Reducing the Vulnerability of Disadvantaged Communities to the Impacts of Cascading Hazards under a Changing Climate

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Project Challenge

The goal is to reduce the vulnerability of disadvantaged communities to cascading hazards associated with wildfires in a changing climate. Objectives include advancing current modeling capabilities to understand the complex spatiotemporal factors that define the evolution of cascading hazards related to wildfires and their impacts, identifying information shortfalls and behavioral responses of emergency managers, planners, and vulnerable communities in preparation and response to cascading hazards, and developing interactive, scenario-based, multilingual tools to enable emergency managers and planners to make and communicate timely decisions about cascading hazards.

Intellectual Merit

The project's objectives are to elevate the state of the art in temporal and spatial modeling of cascading climate hazards and to understand how these events might deepen social and infrastructural disparities in disadvantaged communities. This will be accomplished by creating an interdisciplinary platform that fuses engineering with social science analysis. Ultimately, this comprehensive approach aims to empower vulnerable communities by providing actionable insights to policymakers and stakeholders for building resilience against climate-related hazards.

Major Outcomes/Progress

Information Dissemination: Established a comprehensive website to disseminate project updates and engage with the public.
Analytical Achievements: Performed regional analysis to assess the impact of wildfires on the stability of slopes in Lake County.
Community Insights: Held focus groups to gain a deeper understanding of the local community's needs and vulnerabilities.
Shelter Access Analysis: Created a map merging shelter access data with wildfire risk to aid in emergency planning.
Educational Outreach: Developed a curriculum to promote resilience among Lake County's youth in the face of natural disasters.
Behavioral Research: Conducted a community survey to study the local population's response to wildfires, laying the groundwork for future resilience measures.
Partner Feedback Integration: Incorporated feedback from the Lake County Sheriff's Office to refine emergency shelter access and evacuation strategies.
Applied Research: Monitored environmental conditions post-wildfire, providing insights crucial for land and hazard management.
Cache Creek Landslide Monitoring: Analyzed decades of imagery, uncovering significant and ongoing landslide movements in Lake County.
Environmental Response Study: Investigated wildfire impacts on land recovery, focusing on key environmental parameters.

Broader Impact

The project's **immediate impact** lies in enhancing Lake County's resilience to climate hazards, directly benefiting local residents through improved emergency preparedness and response.
In the long term, the project will provide policymakers and emergency responders with advanced, human-centric analytical tools, enhancing their ability to make strategic decisions that minimize the impact of cascading hazards on underprivileged communities. As technical impact this initiative aims to synthesize engineering, scientific, and social approaches to mitigate the effects of cascading hazards, fostering a more integrated and holistic perspective in hazard management.

Future Goals

- Analyze shelter accessibility and community risk by integrating socioeconomic data and shelter characteristics.
- Conduct fieldwork to assess local vegetation flammability and the impact of prescribed burns, employing drone technology.
- Perform a second-wave survey to evaluate community mental health following wildfire seasons.
- Continuously monitor climate data in wildfire zones to inform temperature, wind, rainfall, and soil moisture records.
- Apply Persistent Scatterers techniques to Cache Creek landslide data, aligning it with hydrology to forecast and mitigate landslide hazards.