

# **The Impacts of Sea Level Rise on the California Coast**

Matthew Heberger

Pacific Institute, Oakland, California

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The Pacific Institute is a nonprofit, nonpartisan organization based in Oakland, California dedicated to advancing a healthy environment and economy and social justice and equity through applied research.

We have been working on climate change and its impacts on water resources for over 20 years, including one of the first detailed assessments of the economics of sea level rise in CA in 1990.

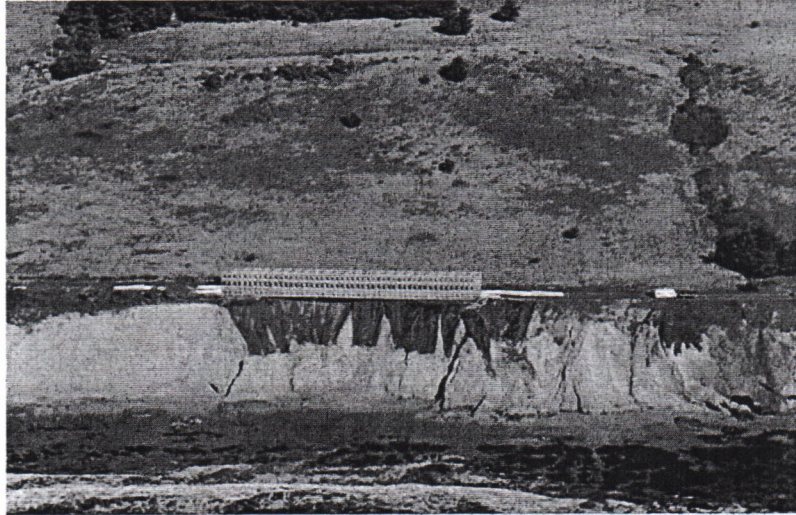
# Laguna Beach



Photos courtesy of the Coastal Records Project, © Kenneth & Gabrielle Adelman, [www.californiacoastline.org](http://www.californiacoastline.org)

The California coast stretches about 1,000 miles along the Pacific coast, 1,000 miles along SF Bay.

## Transportation Impacts

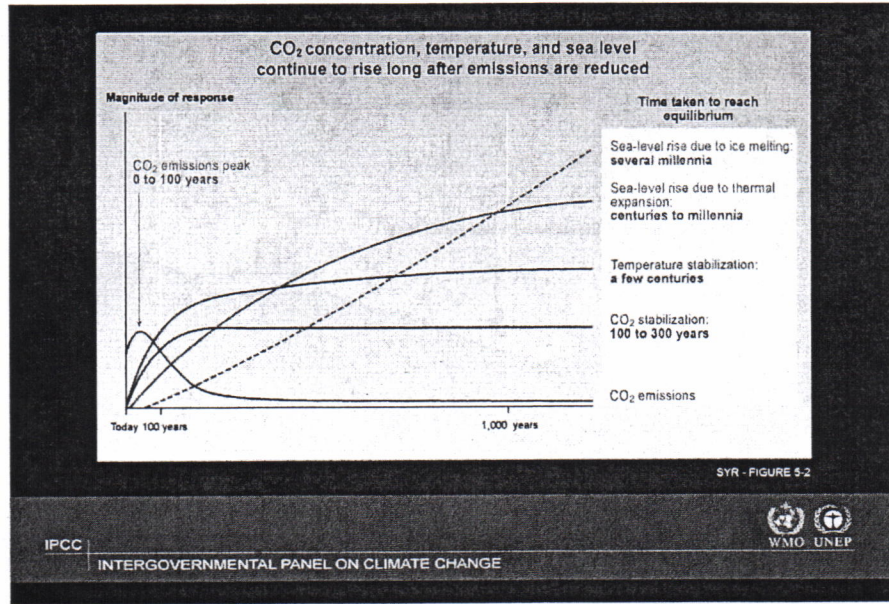


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Many roads on or near the coastline are vulnerable to flooding or coastal erosion.



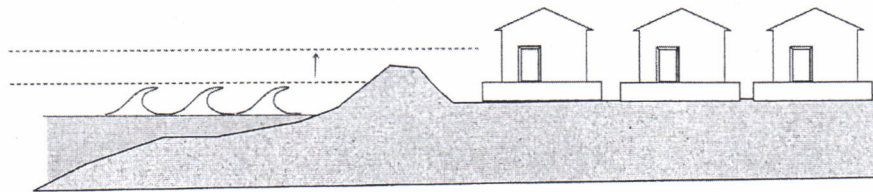
# Adaptation is a Necessity



Soberingly, climate scientists tell us that even if we cut our carbon emissions to zero today, sea levels will continue to rise for centuries due to the time lag effect. A certain amount of continued sea level rise is inevitable. We need to “avoid the unimaginable, and “manage the unavoidable.” We can expect a range of impacts to the natural and human environment:

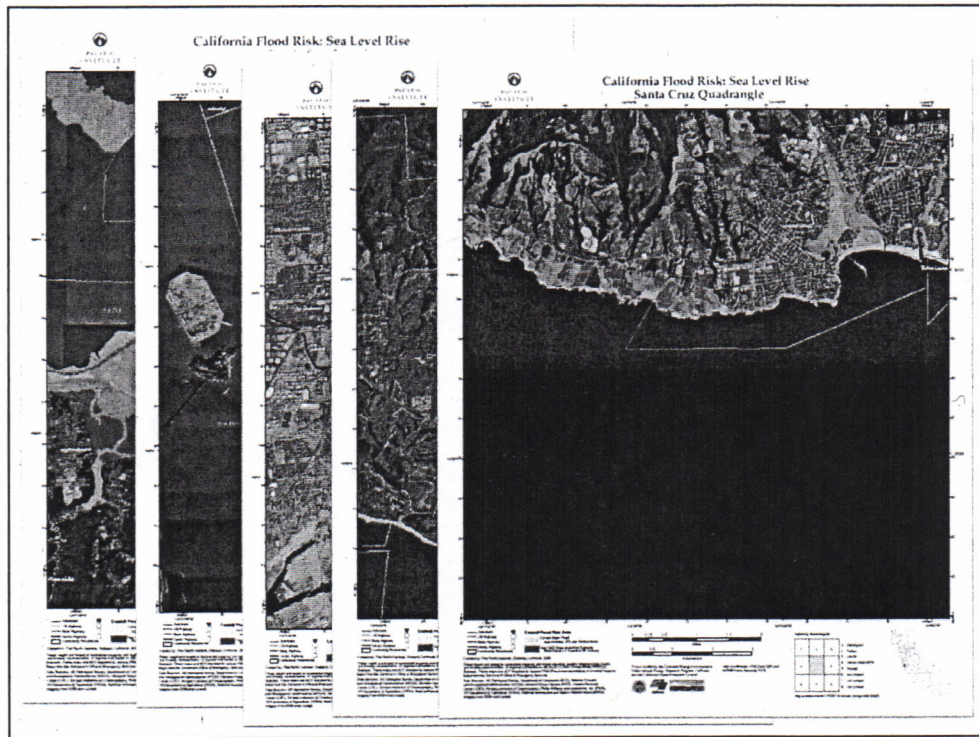
- Increases in coastal flooding
- Increased coastal erosion
- Loss of property, economic and social disruptions
- Potential loss of wetland habitat
- Selective armoring of the coast, as people take steps to protect human settlements and infrastructure

## Existing Development Behind Levees

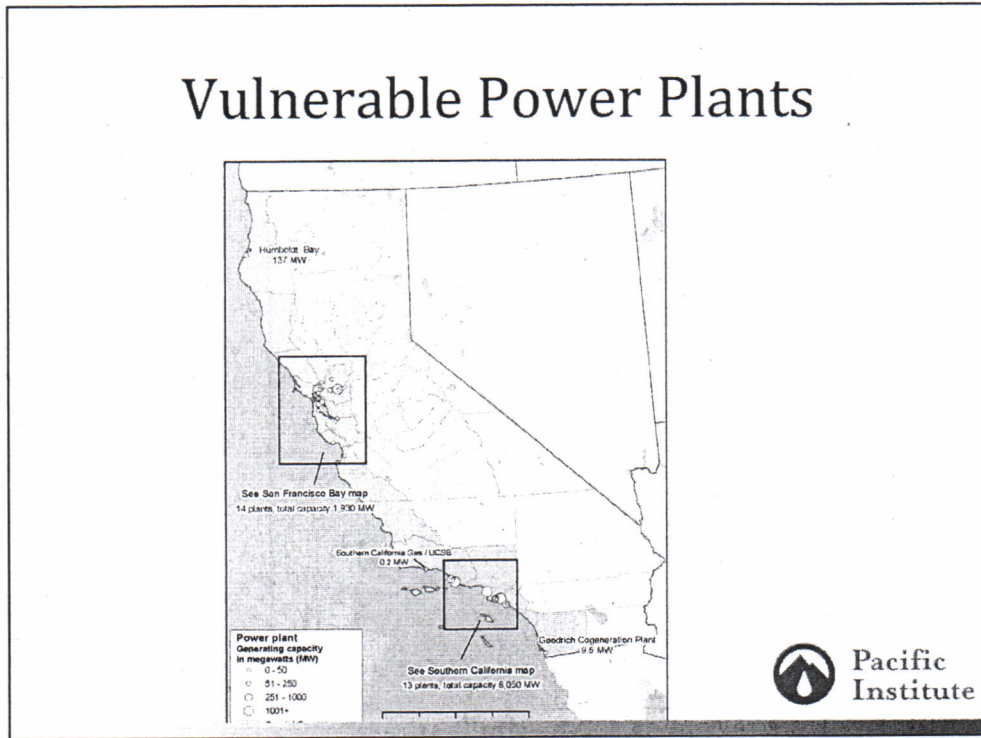


Much of the flat land around San Francisco Bay is fill, or land that was created in the 20<sup>th</sup> century as cities expanded. Many areas are protected from tides by levees. Other coastal areas are protected from high tides and storms by seawalls. Most of these will need to be raised or strengthened to protect against rising sea levels in coming decades. Our study was hampered by lack of accurate data on the location and condition of coastal defenses.

We estimated that to protect existing high-value development would require building or upgrading over 1,000 miles of levees and seawalls, at a cost of over \$10 billion. While this is one option, coastal armoring comes with a tradeoff, often leading to the loss of beaches, wetlands, and their recreational and ecological value.



# Vulnerable Power Plants



## Infrastructure

Buildings: \$100 billion

Highways: 180 miles

Roads: 1,600 miles

Railways: 170 miles

Electric Power Plants: 30 (10,000 MW)



## Other Infrastructure at Risk

- Roads: 3,500 miles
- Highways: 430 miles
- Railroads: 280 miles
- Schools: 137
- Police Stations: 17
- Fire Stations: 17
- EPA-listed toxics sites: 330
- Parks, airports, bridge access, coastal wetlands, etc.



Fire and police stations are of particular importance as they are the emergency responders. Schools often serve as shelters during natural disasters.

EPA-listed sites are locations where toxic contaminants may be present that have the potential to be mobilized by flood waters.



## Conclusions

- Climate change will inevitably change the character of the California coast, so we must begin to adapt
- We can expect increased flooding and erosion
- Large populations and extensive infrastructure will be at risk
- We can armor the coast to defend lives and property, but this will come at a financial and environmental cost

654 13th Street, Preservation Park, Oakland, California 94612, U.S.  
510-251-1600 | [www.pacinst.org](http://www.pacinst.org)



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Perhaps the most important message: we should begin planning now and not wait until catastrophe strikes, because *panic almost never leads to good public policy.*