ecology in the Biological Sciences Department at California State University Los Angeles. Research in my lab is centered on terrestrial ecosystems and avian communities. We use field and citizen science data, spatial analyses, and quantitative approaches to explore questions that are focused on avian ecology, urban ecosystems, and conservation. For more information please visit: www.ericmwood.org

Erin Conlisk
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Bio: Erin Conlisk is a quantitative ecologist that uses simulation models to understand the combined impacts of climate and land use change on wildfire and vegetation. Recently she has examined the influences of social vulnerability on wildfire preparation and subsequent structural damage.

Francesca Hopkins
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Bio: Francesca is associate professor of climate change and sustainability in the Department of Environmental Sciences at UCR. Francesca is leading the Inland Deserts regional report of the 5th California Climate Assessment, a role in which she is actively looking for ways to think about how state and local policies can address challenges brought about by a changing climate.

Henry Herrera
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Bio: Henry is the CAL FIRE Urban Forestry Program SoCal Supervisor. He is a Registered Professional Forester and Certified Arborist. Henry's background is in fire prevention, forest health, and urban forestry.

Jacob Cecala
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Bio: Jake is an ORISE post-doctoral fellow working with researchers from the US Forest Service (Drs. Natalie van Doorn and Lara Roman), UC Davis (Dr. Alessandro Ossola), and the USDA California Climate Hub. Currently, he is conducting an extensive review of published literature on how urban trees worldwide are affected by extreme weather and shifting climatic conditions. He earned his PhD in Entomology at UC Riverside in 2021, where he studied how flowering ornamental plants in nurseries support insect pollinators.

Jeff Heys

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Bio: Jeff leads wildfire risk reduction efforts throughout Southern California's four National Forests – Angeles, Cleveland, Los Padres, and San Bernardino – including extensive collaboration across boundaries. He has been managing public lands for 25 years, with emphasis in invasive species management, habitat restoration, and natural and cultural resource management in close partnership with fire management.

Kirsten Schwarz
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Bio: Kirsten Schwarz is an urban ecologist working at the interface of environment, equity, and health. Her research focuses on environmental hazards and amenities in cities and how their distribution impacts minoritized communities. Her work on lead-contaminated soils documents how biogeophysical and social variables relate to the spatial patterning of soil lead.

Loralee Larios (Did not attend)
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Matt Spitsen
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Bio:Matt has been working as a Program Manager at the Arbor Day Foundation. Matt's role involves growing the Alliance for Community Trees program, which connects community-based organizations that plant and care for trees with corporate partners to achieve sustainability and corporate social responsibility goals.

Max Moritz
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Bio: Max is a statewide wildfire specialist within UC Cooperative Extension. Much of his research is focused on understanding the dynamics of fire regimes at relatively broad scales and applying this information to planning and management of fire-prone landscapes. He has used a number of different spatial approaches to quantitative analyses of fire history patterns, stemming from his early work on chaparral shrublands in the Santa Barbara region.

Monica Palta
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Bio :An urban ecosystem ecologist and environmental scientist, Palta has conducted applied research in aquatic and coastal ecosystems throughout the U.S. Before taking the position with

UC ANR, she was an Associate Professor in the Department of Environmental Studies and Science at Pace University in New York City.

Nicole Molinari
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Bio: Nicole Molinari is a community ecologist with a broad interest in the consequences of human induced global change, including the effects of wildfire, biological invasion, climate change, and altered disturbance regimes on vegetation patterns. Dr. Molinari currently serves as the USDA-Forest Service Province Ecologist for the four southern California forests (Angeles, Cleveland, Los Padres and San Bernardino).

Piper Wallingford
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Bio: Piper is the Climate Resilience Scientist for The Nature Conservancy's California Chapter, providing science leadership to the Climate Program. Her work focuses on integrating nature into climate resilience planning, adaptation, and mitigation.

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Santina Contreras
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Bio: Santina Contreras is an Assistant Professor of Urban Planning and Spatial Analysis at the USC Sol Price School of Public Policy. Her research focuses on interrogating community engagement practices surrounding hazards and disasters.

Sarwat Chowdhury
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Bio: Dr. Chowdhury is the Program Director for the Wildland Urban Interface Climate Action Network at UCI. Formerly, Sarwat worked as a climate change and environment policy advisor to the United Nations and worked internationally, managing projects in over 45 countries. Her expertise is in climate adaptation and resilience, energy access, and mitigation, focusing on renewable energy and energy efficiency.

Sophie Katz
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Bio: Sophie supports the development of interdisciplinary, cross-sector proposals aimed at confronting urban sustainability challenges. She offers expert navigation of the proposal development process, customized organizational frameworks, and pursuit strategies to meet the specific needs of the principal investigators, their research teams and partners.

Stephanie Pincetl
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Bio: Stephanie Pincetl is a Professor at the UCLA Institute of the Environment and Sustainability and Founding Director of the California Center for Sustainable Communities at UCLA. Dr. Pincetl conducts research on environmental policies and governance and analyzes how institutional rules construct how natural resources and energy are used to support human activities and create Earth Systems impacts.

Steve Allison
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Bio: Steve Allison is a professor in the Departments of Ecology and Evolutionary Biology and Earth System Science at UC Irvine. Allison Lab research focuses on climate change and microbiomes, particularly the impact of drought and fire on California ecosystems. Steve is the PI for the Wildland Urban Interface Climate Action Network, a California state-funded consortium of land conservancies, community-based organizations, Tribal partners, and universities.

Tamara Harms
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Bio: Tamara is an ecosystem ecologist and biogeochemist interested in the effects of spatial heterogeneity and hydrologic flowpaths on elemental cycles. She has studied desert riparian zones and streams, urban ecosystems, and boreal and arctic catchments.

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Bio: Walter is State Urban Forester for Cal Fire

Yassy Wilkins
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Bio: Yassy is an Wildfire Risk Reduction Administrative/Public Affairs Officer for the USFS' Wildfire Crisis Strategy team