Tsunami Early Warnings and Tsunami Ready Programme

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Tsunami Early Warnings

- **"Tsunami" in Japanese means "harbor wave"**
- **A system of ocean gravity waves formed as a result of large-scale displacement of sea surface. Travel long distances without losing energy**

Tsunami Characteristics

- Length and Time Period
  - Long wave length (of several 100 km)
  - Periods of a few minutes to about an hour
- Speed proportional to square root of water depth
  - 500 to 1000 km per hour in Deep Ocean
  - Grows to Tens of meters near shore About 30 km per hour near shore
- Height of Tsunami Wave
  - Less than a meter in the Deep Ocean

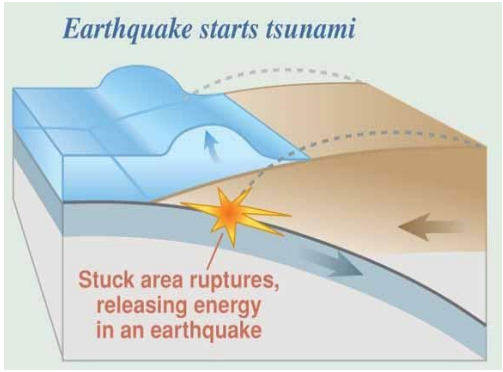
Causes of Tsunamis

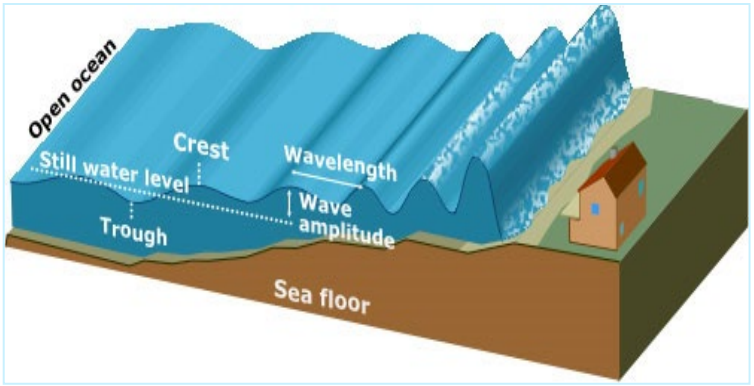
Any impulse that causes large scale displacement of the sea surface.

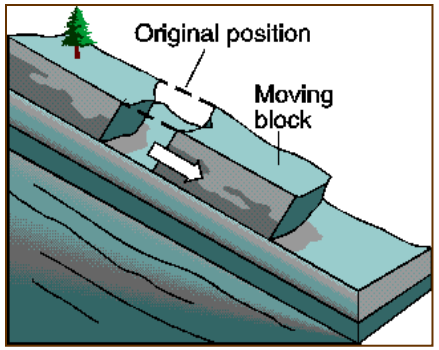
- Earthquakes
- Landslide
- Volcanic eruptions
- Meteoroids Impact

DEEP OCEAN tsunami has long wavelength, travels fast, small amplitude - doesn't affect ships

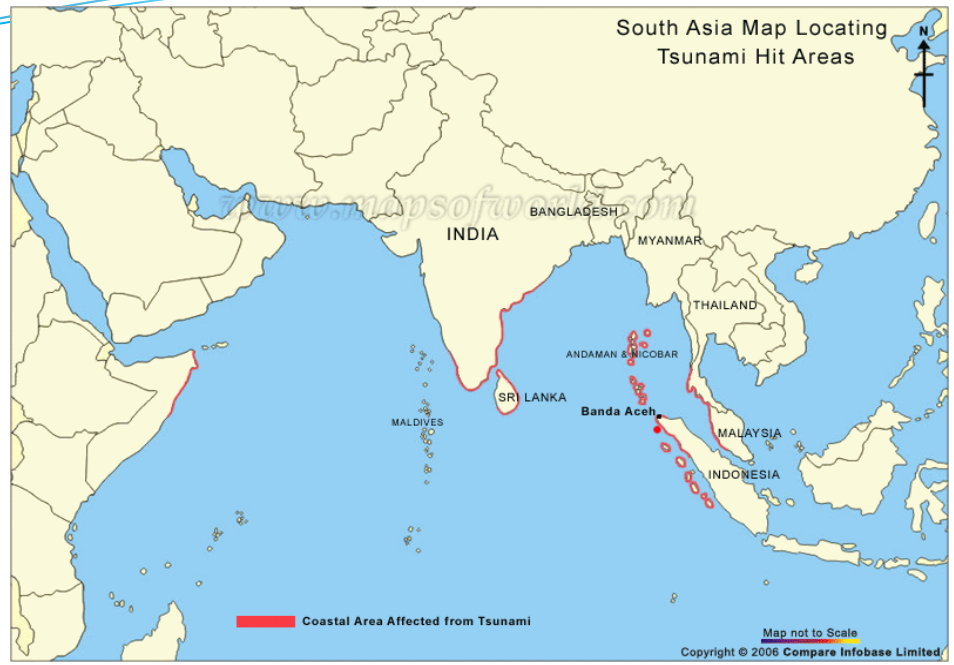
AS IT APPROACHES SHORE, it slows. Since energy is conserved, amplitude builds up - very damaging







Indian Ocean Tsunami of December 26, 2004

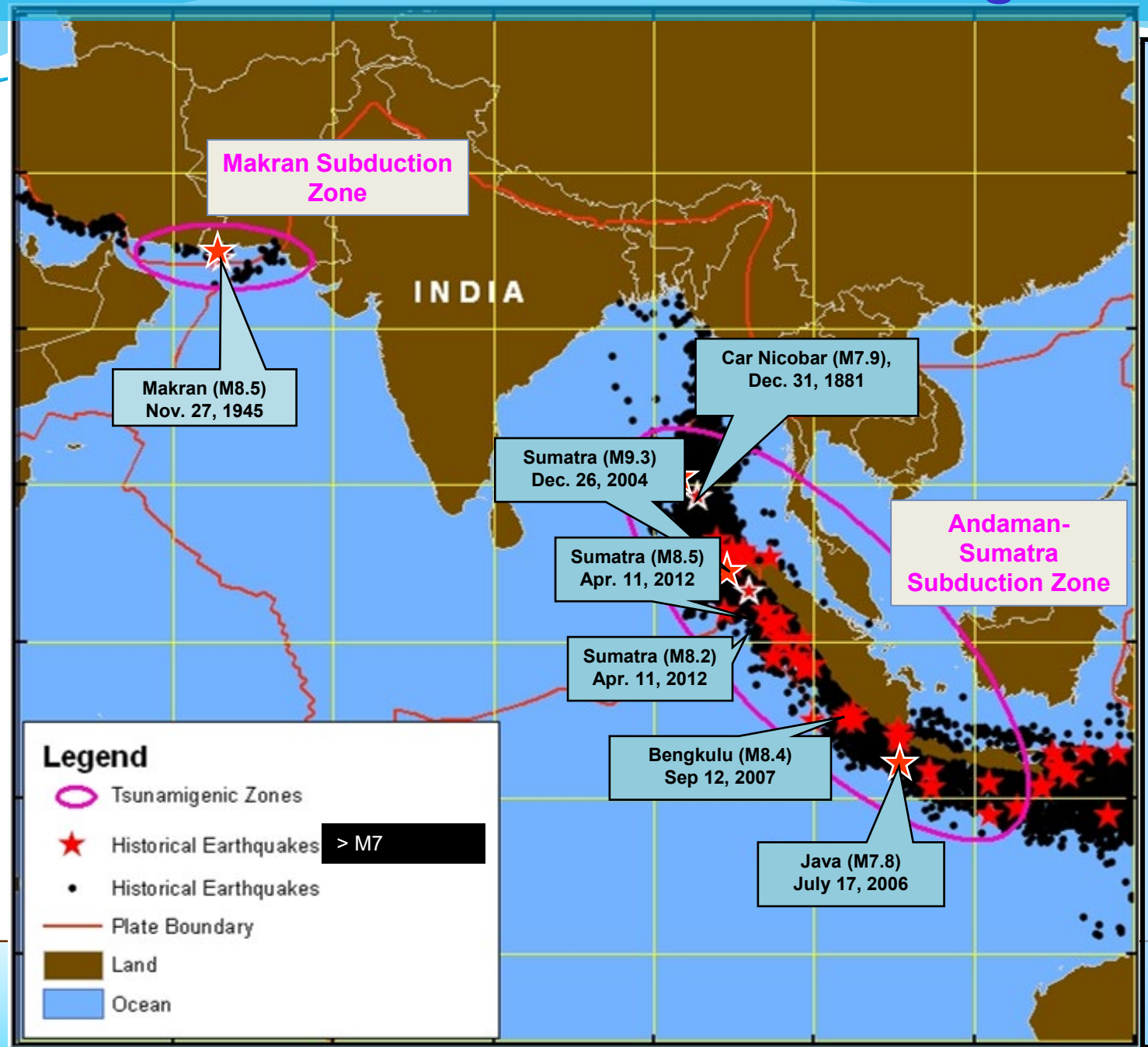


- The worst tsunami in recorded history on December 26, 2004
- Magnitude 9.3 (second strongest earthquake ever recorded on a seismograph)
- Lasted 10 minutes (longest lasting earthquake in history)
- 229,866 confirmed dead, which includes 42,883 missing and never accounted for
- More than $7 billion dollars damage

Reasons for huge loss…..

- Many nations in the Indian Ocean did not even recognize the word “tsunami”
- None had tsunami preparedness programs in place
- Absence of a Tsunami Early Warning System (TEWS) in India
- Ignorance of the natural signs of a tsunami led to inappropriate actions

Potential Tsunamigenic Zones



Tsunamis are primarily caused due to large undersea Earthquakes.

For a tsunami to hit Indian coast, it is necessary that a tsunamigenic earthquake occurs and its magnitude should be larger than M 7. Possible locations of such events are enclosed in ellipse

Earthquakes with Slow Rupture Velocities are most efficient Tsunami Generators

75% of earthquake energy is released in the circum-Pacific belt – 900 Tsunamis in 20th Century

20% in the Alpine-Himalayan belt – 6 Tsunamis in 20th Century

Historical Tsunami in India

12 Apr, 1762 (BoB EQ) – 1.8 M
31 Dec, 1881 (Car Nicobar EQ)
27 Aug, 1883 (Krakatoa) – 2 M
26 Jun, 1941 (Andaman EQ)
27 Nov, 1945 (Makran EQ) – 12 M
26 Dec, 2004 (Sumatra EQ)

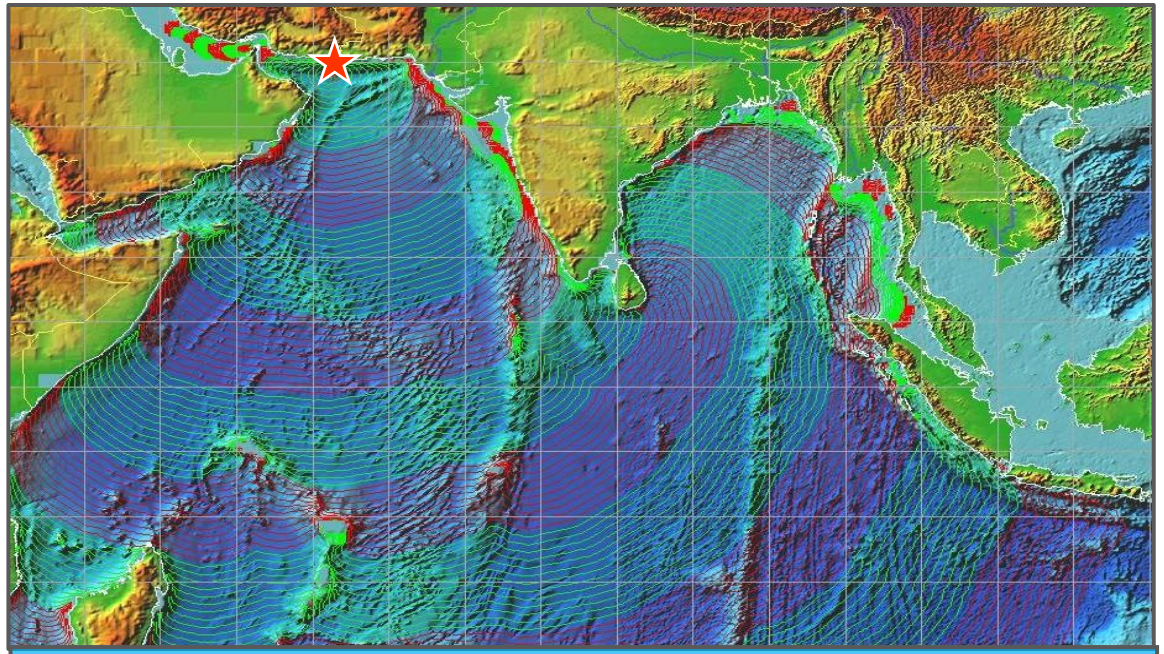
Landslides, Volcanoes & Meteor Impacts can also generate Tsunamis

Tsunami Risk Assessment

Tsunami Travel Times & Response time

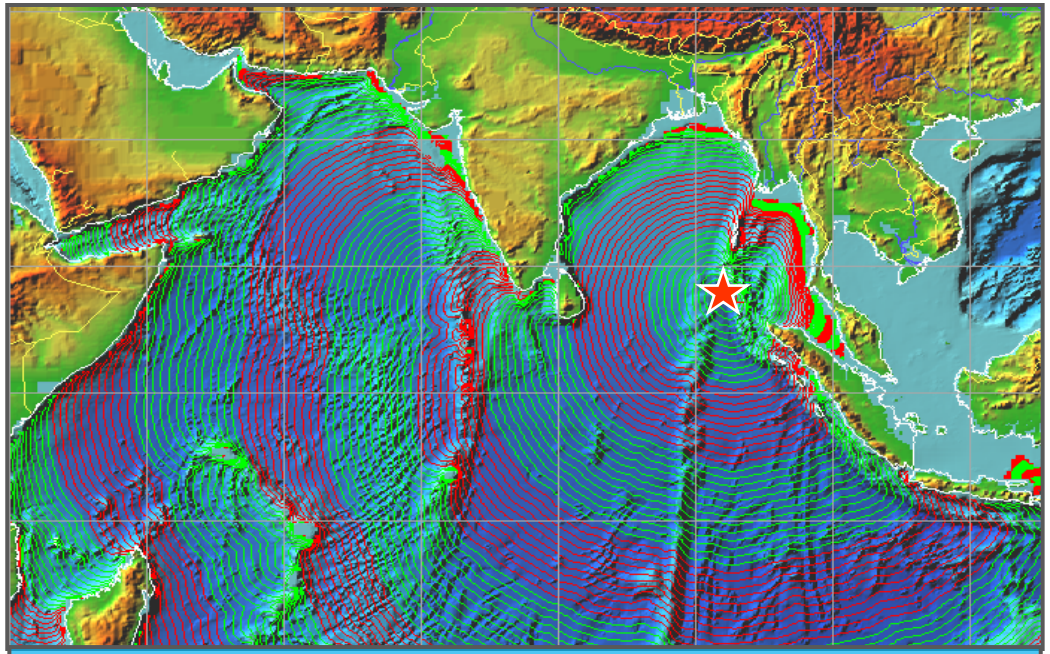
- Depending upon the Earthquake location (Makran/Andaman-Sumatra Subduction Zone) the response time for evacuation of coastal population could range between 10 min to few hours.
- As Andaman & Nicobar Islands situated right on subduction zone the available response time is very short

Makran Subduction Zone



- **If Earthquake occurs at Makran Subduction zone, Travel Time to nearest Indian Coast (Gujarat) are 2 to 3 hrs**

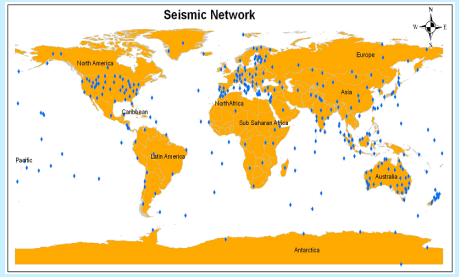
Andaman-Sumatra Subduction Zone



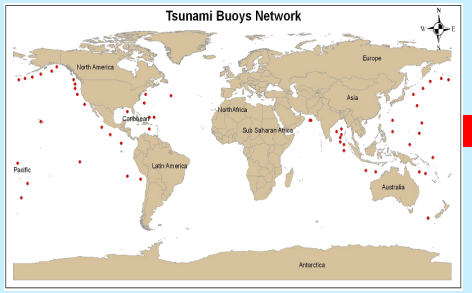
- **If Earthquake happens at Nicobar Islands , travel times to nearest coast (A&N Islands) are 20 to 30 min**
- **For Indian main land travel times are 2 to 3 hrs**

Tsunami Early Warning System

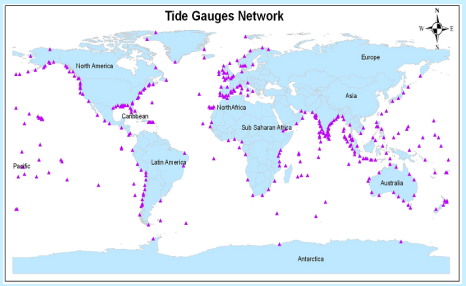
Detection → Warnings → Dissemination



Seismic Network



BPR Network



Tide gauge Network

Observation Networks

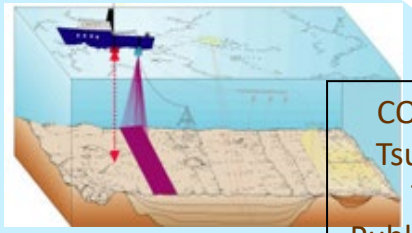
VSAT

INSAT

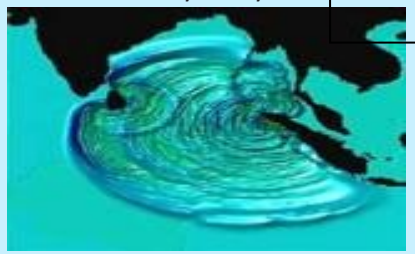
GPRS

INMARSAT

Communications



Bathymetry



Tsunami Modelling

Topography

Costal Vulnerability

Modelling

COMMS Tests
Tsunami Drills
Trainings
Publicity Material

Capacity Building

R & D

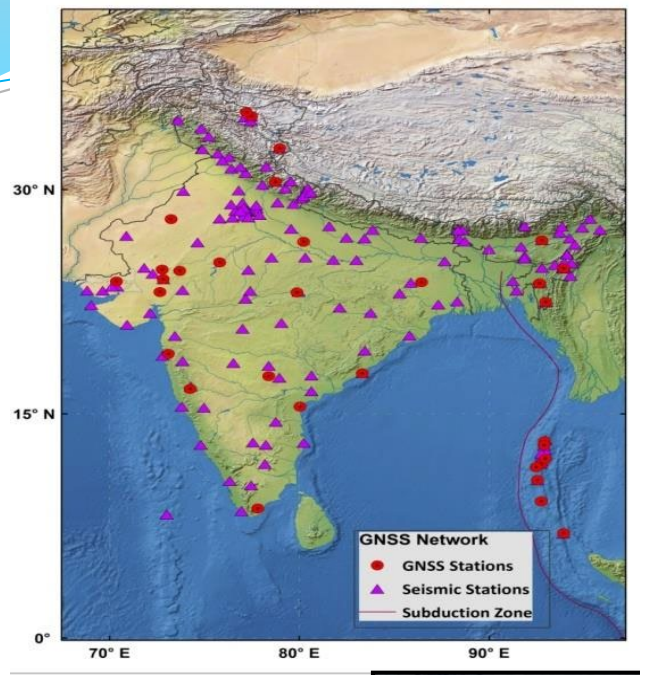
Paleo-tsunami Modelling
GNSS Data Use

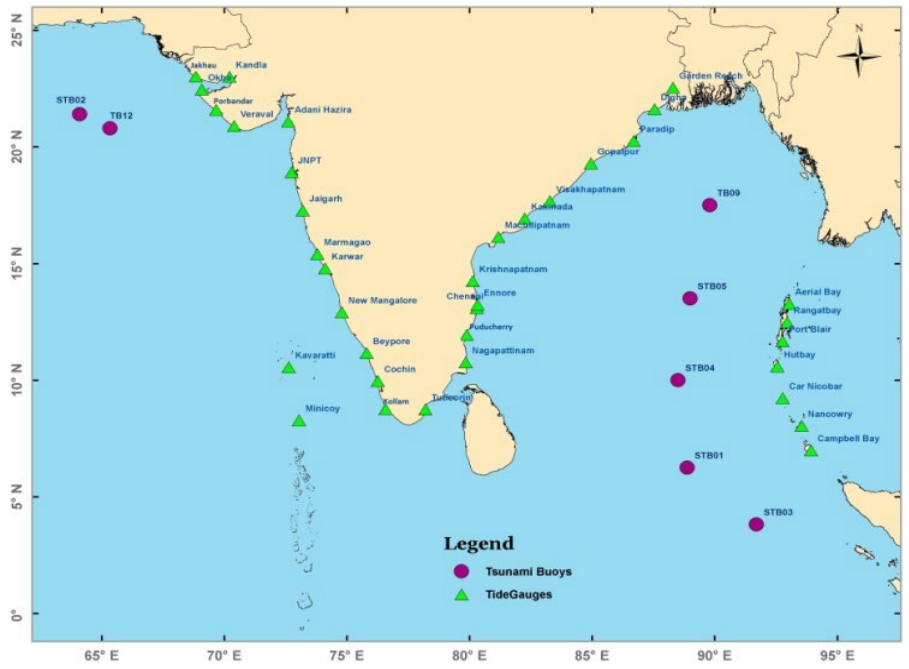
Last mile connectivity

TSUNAMI WARNINGS!!!

Participating Institutions
IMD, NIOT, NCCR, SOI,
NRSC, INCOIS
MHA, NDMA, Coastal States

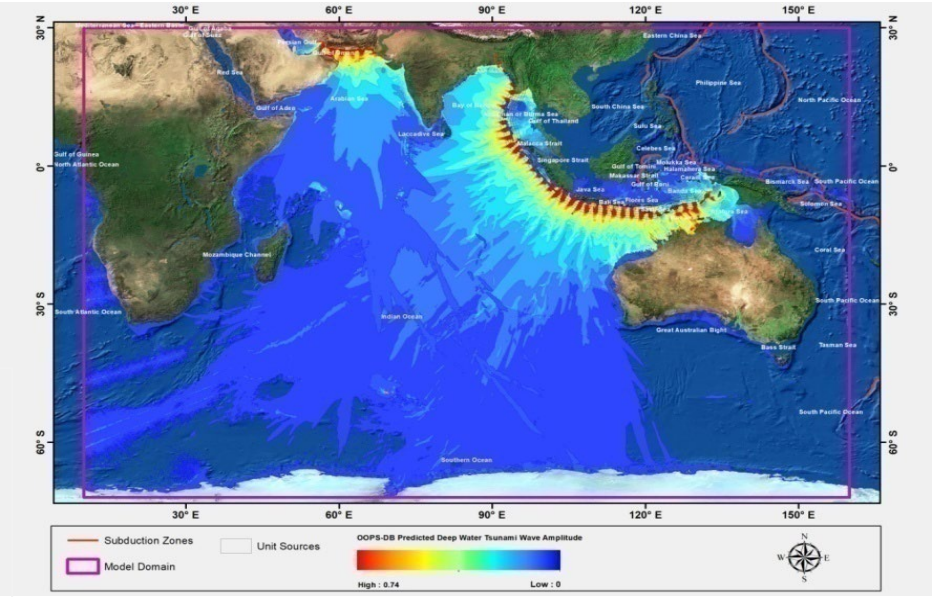
Observational Network and Numerical modeling





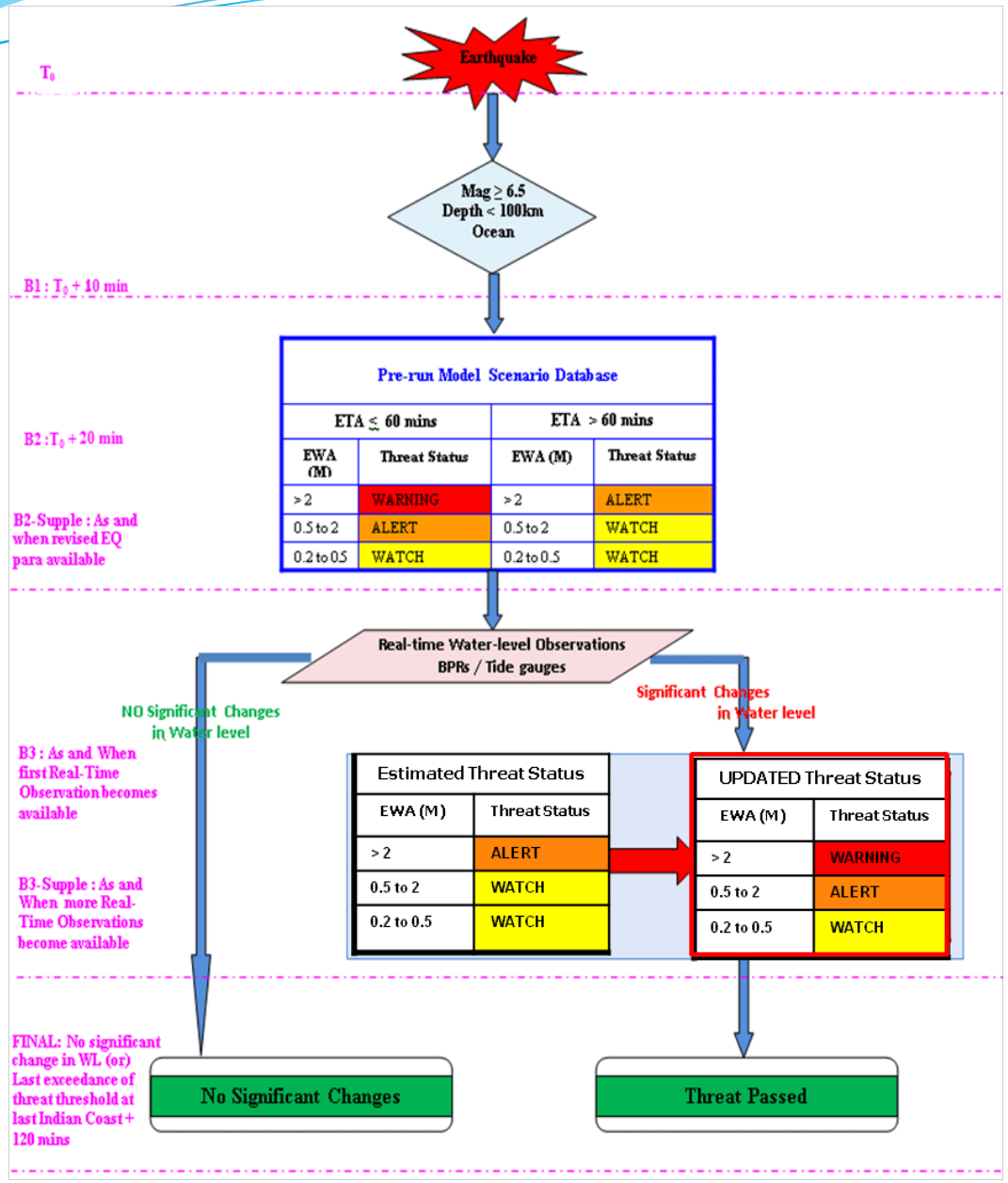
Observation Network

- **Seismic Network**
  - 130 broadband seismometer, 35 Strong Motion Accelerometers, 35 GNSS receivers
- **Sea-level Network**
  - Network of **7 Tsunami Buoys**
  - Network of **36 Tide gauges**
  - Three types of Sensors at each location : Radar (RAD), Pressure (PRS) and Shaft Encoder (ENC)



- Sunda and Makaran Tsunamigenic Zones with extended New Indian Ocean Model Domain with 3.2 million grids
  - Depending on EQ's location and magnitude basic unit source open ocean propagation scenario database scenarios are either scaled up or down - **ABC of OOPSDB**
  - Expected Wave Arrival & Amplitude forecasts at 4380 Costal Forecast Points (CFPs) in the Indian Ocean Coast

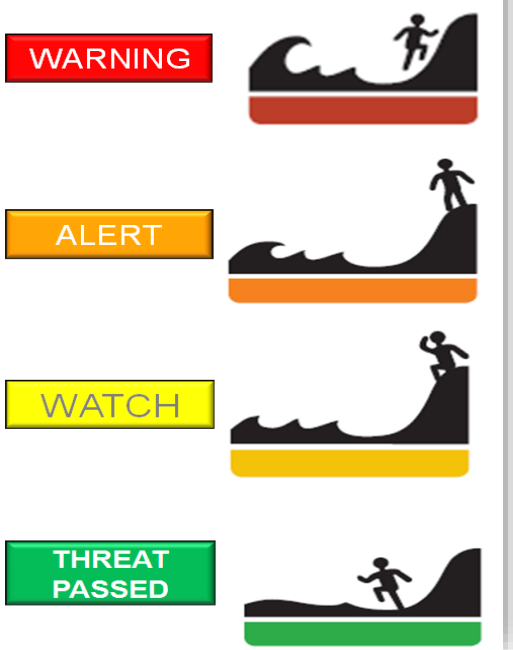
Standard Operating Procedure for ITEWC



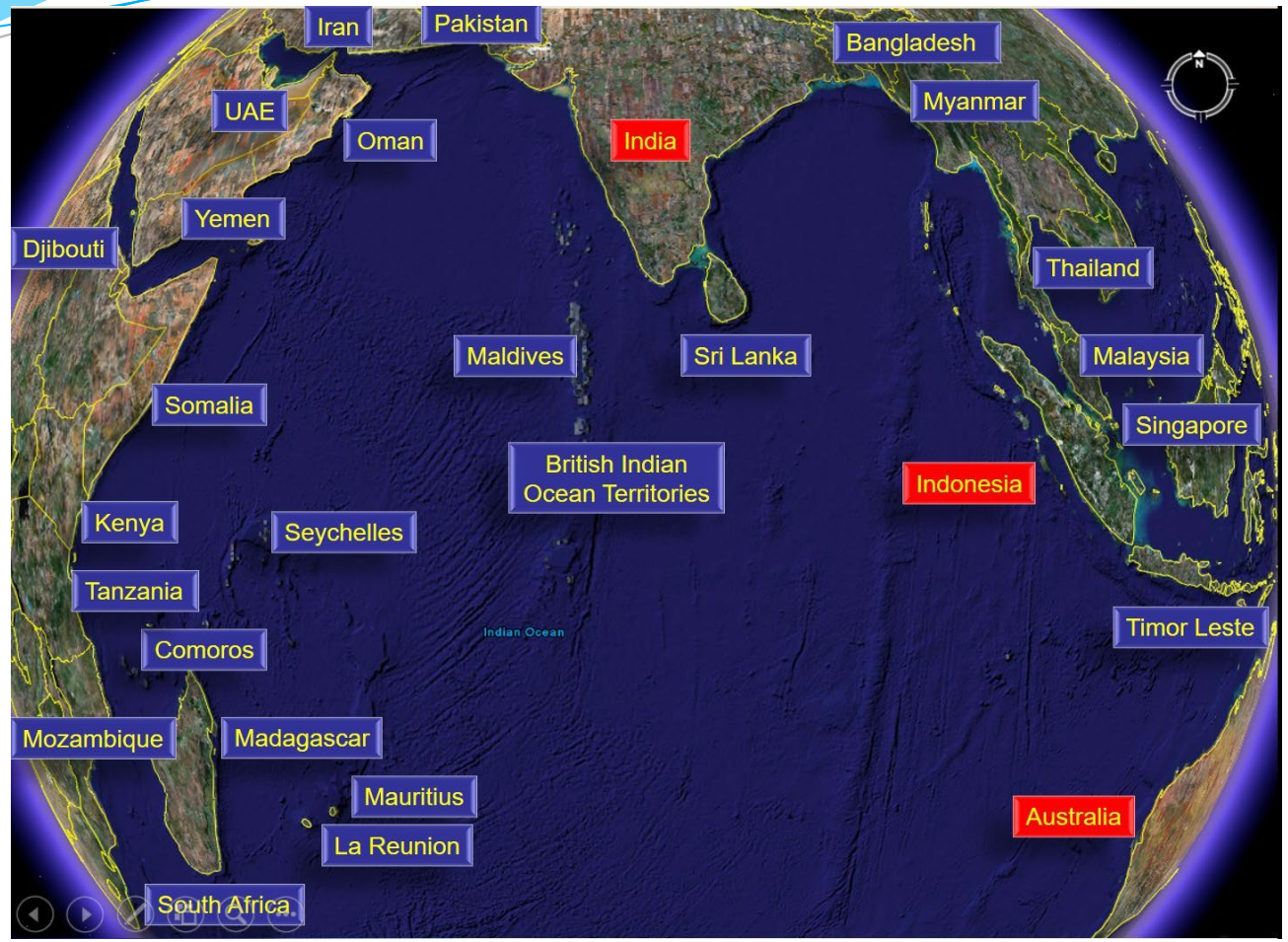
- The Indian Tsunami Early Warning Centre (ITEWC) services for an event commence whenever an earthquake is recorded with M ≥ 6.5 within the Indian Ocean and M ≥ 8.0 outside of the Indian Ocean
- Uniquely designed SOP for generation of timely and accurate tsunami bulletins to handle both near-source and far-source coastal regions
- Based on proximity of a coastal zone to the tsunamigenic earthquake source regions and Expected Wave Heights from Models
- 4 Threat Levels corresponding to different public responses and mapped to NDMA guidelines

SOP – Public Response and Threat Levels in Bulletins

Threat Status	Action to be taken	Dissemination to
WARNING	Public should be advised to move inland towards higher grounds. Vessels should move into deep Ocean	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media
ALERT	Public should be advised to avoid beaches and low-lying coastal areas. Vessels should move into deep Ocean	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media
WATCH	No immediate action is required	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Media
THREAT PASSED	All clear determination to be made by the local authorities	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media



Indian Ocean Tsunami Warning and Mitigation Service



The Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS) was formed in response to the tragic tsunami on 26 December 2004

In October 2011, ITEWC recognized as a Tsunami advisory Service Provider (TSP) along with other two TSPs of Australia and Indonesia by IOC-UNESCO. Since then ITEWC providing services to all Indian Ocean member countries.

INCOIS is providing tsunami services to 25 countries in the Indian Ocean Region

Service Levels – IOTWMS

- Level – 1 Tsunamigenic Potential
- Level – 2 Tsunami Threat Information
  (**No Threat /Potential / Confirmed / Threat Passed**)
- Level – 3 Coastal Inundation
  (**Runup and Extent of Inundation**)

Sample Bulletin Structure

TSUNAMI BULLETIN NUMBER 1
INDIAN TSUNAMI EARLY WARNING CENTRE INCOIS HYDERABAD (ITEWC)

ISSUED AT: 0835 IST Wednesday 05 September 2018

... EARTHQUAKE BULLETIN ...

Header

Location Map | Information

EARTHQUAKE INFORMATION

Magnitude (Preferred) :	8.5 M
Depth:	10 km
Date :	05 Sep 2018
Origin Time:	0830 IST
Latitude:	3.3 N
Longitude:	96 E
Location:	Northern Sumatra, Indonesia

Earthquake Info

EVALUATION

Earthquakes of this size sometimes have potential to generate tsunamis. However, so far there is no confirmation about the triggering of a tsunami. An investigation is under w ...TEWC INCOIS will monitor sea level gauges near epicenter and report if any tsunami wave activity has occurred.

Evaluation

ADVICE

This is only a Heads-up message to the national/state/local authorities and disaster management offices. No immediate public action is required. This Bulletin is being issue... and disaster management offices have the authority to make decisions regarding the official threat status in their coastal area and any action to be taken in response.

Advice

UPDATES

Additional bulletins will be issued by ITEWC INCOIS for this event as more information becomes available.

Updates

CONTACT INFORMATION

Indian Tsunami Early Warning Centre (ITEWC)

Indian National Centre for Ocean Information Services (INCOIS)

Address:"Ocean Valley", Pragathi Nagar (BO), Nizampet (SO),

Hyderabad - 500 090, India.

Tel: 91-40-23895011

Fax: 91-40-23895012

Email: tsunami@incois.gov.in

Website: www.incois.gov.in

Contact Info

TYPE – II Potential Tsunami Threat / No Threat

INCOIS

Indian Tsunami Early Warning Centre
Ministry of Earth Sciences,Government of India

Print KML TXT DBF

Home NTWC Public Bulletins

Bulletin 15
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Bulletin 5
Bulletin 4
Bulletin 3
Bulletin 2
Bulletin 1

TSUNAMI BULLETIN NUMBER 2

INDIAN TSUNAMI EARLY WARNING CENTRE INCOIS HYDERABAD (ITEWC)

ISSUED AT: 0845 IST Wednesday 05 September 2018

*** TEST TEST TEST TEST TEST TEST TEST TEST TEST TEST ***
*** THIS IS NOT A REAL TSUNAMI EVENT ***

...POTENTIAL THREAT TO INDIAN COAST...

Threat Map | Tsunami Information | Directivity Map | Travel Times map

EARTHQUAKE INFORMATION (Revised)

Magnitude (Preferred) :	8.8 M
Depth:	10 km
Date :	05 Sep 2018
Origin Time:	0830 IST
Latitude:	3.3 N
Longitude:	96 E
Location:	Northern Sumatra, Indonesia

EVALUATION

Earthquakes of this size are capable of generating tsunamis. However, so far there is no confirmation about the triggering of a tsunami. An investigation is under way to determine if a tsunami has been triggered. ITEWC will monitor sea level gauges and report if any tsunami wave activity has occurred. Based on pre-run model scenarios, the zones listed below are POTENTIALLY UNDER THREAT.

TSUNAMI THREAT FOR THE INDIAN OCEAN

The list below shows the forecast arrival time (T) of the first wave estimated to exceed 0.2 m amplitude at the beach in each zone, and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than 0.2m at the beach are not shown.

The list is grouped by State (alphabetic order) and ordered according to the earliest estimated times of arrival at the beach.

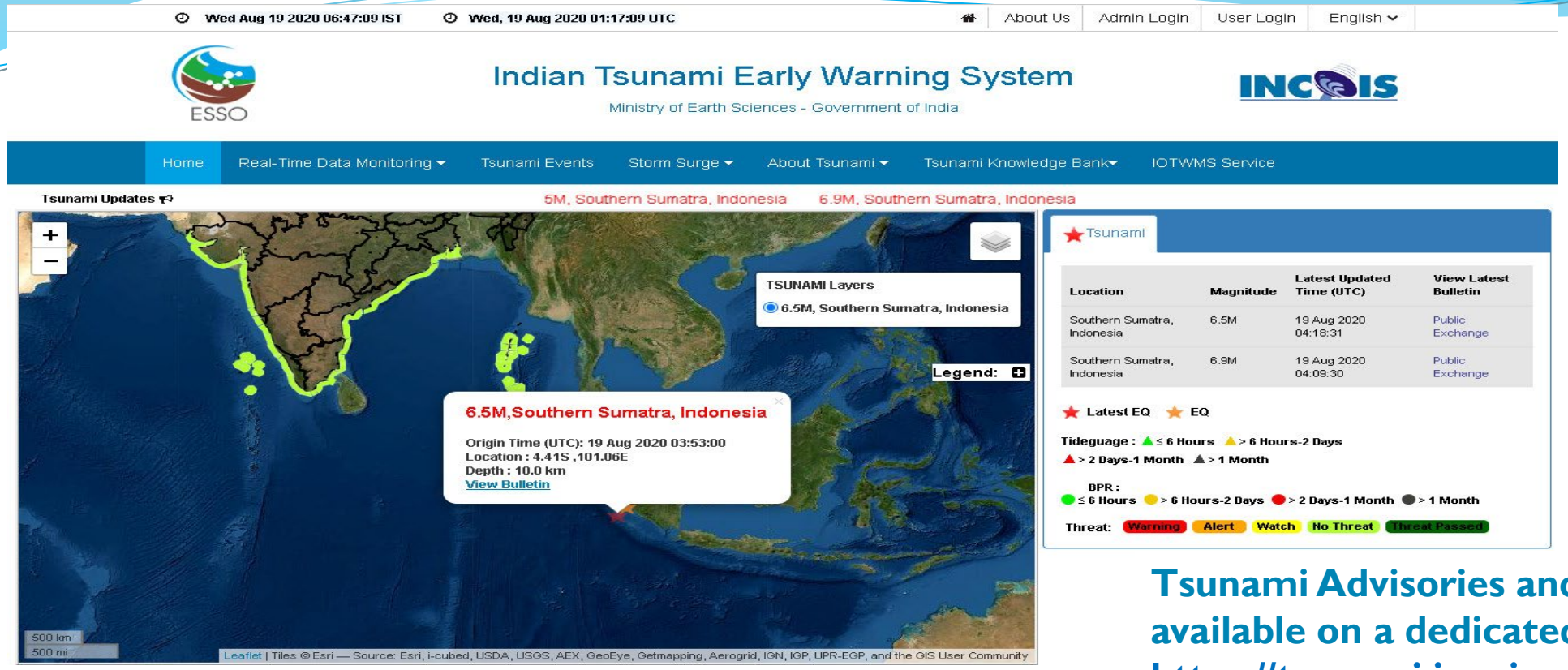
Please be aware that actual wave arrival times may differ from those below, and the initial wave may not be the largest. A tsunami is a series of waves and the time between successive waves can be five minutes to one hour.

The threat is deemed to have passed two hours after the forecast time for last exceedance of the 0.5m threat threshold for a zone. As local conditions can cause a wide variation in tsunami wave action, CANCELLATION of national

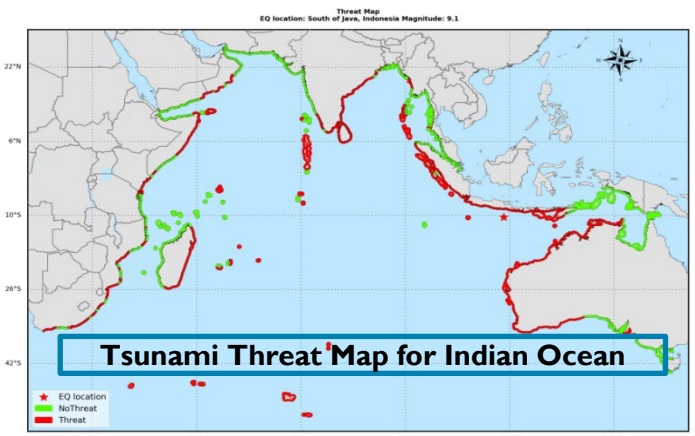
Country	State/Teritory	Zone	T2(IST)	Amplitude(m)	max deep(m)	depth(m)	Threat Status
INDIA	ANDAMAN AND NICOBAR	INDIRA POINT	05-Sep-2018 09:08	2.4	1.0	47	Warning
INDIA	ANDAMAN AND NICOBAR	KOMATRA & KATCHAL ISLAND	05-Sep-2018 09:33	2.5	1.0	42	Alert
INDIA	ANDAMAN AND NICOBAR	CAR NICOBAR	05-Sep-2018 09:51	1.7	0.6	46	Watch
INDIA	ANDAMAN AND NICOBAR	LITTLE ANDAMAN	05-Sep-2018 10:10	3.5	1.3	41	Alert
INDIA	ANDAMAN AND NICOBAR	BARREN ISLAND	05-Sep-2018 10:11	0.3	0.1	167	Watch
INDIA	ANDAMAN AND NICOBAR	PORT BLAIR	05-Sep-2018 10:20	2.3	0.9	54	Alert
INDIA	ANDAMAN AND NICOBAR	NARCONDAM ISLAND	05-Sep-2018 10:27	0.3	0.1	42	Watch
INDIA	ANDAMAN AND NICOBAR	HAVELOCK	05-Sep-2018 10:29	1.3	0.4	43	Watch
INDIA	ANDAMAN AND NICOBAR	NORTH SENTINEL ISLAND	05-Sep-2018 10:34	1.3	0.6	36	Watch
INDIA	ANDAMAN AND NICOBAR	RANGATH BAY	05-Sep-2018 10:44	1.3	0.4	57	Watch
INDIA	ANDAMAN AND NICOBAR	DIGLIPUR	05-Sep-2018 10:59	1.0	0.3	48	Watch
INDIA	TAMIL NADU	POOMBUHAR	05-Sep-2018 11:28	1.9	0.8	36	Watch
INDIA	TAMIL NADU	CUDDALORE	05-Sep-2018 11:28	1.3	0.5	35	Watch
INDIA	TAMIL NADU	PUDUCHERRY	05-Sep-2018 11:28	1.5	0.6	33	Watch
INDIA	TAMIL NADU	MARAKKANAM	05-Sep-2018 11:29	1.3	0.6	40	Watch
INDIA	TAMIL NADU	KARAIKAL	05-Sep-2018 11:35	1.8	0.8	29	Watch
INDIA	TAMIL NADU	ENNORE	05-Sep-2018 11:36	1.8	0.8	34	Watch
INDIA	TAMIL NADU	CHENNAI	05-Sep-2018 11:38	1.8	0.8	33	Watch
INDIA	TAMIL NADU	MAHABALIPURAM	05-Sep-2018 11:40	2.1	0.9	32	Alert
INDIA	ANDHRA PRADESH	SRIHARIKOTA	05-Sep-2018 11:42	2.4	1.0	37	Alert
INDIA	ANDHRA PRADESH	MACHILIPATNAM	05-Sep-2018 11:48	1.4	0.6	44	Watch
INDIA	ANDHRA PRADESH	KAKINADA	05-Sep-2018 11:55	1.2	0.5	30	Watch
INDIA	TAMIL NADU	NAGAPATTINAM	05-Sep-2018 12:03	1.4	0.6	33	Watch
INDIA	ANDHRA PRADESH	KALINGAPATNAM	05-Sep-2018 12:08	1.6	0.7	30	Watch
INDIA	ANDHRA PRADESH	VISAKHAPATNAM	05-Sep-2018 12:10	1.0	0.4	31	Watch
INDIA	ORISSA	PURI	05-Sep-2018 12:14	0.8	0.3	35	Watch
INDIA	ORISSA	GOPALPUR	05-Sep-2018 12:16	1.2	0.5	37	Watch
INDIA	ANDHRA PRADESH	PERUPALEM	05-Sep-2018 12:19	1.0	0.4	35	Watch

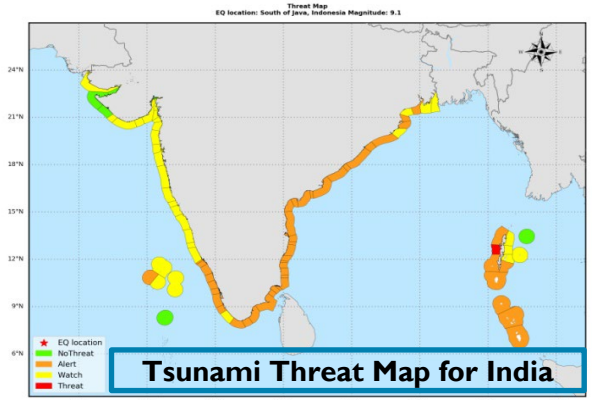
CFZ Information with Threat Status

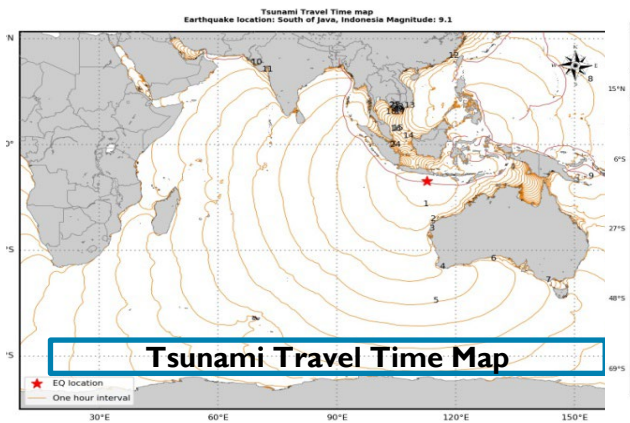
ITEWC Website & Products

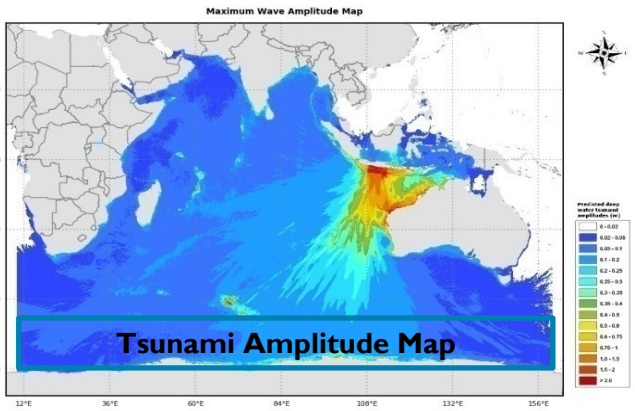


Tsunami Advisories and bulletins are made available on a dedicated website.
https://tsunami.incois.gov.in



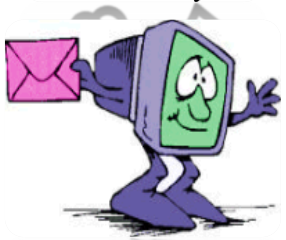






Product Formats & Dissemination

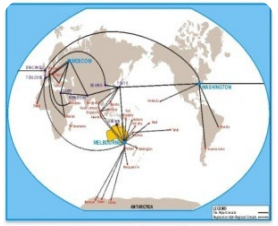
Fax



Email

SMS

Web



GTS

- **Notification Messages** are issued in **text** format
- **Bulletins** are generated in both text and **HTML formats** on the websites
- **Graphics** are generated in jpg or png format on the websites
- **Spatial** data is also available in dbf format on the websites

International Level

All 25 Indian ocean rim countries

National Level

MHA, NDMA, MoES, NDRF Head quarters, IMD & CWC

State Level

Principal Secretaries (Revenue) of Andaman & Nicobar Islands, Andhra Pradesh, Gujarat, Goa, Karnataka, Kerala, Maharashtra, Orissa, Tamilnadu, West Bengal, Lakshadweep and Puducherry

District Level

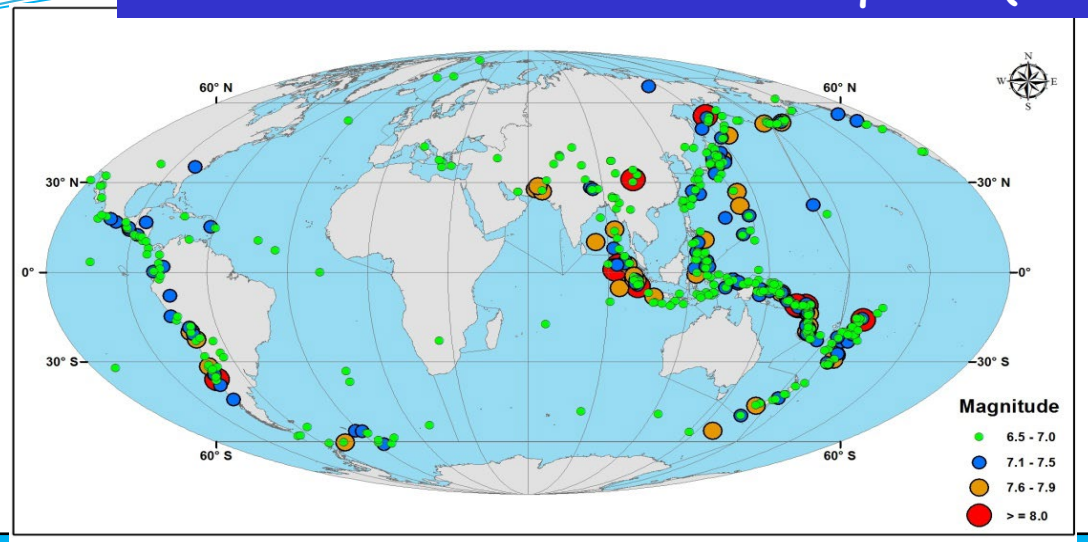
DROs of Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasham, and S.P.S Nellore

Institutional

1-10 NDRF Battalions, ALL control rooms of A&N Islands, HQWNC, HQENC, HQANC, HQSNC, NOIC Tamilnadu, Gujarat, West Bengal, NPCIL, Mumbai, Madras Atomic Power Station, Tarapur Atomic Power Station (1&2, 3&4), Kudankulam Atomic Power Unit, SHAR, MRCC, Coast Guards, Port Officers, Coastal Industries (Reliance) Media & Public subscriptions

Performance of ITEWC

ITEWC monitored 667 earthquakes (M>6.5) since its inception to till date



Region	No of Earthquake M≥6.5
Indian Ocean **(IO)**	101
Other than Indian Ocean (GO)	566

Parameter	Target (local/distant)	Achievement GO	Achievement IO
Elapse time from earthquake origin time to initial earthquake information issuance	10 min	10.0min	7.7 min
Probability of detection of Indian Ocean earthquakes with Mw ≥ 6.5	100%	100%	100%
Accuracy of hypocenter location (with respect to USGS final estimates)	Within 30 km	16.5 Km	14.8 Km
Accuracy of hypocentre depth (with respect to USGS final estimates)	Within 25 km	16.9 Km	13.8Km
Accuracy of earthquake Mw magnitude (with respect to USGS final estimates)	0.3	0.19	0.13

Last mile connectivity

A perfect warning will be useless if people do not know what to do in case of an emergency

Awareness and preparedness at the country/community level is essential

Tsunami Preparedness & Response

Communications Tests (Comms Test)

- To validate the dissemination and reception processes of advisories in all possible communication modes and to determine transmission times of messages

SOP Workshops

- For DMOs to build their own SOPs detailing actions to be taken upon receipt of bulletins from the warning centre

Tabletop Exercises

- To stimulate the development, training, testing and evaluation of Emergency Response Plans, SOPs and assess procedures followed (Conducted in a conference room environment)

Mock Drills

- Full scale mock Tsunami Drill to evaluate and improve the effectiveness of SOPs of TWC and DMOs, in responding to a potentially destructive tsunami

World Tsunami Awareness Day

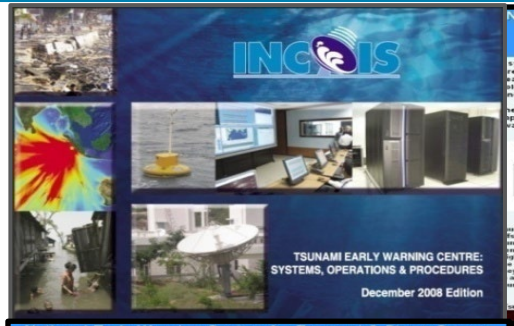
- 05 November is recognized as World Tsunami Awareness Day by UNESCO

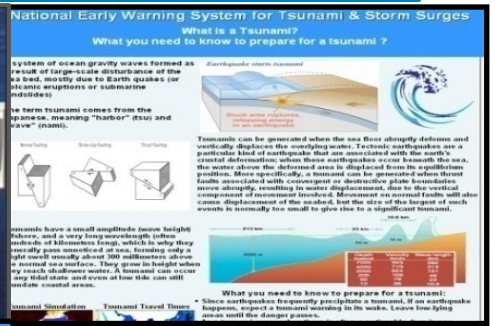
Tsunami Ready Programme

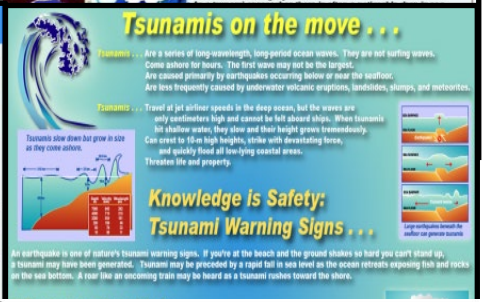
- IOC-UNESCO Tsunami Ready Programme is a community performance based programme to strengthen tsunami preparedness of coastal communities through a structural and systematic approach

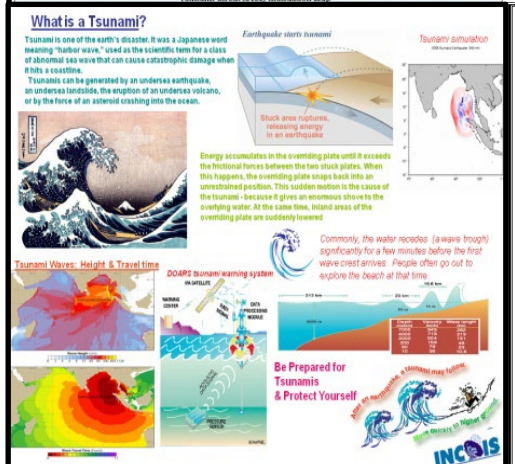
Capacity Building

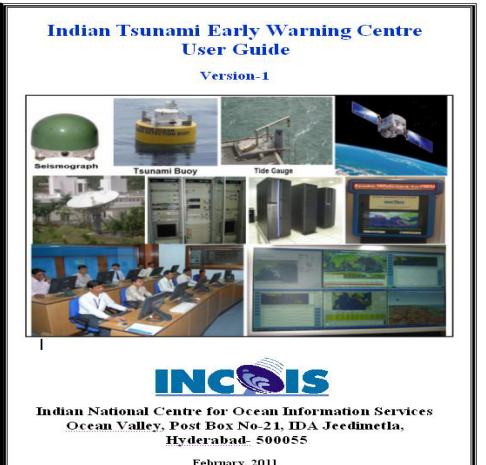
- Workshops, seminars, Trainings (national & international), Exhibitions
- Capacity building to public (especially in near-source vulnerable coastal areas) on responding to earthquakes & tsunami warnings
- Capacity building to coastal administrators, disaster management officials and public on SOPs, use of tsunami inundation maps, etc.
- Include disaster awareness and response related topics in primary, secondary and high school curriculum.
- Awareness activities on World Tsunami Awareness Day on 05 November











Tsunami Mock drills

➢ Objectives of Mock Drill:

- Validate the Warning Centre dissemination process for issuing Tsunami Advisory Bulletins to national disaster management authorities and other participating agencies.
- Evaluate the processes and procedures of agencies receiving and confirming Tsunami Bulletins.
- Hone the organizational decision making process about public warnings and evacuations.
- Identify the proper communication methods that would be used to notify and instruct the public.
- Record and assess the elapsed time until the public would be notified and instructed.

➢ Previous Drills

- IOWave09 on October 14, 2009
- IOWave11 on October 12, 2011
- A&N Islands on November 22, 2013
- IOWave14 on September 9 & 10, 2014
- East Coast of India on September 26, 2015
- Kerala Coast on March 10-11, 2016
- IOWave16 Exercise September 7-8, 2016
- Mega mock drill for East Coast of India on November 24, 2017
- IOWave18 Exercise September 4-5, 2018
- IOWave20 Exercise October 13 and 20, 2020

Tsunami Ready Programme Implementation

- The IOC-UNESCO Tsunami Ready Programme is a community performance-based programme
- The Programme to strengthen tsunami preparedness of coastal communities through a structural and systematic approach through fulfilling a few best-practice indicators (11 Nos) set by ICG/IOTWMS.
- The main objective of Tsunami Ready programme is to improve coastal community preparedness for tsunami emergencies and to minimise the loss of life and property.

Tsunami Ready Programme

- Main Goal
  - To improve coastal community preparedness for tsunami emergencies and to minimise the loss of life and property.
  - To ensures structural and systematic approach in building community preparedness
- How
  - Bringing the ownership of preparedness to the community → Voluntary and Bottom Up
  - A collaborative effort to meet a level of tsunami preparedness through the achievement of fulfilling a set of established best practice guidelines and indicators.
  - Make use of existing Community Preparedness programme of activity. Not necessary creating a new programme.

Benefits of Tsunami Ready Programme

- Strengthens tsunami preparedness of coastal communities through structural and systematic approach
  - Improved assessments of Hazards, Risk, Inundation, and Evacuation
  - Improved early warning systems/warning chain, EOP, and EOC
  - Improved/Increases public awareness, understanding of tsunami threat, build preparedness, and ensures exercises.
- Improves community pre-planning
- Strengthen preparedness for other hazards
- Encourages a consistent and sustainable approach
- Contributes to the aims of the Sendai Framework 2015-2030 targets and priorities for action, i.e. Minimizes loss of life and property

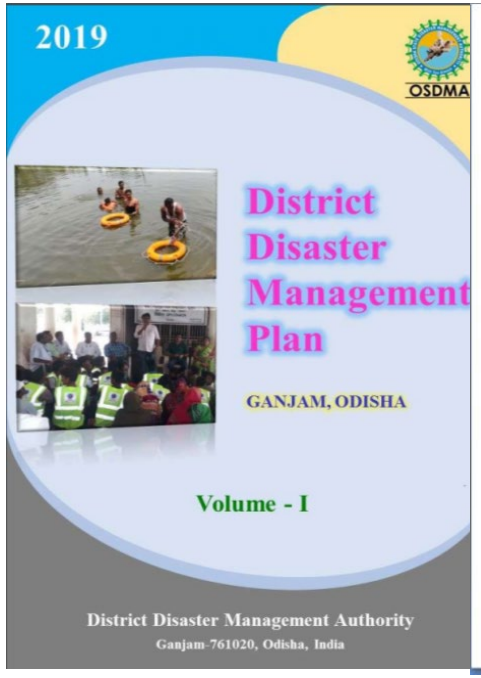
Tsunami Ready Indicators

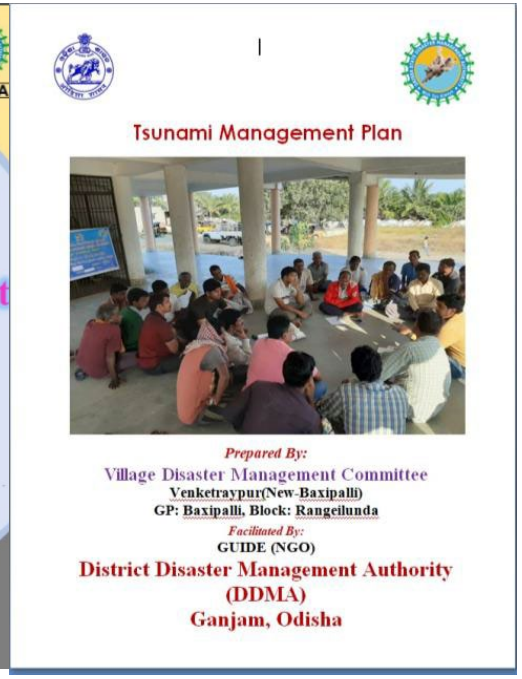
COMMUNICTY TSUNAMI READY INDICATORS (INDIAN OCEAN) - CTRI	
CTRI 1	Have Community Tsunami Risk Reduction Plan
CTRI 2	Have designated and mapped tsunami hazard zones
CTRI 3	Have a public display of tsunami information
CTRI 4	Produce easily understood tsunami evacuation maps as determined to be appropriate by local authorities in collaboration with communities
CTRI 5	Develop and distribute outreach and public education materials
CTRI 6	Hold at least three outreach or educational activities annually
CTRI 7	Conduct an annual tsunami community exercise
CTRI 8	Address tsunami hazards in the community's Emergency Operations Plan (EOP)
CTRI 9	Commit to support the Emergency Operations Centre (EOC) during a tsunami incident, if an EOC is open and activated.
CTRI 10	Have redundant and reliable means for a 24-hour warning point (and EOC if activated) to receive official tsunami threats/information
CTRI 11	Have redundant and reliable means for a 24-hour warning point and/or EOC to disseminate official tsunami alerts to the public

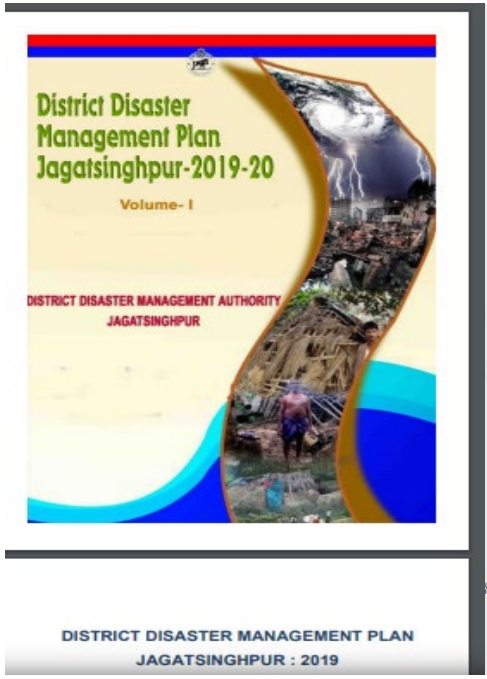
Indicator - I
Have Community Tsunami Risk Reduction Plan

community have information and knowledge of tsunami hazards affecting their area, understanding of their vulnerability (population, infrastructure, etc) that can be affected by the hazard, and knowledge and capacity to access to internal and external resources to mitigate the risk

- Annual training calendar in coastal villages
- Fixed data of mock drill
- Tsunami Mitigation Plan

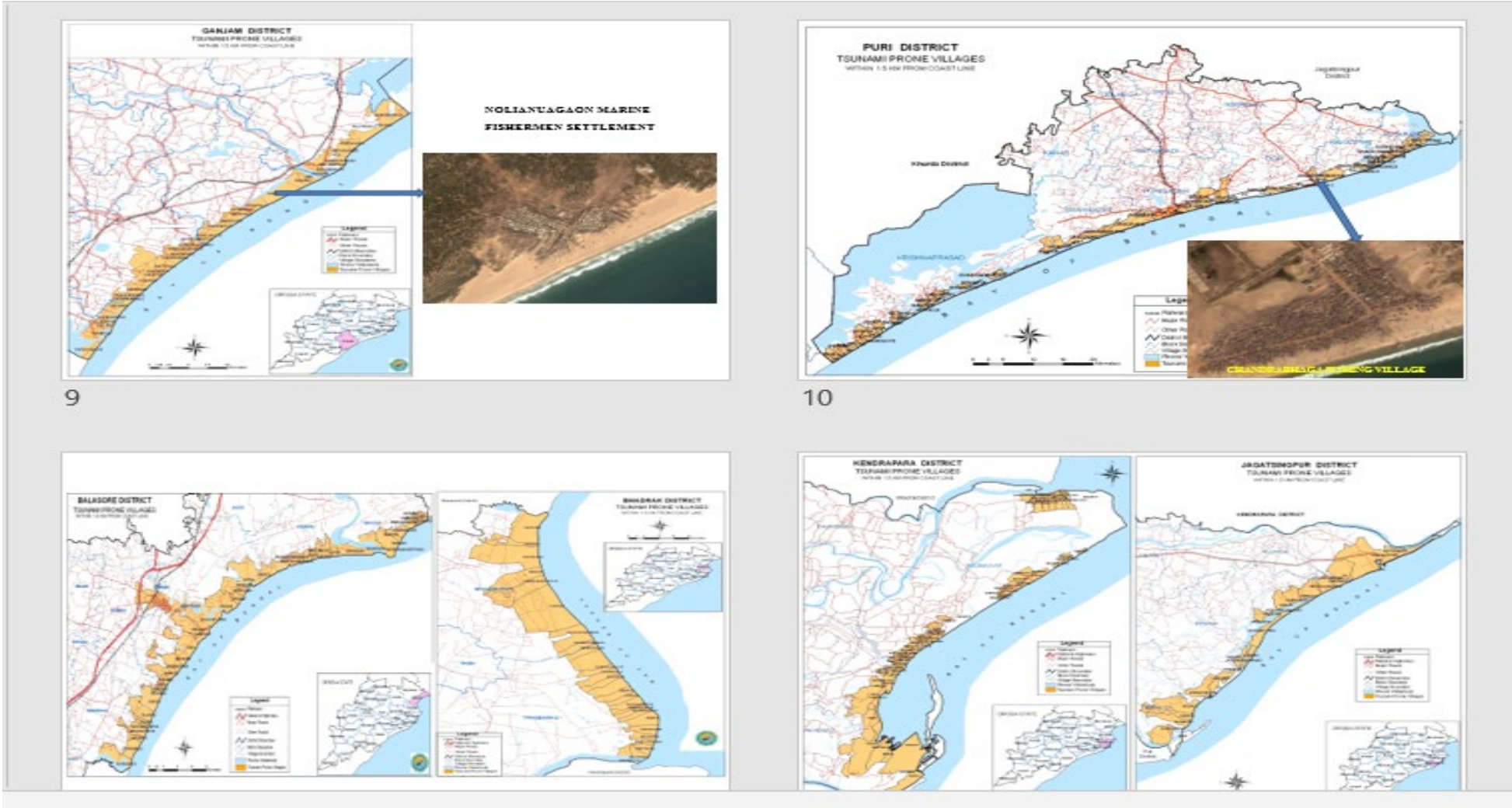






Indicator - 2
Have designated and mapped tsunami hazard zones

Mapping tsunami hazard zones based on inundation modeling, which illustrates expected areas to be flooded by the tsunami.



Indicator - 3
Have a public display of tsunami information

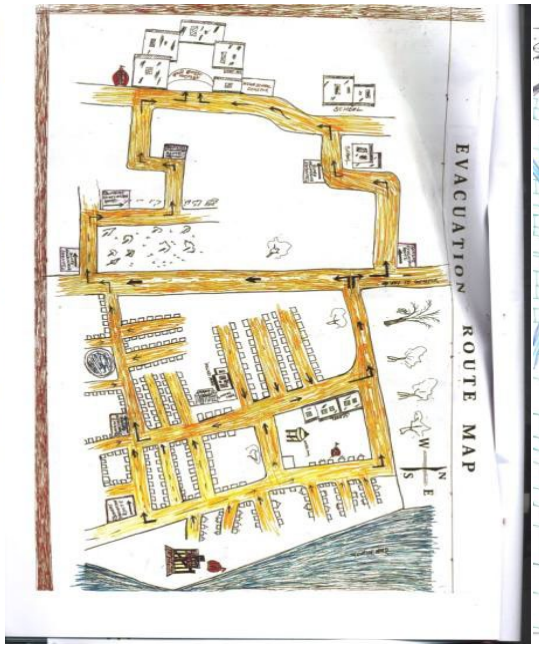
Have a public display of tsunami information and response that identifies tsunami danger area and/or hazard zone, evacuation routes, signs, and assembly area; and provides tsunami response education (i.e. go to high ground).

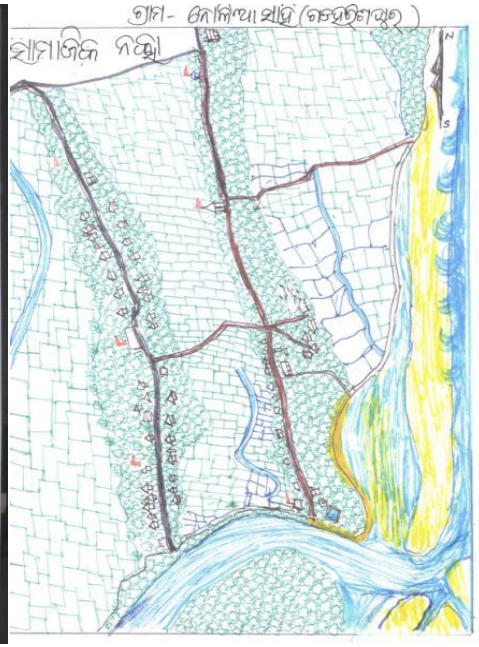
- Signage should be implemented according to national and local policies, standards, and as determined to be appropriate by authorities, and with possible assistance from partners.

Indicator - 4

Produce easily understood tsunami evacuation maps as determined to be appropriate by local authorities in collaboration with communities

- Maps should be based on tsunami hazard zone mapping and in accordance with the community's emergency operations plan.
- Maps should be made available via appropriate print and/or digital media. These maps should follow national standards
- Communities should be involved in preparation of evacuation maps to incorporate local knowledge (accessibility/difficulties to reach or to take certain path).

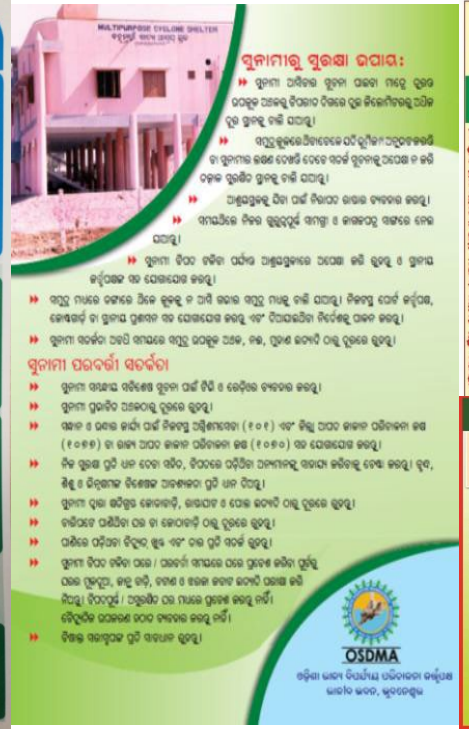


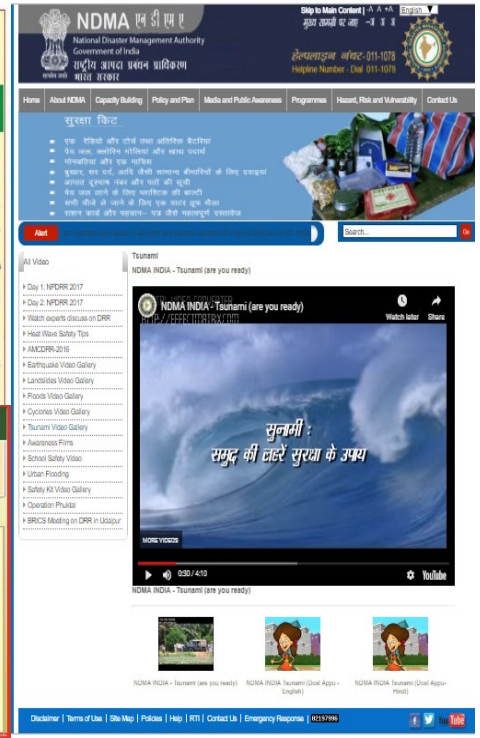


Indicator - 5

Development and distribution of outreach and public education material

- Posters, Banners, Leaflets, Tsunami Videos in Social Media, etc
- Include tsunami evacuation maps, evacuation routes, safety tips, and information about when and how to respond to warnings (including natural warnings for regions with a local tsunami threat).
- They should be tailored to meet local information needs and be based on location-specific tsunami threats.
- All schools and critical infrastructure (hospital, power plan, harbor, etc.) within the community should receive a copy of the materials





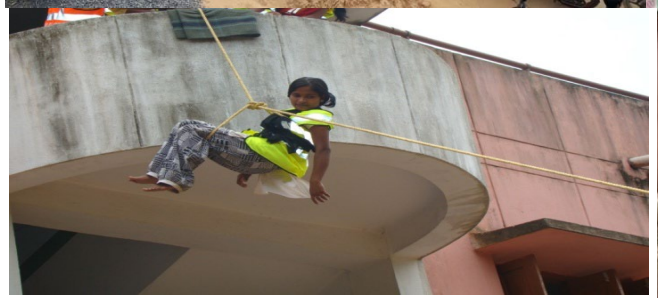
Indicator - 6
Hold at least ”three” outreach or education activities annually

- Orientation Programmes, Sensitization Meetings, Awareness campaign, etc.
- Educate community residents, businesses, and visitors, with an emphasis on those in the tsunami hazard zone, on tsunami hazards, evacuation routes, how warning information will be received (including natural warnings for regions with a local tsunami threat), safety, and response.
- These activities may be multi-hazard as long as they include tsunamis in the content.
- Example: Posters, Pamphlets Jingles, Songs, Poetry, Drama, Social Media, Presentations in Schools, Presentations in religious places etc.

Indicator - 7
Conduct an "annual" tsunami community exercise

- The exercise can focus solely on the tsunami hazard or can be a multi-hazard exercises that also address the tsunami hazard.
- The exercises could be tabletop, functional, or full-scale.
- The exercise should include a communications test.
- An effort should be made for the schools within the mapped evacuation zone to participate by conducting an evacuation drill.

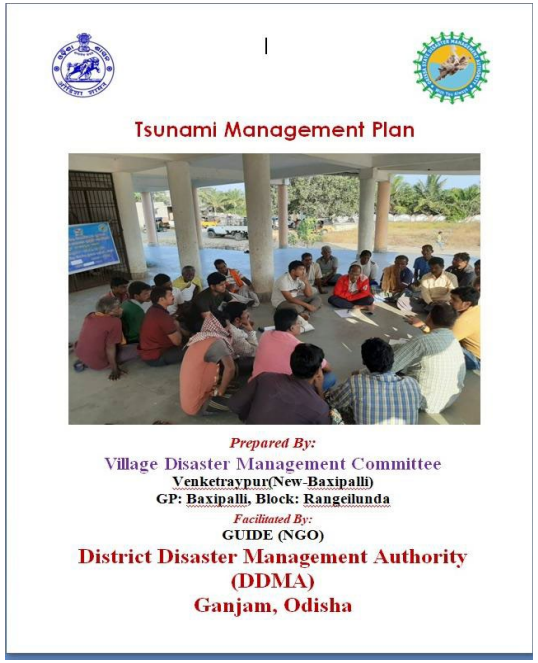


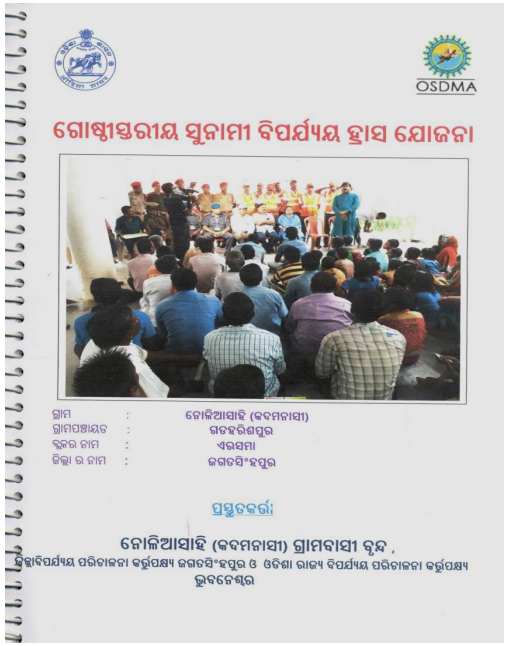



Indicator - 8

Address tsunami hazards in the community's Emergency Operations Plan (EOP)

- If a community-level plan does not exist, other acceptable plans include a countywide EOP or a state or local comprehensive emergency management plan. To meet this requirement, plans should among others:
  - Detail 24-hour warning point procedures relating to tsunamis, specify emergency operations center activation criteria, staffing expectations, etc.
  - Contact information for all jurisdictional agencies and response partners,
  - Include evacuation plans for tsunamis, roles of community entities/agencies/organization, tsunami hazard zone maps with evacuation routes, and protocols for access and functional needs populations.





Indicator - 9

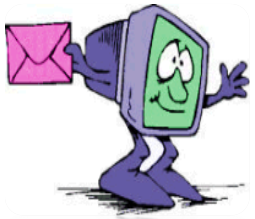
Commit to supporting the emergency operations centre (EOC) during tsunami incidents if an EOC is opened and activated

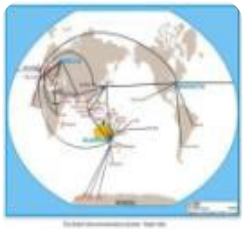
- Has 24-hour operations or plan to activate an EOC for tsunami incidents in accordance with the EOP. Has warning reception and dissemination capability
- Has the ability and authority to activate the public warning system in its area of responsibility

Indicator - 10

Have redundant and reliable means for a 24-hour warning point (and EOC if activated) to receive official tsunami threats

- Able to receive official tsunami threat from National Tsunami Warning Centers/Tsunami Warning Focal Points, or other officially recognized agencies such as local emergency management agencies.
- Alerts must be able to reach the 24-hour warning point by at least three means. Example: Telephone, Email, Fax, Police Radio etc.
- Has the ability and authority to activate the public warning system in its area of responsibility




Indicator - 11

Have redundant and reliable means for a 24-hour warning point and/or EOC to disseminate official tsunami alerts to the public

Alerts must be able to be disseminated to all community from the 24-hour Warning Point and/or EOC through at least three methods





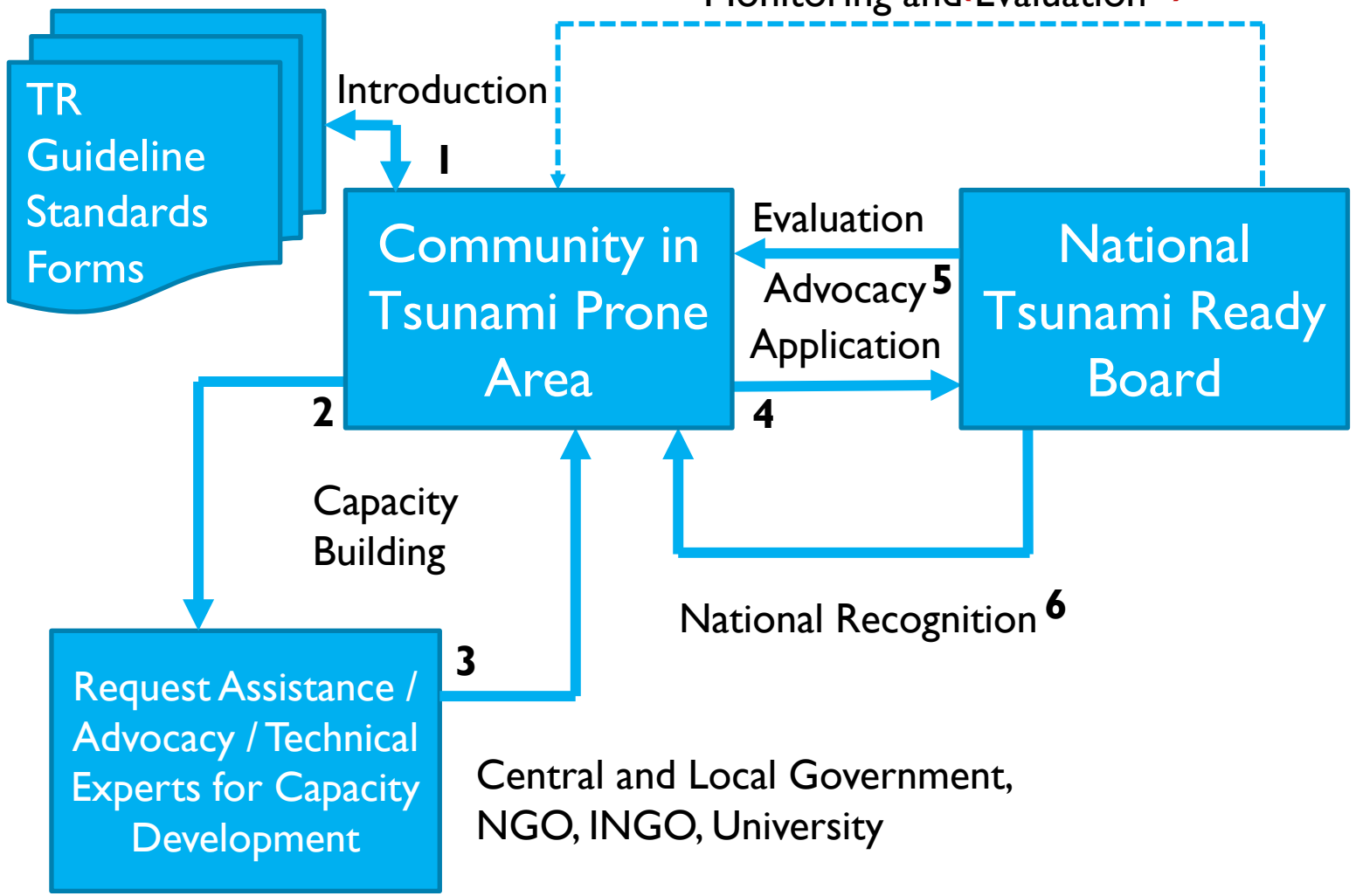




UNESCO-IOC Tsunami Ready

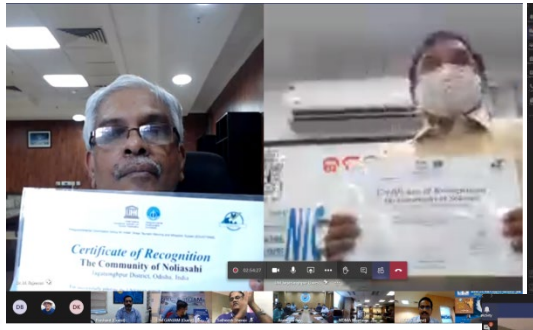
TSUNAMI READY PROGRAMME

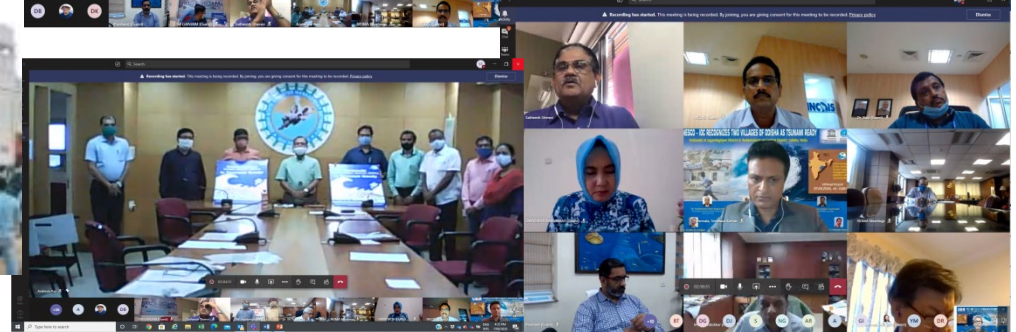
RECOGNITION PROGRAMME (PROCESS)



Implementation of IOC-UNESCO Tsunami Ready in India

- In India, a National Board was constituted under the Chairmanship Director, INCOIS with members drawn from Ministry of Earth Sciences (MoES), National Disaster Management Authority (NDMA), Ministry of Home Affairs (MHA), Odisha State Disaster Management Authority (OSDMA), Andaman & Nicobar Islands Directorate of Disaster Management (DDM) and INCOIS.
- Odisha State Disaster Management Authority, (OSDMA) Odisha implemented the programme pilot basis in 6 villages
- National Board visited to Venkatraipur of Ganjam district and Noliasahi of Jagatsinghpur district in December 2019 and recognized them nationally and recommend for IOC-UNESCO recognition.
- Venkatraipur and Noliasahi of Odisha recognized as Tsunami Ready communities by IOC-UNESCO.
- On 7 August 2020, the IOC-UNESCO conferred Certificate of Recognition and Certificate of Appreciation to Venkatraipur and Noliasahi communities, through a virtual event.
- India is the first country Tsunami Ready programme in the Indian Ocean region.
- INCOIS is planning to extend the programme to other coastal States/UTs of India.





Thank You !