

Identifying Areas at Risk from Sea Level Rise-Induced Groundwater Contamination in Coastal California

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CENTER FOR GEOSPATIAL
SCIENCE & TECHNOLOGY
California State University, Northridge

CSU-WATER Conference
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Collaborators



- Center for Geospatial Science and Technology (CGST)
 - Danielle Bram, Zachary Canter, Aaron Gaines, and Alondra Rodriguez Noriega
- California State University, Long Beach
 - Dr. Ben Hagedorn, Dr. Matt Becker, and Mark Pratt
- Funding from the CSU Council on Ocean Affairs, Science, and Technology (COAST)
 - State Science Information Needs Program (SSINP)

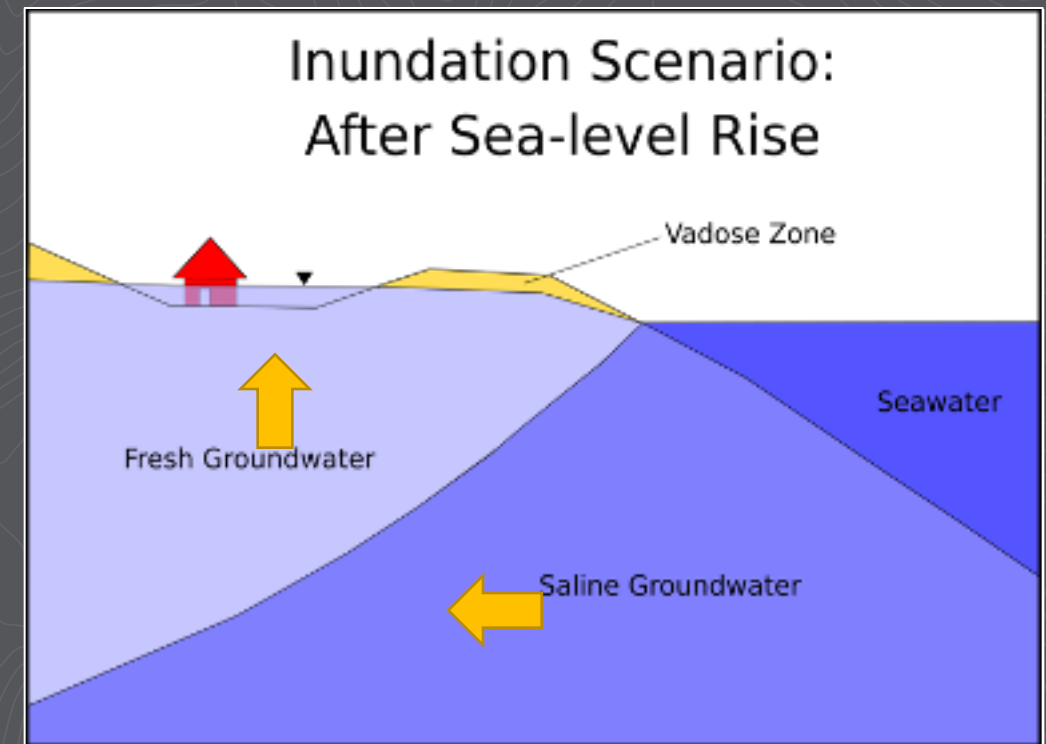
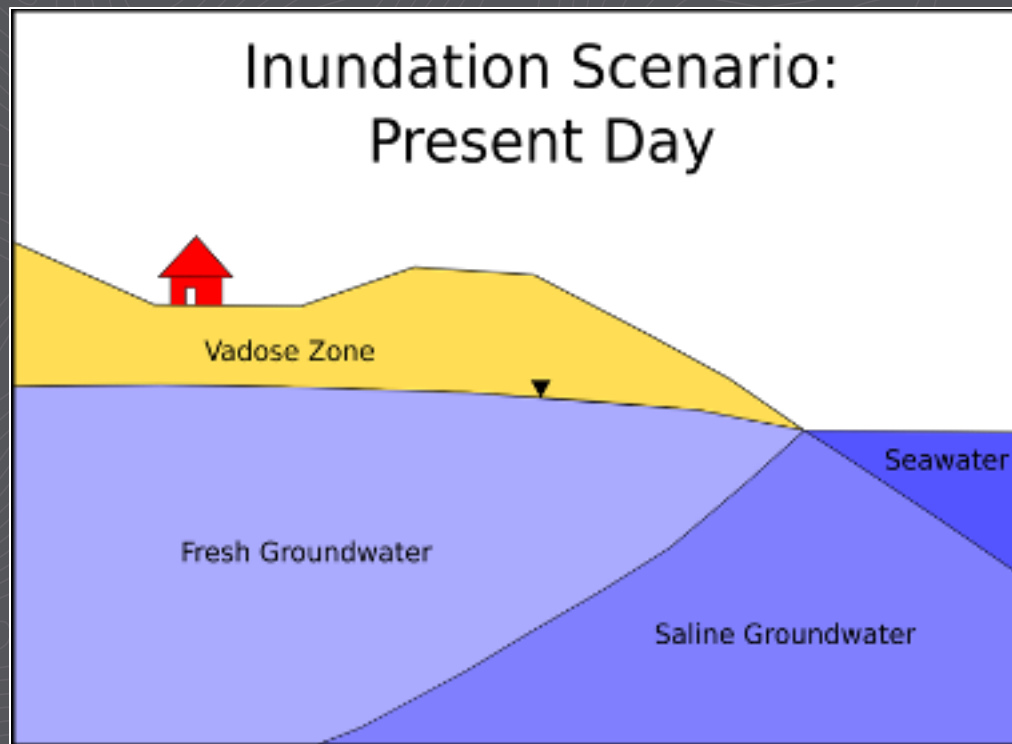


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LONG BEACH



Significance of Research

- Sea level rise-induced groundwater inundation



Significance of Research



Flooding of hazardous sites



Human Exposure



Image credit: US Dept of Energy

Image credit: Unsplash | Vidar Nordli-Mathisen

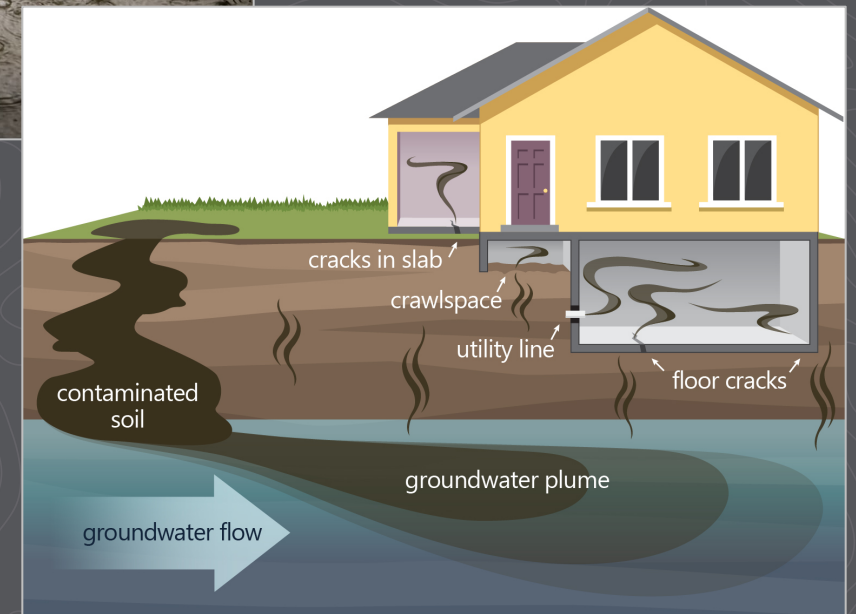


Image credit: WA Department of Ecology

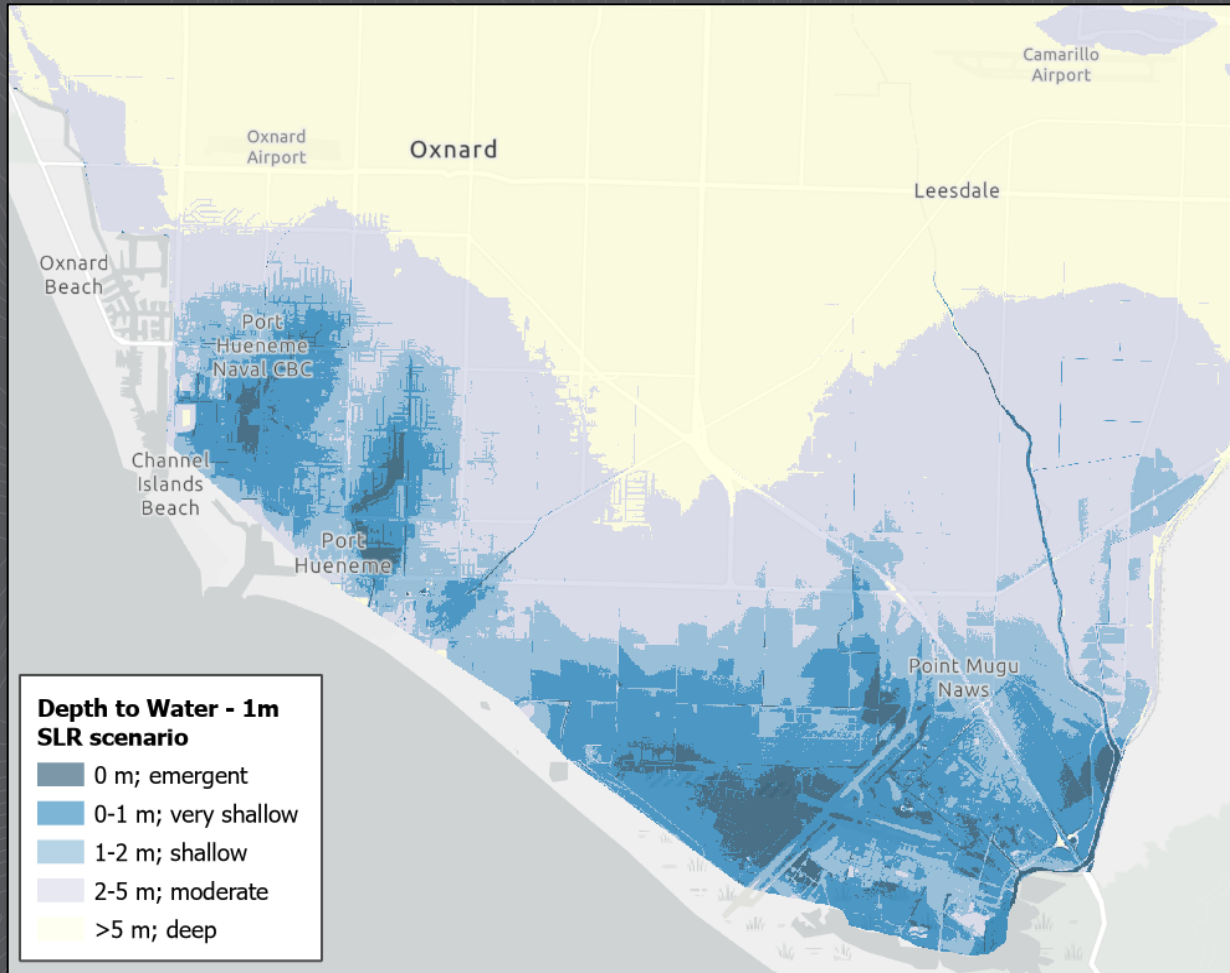
Project Tasks



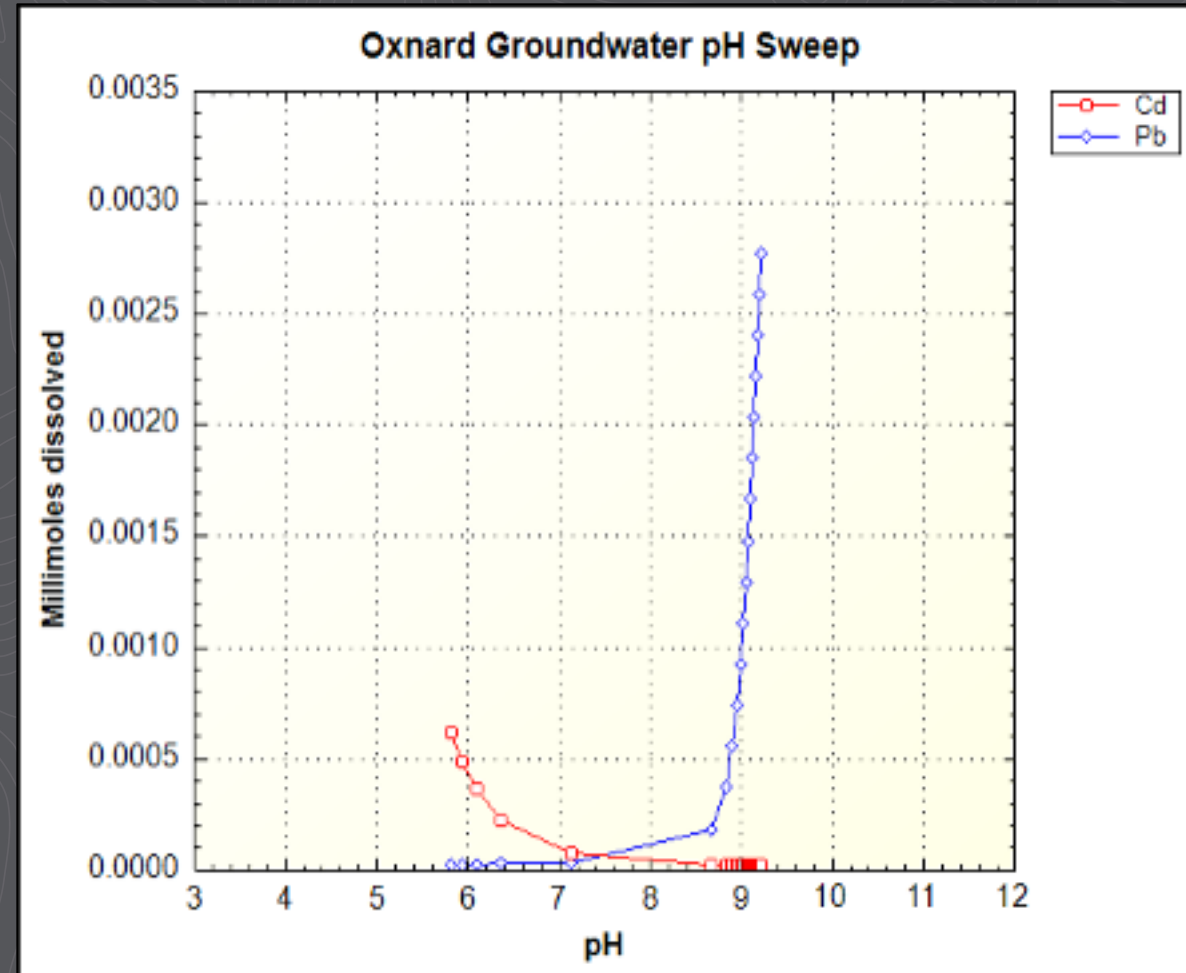
- Groundwater and chemical transport modeling
- High spatial resolution socio-vulnerability modeling
- Combine modeling results to identify coastal communities that are at risk from sea level rise-induced groundwater pollution



Groundwater Flow and Chemical Transport Models



Analytic Element Modeling (AEM) chosen to minimize errors associated with grid-based models



Investigate mobility of contaminants under likely pH, redox, and temperature conditions

Socio-vulnerability Score (SVS) Model



Vulnerable Populations

SOCIO-VULNERABILITY	INDICATOR
Child Population	% Population < 18 years old
Elderly Population	% Population ≥ 65 years old
Female Population of Childbearing Age	% Population considered to be a female of childbearing age (15 - 44)
Linguistic Isolation	% Limited English speaking households
Racial Minorities	% Not White alone population

Neighborhood Capital

SOCIO-VULNERABILITY	INDICATOR
Concentration of Health Services	Number of health centers within 1000m of block group
Housing Density	Number of units per square mile
Vacancy	% Vacant housing units
Vehicle Access	% Occupied housing units with no vehicles available

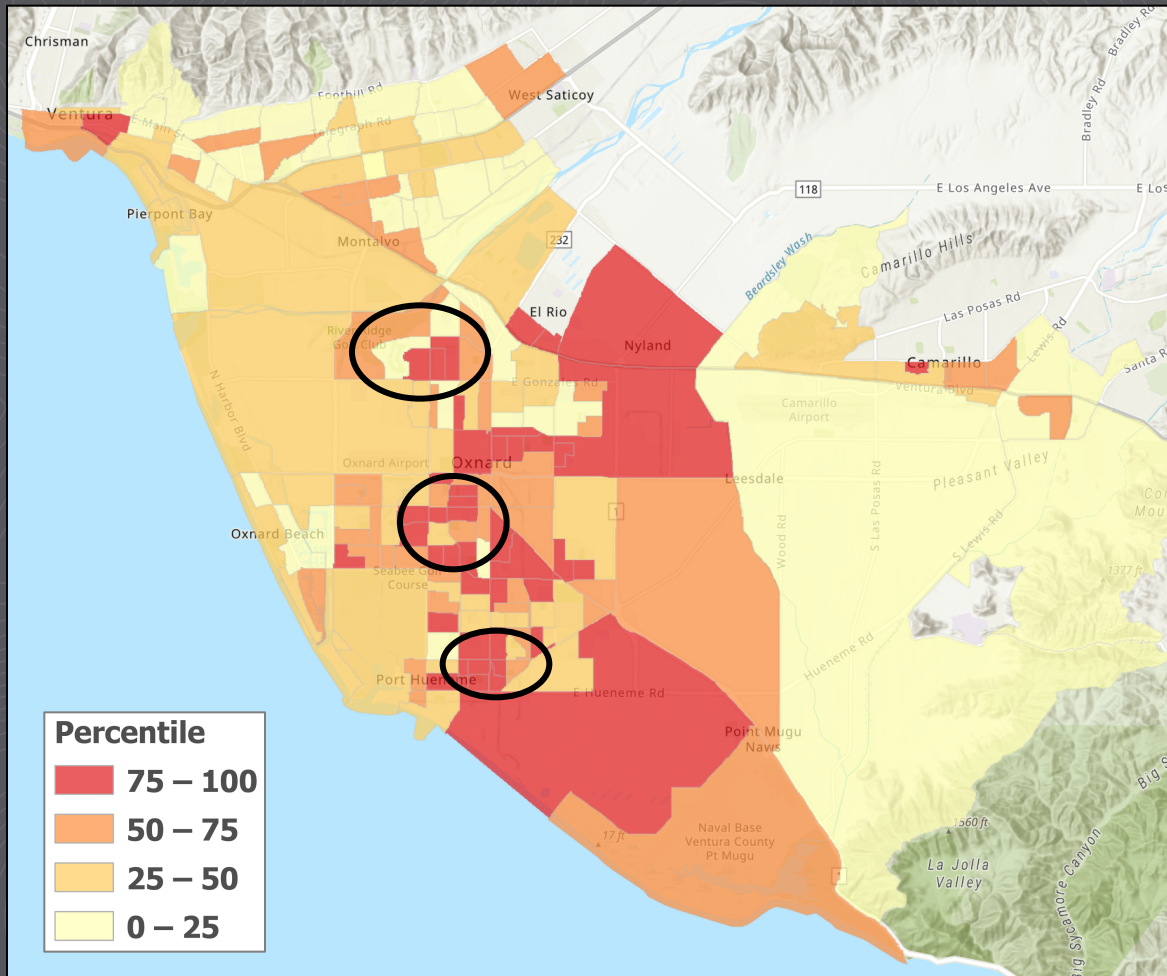
Socioeconomic Status

SOCIO-VULNERABILITY	INDICATOR
Unemployment Rate	% Population 16 to 64 years old that is unemployed
Education	% Population age 25 or over with less than high school degree
Single-Parent Households	% Households w/ female or male householder, no spouse/partner present, w/ own children < 18 years old
Poverty Level	% Households whose income in the past 12 months is below the poverty level
Lack of Health Insurance	% Population with no health insurance coverage

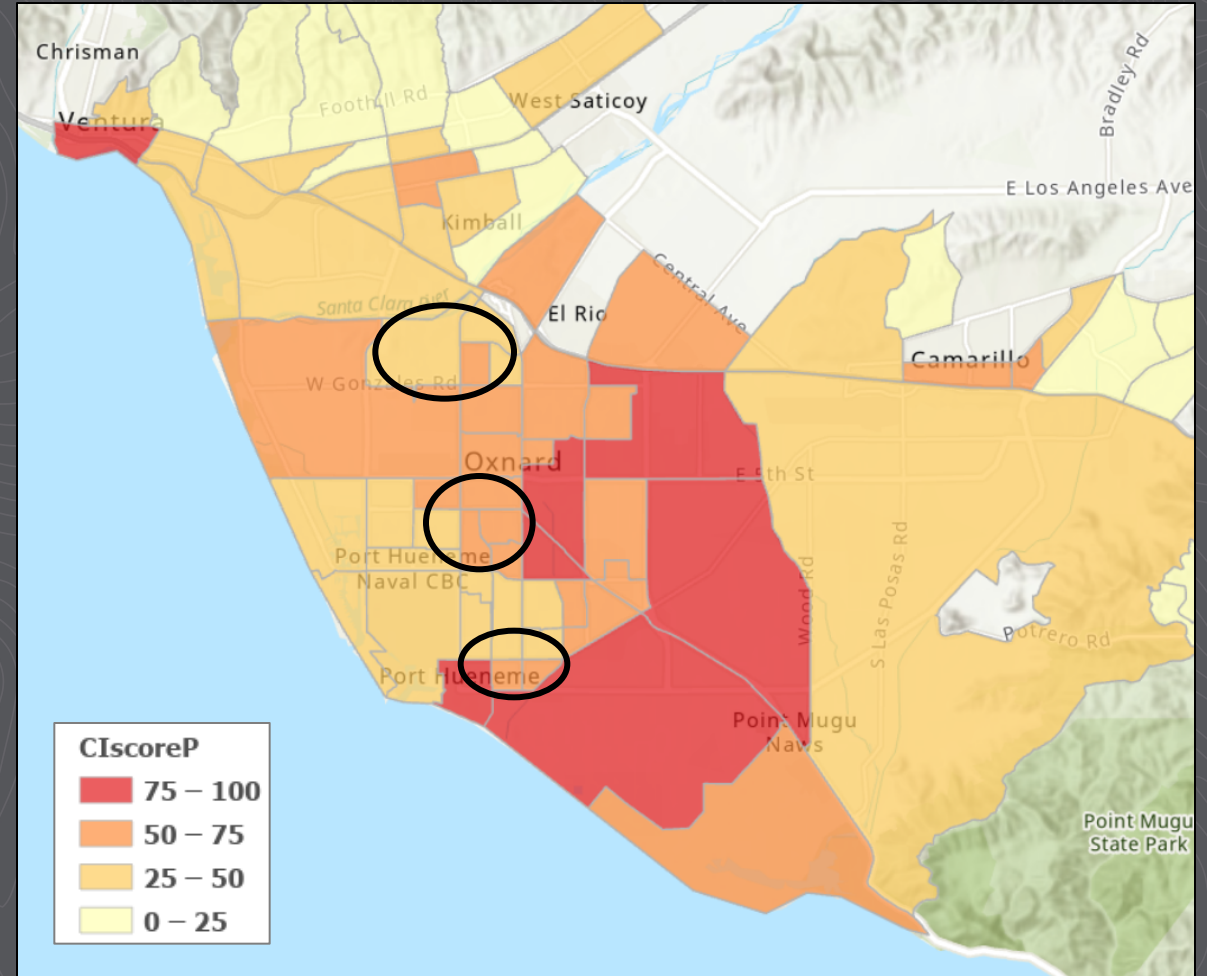
Preliminary SVS Results



SVS Percentiles



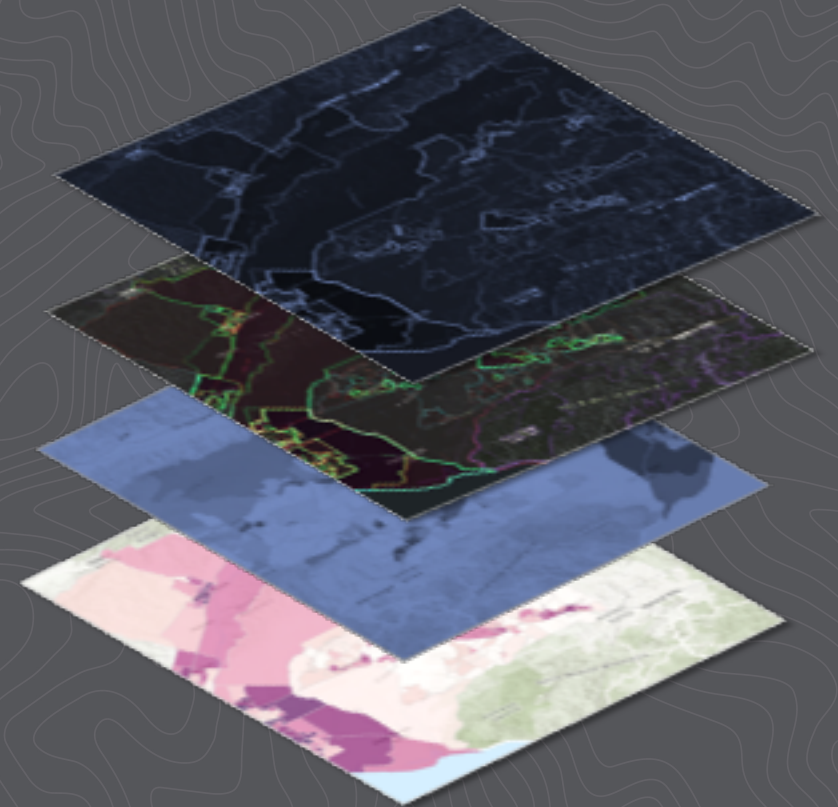
CES Percentiles



Next Steps



- **Spring/Summer 2023**
 - Complete groundwater and chemical modeling
 - Overlay model results to identify coastal communities at risk
- **Summer 2023**
 - Share results with state agencies and the public
 - Department of Toxic Substances Control (DTSC)
 - Ocean Protection Council (OPC)
 - State/Regional Water Boards





Thank you!

For more information, please email ben.chou@csun.edu

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