

DRAFT

Subperil: Flood & Sea Level Rise

Background and Preliminary Recommendation Concepts Information

Flood Risk in California

California has experienced floods both from a frequency and severity perspective, with the main source of rainfall from Atmospheric Rivers. Atmospheric Rivers are actually narrow vapor streams, extending thousands of miles across the sea, occasionally carrying as much water as 15 Mississippi Rivers combined. One such event The Great California Flood of 1861/1862 should be a reminder that a significant event of that magnitude can re-occur. The flooding event extended for 40+ days with Central Valley experiencing inundation extents of approximately 300 miles in length and 20 miles in breadth. The impact on property, agriculture and livelihoods in the modern era could be more devastating than has been experienced in the past.

Current State of Resilience in California

Insurance is a key measure of resilience of a community to a natural disaster. Many studies have highlighted the importance flood insurance plays in developing resilient communities. Research has shown that insurance improves recovery.¹ Unfortunately, a large flood insurance gap persists nationwide and in California. As of Sept 2019, approximately 227,000 homes in the state were insured for flood by the National Flood Insurance Program (NFIP). The private flood insurance market, while growing, still represents less than 10% of the overall policies in force. With about 12 million housing units in California, that means only about 2% of all California homes have purchased flood insurance. As flood risk grows from the combined effects of sea level rise and changing precipitation patterns, this insurance gap will hinder climate adaptation and jeopardize recovery from floods.

While insurance plays an important role in terms of the financial resilience of a community, it must be complemented by investments in flood risk reduction. A comprehensive solution for mitigation against natural catastrophes like floods would also benefit communities. Critical infrastructure like dams and levees, as well as natural infrastructure like wetlands, and green infrastructure to manage storm water, play a crucial role in providing flood protection for both small events and large-scale floods like major AR storms.

¹ Kousky, C. (2019). "The Role of Natural Disaster Insurance in Recovery and Risk Reduction" *Annual Review of Resource Economics* 11(3).

This infrastructure also needs ongoing maintenance and much flood infrastructure is in dire need of repair and upgrading. For example, in early 2019, an assessment by the US Army Corps of Engineers on the Whittier Narrows Dam revealed that the dam would not be able to hold up against a major Atmospheric River storm like the one in 1862. There are approximately 210 dams in California that are classified as Extreme High Risk.

May be good to have a paragraph here on the impact of sea level risk and erosion across the coast.

We identified three priority policy areas for California in addressing flooding and sea-level rise:

1. Improving risk communication,
2. Developing new insurance solutions, and
3. Supporting nature based approaches.

1. Risk Communication

- Risk communication for households is currently insufficient and inadequate (here)
 - o Risk information for many perils in California (particularly floods and sea level rise) is difficult to access for households and communities, spread across many sources creating consumer confusion, or not presented in way that is relevant and understandable.
 - o NFIP flood maps, which are one comprehensive source of flood information, present a backwards-looking and binary view of risk. According to a report by the OIG of DHS, more than 50% of the FEMA flood maps are outdated, i.e. required re-study or have not yet been assessed through the validation process.
- Currently there exists no quick and easy way for property owners in California to enter their address and obtain accurate current and future flood risk information. This information is needed to send accurate information to housing markets, to guide new development, and to help identify mitigation priorities.
- California does have a hazards disclosure law that is stronger than many states. This is on top of the federal requirement on lenders to disclose to borrowers if their property is located in a SFHA.

- Atmospheric Rivers (AR) are the main source for water (as well as flooding) in California. Yet the awareness on the topic is minimal. A recent article highlighted how the warming climate will impact these AR storms. A USGS report from 2011 on AR storms and their impacts estimates a property loss of \$400 billion (and \$325 billion in business interruption) if the 1862 event happens today. Can the current infrastructure (dams and levees) hold up to such an event?

Recommendations:

- The state should maintain a public digital database of previously flooded properties that is easily searchable online and consider if this should be a required property disclosure.
- The state should pilot a training program on flood risk and climate change for real estate agents.
- The state should require continuing education requirements specific to flood for any insurance agent selling flood insurance.
- The state should convene a group to consider if disaster resilience could be made a part of the home inspection process?
- The state should put out an RFP to produce an online property-level flood risk information portal for the state. These firms could have creative ideas for how to harness big data and new technological tools for such a platform.
- The states should create a NFIP flood insurance premium calculator, where individuals can enter information about their property and get a price quote.
- The state should create a repository for flood risk information and data beyond FIRMs by leveraging the research and development done by the state University System
- The state could pilot a vulnerability analysis of a particular region and for a particular extreme event scenario (such as a certain AR event or a dam break, for example). This could draw attention to possible impacts and necessary mitigation measures. Scenarios are sometimes useful communication strategies. Multiple scenarios could be used to explore issues of social equity issues in regards to flood.

2. Insurance Solutions

- Currently less than 5% of home owners in California have flood insurance.
 - o Determinants of low takeup rate:
 - Affordability/price
 - Lack of understanding of risk

- Lack of understanding about insurance
 - Biases
- How can the state promote the Flood Market to narrow the protection gap that exists for Flood? Promoting both Public (NFIP) and Private options will have the following advantages:
 - Broader coverage options
 - Risk adequate premium
 - Varying limit options
 - Standalone and Endorsement options
- Catastrophe Modeling is the science of making probabilistic predictions of financial risk due to natural and non-natural catastrophic events. Probabilistic Models for floods have evolved significantly over the years and can play an important role in capturing the Climate Risk. The State should consider accepting models for the rating process of flood insurance.
- There are new risk transfer approaches that could help close the flood insurance gap in California:
 - Community insurance
 - Parametric policies
- Insurance can play a stronger role in also funding or promoting risk reduction. This potential needs to be harnessed.
- California is uniquely structured to have Geological Hazard Abatement Districts (GHADs) which were created to enable local residents to collectively mitigate geological hazards which pose a threat to their properties.
 - Can Community Insurance by the GHAD's play a role in reducing the protection gap and avoiding a surprise event?

Recommendations:

- DOI should support piloting of new solutions, such as community-based insurance and parametric policies for flood recovery.
- DOI should consider using models for insurance rating purposes, similar to the Florida Hurricane Commission.
- The state could undertake a detailed and granular analysis of take-up rates for flood insurance to better document/identify flood insurance gaps in the state.
- DOI could encourage private firms to experiment with approaches to encourage risk reduction, such as rate lock following investments in hazard information or expanded payouts to cover mitigation as part of rebuilding. The California

Earthquake Authority has models for how this could be done in partnership with the state.

- The state should develop maps of high flood risk areas, similar to CBRA zones, where there will be no state funds for any development or infrastructure. The DOI should also consider not regulating insurance in the high risk zones.
- The state could follow North Carolina's example and implement an affordability program for flood insurance to help lower income families afford coverage.
- The state should consider broadening the scope of the GHADs under the Beverly Act (1979) to include all Climate Related perils.
- Mitigation for erosion or landslides? Insurance options?

3. Nature Based Solutions

California has a wealth of natural infrastructure that can help in reducing the risk of flood and sea level rise. One example is wetlands that are among the most productive ecosystems, comparable to rain forests and coral reefs. Apart from their ecological benefits, wetlands are crucial for storing flood waters and maintaining surface water flow during dry periods. Unfortunately, 90% of the wetlands in California have disappeared over the past century.

https://www.waterboards.ca.gov/rwqcb5/board_decisions/tentative_orders/1504/2_5_wetlands/3_wet_savecalastwetlands.pdf

- Profile Napa, CA investment in wetlands for flood control

Wetlands provide significant protection from major flooding events. For example, a study post Superstorm Sandy found that about \$625 million in property damages were prevented due to coastal wetlands. Where wetlands remain, the average damager reduction from Sandy was greater than 10%. More details in the link below:

<https://www.universityofcalifornia.edu/news/wetlands-offer-valuable-return-investment>

Sea Level Rise and Erosion are also among the major threats for California's coastline. See case study by TNC on the Natural Shoreline Infrastructure.

https://scc.ca.gov/files/2017/11/tnc_Natural-Shoreline-Case-Study_hi.pdf

While the strongest demonstrations of (direct) natural infrastructure investments leading to risk reduction seem to be in dealing with flooding and storm surge with wetlands,

there have been studies that combine risk reduction from nature-based solutions and a corresponding risk transfer. The risk reduction quantified by the restoration of a wetland is directly applied to the reduction in premium for the risk transfer. A major benefit of such a resilience based risk transfer solution is that the reduction in premium can be amortized back to the initial investment made towards the nature based solution (i.e. risk mitigation).

Recommendations:

- Develop maps of current natural infrastructure in the state that are providing risk reduction benefits and prioritize these areas for conservation.
- Hold discussions with stakeholders on models where insurance industry or holders of property insurance policies could contribute small amounts to a fund that would be used to invest in conservation of areas that provide flood or sea level rise protective benefits.
- Promote Public Private Partnerships that focus on nature-based solutions and that link risk mitigation and risk transfer.