UNESCAP Project TTF-31:

Strengthening Tsunami Warning in the North-West Indian Ocean Through Regional Cooperation

First Regional Workshop on Tsunami Inundation Mapping(TIM)

7 September 2022

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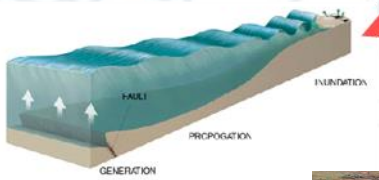
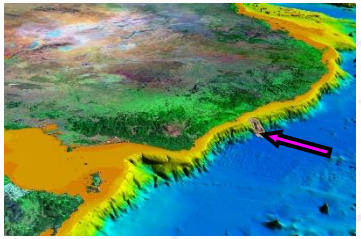
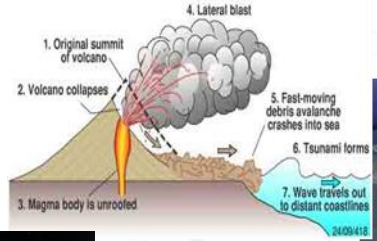
Sources of Tsunami

- Earthquakes along subduction zones (most common cause)
- Undersea landslides
- Volcanoes
- Meteo-tsunamis
- Meteorites







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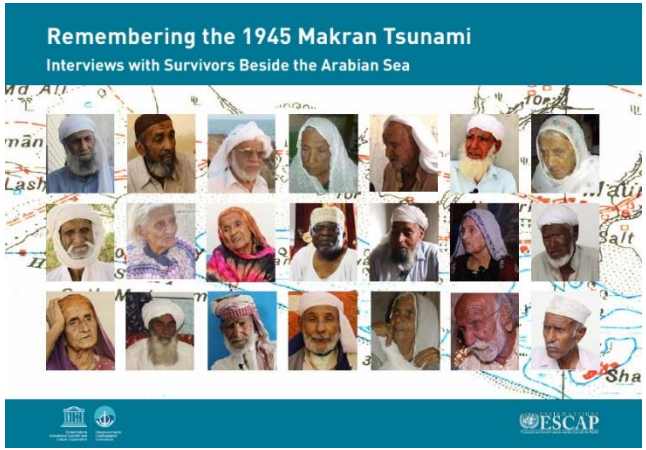
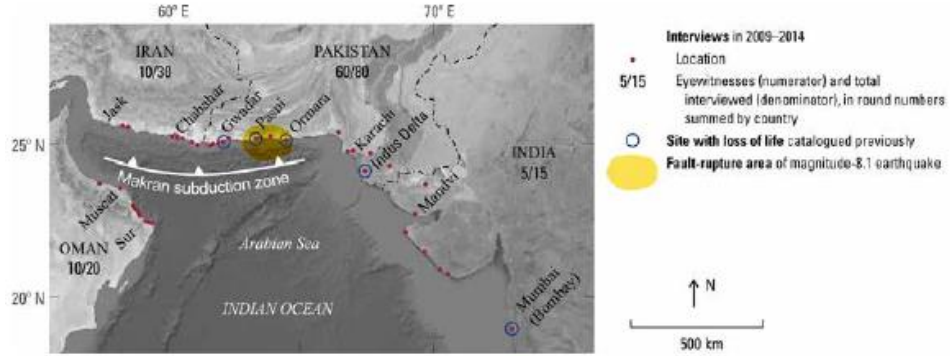
Historical Near-Field Impacts in NWIO



Makran Source Zone

Carried out by Drs. D.M. Kakar, G. Naeem, et al. [2015]

Up to 4,000 deaths



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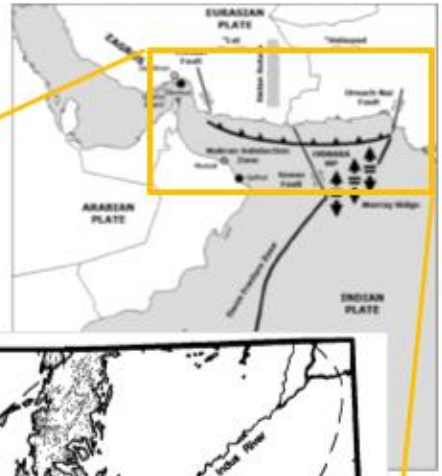
Historical Earthquakes in the Makran Subduction Zone

(Kukowski et al, 2000)



Earthquakes along the MSZ:

- Recorded Ms 8.1 in 1945
- Historical events in 1765 and 1851
- Only one possible historical event in Western Makran in 1483

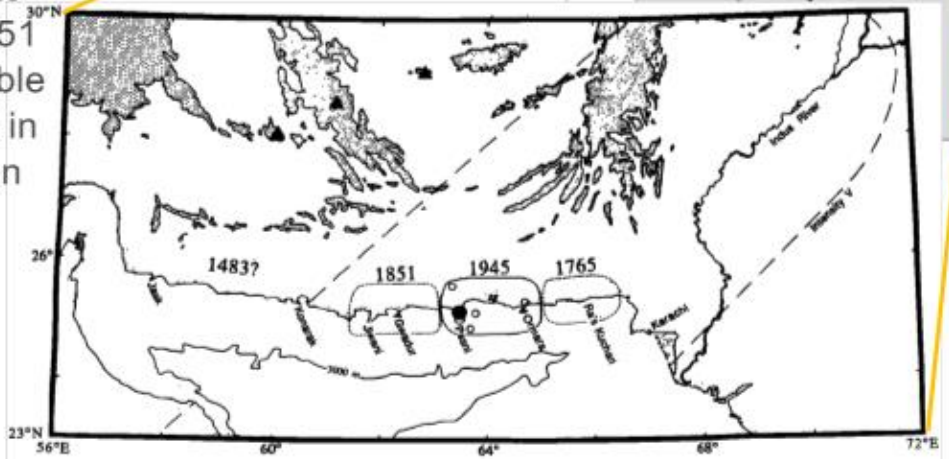


Fig. 6. Historical great earthquakes of Makran. Maximum estimated rupture areas are shown for historic sequences; thin solid line shows our estimate of the approximate rupture area of the 1945 earthquake (see text for discussion). The epicenter of 1945 mainshock is shown as large solid circle; aftershocks shown by open circles. The intensity 5 isoseismal of 1945 event from *Pendse* [1948] is shown as long dashed line. Solid triangles mark major volcanic centers. Regions elevated more than 1500 m are enclosed by dotted pattern.

(Byrne et al., 1992)

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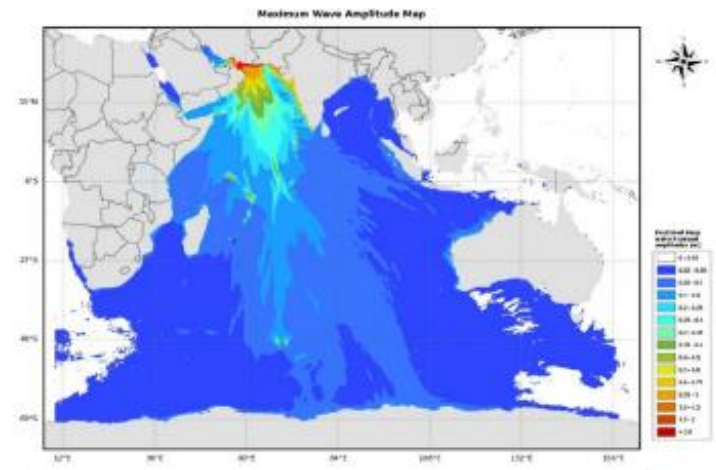

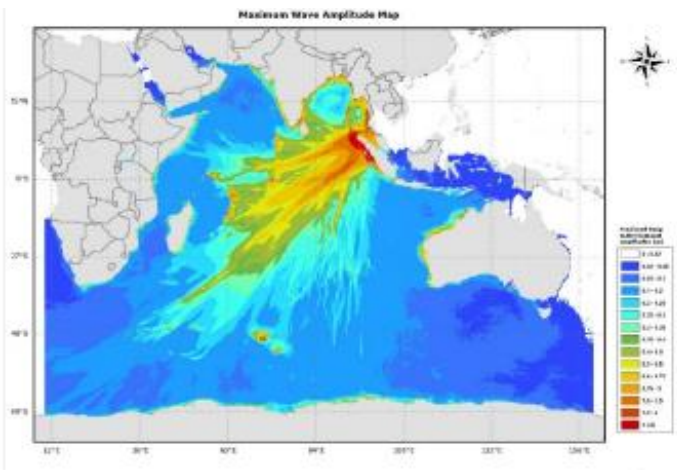

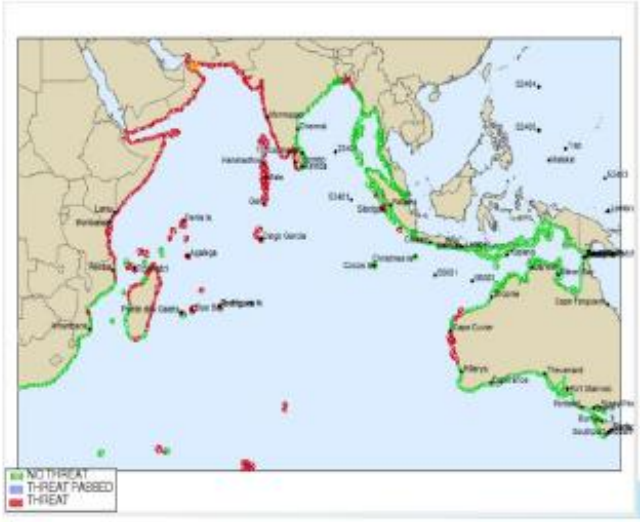

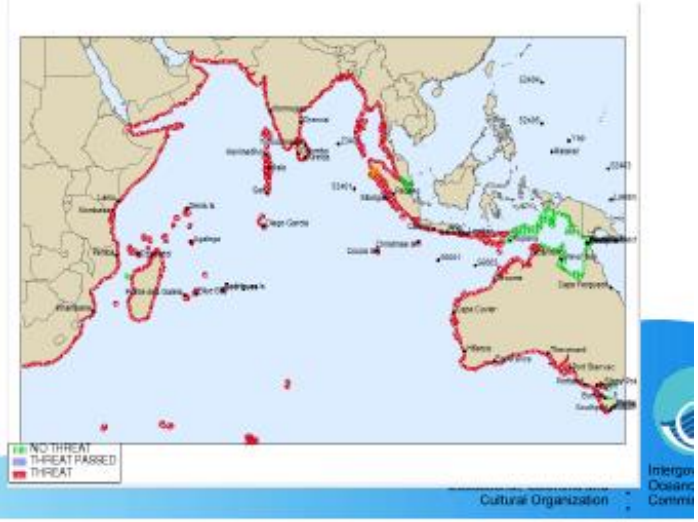

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Possible Scenarios for Near-Field and Far-Field Tsunami Threats to NWIO

Hazard: Different Levels of Threat

- **Land Threat**:
  Life threatening and devastating land inundation impacts…
  low lying coast evacuations required

- **Marine Threat:** Damaging ocean currents and surges, plus potential minor land inundation, leading to serious economic impacts…

  no major evacuations required

Are we at risk?

Tsunami hazard and risk assessment

Phase 1&2

How will be warned?

Tsunami warning chain & SOP development

Phase 1&2

People Focused Early Warning & Mitigation System

How do we prepare?

Inundation and evacuation mapping, Tsunami Ready communities

Phase 2&3&4

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ESCAP TTF-29 Project Plan:

Better understand tsunami risk

Build national tsunami warning chains

Assess and develop inundation and evacuation mapping capability

Train in inundation and evacuation mapping

Prepare at-risk communities to be Tsunami Ready

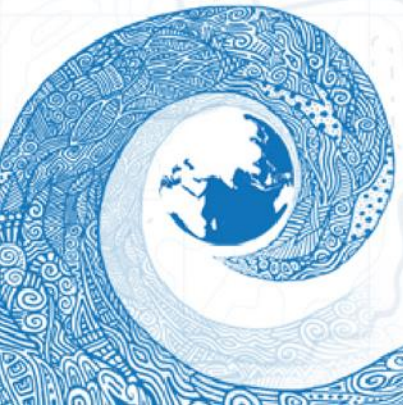
Phase 1 (completed)

Phase 2a

Phase 2b

Phase 2c (proposed)

Phase 3 (proposed)



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Science Informing Tsunami Warning Response and Community Preparedness

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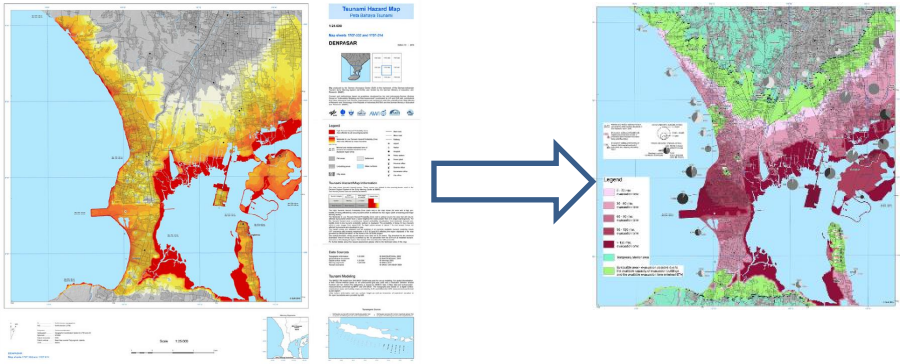
Improved scientific understanding of tsunami hazard in NWIO

Enhanced tsunami model for forecasting

Inundation modelling



Inundation maps

Evacuation maps

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UNESCO-IOC Tsunami Ready Recognition Programme

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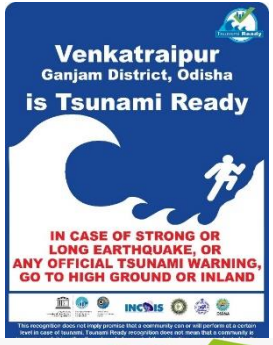
Community performance-based programme

Active collaboration of the public (community), community leaders, local and national emergency management agencies, and the national tsunami warning centre.



Tsunami **Ready**

Based on 12 Indicators

Developed from **best practices and lessons learnt** worldwide.

I	**ASSESSMENT (ASSESS)**
1	**ASSESS-1**. Tsunami hazard zones are mapped and designated
2	**ASSESS-2**. The number of people at risk in the tsunami hazard zone is estimated
3	**ASSESS-3**. Economic, infrastructural, political, and social resources are identified
II	**PREPAREDNESS (PREP)**
4	**PREP-1**. Easily understood tsunami evacuation maps are approved.
5	**PREP-2**. Tsunami information including signage is publicly displayed.
6	**PREP-3**. Outreach and public awareness and education resources are available and distributed.
7	**PREP-4**. Outreach or educational activities are held at least 3 times a year.
8	**PREP-5**: A community tsunami exercise is conducted at least every two years
III	**RESPONSE (RESP)**
9	**RESP-1**. A community tsunami emergency response plan is approved.
10	**RESP-2**. The capacity to manage emergency response operations during a tsunami is in place.
11	**RESP-3**. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place.
12	**RESP-4**. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place.

UNESCO-IOC Tsunami Ready Recognition Programme

Implement across NWIO
in Phase 3
to achieve Tsunami Ready Certification
of 100% at-risk coastal communities
to meet UN Ocean Decade 2030 Goal

Community performance-based **Based on 12 Indicators**

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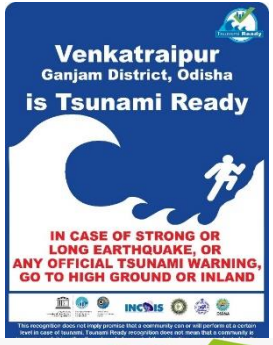

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