Collaborative flood modeling for timely, effective and equitable flood risk adaptation

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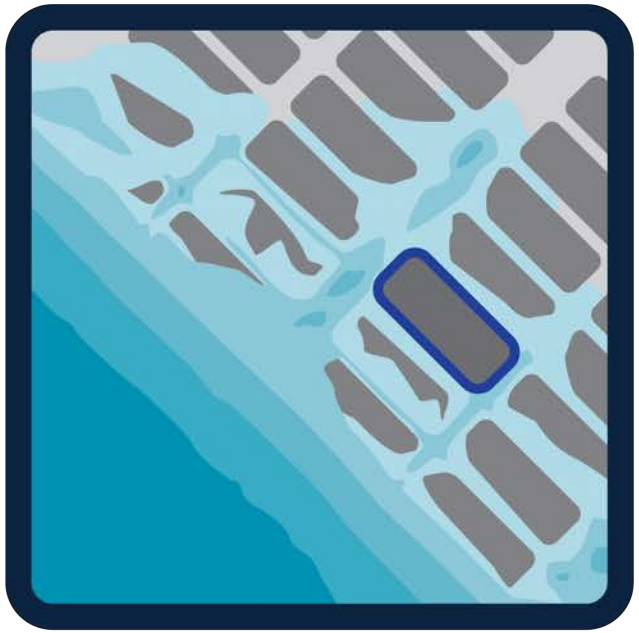

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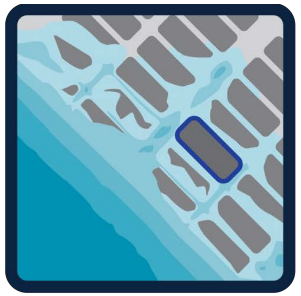
Motivation

- Flood risks and impacts are growing, and responses are not yet adequate for future climate change
- Resident/stakeholder participation is crucial to effective and equitable responses, yet extremely time intensive and challenging
- Most simulation software is too slow to support wide exploration of risks and coordination of responses
- New technology (PRIMo): rapid fine-scale urban flood modeling for risk exploration

- 456,000 people and $56 billion in property exposed to more than 1 ft of flooding
- Disproportionate exposure of Black populations and disadvantaged populations



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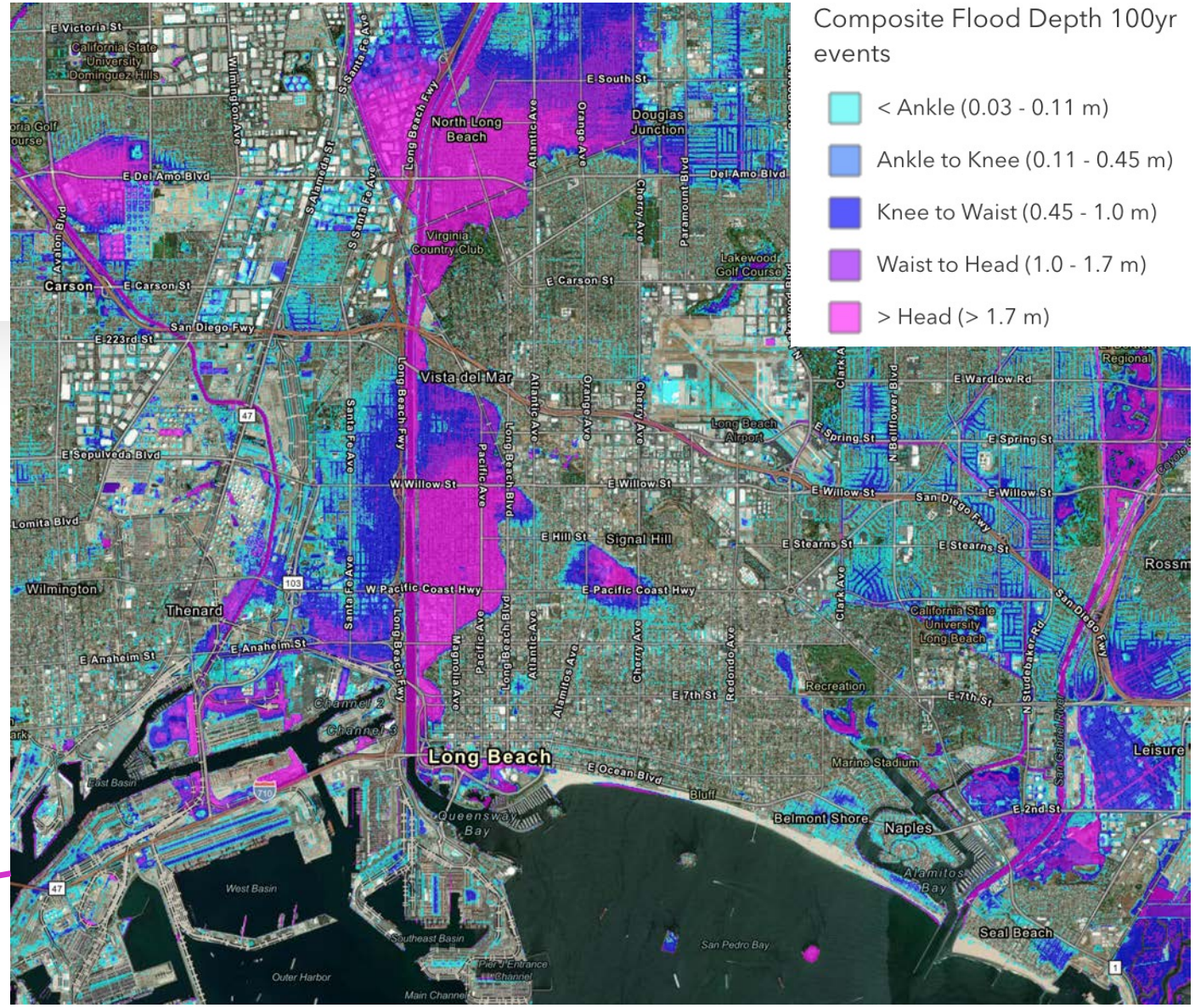
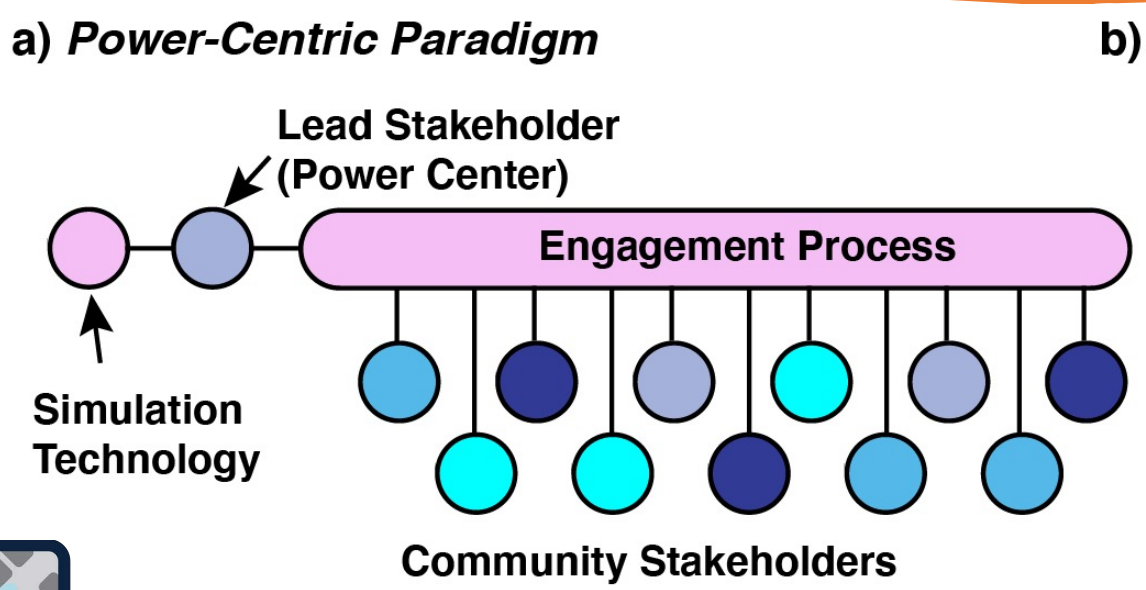
Parallel Raster Inundation Model (PRIMo)

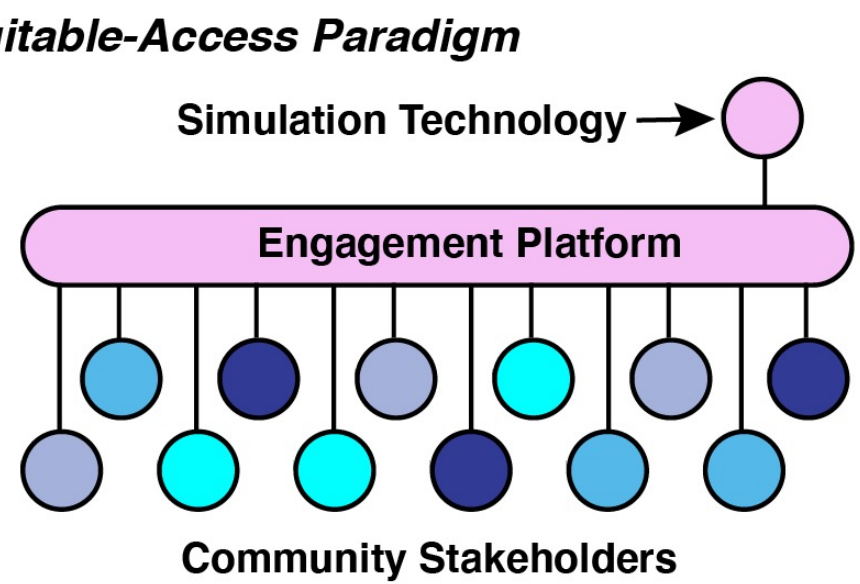


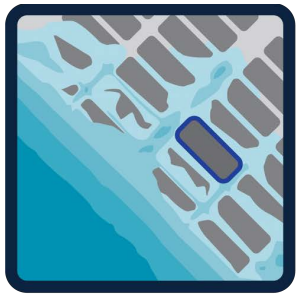
Sanders et al., *Nature Sustainability*, 2023

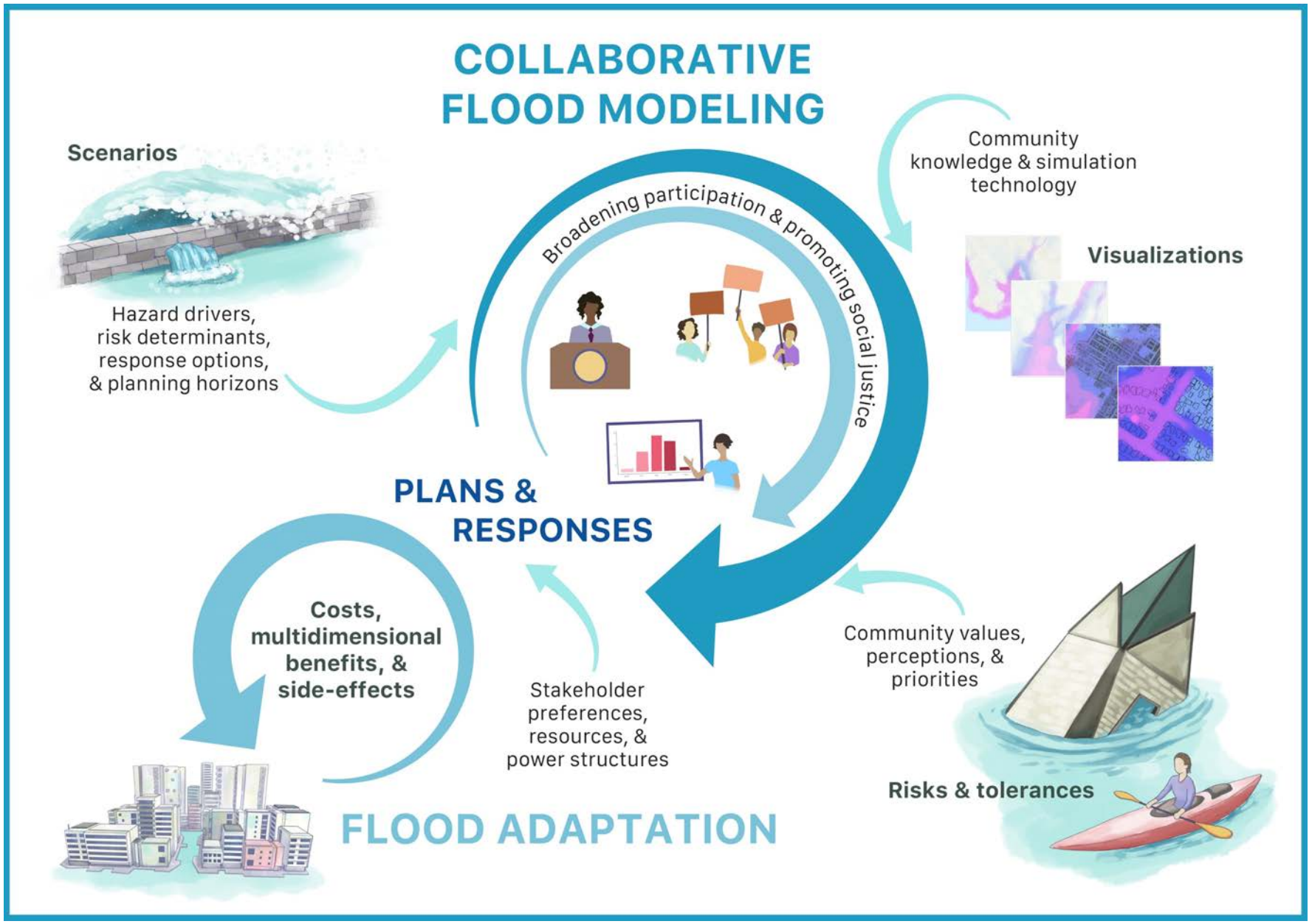
Hypothesis

Shifting control over flood modeling will change the outcomes of adaptation









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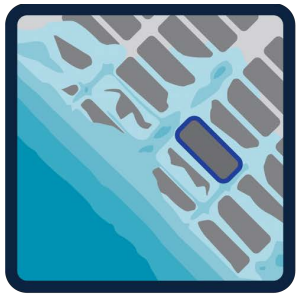
Alliance of Regional Collaboratives for Climate Adaptation (ARCCA)

- Network of local governments, regional agencies, non-profit organizations, businesses, utilities, and academics working together to advance climate mitigation and adaptation efforts



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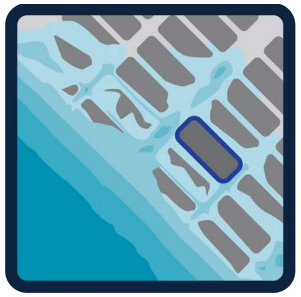
Framing the Problem of Flood Risk and Flood Management in Los Angeles

- The way that decision-makers understand flooding shapes the way they will plan for and respond to flood events
  - 43 participants: city planning departments (7), nonprofits (11), special districts. (4), state agencies (3), county flood control (5), universities (7)
- Three problem frames:
  - Large floods affecting large swaths of infrastructure and housing.
  - Frequent, small floods that mobilize pollution in low-income areas.
  - Protecting coastal ecosystems during sea level rise.



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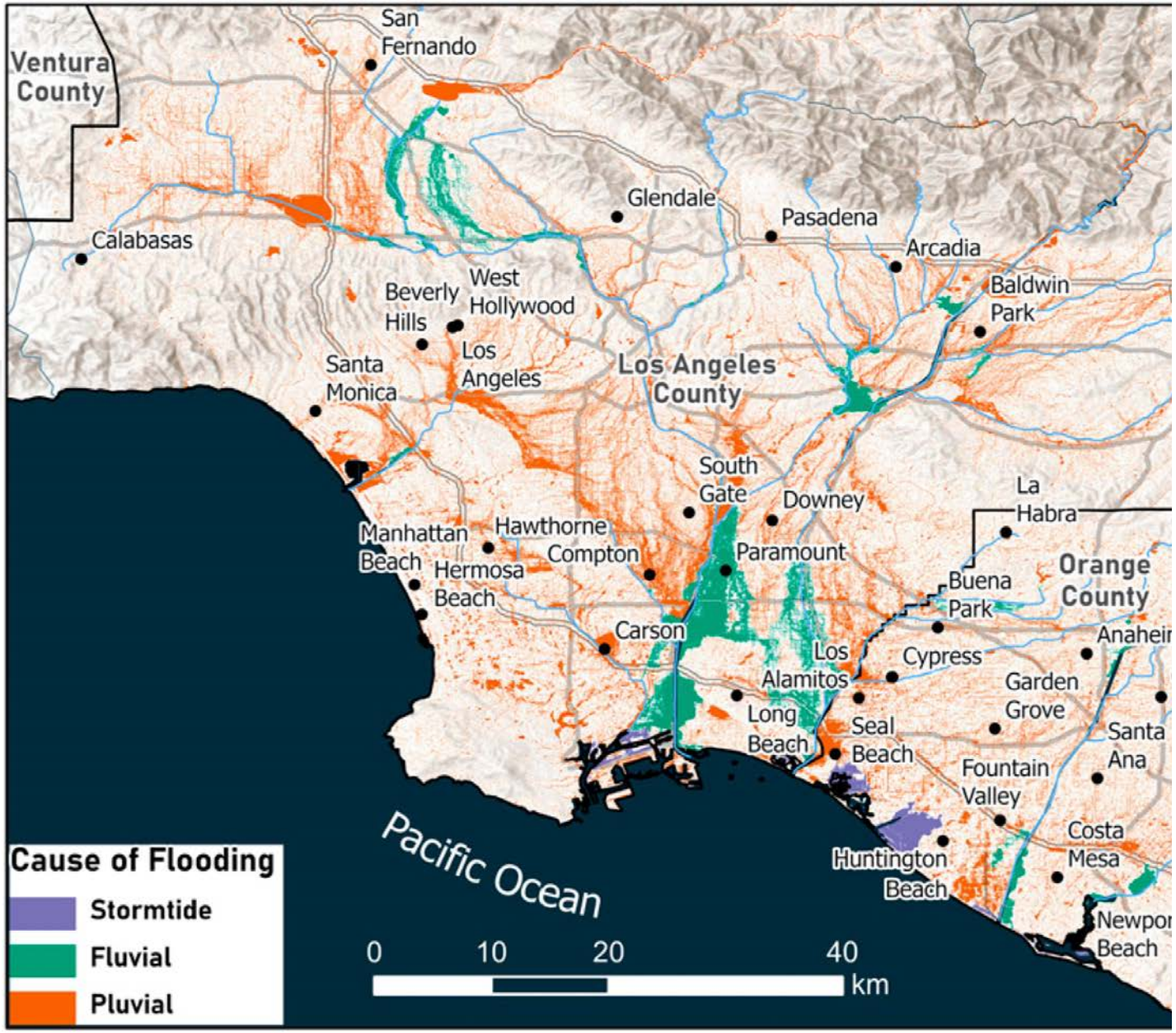

Ulibarri et al., *Weather, Climate and Society*, 2023

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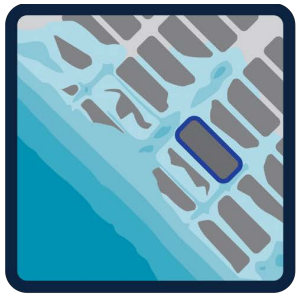
- Developing and evaluating three “end-member” adaptation pathways
  - Raising levees (business as usual)
  - Widening channels (and restoring floodplains)
  - Stormwater capture (with green infrastructure)
- Community engagement
  - Scenario development
  - Scenario evaluation for economic, social and ecological benefits
- Empowering communities to secure federal funding (FEMA and NFWF) for risk management and habitat restoration projects



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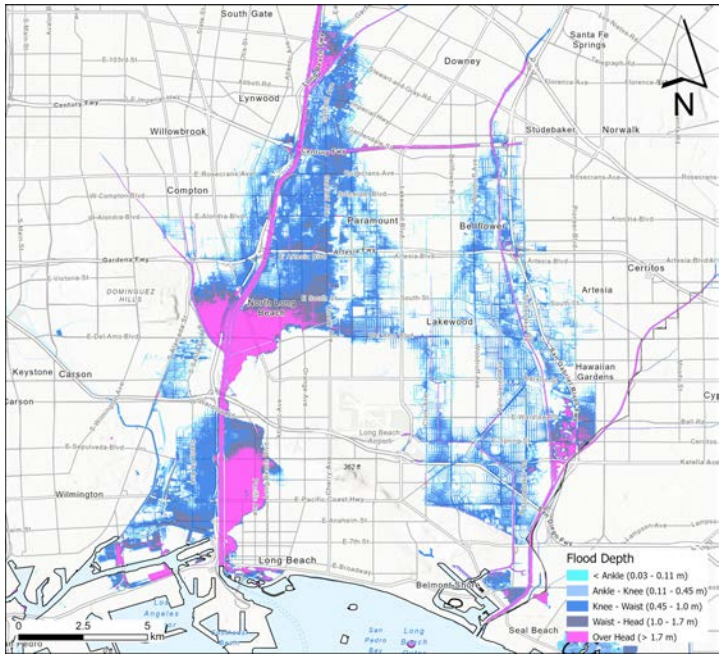
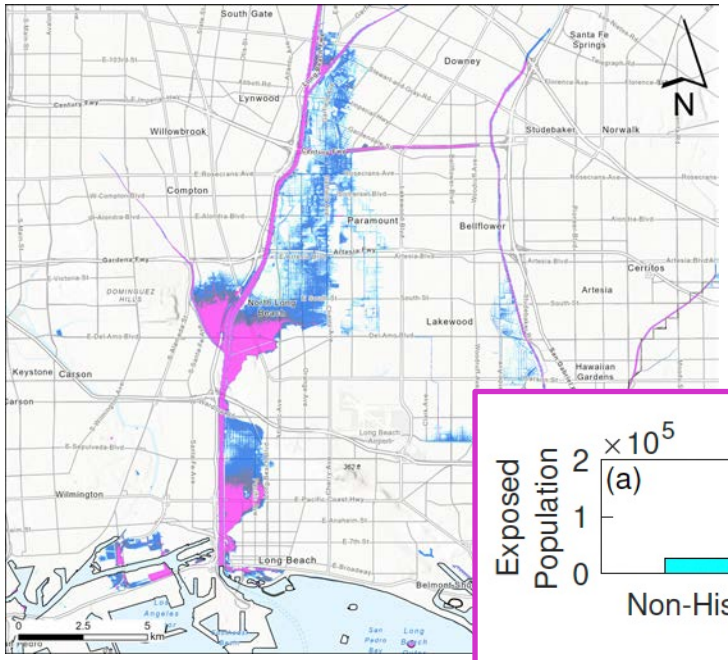
Testing Solutions with PRIMo

1% Flood Hazard Today



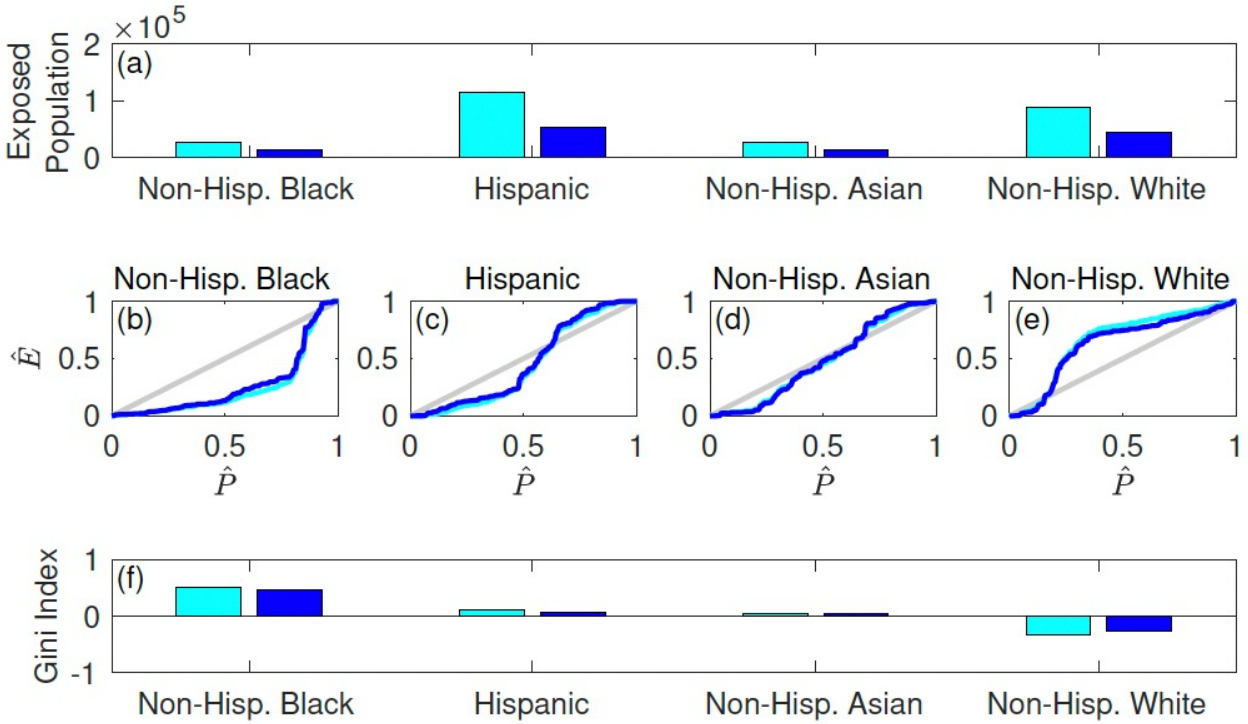
Hazard with Levees Raised by 1 m



Hazard Today

Raised Levees

Exposure Inequality Analysis



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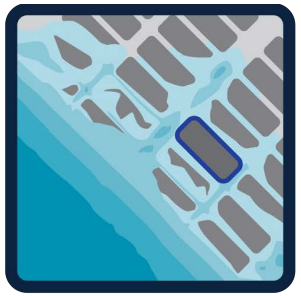
Let’s summarize!

- New regional models (PRIMo) facilitate participation in adaptation planning
- Regional climate collaboratives facilitate outreach and engagement across decision-makers including governments, households and disadvantaged communities
- Early engagement is important for building trust and developing a shared awareness of costs, benefits and opportunities
- Win-win solutions will come from alignment of needs and benefits
- PRIMo is in the cloud and available for applications



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