The Importance of a Coastal Resilience Index for Community Development

3rd Coastal Hazards Symposium
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Motivation

- Coasts are high hazard areas – vulnerable to storms, hurricanes, tsunamis, floods
- 10s to 100s of millions dollars in global coastal damage annually
- High numbers of coastal fatalities
- Rising sea level will bring increased problems
- Finite resources and financial capital for disaster

Motivation

7 billion people

Earth at Night
More information available at:
http://antwrp.gsfc.nasa.gov/apod/ap001127.html

Astronomy Picture of the Day
2000 November 27
http://antwrp.gsfc.nasa.gov/apod/astropix.html

Methodology

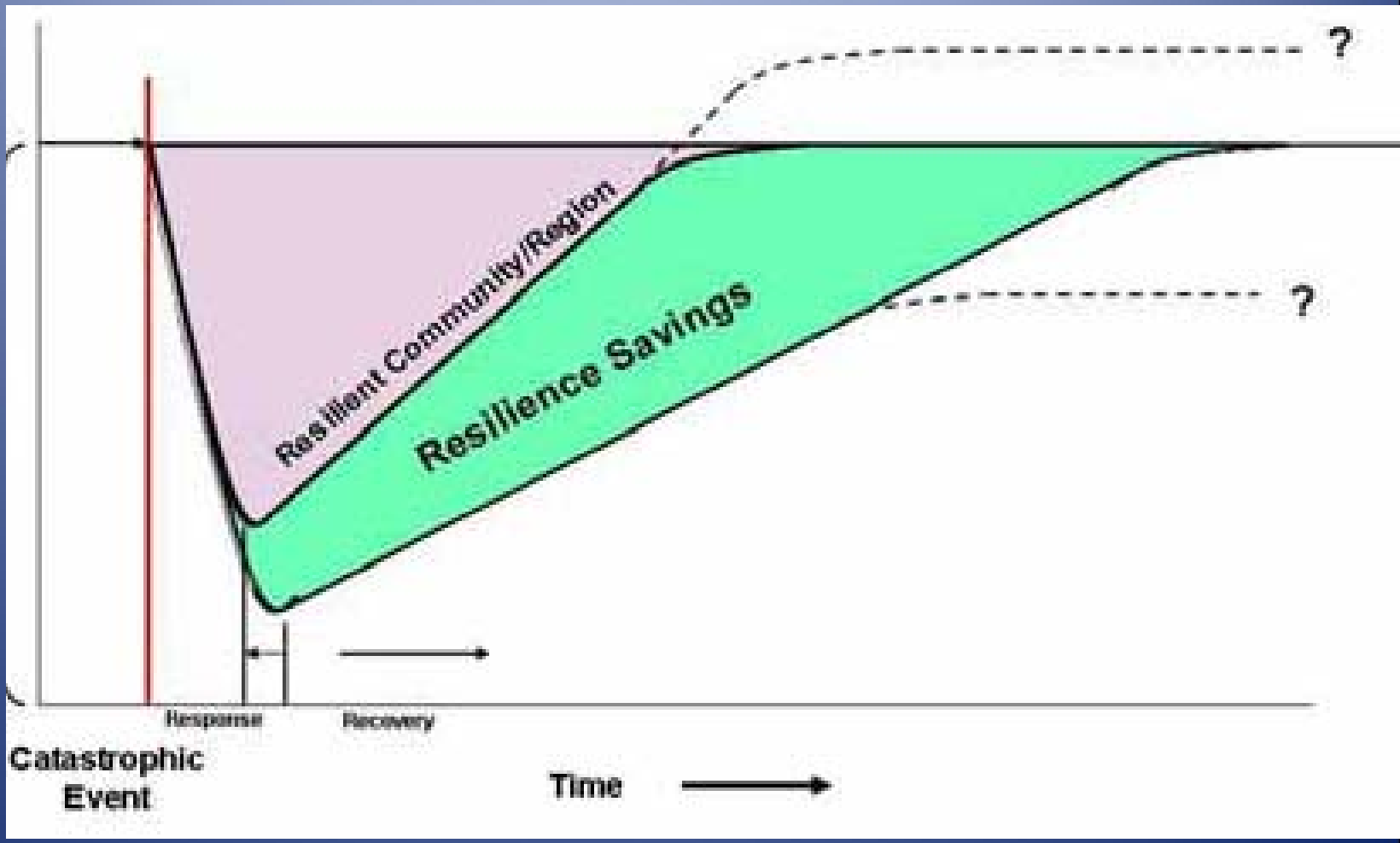
- What is Resilience
- Lessons learned from recent disasters
- What worked and what did not work
- Community options for risk management & resilience
- Fit options into a coastal resilience framework or index

Conclusions

- Community resilience is location-specific
- Current approach to coastal disasters will continue the trend of massive community interruptions, property damage and fatalities
- Disaster-responses stress available resources
- Coastal resilience covers all aspects of a disaster

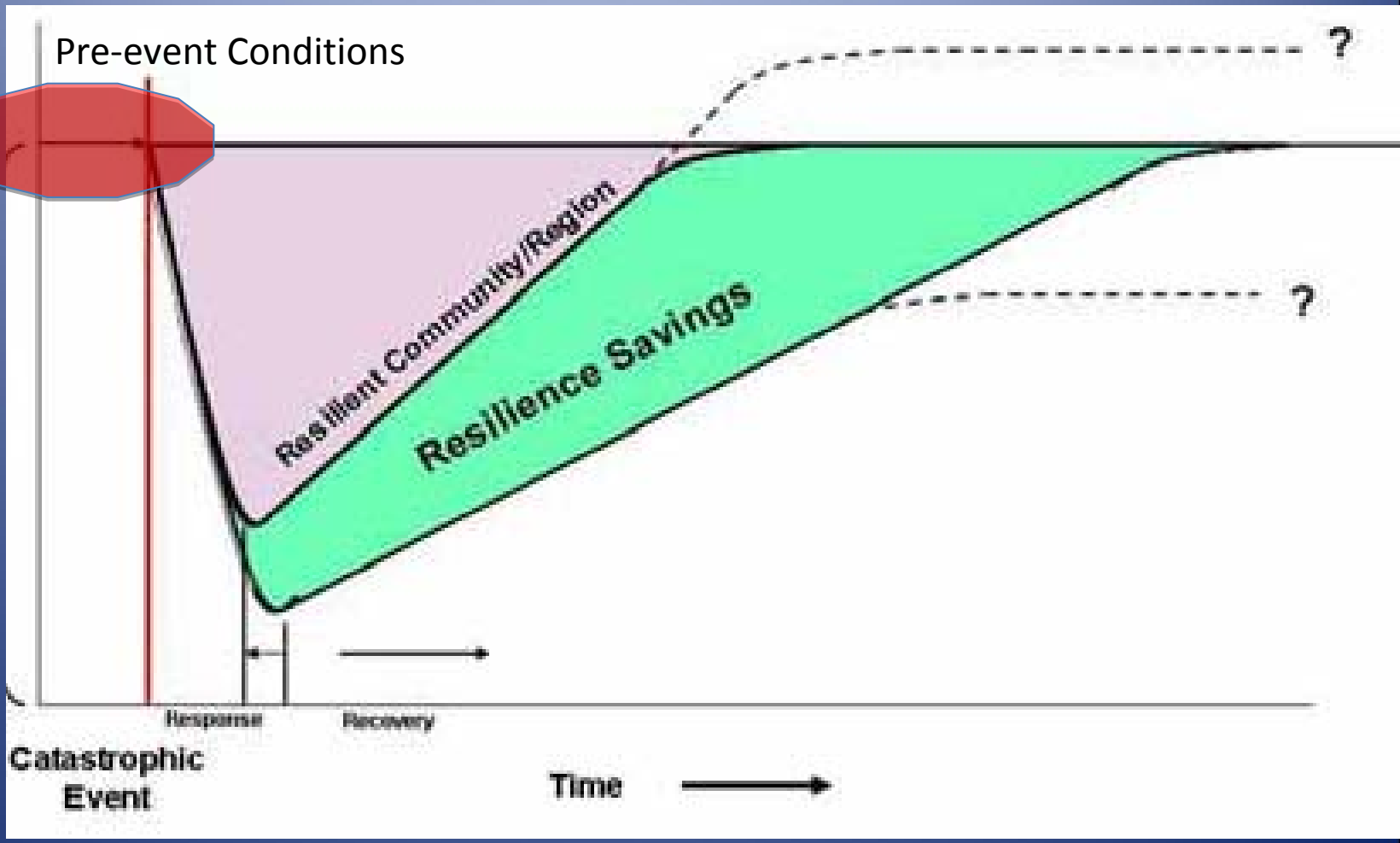
What is Resilience

Resilience/ Safety from Coastal Hazards



Adapted from NOAA & Mobile Bay Chamber of Commerce(2007 - 2008) Mobile Bay Region Creating a Strategic Framework for Regional Growth and Resilience

What is Resilience



Resilience/ Safety from Coastal Hazards

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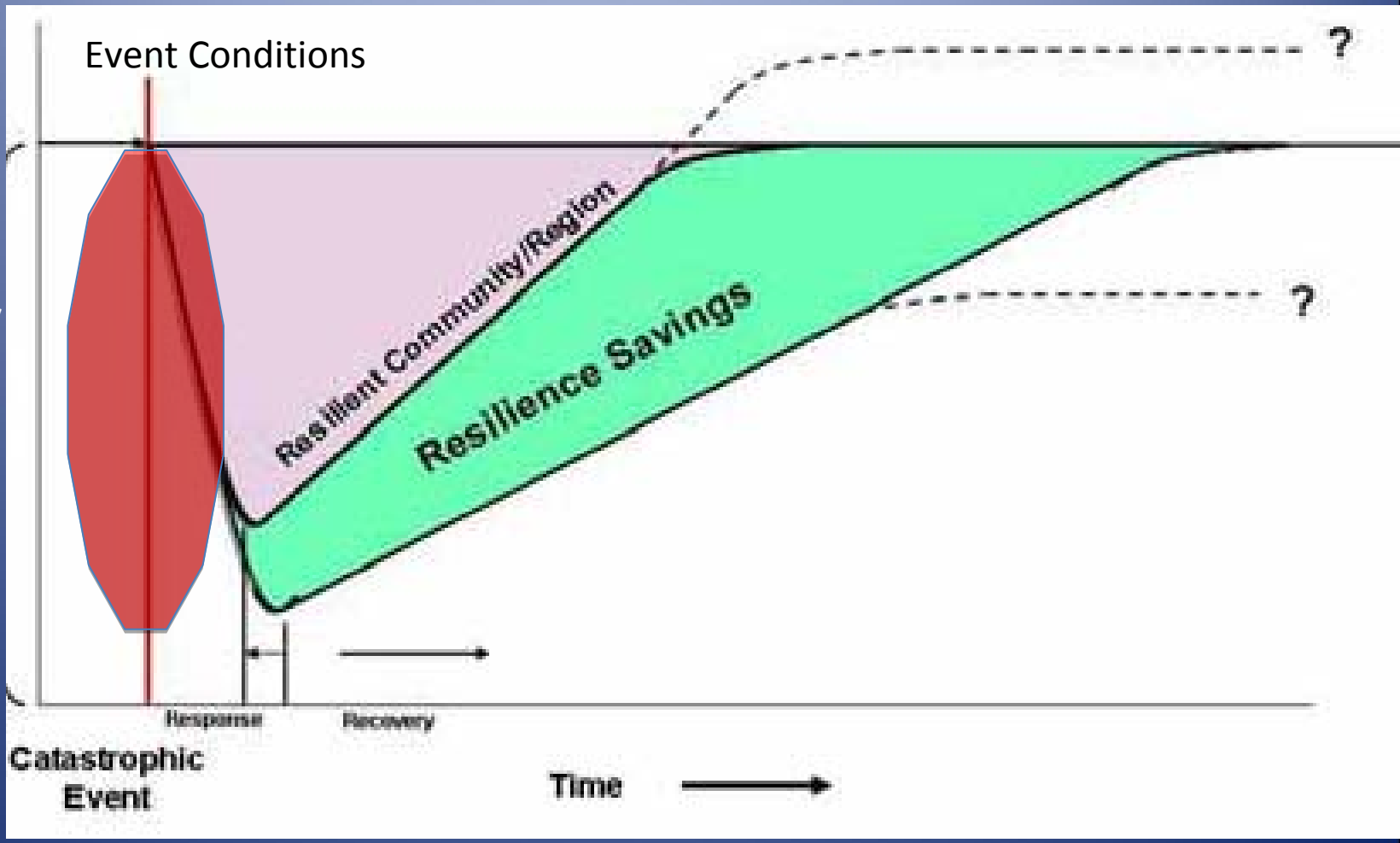

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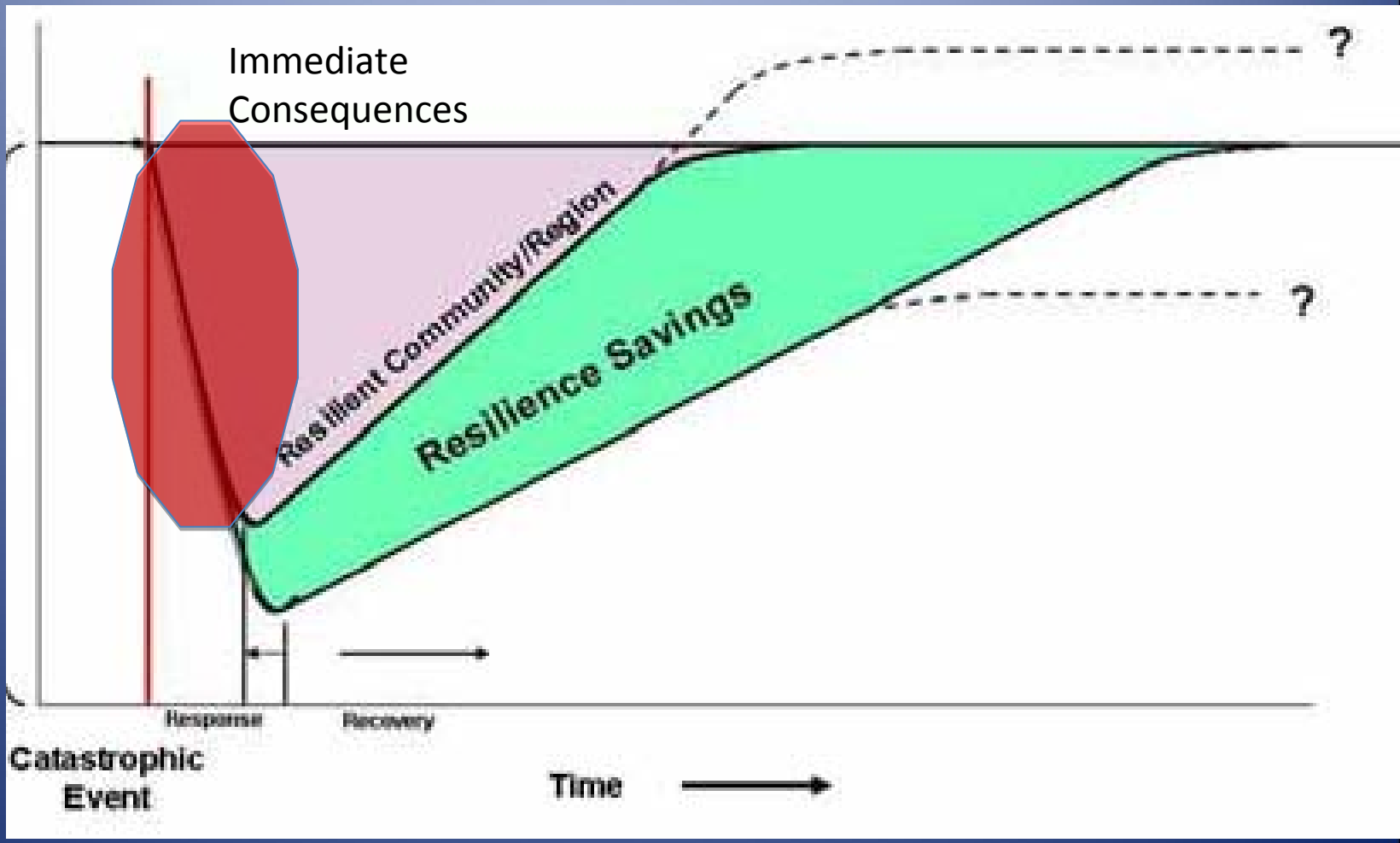

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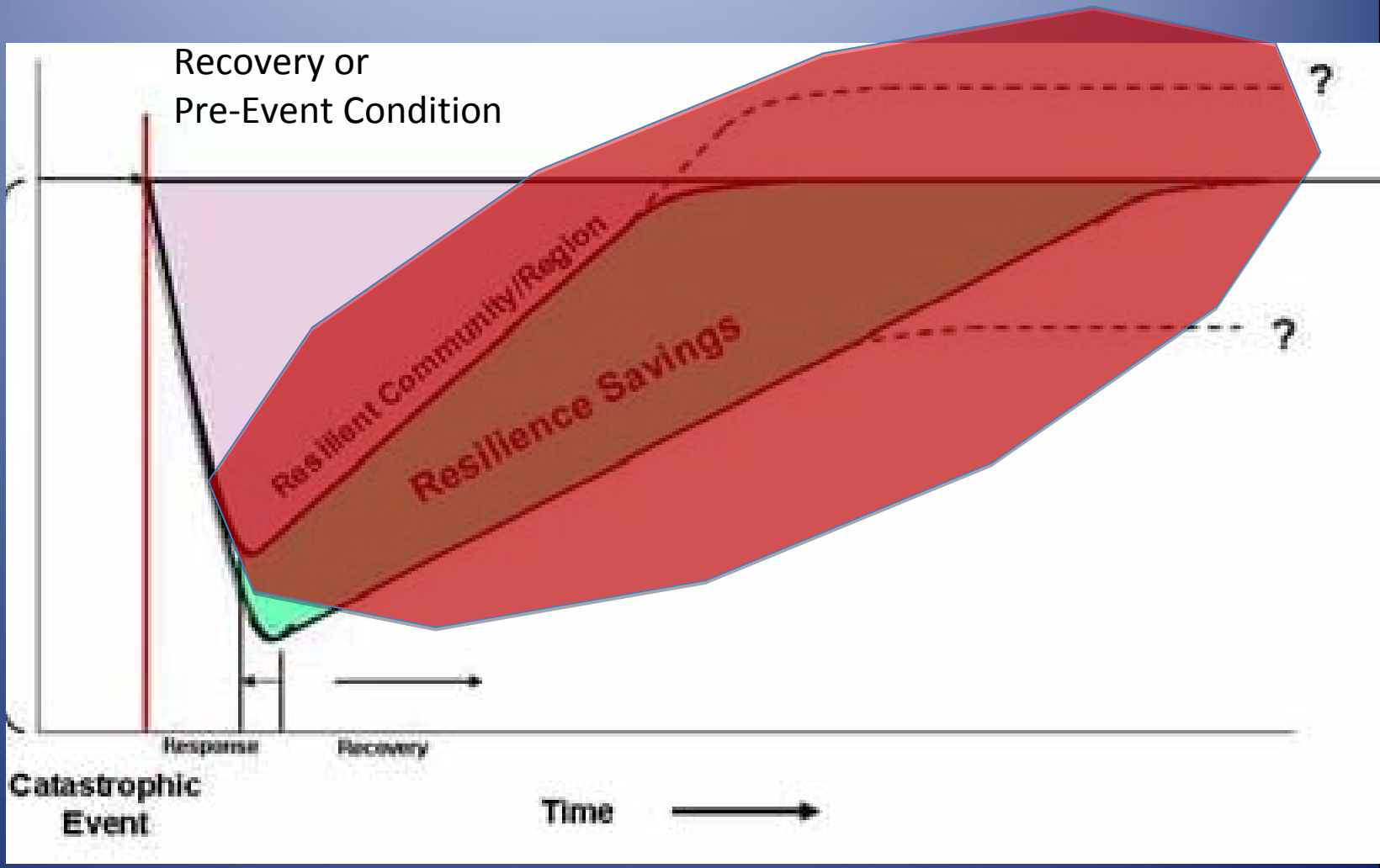

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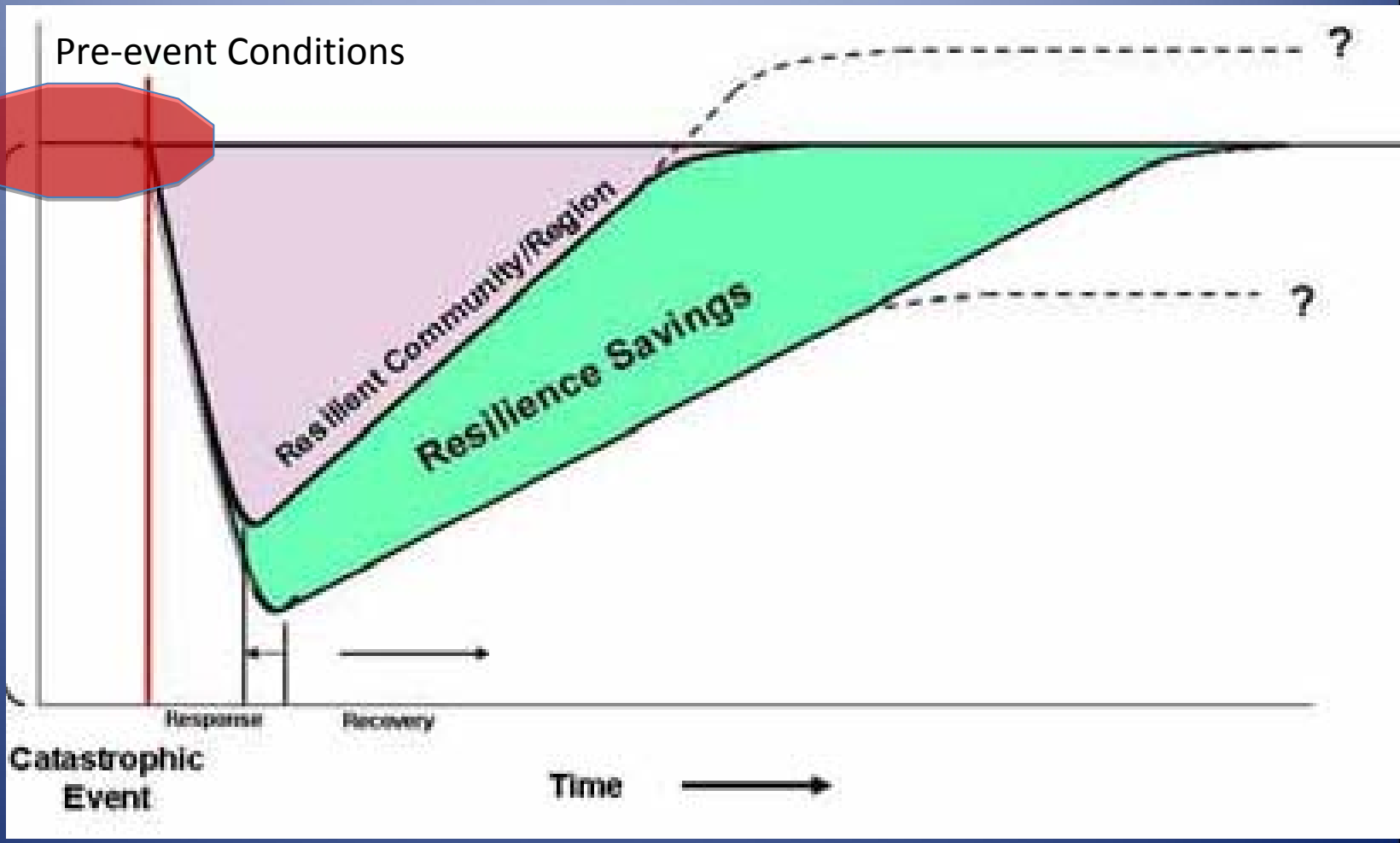
Engineering Coastal Resilience



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Engineering Community Resilience

Hazard Events

"Project" Design Conditions

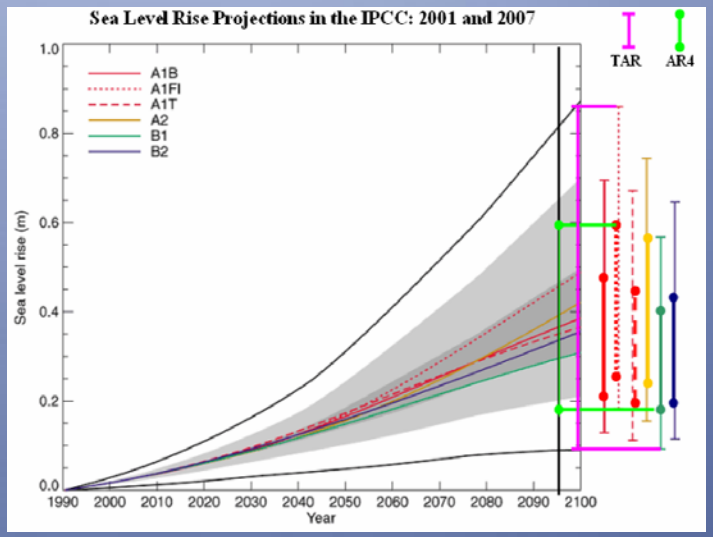
"Project" Performance

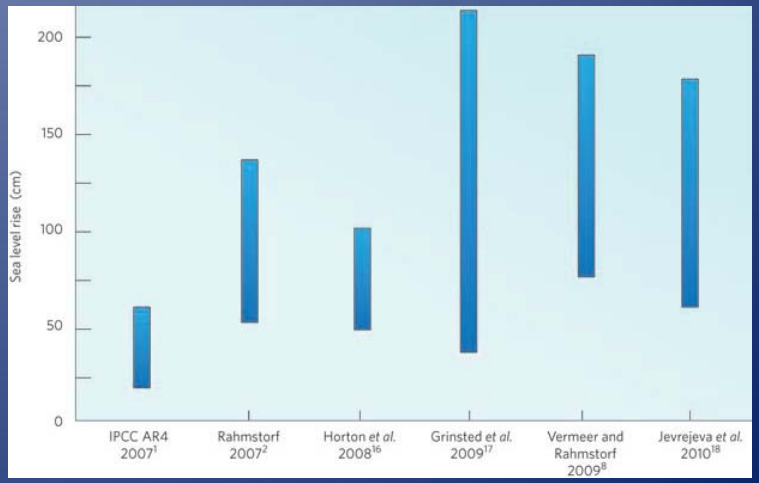
Hazard Variability

Hazard Events

"Project" Design Conditions

"Project" Performance



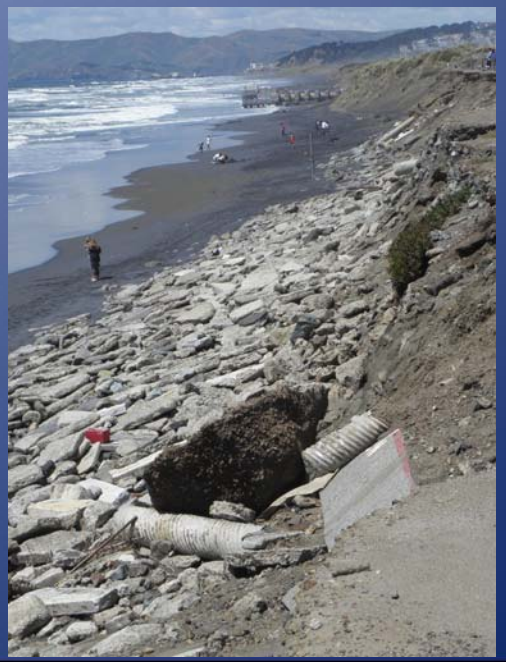


Project and Performance Variability

Hazard Events

"Project" Design Conditions

"Project" Performance



Variability in Expectations

Hazard Events

"Project" Design Conditions

"Project" Performance

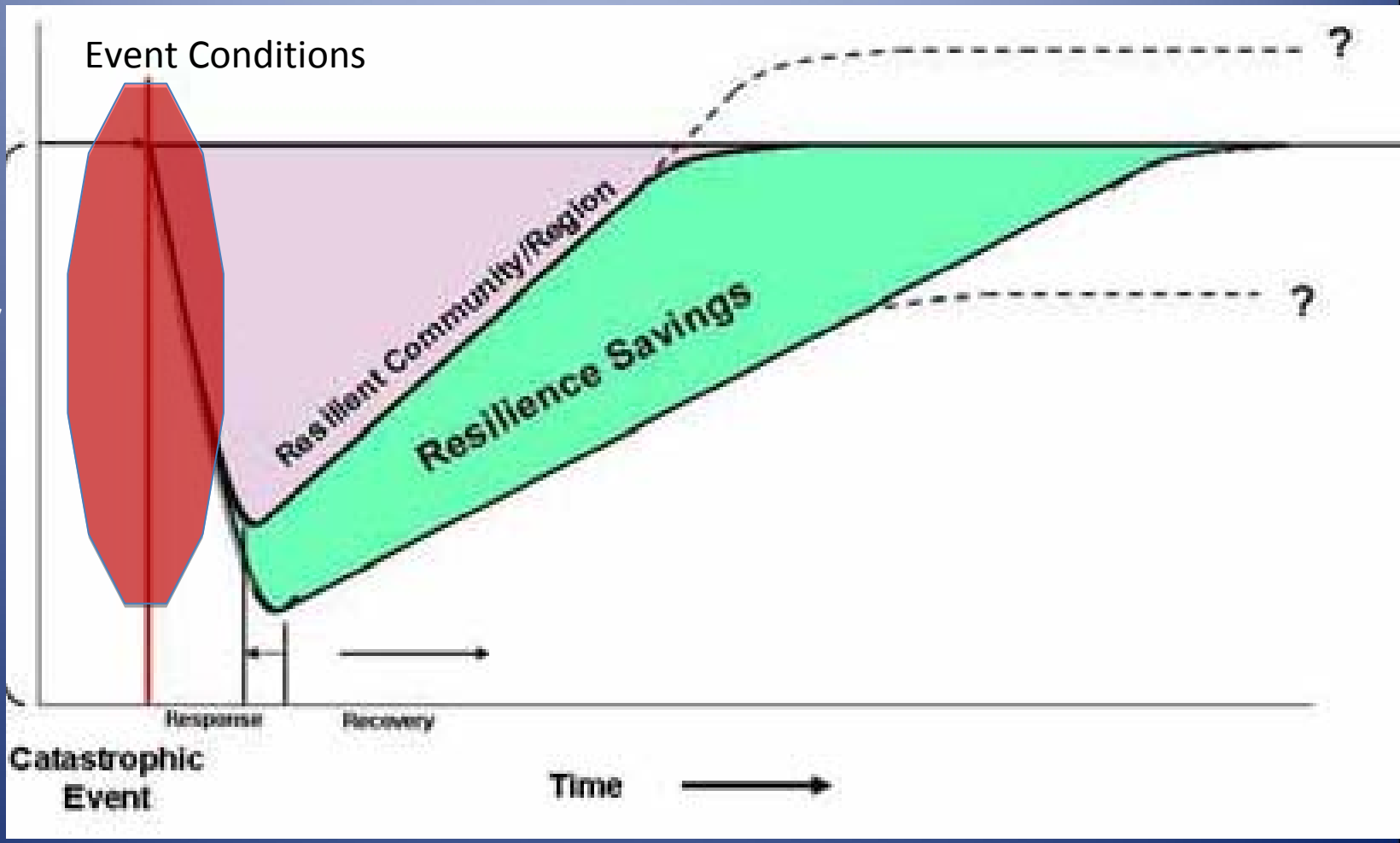
Community Expectations

Government will provide coastal protection

Poor understanding of "100-year" event

Structures are safe

Event-based Resilience



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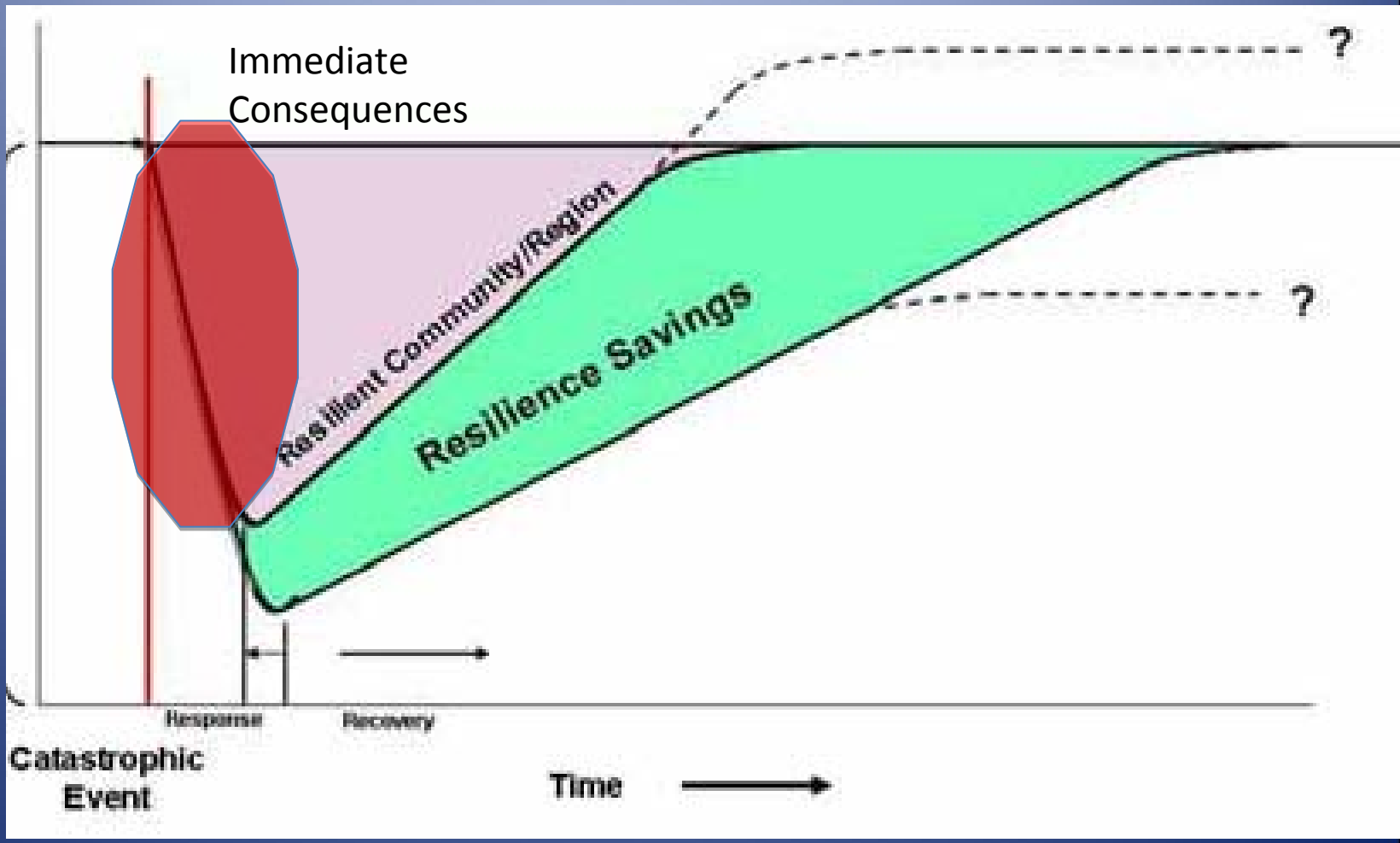
Event-based Resilience



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Community Control of Resilience

Community Control of Resilience

Hazards Are Local

CRESCENT CITY, CA

Mean Tide Range 1.5 m

Diurnal Tide Range 2.1 m

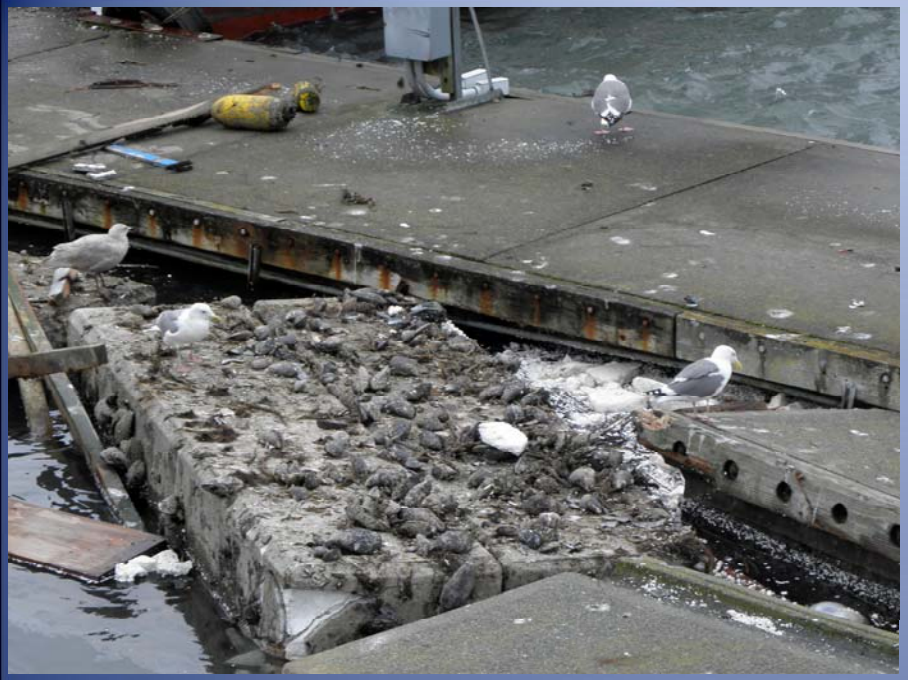
CRESCENT CITY, CA

Predicted Max. Amplitude – 2.5 m

Observed Max. Amplitude - 2.47 m (8.2 ft)

Aerial image of Inner Boat Basin from Google Earth

Aerial of boat damage courtesy of T. Williams



Damages:
$50 Million in CA
1 fatality

Community Control of Resilience

Lessons Learned from Recent Disasters

ELEVATION *

Lessons Learned -- Elevation

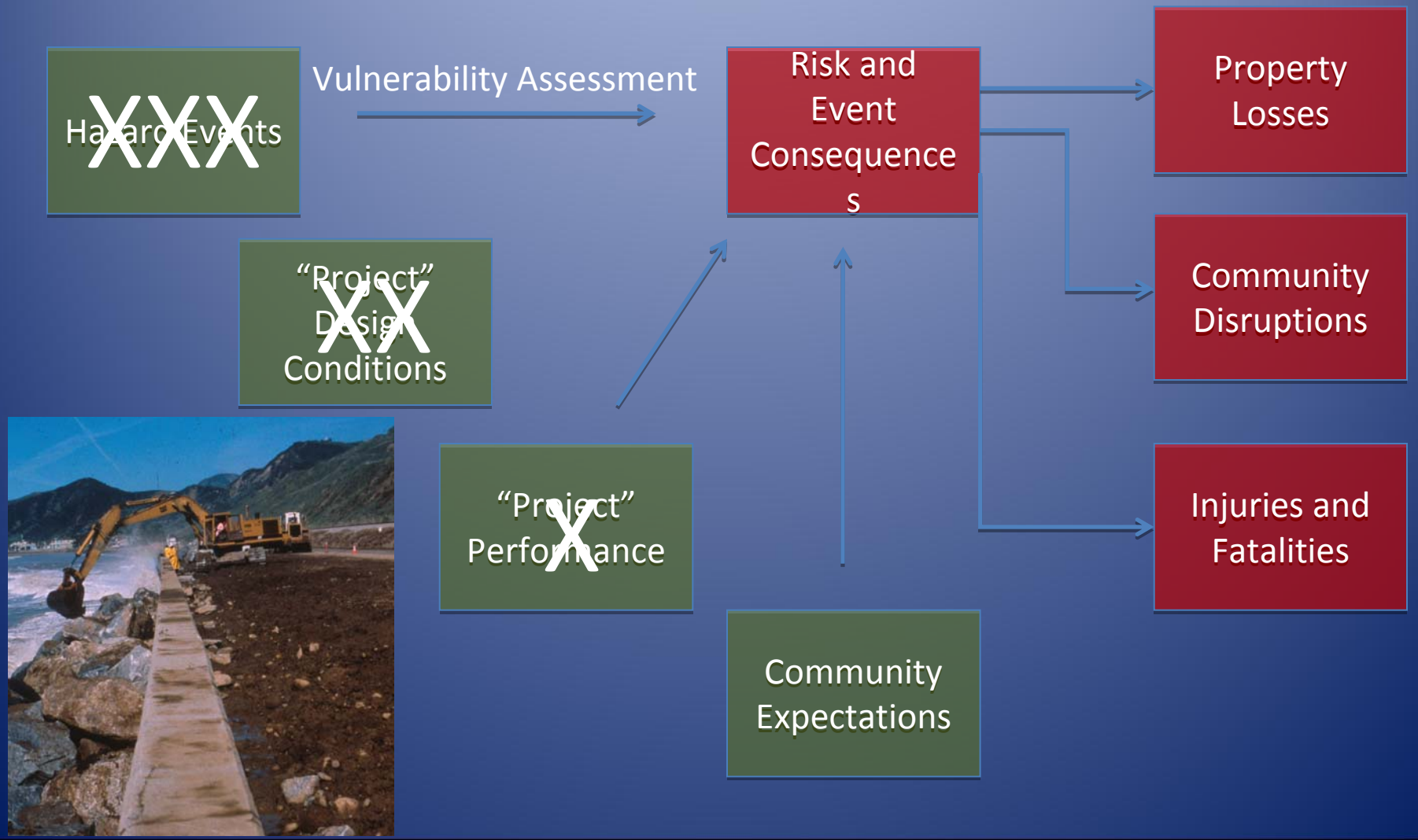
Otanabe, near Fudai RIver

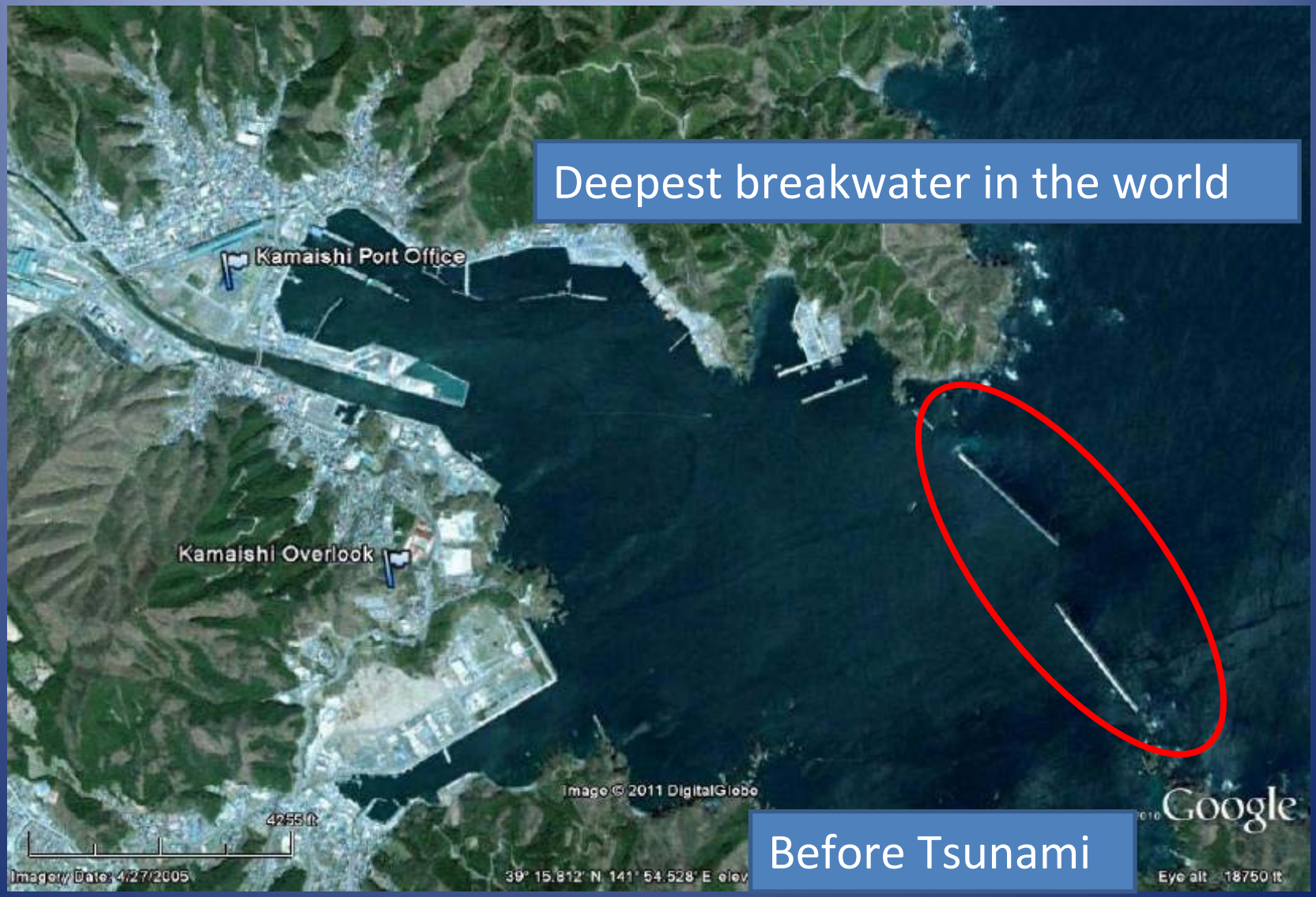
Tar

Lessons Learned from Recent Disasters

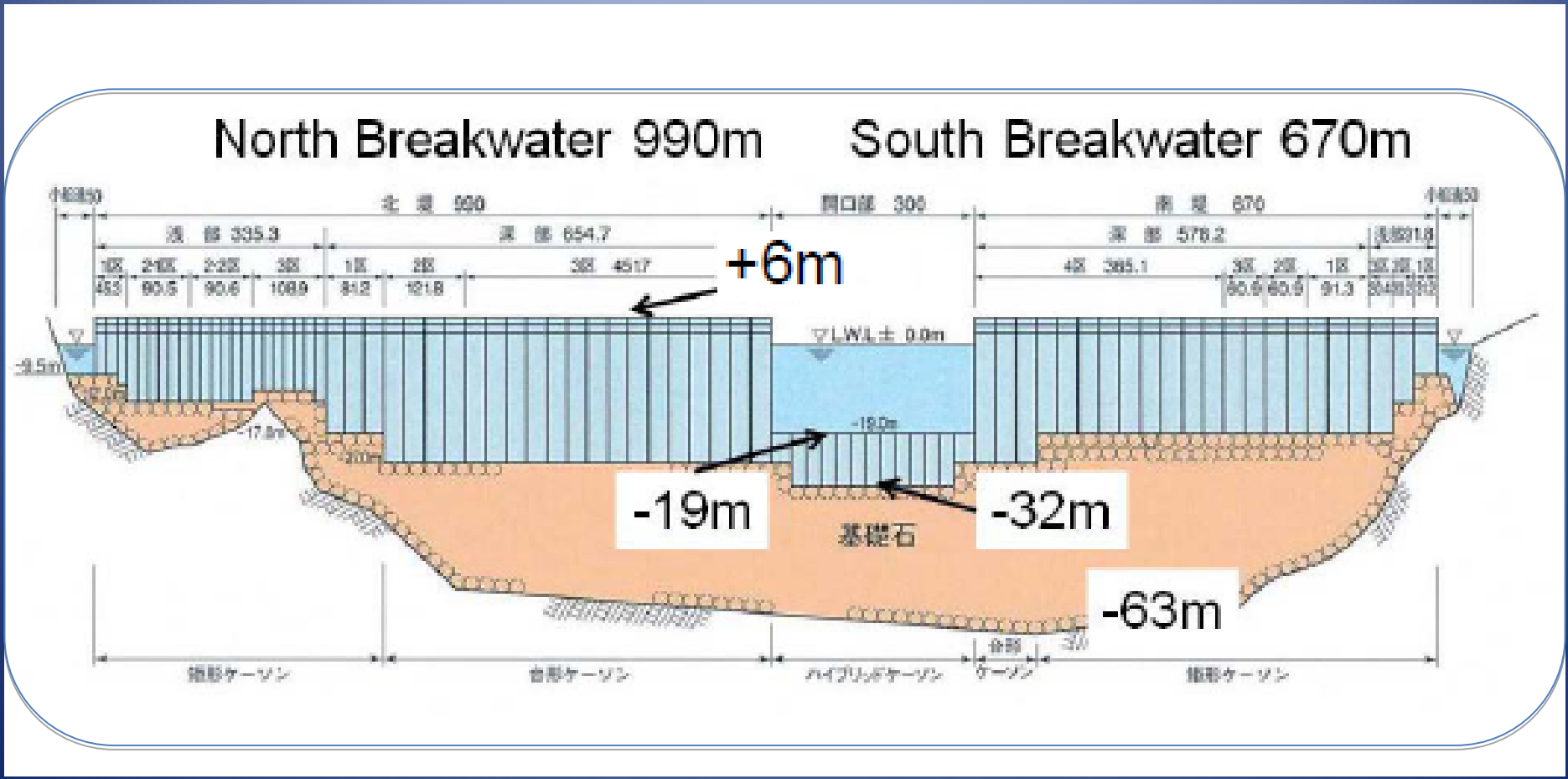
SCOUR

Community Resilience





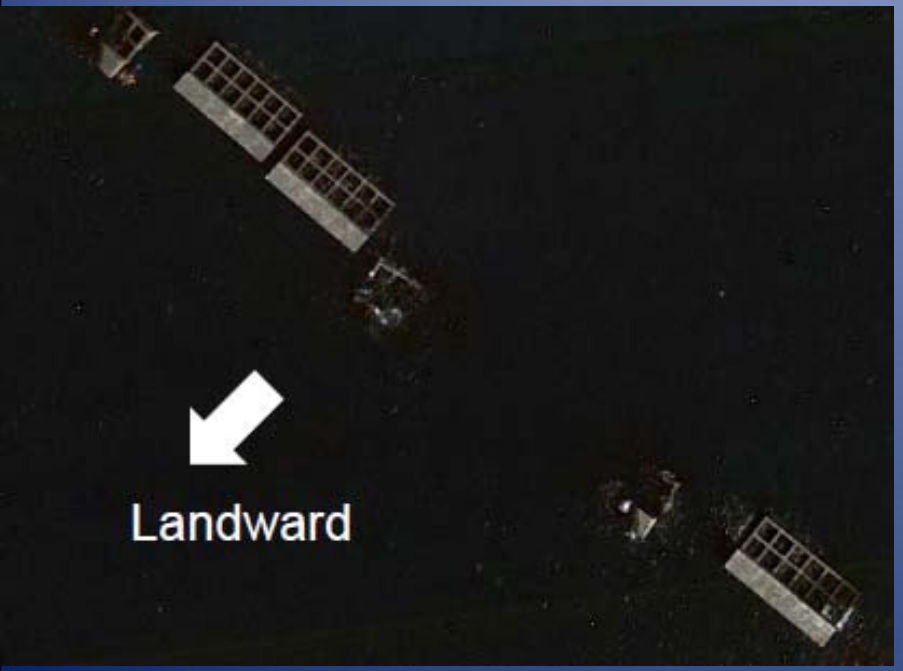
Kamaishi Tsunami Breakwater ~ $1.6 billion initial construction



Kamaishi Tsunami Breakwater

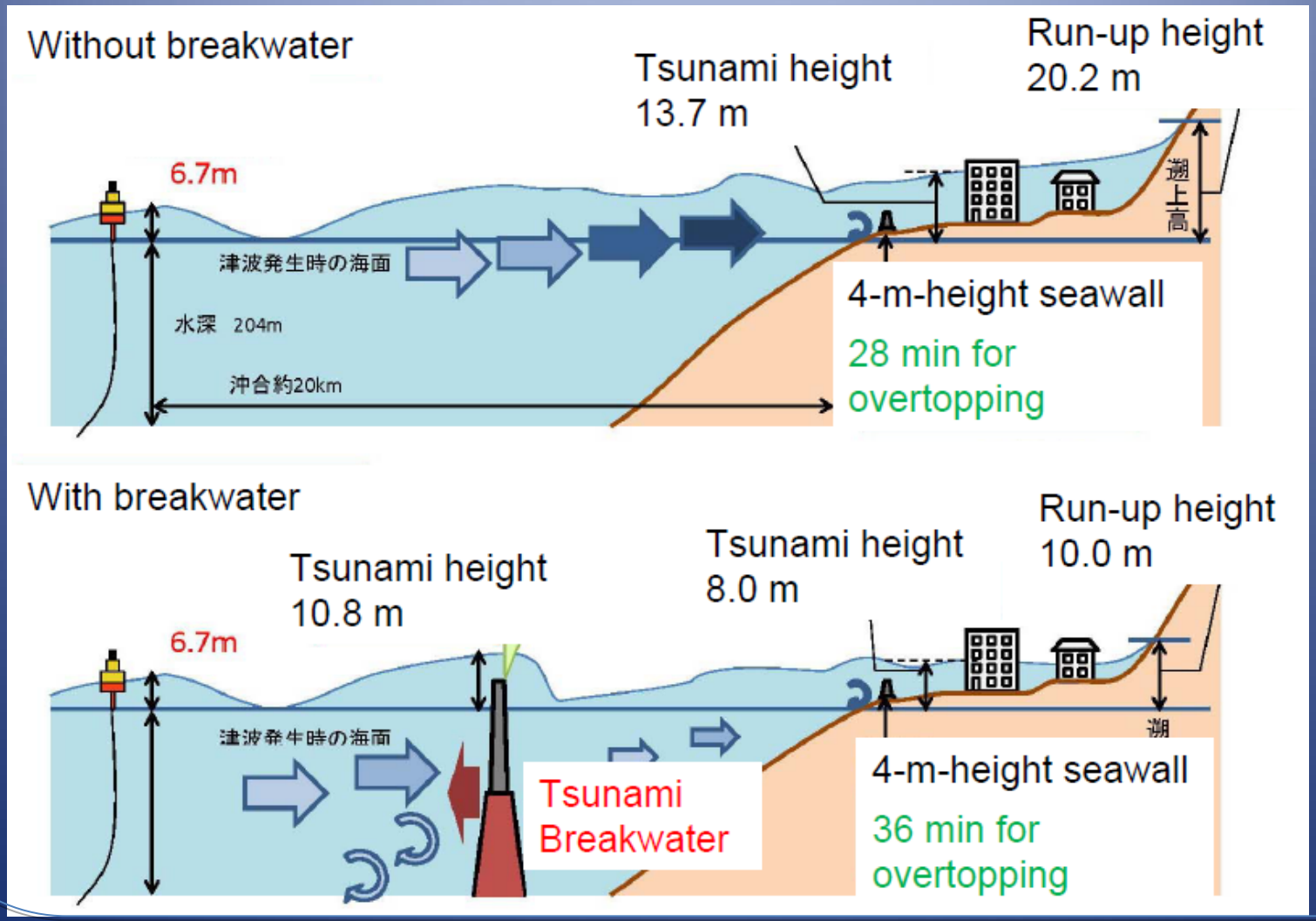
Kamaishi Tsunami Breakwater

20-meter caissons



Kamaishi Tsunami Breakwater

Lesson Learned: Redundancy

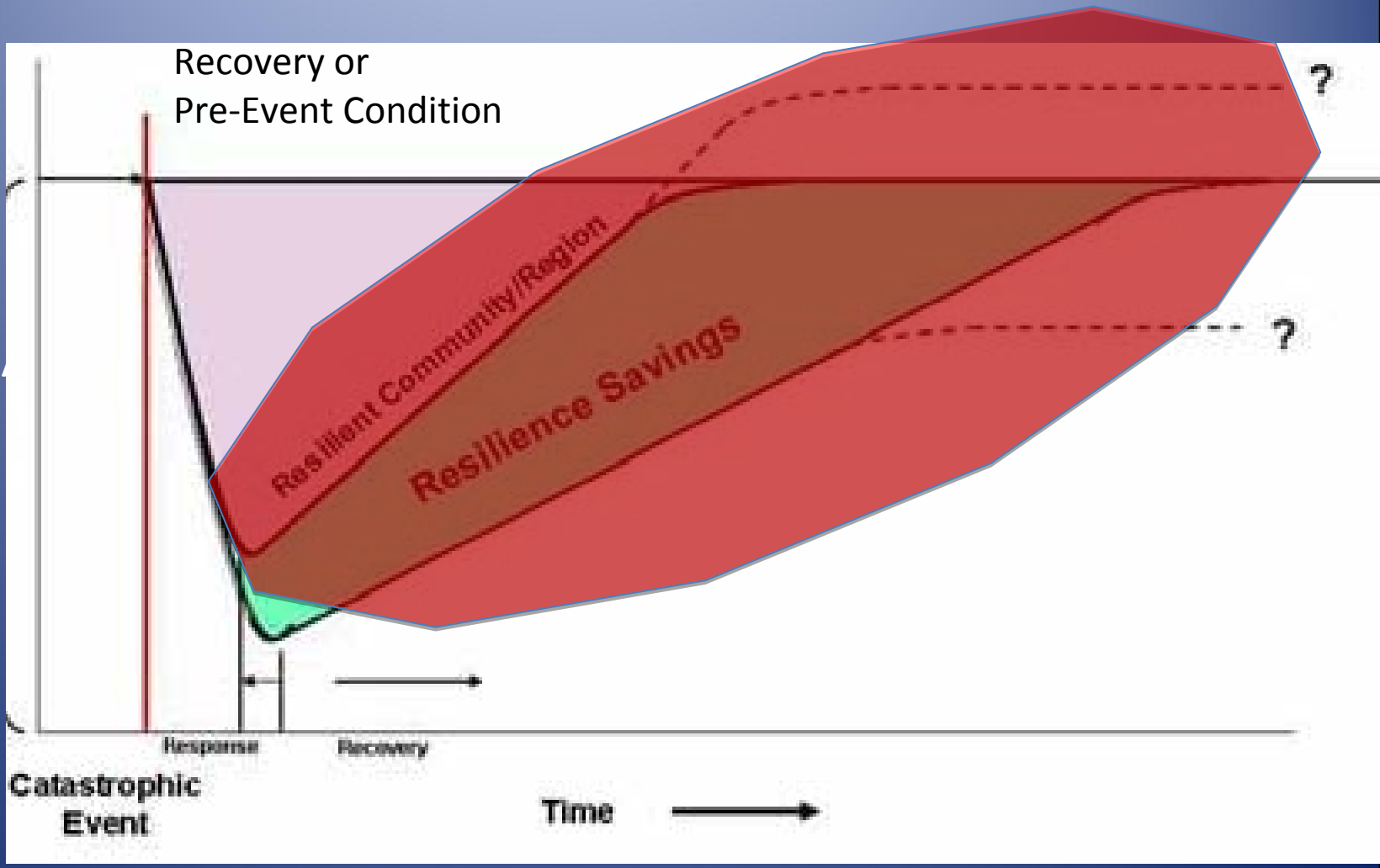


Source: Takahashi, Shigeo et al. *Urgent Survey for 2011 Great East Japan Earthquake and Tsunami Disaster in Ports and Coasts* ,Technical Note of Port and Airport Research Institute. Vol. 1231. Print. April 28, 2011

Community Protection can be Costly

Kamaishi Tsunami Breakwater ~ $650 million reconstruction

Resilience after a Disaster



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Recovery – Pre-event Preparedness

Elements of a Coastal Resilience Index

Elements of a Coastal Resilience Index

Pre-Event Conditions	Life Safety Efforts	Initial Resilience	Post-event Recovery
Risk Analysis	Early Warnings	Resistance	Robustness
Project Performance	Preparedness & Evacuation Plans	Redundancy	Adaptation

Conclusions

- Community resilience is location-specific
- Current approach to coastal disasters will continue the trend of massive community interruptions, property damage and fatalities
- Disaster-responses tax available resources
- Coastal resilience covers all aspects of a disaster