



# Coastal Communities at Risk of Tsunami Impacts Need to be Ready

## PAKISTAN

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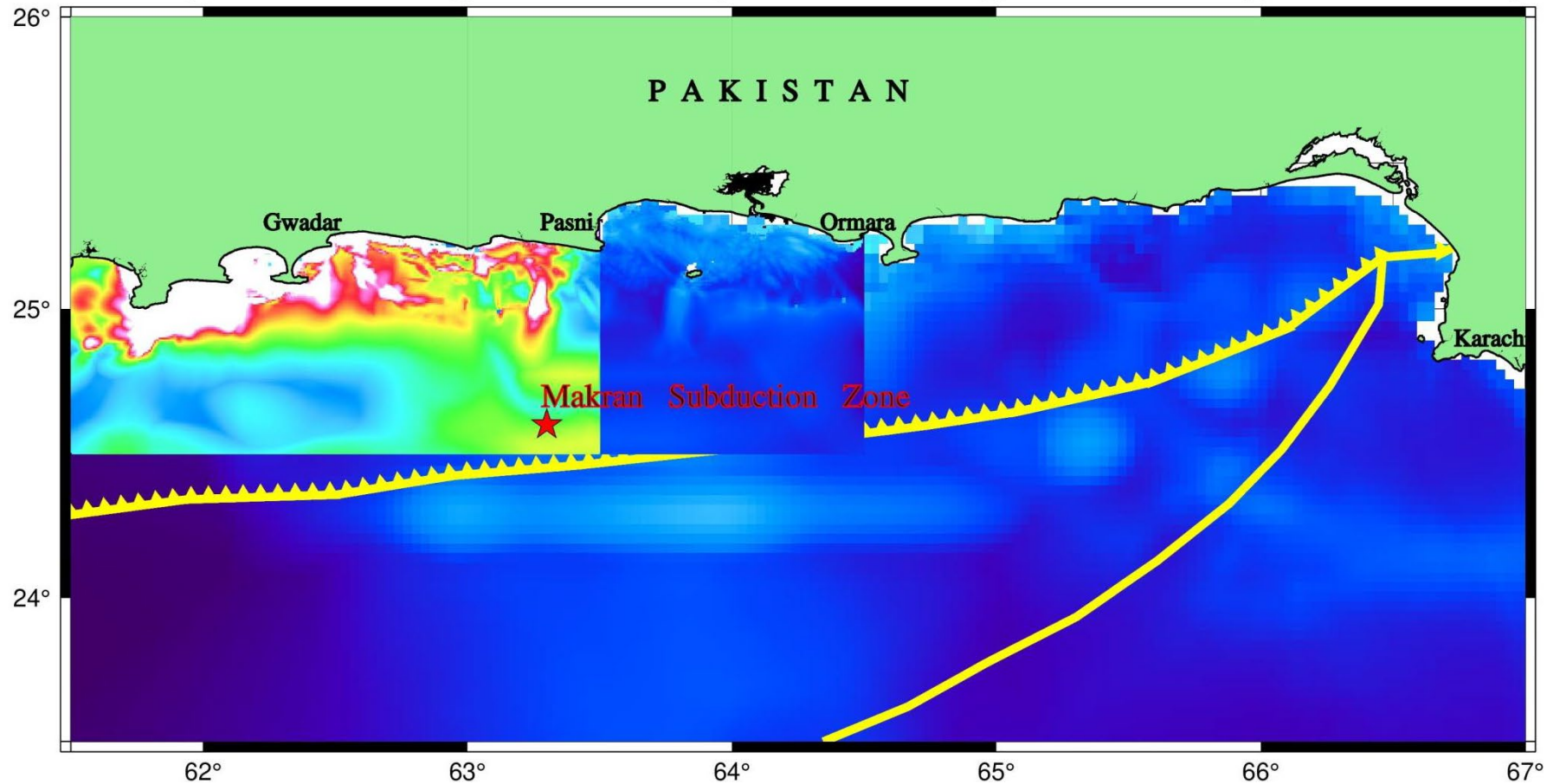


# Seismic and GPS Monitoring Network of Pakistan

▲ Seismic Stations  
● GPS Stations



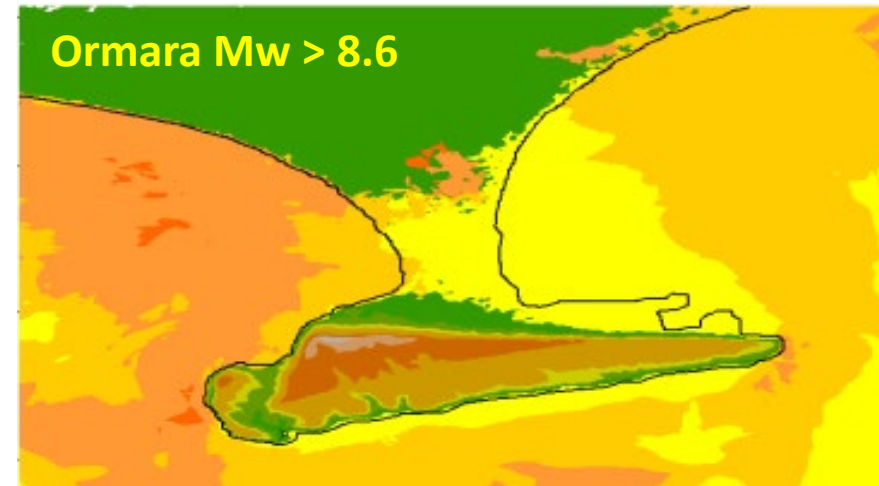
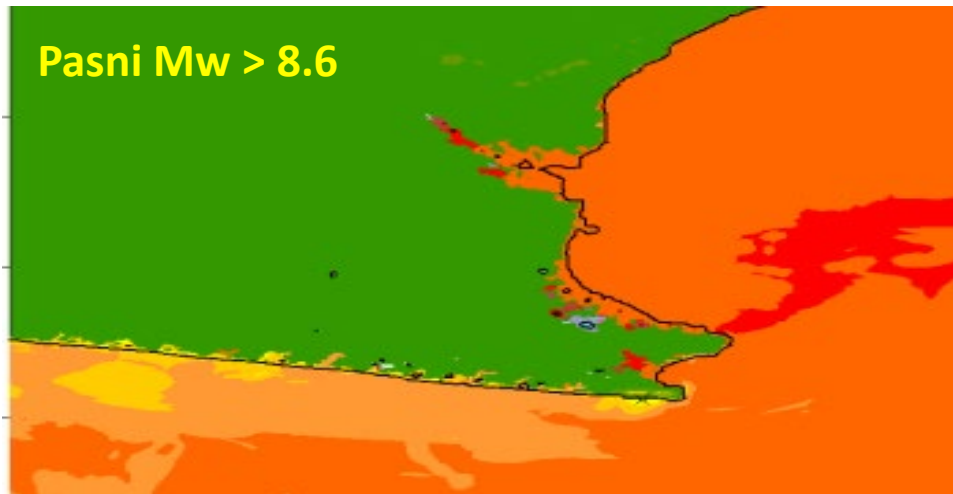
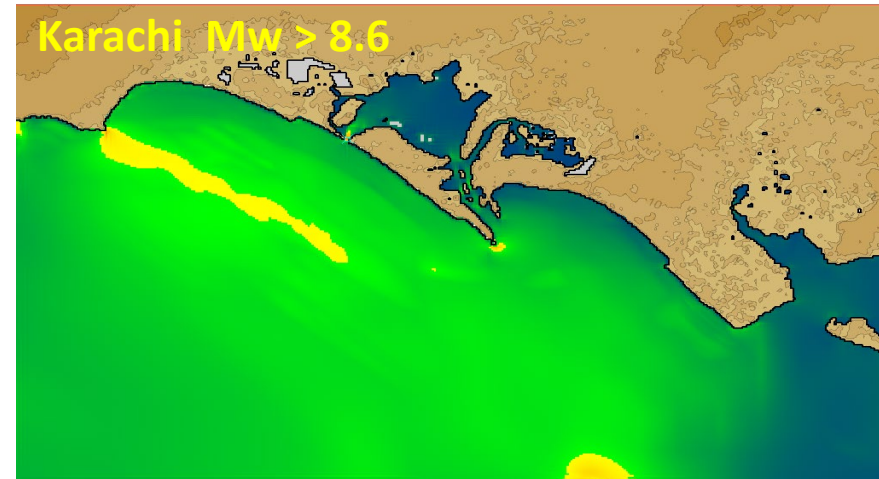
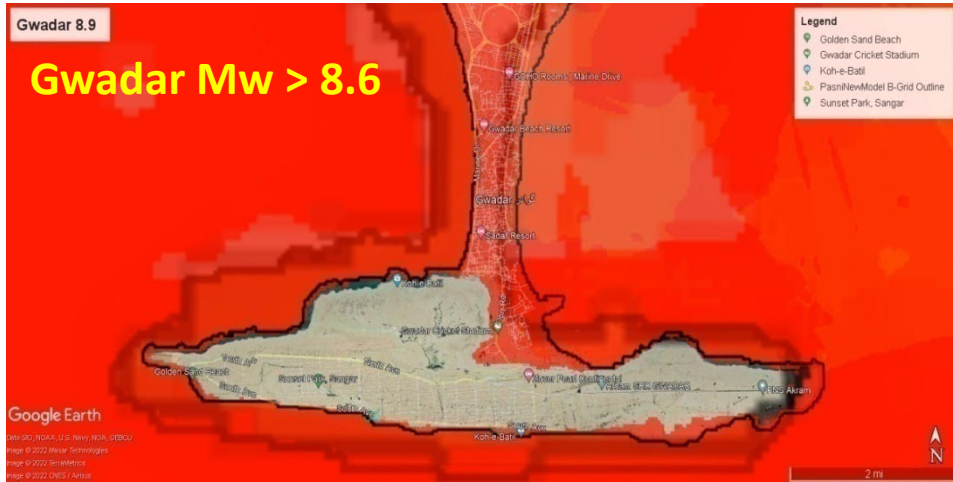
# Major Tsunami Threat for Pakistan Makran Subduction Zone



***Makran Subduction Zone has history of Tsunami i.e. Ms 8.3 , 1945***

**Major Tsunami Risk Zones in Pakistan: *Gwadar , Pasni , Ormara and Karachi***

# Tsunami Hazard Along Makran Coast of Pakistan



# Possible Tsunami Wave Propagation Results

Coastal City	First Maximum Wave	Arrival Time	Wave Height (max)	Arrival Time
Gwardar	1.6 meters	11 minutes	7 – 9 meters	22minutes
Pasni	0.2 meters	31 minutes	3 - 4 meters	42 minutes
Ormara	0.8 meters	41 minutes	5 - 7 meters	53 minutes
Karachi	0.1 meters	1 hr 38 minutes	≈ 1 meters	2hr 05 minutes

# Tsunami Hazard

- Makran Subduction Zone (MSZ) is very complex region consisting of splay faults, normal faults, imbricate faults, strike-slip faults, mud diapir etc, let alone the megathrust.
- 2013 Awaran Earthquake (7.7 Mw) caused a landslide generated tsunami.
- 2017, 6.3Mw, Pasni earthquake generated a small tsunami recorded at Gwadar tide gauge (lowest recorded earthquake magnitude to generate tsunami).
- Hazard is hence not well understood as the data is sparse and complexities are still unknown.

# Where are the communities at risk

- Communities settled along 1100 Kilometres of coastal Belt

Sindh Province	Baluchistan Province
6 Coastal Districts Karachi South, Kemari, Malir, Korangi, Thatta, Sajawal and Badin Population: <b>1.8 million</b>	2 Coastal Districts Gwadar & Lasbella Population : <b>0.85 million</b>

- How many people at Risk???
- Critical infrastructure
  - Ports, airports, power plants, highways,
- Economic losses
- Environmental Losses

# Tsunami Risk In Pakistan

City	Population (1951 Census)	Population (2017 Census)	Increase in population
Karachi	1,133,926	14,910,352	13.15
Ormara	2,796	25,727	9.20
Pasni	4,822	61,396	12.73
Gwadar	2,590	138,438	53.45

- The ever developing infrastructure along the ports in Gwadar and Karachi are also at risk apart from the population.
- Social, economical, physical and environmental impacts are expected.
- The risk is not only posed or limited to people living in coastal cities but it also threatens the economy of the entire country.



# Communities living along Pakistan Coast

Gwadar



Karachi



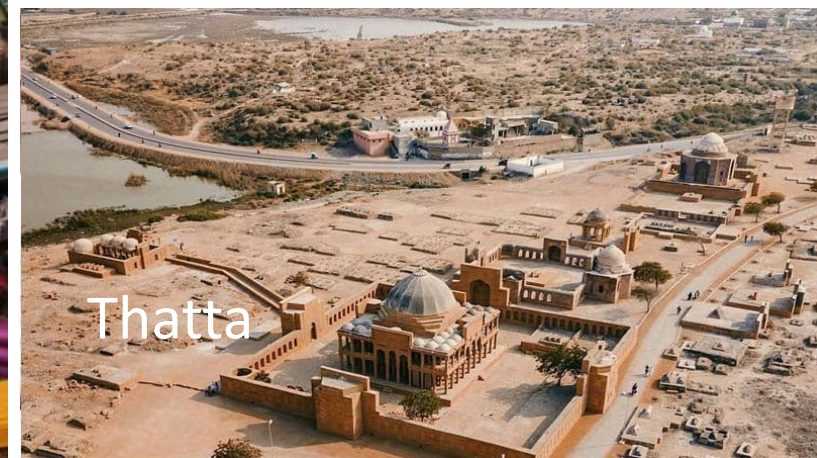
Sajawal



Lasbella



Thatta



# Tsunami Risk Reduction in Pakistan

- Since 2006
  - Strengthening Early Warning System
  - Capacity Building of Stakeholders
  - Awareness Raising among public
  - Tsunami Evacuation Planning & Infrastructure
  - Hazard & Risk Assessment
  - Policy Guidelines

# Why Tsunami Ready is important to the country

- Life Safety first
- Enhance Resilience through continuous engagement on tsunami risk reduction
- Inspiration for Policy & decision makers

# THANK YOU