LIGHTNING TALK ABSTRACTS

Navigating Post-Wildfire Recovery: Lessons from Catastrophic Fires in the Western U.S.

Cole Buettner, CSU

There is a growing need for research on the efficacy of post-wildfire response and recovery policies in light of increased wildfire severity, longer fire seasons, and continued development in the Wildland Urban Interface (WUI). We explored this topic through two case studies in the Western United States: The Hermit's Peak Calf Canyon Fire and the East Troublesome and Cameron Peak fires. We investigated the major challenges communities face after a wildfire event, factors that facilitated effective response, and the recommended approaches for improving the response and recovery process. In this talk I will discuss salient themes across both study sites. We found that post-wildfire response and recovery is a community-driven, state-led, and federally supported process. This understanding can better center where capacity should be prioritized, as well as set expectations of federal support. We also found that frameworks for pre-wildfire planning, and coordination must be collaborative and adaptable to overcome governance and jurisdictional complexities. Understanding and improving post-wildfire response requires a coordinated, adaptive approach that promotes community-driven solutions and clarifies the roles of state and federal agencies to effectively address the growing challenges of wildfire recovery.

Mapping of Post Wildfire Debris Flow Risk to Interbasin Transfers across the Southern and Central Rocky Mountains

Abelino Fernandez Leger, NM Tech

Forested headwaters are crucial for surface water supplies in the Southwestern US, and interbasin water transfers – small and large-scale engineering projects that divert water from remote watersheds across drainage divides – move more than 700,000 acre-feet annually to municipalities and irrigators surrounding the Rocky Mountains. Forest fires are well known to generate debris flows, and post wildfire debris flows threaten to compromise water supply infrastructure entirely. To properly quantify the risk of post-wildfire debris flows compromising public water supply it is necessary to incorporate the risk to water transferred from outside the basin. Our project maps the risk of post-wildfire debris flows for Interbasin Water Transfer donor watersheds. We use readily available remote sensing data to estimate the probabilistic contribution of wildfire severity, precipitation intensity, and basin slope. Our research has produced an interbasin water transfer project risk ranking using annual probabilities. Preliminary results indicate headwaters in the Southern Rockies and the San Juan Mountains are at higher risk than transfer projects serving the Front Range of Colorado. We hope to provide actionable insights for water resource management, forest management, and infrastructure planning.

Ecohydrological Metrics as a Tool for Watershed Management

William F. Mejía-Garcia, UNM

Streams are intrinsically connected to their surrounding terrestrial environment. By implementing a synoptic sampling approach at spatially diverse and strategically chosen sites on a stream network, we can infer information about aquatic and terrestrial disturbances affecting a watershed. This sampling framework and accompanying ecohydrological metrics can be used to determine areas of hydrological importance, both in quality and quantity of water. This approach is being implemented at the Santa Fe Municipal Watershed, an essential source of water for the City of Santa Fe. This watershed is at high-risk of potential wildfire due to climate change and a long history of fire suppression. The information gathered by this sampling approach and accompanying metrics has the potential to be a powerful tool for watershed management in Santa Fe, and worldwide.

Edge Effects: Regeneration dynamics in Colorado's pinyon-juniper woodlands post-fire

Jamie Woolet, CSU

Pinyon-juniper woodlands are undergoing significant ecosystem changes due to drought and fire disturbances. Concerns arise over potential conversion to grasslands or shrublands, especially under hotter and drier recovery conditions. Therefore, we examined 25+ year old fires in western Colorado to compare plant community recovery and tree establishment patterns in unburned, interior burned, and edge burned plots. We found that adjacent unburned plots had the highest regeneration of pinyon and juniper seedlings, typically under juniper trees. In burned plots, tree regeneration was higher in edge plots than in interior plots. Unburned plots exhibited high tree cover and 1-hr fuel loading, whereas burned plots had high percent cover of grasses, forbs, shrubs, and 10-hr, 100-hr, and 1000-hr fuel loading. Our models indicated that pinyon seedling presence was negatively associated with grass, shrub, and forb cover, while juniper seedling presence was negatively associated with grass cover. These findings suggest that burned woodlands, even 25+ years post-fire, resemble early-successional systems, and full recovery may take centuries, or be unlikely given changing climatic conditions.

Surface water and snowpack modeling with emphasis on post-wildfire hydrologic impacts in the Santa Fe Watershed, NM

Joseph Kuljis, NM Tech

This study covers the development of a coupled snowpack-surface water model (SnowModel, HEC-HMS) for the Santa Fe Municipal Watershed to be used in predicting runoff quantity and timing. The Santa Fe Municipal Watershed is a source of drinking water and water storage for the City of Santa Fe and these water resources are believed to be at considerable risk from high severity wildfires. Two models are utilized: SnowModel for seasonal snowpack evolution/melt modeling and HEC-HMS for watershed rainfall-runoff modeling. Once the models are calibrated sufficiently, runs will be parameterized with different wildfire and forest management scenarios to provide insight into hydrologic vulnerability and resilience in the Santa Fe Municipal Watershed.

How does a severe wildfire shape post-fire hydrologic recovery in a snow-fed mountainous watershed across forest regrowth stages?

Moazzam Rind, WSU

Wildfires pose a significant threat to water supply, particularly in snow-dominated, water-stressed regions like the Western United States. While extensive research exists on wildfire impacts, there is a shortage of studies addressing the entire post-fire watershed system and tracking interactions across forest regrowth stages. This information is crucial for refining post-fire hydrologic models and helping manager's address post-fire impacts. We have summarized literature on post-fire processes and developed process-based conceptual models of water yield across three forest recovery stages: initial, intermediate, and full recovery. The results show that the initial recovery stage has the most active mechanisms and interactions, potentially affecting both summer and annual water yields. The intermediate stage is dominated by understory growth, leading to a mostly negative impact on water yield. In the final stage, overstory regrowth restores water cycle components to either a pre-fire state or a new stable equilibrium. The overarching goal is to ensure easier accessibility of post-fire eco-hydrological literature and enhance modeling capabilities. We are currently working with the RHESSys, a physically-based eco-hydrological model, to refine its post-fire functionality.

Pluriversal Post Wildfire Recovery

Cassidy Tawse-Garcia, UNM

What if we thought of Convergence Science from the perspective of its multiple future imaginaries? What would this look like? The 2022 Hermit's Peak and Calf Canyon Wildfire remains the largest wildfire in New Mexico state history. Two years on, the recovery support promised by State and Federal agencies has amounted to ostensibly —promises. In practice, large sums of recovery dollars have failed to bring about community recovery and in many cases, have not reached those most in need of assistance. My research engages the communities impacted by these fires – including Mora and Las Vegas—to understand how they showed up for each other in the post-wildfire disaster landscape. A potential future of my work is the opportunity to create a space for community members to imagine what their futures could look like, centering their own narratives as placemaking tools. My lightning talk will focus on my novel method of community-engaged listening sessions and alternative pathways forward in post-wildfire disaster. I hope together, the work of the TN can move us closer to answering *how can pluriversal thinking help researchers and science better engage with the communities they work with and in?*