



# RESEARCH BRIEF

JULY 2021

## Coastal Flood Adaptation: Inequities in the San Francisco Bay Area

*Coastal flooding exacerbates existing community inequities, highlighting the need to expand holistic adaptation planning efforts now to lessen future risks.*

### Background

Increasing incidents of coastal flooding threaten urban centers worldwide. While the prospect of flooding caused by rising sea levels is well-known, there is significant uncertainty associated with the overall magnitude of the hazard and the rate at which it will increase over time. This has led decision-makers to hesitate in adaptation planning efforts, all while risks continue to increase and may be compounded by inactivity. Low-lying, coastal metropolitan cities—like those in the San Francisco Bay Area—may be particularly affected by this type of hazard. Communities face multiple climate risks from coastal flooding to wildfires, while simultaneously confronting challenges brought on by rapid urban growth and ensuing socioeconomic inequities.

The impact of coastal flooding on communities hinges not only on the cost of the flood itself, but also on the ability of households to pay for those costs. Typically, projections of physical damages to structures and property focus on calculating monetary loss, but do not necessarily account for socioeconomic context. Stanford researchers developed a quantitative measurement called “social

### POINTS FOR POLICYMAKERS

► **Greater certainty around sea level rise is not necessary to identify communities with high financial instability or to assist in designing adaptation interventions.** Immediate policy interventions that target existing social risk and that are collaborative, actionable and equitable would serve as an important component to coastal adaptation planning. However, these types of policy interventions are not traditionally part of flood-mitigation strategies, indicating the importance of integrating equity into flood-risk management. This approach is transferable to similar coastal urban areas and could help planners pinpoint the specific challenges that these communities face as well as inform optimal adaptation interventions.

► **Coastal flooding in the Bay Area over the next four decades will repeatedly burden households that are already financially unstable.** Different communities are impacted in different ways. For some communities, future financial instability is driven by the monetary risk associated with coastal flooding. For other communities, existing social risk is the driving factor. Separating communities where social risks dominate and a large percentage of households are already financially unstable from communities where monetary risks dominate and a large percentage of households may become financially unstable in the future would be valuable.

► **Future coastal flooding could destabilize racially diverse communities in the San Francisco Bay Area by burdening households with flood damage costs that exceed discretionary funds left over after covering costs of living.** The percentage of households without discretionary income before and after projected coastal flooding costs is significant for several communities in San Mateo County, highlighting the need for policy interventions. For example, researchers estimated that 50% of households in East Palo Alto are already financially unstable, even without accounting for additional, flood-related costs. Flood insurance—even if revised and reauthorized—is unlikely to bridge these monetary gaps.

risk” that is intended to complement existing assessments of monetary risk. Social risk captures how many households in a community are financially unstable even in the absence of accounting for climate hazards, such as household flooding. These are often single-parent households which are racially more diverse than average and already considered ‘at risk’. A disruptive event could have potentially far-reaching financial consequences for household members. Adding this dimension of social risk instead of solely focusing on monetary risk could help to better prioritize community needs in adaptation planning.

To better understand the full range of community-level costs from coastal flooding, Stanford researchers partnered with local stakeholder groups in the San Francisco Bay Area to advance a collaborative, actionable and equitable approach to sea level rise adaptation planning. The researcher team quantified the financial instability and associated inequity that coastal flooding poses to communities in the San Francisco Bay Area over the next four decades, 2020-2060. They found that every household within the projected flood plain will be burdened by flood damage costs, but that different communities were impacted in different ways and that the burden depended heavily on the socioeconomic context.

The risk inequity identified is not inevitable and could potentially be offset with innovative adaptation ideas designed to address socioeconomic inequalities likely to be exacerbated by future and increased coastal flooding events. Instead of waiting for what may be unattainable certainty in sea level rise projections, policy interventions targeting existing, socially-produced risk should be considered now.



Photo courtesy of Brian Sterling



Photo courtesy of Michael Patrick



Photo courtesy of Ellin Beltz

## ABOUT THE AUTHORS



### Jenny Suckale

Jenny Suckale is an assistant professor of Geophysics and fellow at the Stanford Woods Institute for the Environment at Stanford University.



### Leonard Ortolano

Leonard Ortolano is a professor of Civil and Environmental Engineering and affiliate at the Stanford Woods Institute for the Environment at Stanford University.



### Derek Ouyang

Derek Ouyang is a lecturer in Geophysics at Stanford University.

---

This brief is based on “**Rising seas, rising inequities? Communities at risk in the San Francisco Bay Area and implications for adaptation policy**” published in *Earth’s Future*.

---



Photo courtesy of Dale Kolke / CA DWR

## FOR MORE INFORMATION

Office of Policy & Engagement  
Stanford Woods Institute for the Environment  
woods-extaffairs@stanford.edu  
woods.stanford.edu