

## Title Page

---

**Project Title:** Resilient and Equitable Urban Stream Corridors

**Project Duration (year):** 2

**Proposed Project Start** 08/01/2023

**Date:**

**Proposed Project End** 07/31/2025

**Date:**

**Has a**  **Yes**  
**research/academic**  **No**  
**collaborator been**  
**identified for this**  
**project?:**

**List the identified collaborator(s), their institution, and their role in the project.**

Prof. Greg Pasternack, UC Davis, proposal lead applicant. Interdisciplinary river scientist guiding vision for entire research program and practical actions while also leading individual tasks related to experimental design for local site selection to collect training data, natural hazards assessment, and nature-based solutions in streams.

Prof. Yufang Jin, UC Davis, investigator working on use of remote sensing and artificial intelligence for assessing vulnerabilities at the systemic scale of an entire urban region drawing on a combination of available raster datasets and local “training data” we collect at study sites.

Assoc. Prof. Serena Alexander, SJSU, investigator working on assessment of urban planning and urban infrastructure dynamics, especially transportation, that create “geographic exposure” to stream corridor problems (i.e., homelessness, natural hazards, ecosystem dysfunction).

Asst. Prof. Costanza Rampini, SJSU, investigator working on socio-economic and geographic vulnerability and risk assessment methods and applications, who also addresses homelessness in stream corridors.

Dr. Igor Lacan, University of California Cooperative Extension Advisor for the San Francisco Bay Area, investigator working on systemic-scale visioning and assessment, especially bringing landscape ecology spanning terrestrial and aquatic systems as well as experience in outreach and stakeholder engagement.

Has a community/end-user partner been identified for this project?:  Yes  No

List the identified end-user partner(s), their organization (if applicable), and their role in the project.

Rune Storesund, SafeR3, investigator working on geotechnical engineering and natural hazards in urban stream corridors, especially including landsliding and flooding, also with expertise at engaging with county and city engineers to get current and historical data and information.

Stephanie Moreno, Executive Director of the Guadalupe-Coyote Resource Conservation District, end-user in the South SF Bay region with extensive experience working with government, industry, NGOs, and other stakeholders. Will provide education and technical assistance to constituents and watershed stakeholders to sustainably manage soil, water and wildlife with the best available science.

Dr. Lucas Patzek- Executive Director of the Napa Resource Conservation District, end-user in the South SF Bay region with extensive experience working with government, industry, NGOs, and other stakeholders. Will provide education and technical assistance to constituents and watershed stakeholders to sustainably manage soil, water and wildlife with the best available science.

Chris Lim- Executive Director of the Contra Costa Resource Conservation District, end-user in the East SF Bay region with extensive experience working with government, industry, NGOs, and other stakeholders. Will provide education and technical assistance to constituents and watershed stakeholders to sustainably manage soil, water and wildlife with the best available science.

## Project Information

---

## Research Area

---

### Lay Abstract

Natural hazards, socio-economic wellbeing, and ecological functions all intertwine in California's urban stream corridors, because these pathways are heavily relied on for flood and pollution control, recreation, ecosystem services, education, and residency. As we write, tens of thousands of unhoused people, previously pushed into living and forage along streams, are evacuating streams and losing belongings due to flash flooding. Meanwhile, landslides are destroying homes along the hills above. Yet 5 months earlier, the concern was drought, fire, and overheating. California's climate has always been defined by variability. Climate change synergized with urbanization is amplifying extremes in ways that our urban stream communities and ecosystems are not resilient against. Regional climate models already provide reasonable forecasts that illuminate broader impacts requiring adaptation, but these must be combined with a better understanding of local effects. Local urban managers tend to address crises with small, specific projects absent the context of a whole urban region, with its complex intertwining of multiple types of natural hazards, civil infrastructure, and socio-economic vulnerabilities. To provide climate action in this context, we formed a multi-institutional and interdisciplinary partnership that will carry out integrated applied research and practical action looking at urban stream corridors as a system seeking climate resilience. We will discover landscape patterns that amplify risks and identify locations where nature-based solutions can be most effective, by using a combination of (1) targeted interdisciplinary data collection in local communities and their streams, (2) model-predicted future climate condition maps, (3) remote sensing, and (4) Big Data spatial analysis. Resulting risk and opportunity maps and recommendations will then be used by our local nonprofit and conservation district partners to aid decision-making about where to deploy their resources and expertise for community engagement, master planning, community education, and siting shovel-ready projects. We will also use this project, with its training opportunities for diverse students, targeted workshops, and dedicated outreach to strengthen ties across academic, industry, nonprofit, and government sectors leading to subsequent actions that leverage this seed grant.

### California Climate Priority

California Climate Adaptation Strategy, Pathways to 30x30 Strategy, Other

**Enter the name of a state climate action resource and associated web link**

Defining Vulnerable Communities in the Context of Climate Change. [https://opr.ca.gov/docs/20180723-Vulnerable\\_Communities.pdf](https://opr.ca.gov/docs/20180723-Vulnerable_Communities.pdf)

**California Climate Relevance**

California's large, dense urban areas are globally unique for their high vulnerability to so many natural hazards- drought, fire, flood, landsliding, sea level rise, and earthquakes. They also provide patches of nature that wild organisms and human residents use. Our project addresses 4 climate action priorities. (1) Strengthen protections for climate vulnerable communities by focusing on California's dense urban stream corridors, because they naturally cut a path from hills to coast through communities spanning the economic spectrum. Different natural hazards occur along the path, creating different vulnerabilities tied to landscape and socio-economic patterns. We will map and analyze the synergies among risk factors, with a special focus on addressing unhoused people drawing on expertise at SJSU. (2) Accelerate nature-based climate solutions and strengthen climate resilience of urban stream ecology by adapting advanced river analysis and NbS engineering design tools developed at UC Davis to meet the needs of urban conservation districts, three of which are on our team. (3) Partner and collaborate among 9 investigators spanning 7 organizations to leverage existing resources from these different entities and help envision and propel a systemic framework for urban climate action. (4) Conduct work that will support the 30x30 conservation initiative bearing in mind that California needs to protect and steward nature where most people live, not just out in the wildlands.

**Actionable Project Outcome**

We seek to provide a comprehensive assessment of climate vulnerabilities in urban stream corridors integrating natural hazards, ecosystem functions, and underserved populations, especially unhoused people. While there are a lot of individual pieces of information and geospatial data layers for California's urban areas, we will identify the systemic combinations of natural and societal factors that synergize to produce the most climate vulnerable communities and riverine species in California's urban stream corridors. We will provide RCDs and community leaders with maps indicating which nature-based solutions in urban stream corridors have the greatest lifespans and most ecological benefit for the lowest cost to meet California's 30x30 challenge of increasing habitat connectivity and re-establishing natural systems within the built environment. By including surveys of California's most vulnerable community - those who live and sleep outside - in climate change planning, we aim to identify which stream settings tend to be most suitable/favorable or most hazardous for individual subgroups of the unhoused population. On that basis, we will provide counties and cities with specific recommendations for including unhoused populations in their climate action plans. These communities have long been neglected from climate

action efforts due to institutional and other barriers, which make it particularly difficult to work with them.

### **Plan for Collaboration**

---

Our diverse team of 9 investigators spans UC, CSU, nonprofit, and government to span natural and social sciences, engineering, and on-the-ground practical action. We all have hands-on experience working at the small scale in our individual areas of expertise, and we also all have large-scale capabilities for visioning and systemic analysis. We have a horizontal approach to collaboration, with mutual respect and group-based thinking. Individual investigators will lead efforts within their focal areas. Prof. Pasternack, Dr. Storesund, and Dr. Lacan will lead assessing natural hazards and ecosystem functioning. Profs. Rampini and Alexander will lead efforts on understanding socio-economic vulnerabilities, homelessness, and geographic factors amplifying or mitigating hazards (e.g., civil infrastructure, land alterations, and protected lands). Prof. Jin will provide holistic integration across all these areas with remote sensing, data informatics, and machine learning analytics. Ms. Moreno, Dr. Patzek, and Mr. Lim will identify local problems and opportunities we can use as examples in the systemic framework. They will also help coordinate use of research to aid climate actions by nonprofits and RCDs. The team will have biweekly online meetings to maintain a common understanding and troubleshoot problems. We will have annual workshops at SJSU for progress assessment and targeted external engagement. We will help RCDs host a regional conference on California's urban streams.

### **Plan for Engaging Community/End-User Partners**

---

We have deep experience in urban communities and will help local governments implement science-based solutions that prioritize underserved communities. There are 6 plan facets, each with a designated lead but involving us all. (1) UC outreach through coop. extension and county advisors. (2) SJSU faculty have strong ties with local nonprofits & governments and experience working with unhoused people in urban streams. (3) RCDs leverage a lot of practical action. We have three urban RCD exec. directors on the team to engage us with diverse govt agencies and nonprofits associated with each district, and also connect with remaining urban RCDs. (4) The founder of the nonprofit SafeR3 will help us to offer risk/crisis management education, technology development, and innovation to maximize enterprise risk management for critical infrastructure. (5) We plan to have an outreach coordinator, because there are so many organizations in California's urban areas that we need to have a constant engagement and mutual exchange; this person will run that effort under the supervision of the PIs. (6) We plan to build into our project budget annual subawards directly to nonprofits for short-term, service-oriented actions that build community resilience in the face of climate-exacerbated problems. Such actions are likely to include educational trips enhance by our academic members, adoption of advanced technologies, and help with master planning.

## Approach for Leveraging Existing California Resources

---

Our team of 9 investigators from 7 organizations has extensive experience writing and managing grants for research and action. The 3 RCD ex. directors will enable us to mutually leverage our seed grant with other on-going, state-funded RCD activities and priorities to synergize for mutual benefits. In many talks with stakeholders to develop our plan, a common concern emerged that many projects completed throughout the state's urban regions lack transparency or systemic assessment and prioritization. Further, some websites map where and what projects were done, but generally only within individual organizations. Similarly, we heard that a lot of legacy documentation is not digitized yet. We intend to compile and house historical information for geospatially identifiable projects for better public access and we aim to track the "shifting baseline" of conditions and information, meaning that historical knowledge can better leverage current and future planning with lessons from the past. We think that the State Water Resources Control Board and the Regional Boards are good sources of potential leverage to enable us to solve these problems, also in collaboration with the Water Resources Collections & Archives at UC Riverside. Further, UC's ANR division is underutilized for addressing urban regions, and we have a UC ANR county advisor as a co-investigator. Among him and our UCD Ag. Exp. Station professors, we have a unique avenue to leverage state resources to enhance this project.

## Plan for Future Grant Leveraging

---

Each investigator has other projects that contribute value to this effort and help set the stage for future grant opportunities with established project sponsors once we have established this foundational partnership through the seed grant. For basic science, we plan to build on this to articulate a National Science Foundation proposal on homelessness in urban stream corridors. For applied science, we want to coordinate with urban river planners and scientists we have worked with at BOKU in Vienna, Austria ("Human Rivers in the 21st Century") and University of Melbourne in Australia ("Waterway Ecosystem Research Group") to leverage successful strategies used in those global cities known for their highly effective hazard and water management approaches, and this will enable us to seek international sources of funding for partnership as well. For more local actions, our RCD ex. directors and their grant writers will seek funding to support our collaboration and on-going regional workshops, because they have a lot of experience with these efforts, too. They also have experience with going after National Fish and Wildlife Foundation grants and Coastal Conservancy grants to aid with river management and nature-based solutions, and we expect the Wildlife Conservation Board to put out calls for funding we can apply for. Thus, among our members, we have a lot of demonstrated success with grant writing to enable this project to extend well beyond the initial 2 years of seed funding.

## Subject Area(s)

---

## Budget

---

### Amount Requested - LOI

---

\$2,000,000

**Amount Requested Year 1:** \$1,000,000

**Amount Requested Year 2:** \$1,000,000

## Signature Page

---

### Applicant Signature

---

I certify that the statements herein are true, complete and accurate to the best of my knowledge. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if a grant is awarded as a result of this application.

### Applicant Electronic Signature (Type in your full legal name)

---

Gregory B Pasternack

### Date

---

01/19/2023