

Presentation on

Tsunami Evacuation Planning

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Tsunami Risk Reduction and Response

The risk reduction responses

- Constrain, or reduce **exposure** to, tsunami inundation (the hazard);
- Reduce a community's **vulnerability** in respect of tsunami inundation; and
- Improve a community's **preparedness** to anticipate, respond to, and recover from tsunami inundation.

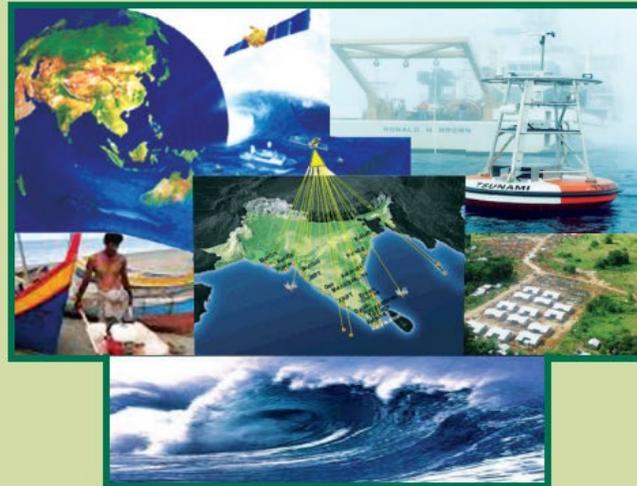
Response measures

- Some measures may be implemented immediately, e.g. improving early warning and evacuation procedures, community education and drills.
- Other measures are longer-term, strategic in nature, e.g. structural protective methods and non-structural initiatives such as land-use planning and regulation.



NATIONAL DISASTER MANAGEMENT GUIDELINES

Management of Tsunamis



August 2010



NATIONAL DISASTER MANAGEMENT AUTHORITY
GOVERNMENT OF INDIA

raise, from within their armed police force, adequate strength of personnel for raising of State Disaster Response Force (SDRF) with appropriate disaster response capabilities.

(Para 6.8) (Action: State Governments)

41. Evacuation plans and Shelters

- i. Inflatable motorised boats, helicopters and search & rescue equipments are required immediately after a tsunami to carry out search and rescue of people trapped in inundated areas, on tree tops and hanging on to structures. State Governments will compile a list of such equipment and identify suppliers of such specialised equipments and enter into Long Term Agreements for their mobilisation and deployment in the event of tsunami. India Disaster Resource Network (IDRN), which is a web-based resource inventory of information on emergency equipment and response personnel available at every district, will be revised and updated frequently. The IRS will also provide a web-based system for monitoring the emergency logistics requirements of disaster-affected villages as well as the flow of emergency relief supplies to the affected villages.

- ii. The setting up of relief camps for the people whose houses have been damaged by tsunami or flooded by the storm surge and the provision of basic amenities in such camps involves complex logistics of mobilising relief supplies, tents, water supply and sanitation systems, transport and

communication systems, and medical supplies. Immediate restoration of power supply would be essential to carry out relief operations. The DM Plans at the State and District levels will address this issue in detail. An information booth for victims would be established by the district authorities.

- iii. In the event of mass casualties, States/UTs will develop systems for proper identification of dead bodies, recording the details of victims, and their DNA fingerprinting.

(Para 6.9) (Action: State Governments, UT Administrations, SDMA, DDMA)

42. Emergency Medical Response

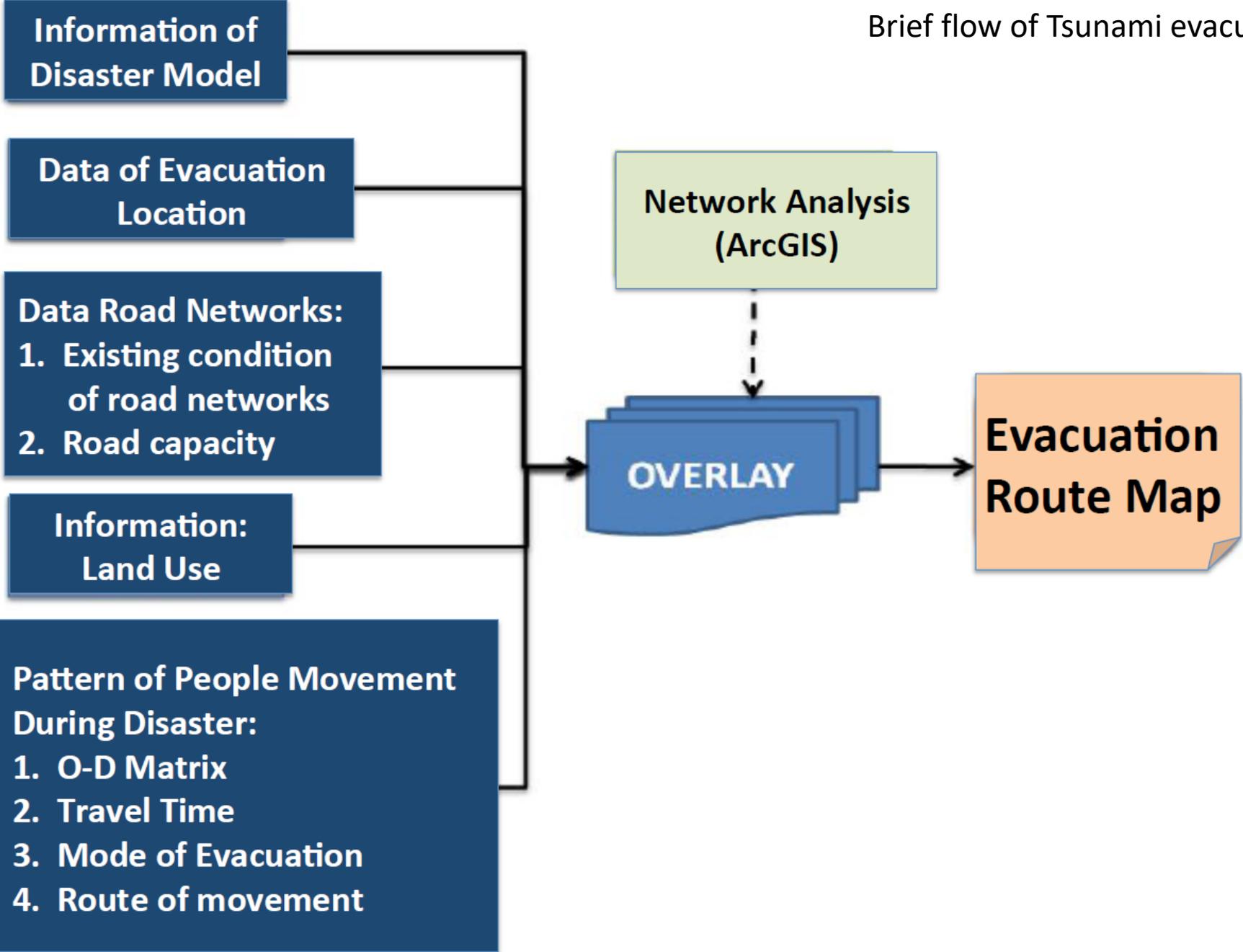
- i. Prompt and efficient emergency medical response will be provided by Quick Reaction Medical Teams (QRMTs), Mobile Field Hospitals, Accident Relief Medical Vans (ARMVs) and Heli-ambulances. They will be activated to reach the tsunami-affected areas immediately, along with dressing material, splints, portable X-ray machines, mobile operation theatres, pulse oximeters, resuscitation equipment and life-saving drugs, etc. Resuscitation, triage and medical evacuation of victims who require hospitalisation will be done in accordance with SOPs. A large number of victims may suffer from psychosocial trauma, for which appropriate counselling will be provided.

- ii. The medical response plan will integrate all aspects of emergency medical management at the incident site, medical care facilities during

Good Evacuation Planning: Key Component of Preparedness

1. Tsunami Risk Assessment - in the Context of Tsunami Evacuation Planning
2. Evacuation Route – Planning and Design
3. Tsunami Evacuation Signage – Planning and Design
4. Evacuation Shelter – Planning and Design
5. Reliable downstream warning chain devices - Community Tsunami Alert System: siren, speaker etc
6. Responsive Stakeholders
7. Community readiness/preparedness

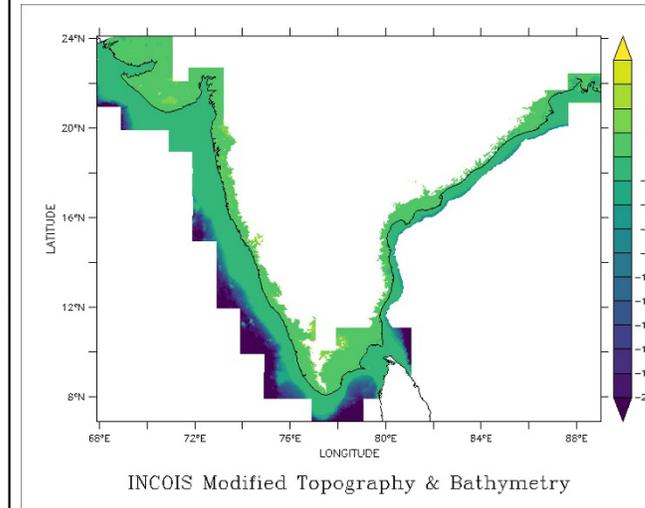
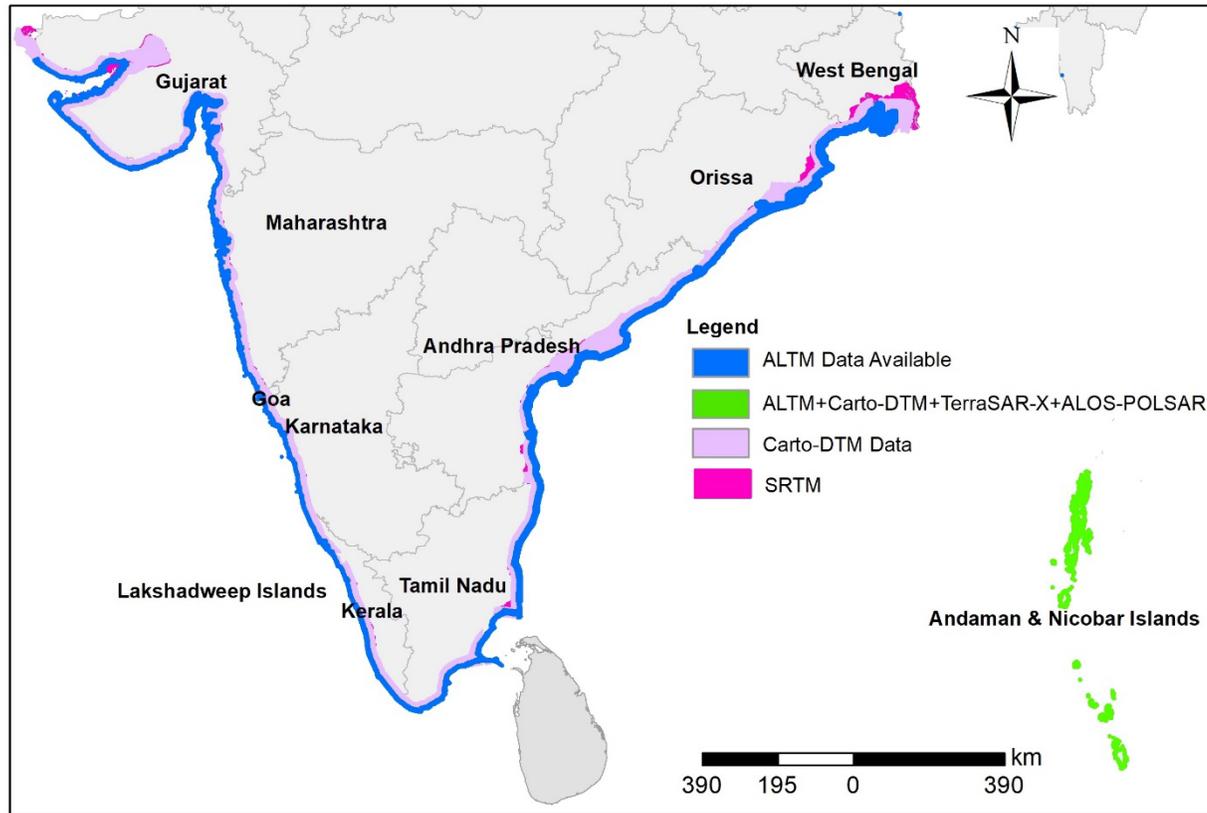
Brief flow of Tsunami evacuation map preparation



Tsunami Evacuation Route: Planning & Design

- Define tsunami safe zone, transition zone and hazard zone
- Designate tsunami safe area for permanent shelter → high and safe place
- Design evacuation route ← design criteria, number of people at risk, evacuation capacity
- Need assessment for vertical evacuation shelter ← design criteria

Tsunami Inundation modeling and vulnerability mapping

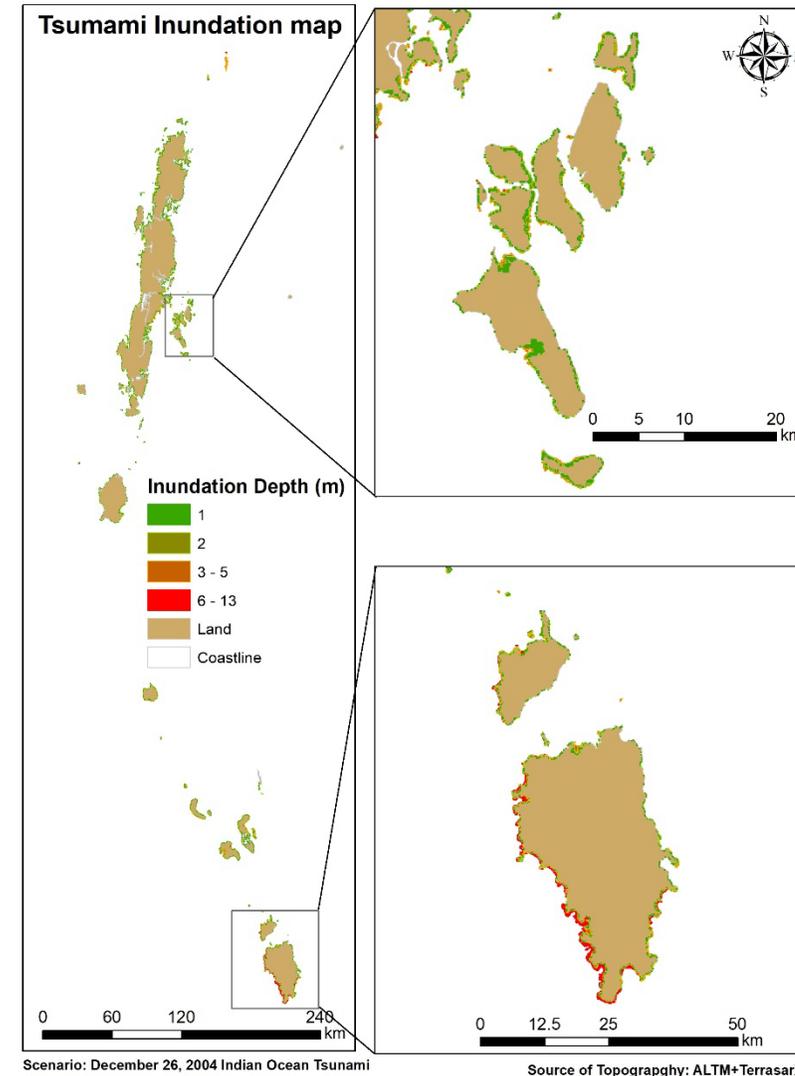
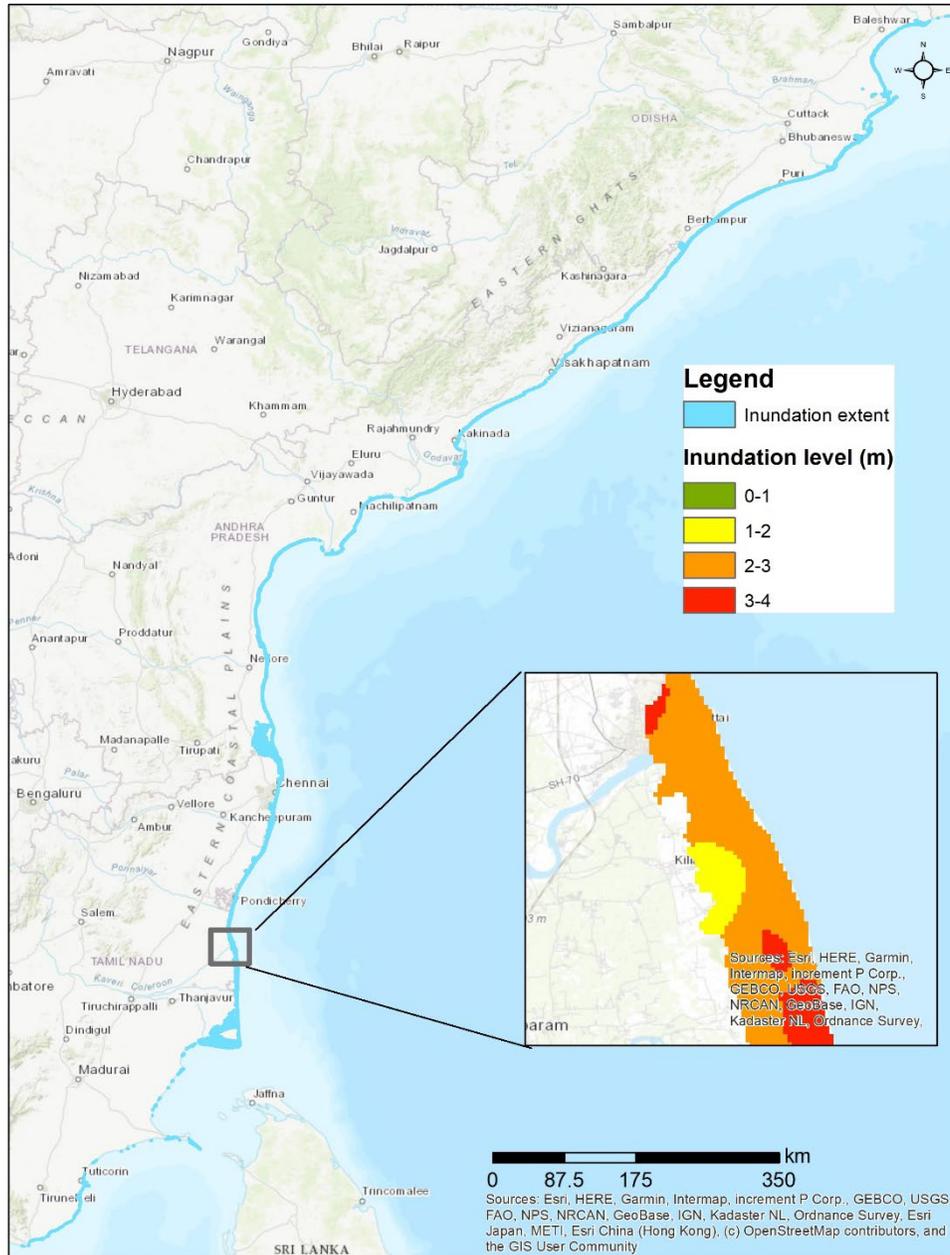


- ALTM data for the Indian Mainland
- Carto-DTM for the Indian Mainland.
- Merged hybrid data from ALTM, Carto-DTM and Terrasar-x data for Andaman and Nicobar Islands
- Bathymetry data available from all the sources

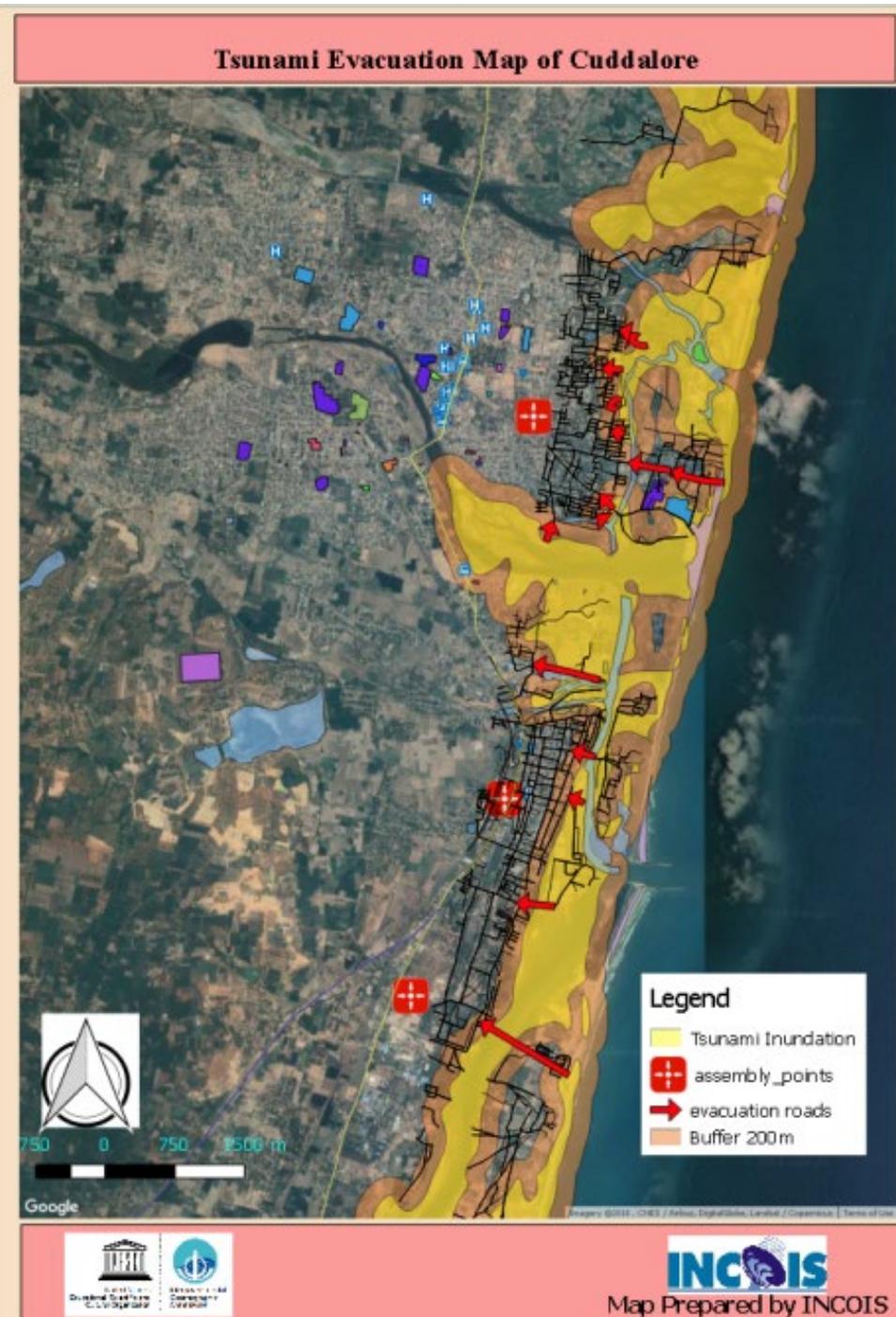
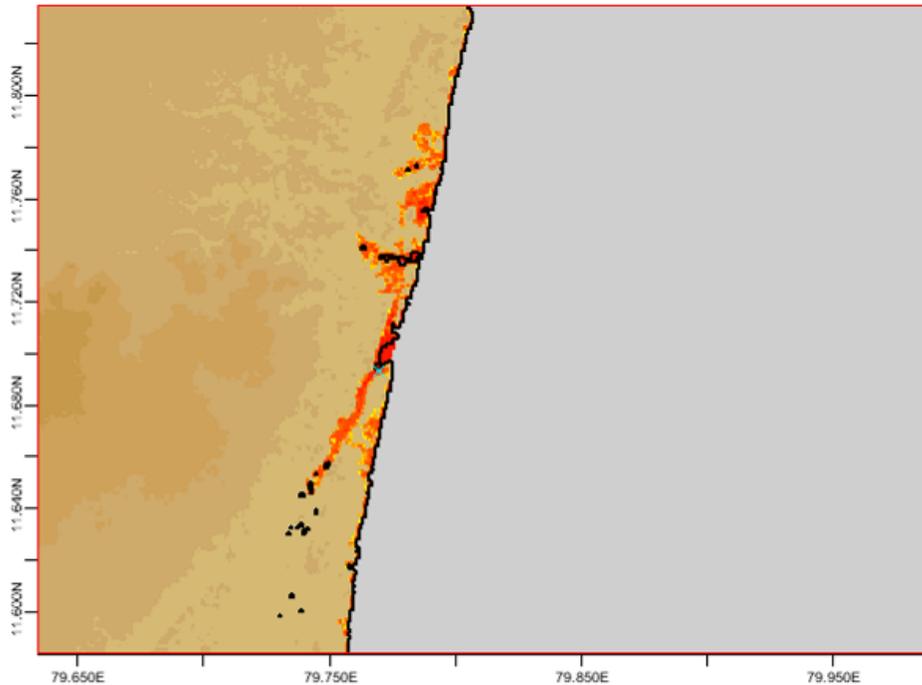
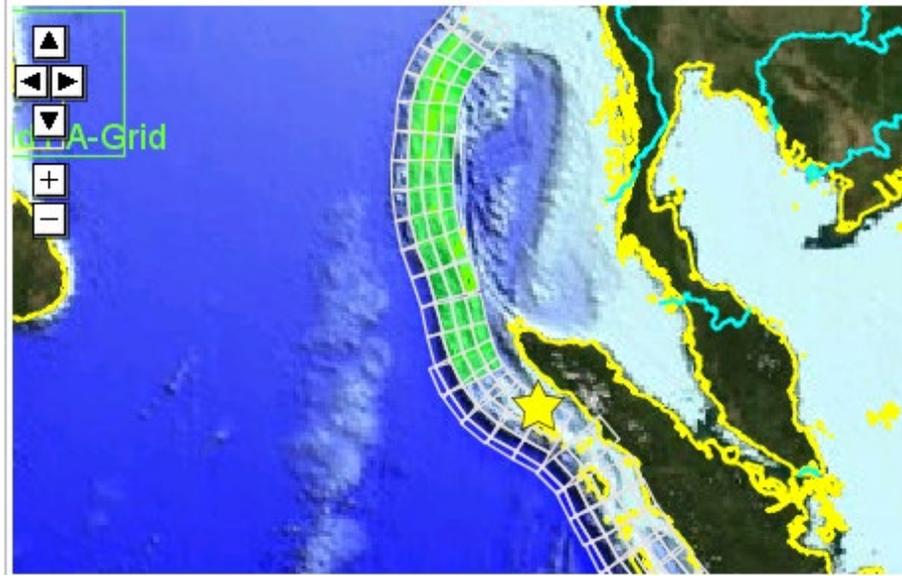
Historical & Worst case scenario

Parameters	Source	Longitude	Latitude	Magnitude
Sumatra 2004	Sumatra	95.85° E	3.32° N	9.3 Mw
Car Nicobar 1881	Car Nicobar	92.43	8.52	7.9 Mw
Andaman 1941	North Andaman	92.5° E	12.1° N	7.7 Mw
Marakan 1762	Arakan	94	19	8.8 Mw
Worst-Case	Car Nicobar	92.43	8.52	9.3 Mw
Worst-Case	North Andaman	92.43	8.52	9.3 Mw

Mapping of Coastal Vulnerability to Tsunamis



Example: Evacuation map of Cuddalore



Tsunami Evacuation Planning

- Aims: to save the people at risk before tsunami arrived.
- General consideration in Tsunami Evacuation Planning:
 - ✓ Direct to safe place
 - ✓ To the closest and fastest route to go to safe place
 - ✓ Consider tsunami arrival time
 - ✓ Consider number of people at risk
 - ✓ Consider number of evacuee that can be accommodated in the safe place
 - ✓ Consider building tsunami vertical evacuation shelter

Questions to improve the tsunami evacuation planning

- Are communities under risk aware of the risk?
- Are the early warning procedures robust and effective?
- Are warnings reaching those at risk who need them?
- Are communities aware of what to do when a warning is issued?
- Is there enough time for people to reach safe areas located inland?
- Will people evacuate to shelters/safe areas when a tsunami warning issued?
- Are evacuation shelters and safe areas really safe?
- Are exercises conducted regularly?

Thank you