

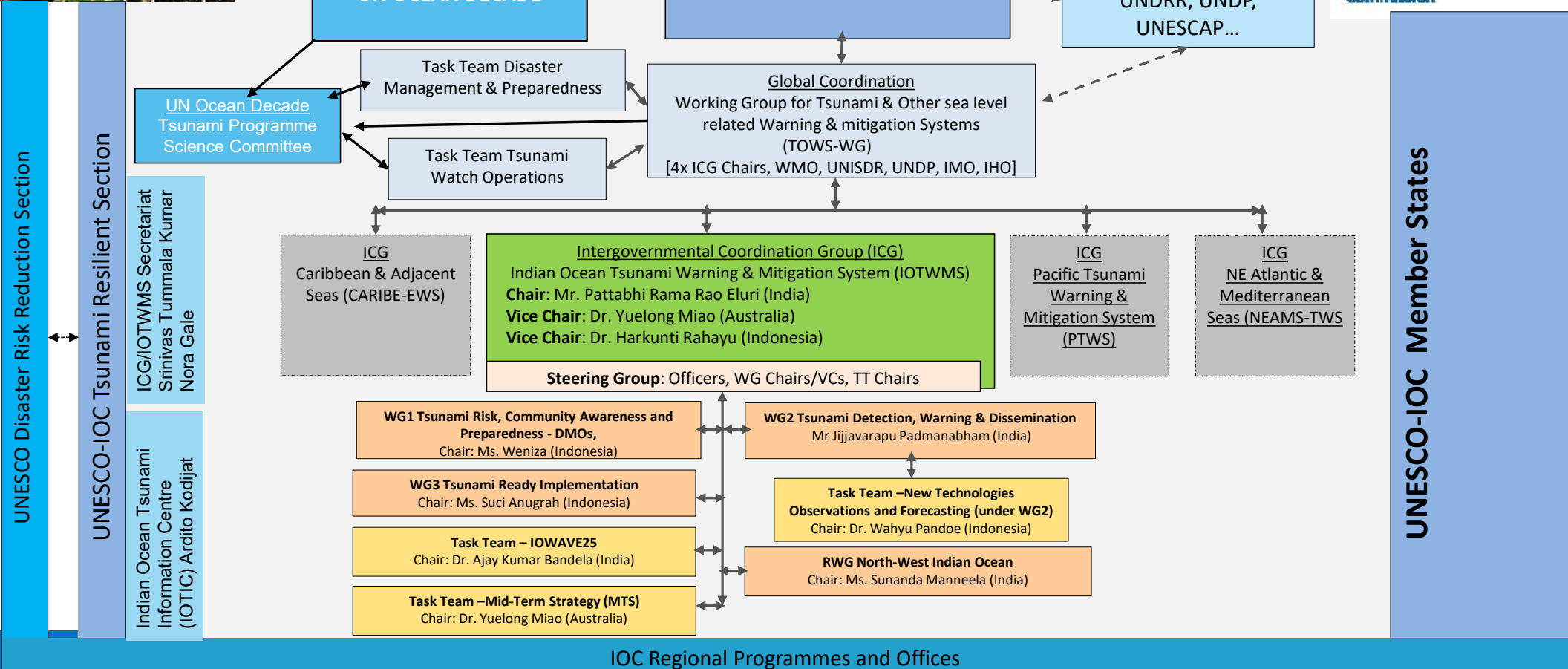


Intergovernmental Coordination Group for Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS)

Eluri Pattabhi Rama Rao
Chair, ICG/IOTWMS

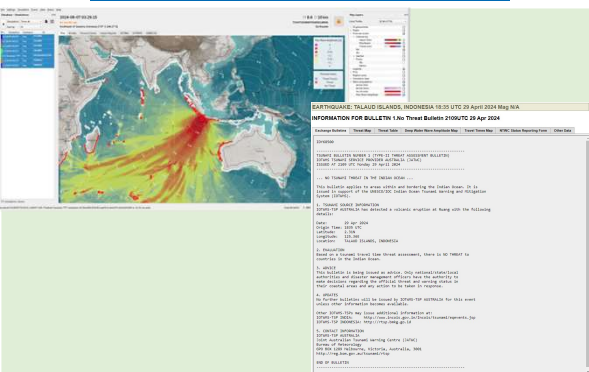


Governance in ICG/IOTWMS



TSP Progress Report

TSP Australia



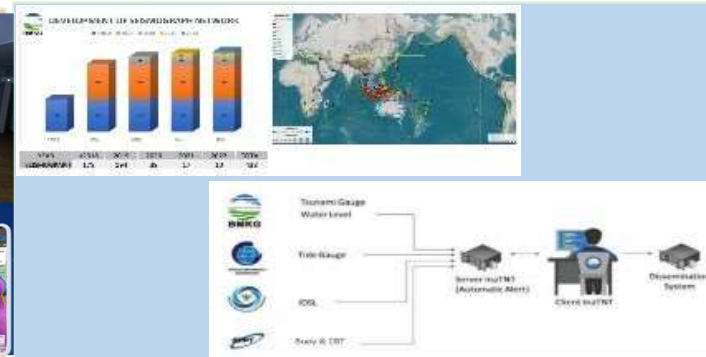
- Capability to produce Indian Ocean products for Non-Seismic events.
- Capability to deliver NAVAREA maritime products.
- Bureau-Joint Australia Tsunami Warning Center in progress with ISO 9001 recertification
- Non-seismic tsunami source SOPs
- No threat Bulletin for the IO was issued in response to the eruption of Ruang on the 29th of April 2024.
- Bureau-JATWC has replaced the current tsunami Decision Support Tool with TOAST on 15 Oct 2024.

TSP India



- Maintaining CFZs Layers for IOTWMS
- Capability to deliver NAVAREA maritime products
- SAMUDRA Mobile App. It is a comprehensive multi-hazard early warning app to the coastal communities about oceanic threats.
- Established SynOPS Lab: A cutting-edge facility advancing ocean monitoring and predictive capabilities.
- HPC facility "TARANG" at INCOIS - Dedicated to real-time tsunami inundation modeling, operational oceanography, and advanced simulations.
- Working towards implementation of SOP for the Non-Seismic (TGV) events.
- Established 13 (of 15 planned) new GNSS stations co-located with Tide Gauges.

TSP Indonesia



- Integration of the New 4000 TsunAWI Scenarios Into TOAST
- Progressive deployment of the seismometers (535 in 2024)
- Indonesia Tsunami Non-Tectonic monitoring system (InaTNT) to monitor the sea-level anomalies
- Multi-Hazard Platform (InfoBMKG mobile App)
- Establishment of the National Consortium of the EQ and Tsunami Experts
- Developed impact based real time system of InaTEWS supported by National Consortium

TSP Future Plans

TSP Australia

TSP India

TSP Indonesia



- GA-JATWC to integrate, test and operationalise seismic array processing as input to rapid earthquake detection and characterization.
- GA-JATWC to commence work towards ISO 9001 accreditation for GA-JATWC systems



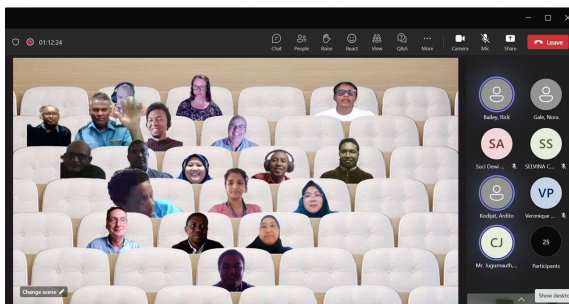
- Developing SOPs and implementing products for non-seismic tsunamis
- Utilizing GNSS & SMA for precise rupture characterization.
- Establishing the GPS co-located tide Gauges along the Indian coast.
- Archiving Makran source PTHA Data for access to member states.
- Establishing new technologies (Cabled Observatory) for rapid tsunami detection.
- Providing on-the-job trainings for IO member states.



- Deploy 100 Tsunami Gauges
- Utilization of GNSS data for earthquake parameter calculation
- Research on non seismic tsunami
- Provide sea level observation portal for the Indian Ocean area
- Support the On-the-job Training for the IO member states
- Development of processing system for Earthquake Early Warning

CAPACITY DEVELOPMENT ACTIVITIES IN 2023 - 2024

No	Activities	Date
1	SOP Workshop for the West Indian Ocean	03-06 July 2023
2	SOP Workshop for the Eastern Indian Ocean,	10-13 July 2023
3	SOP Workshop for the North-West Indian Ocean,	7-8 August 2023
4	Tsunami Ready Training Timor Leste	31 July- 1 August 2023
5	Tsunami Ready Training Seychelles	31 July- 1 Augustus 2023
6	On-the-job trainings for the Indian Ocean Member States (Oman and Timor Leste)	13-21 March 2023
7	TSP-India at INCOIS, conducted in-person on-job training course for Oman on "Tsunamis & Other Ocean Hazards"	11-22 December 2023 & 2-6 September 2024
8	Workshop on the UNESCAP Capacity Assessment Validation to result recommendation	4-6 September 2024
9	Training/Workshop on Tsunami Evacuation Maps, Plans, and Procedures (TEMPP) and UNESCO-IOC Tsunami Ready Recognition Programme (TRRP)	15 - 23 April 2025



SOP Training



Tsunami Ready Training in Seychelles



Tsunami Ready Training in Timor Leste



Oman, On-the-Job Training



48 IOC-UNESCO Tsunami Ready Communities in the Indian Ocean



36 New communities of India [24] and Indonesia (12) were recognized as Tsunami Ready at the 2nd UNESCO-IOC Global Tsunami Symposium

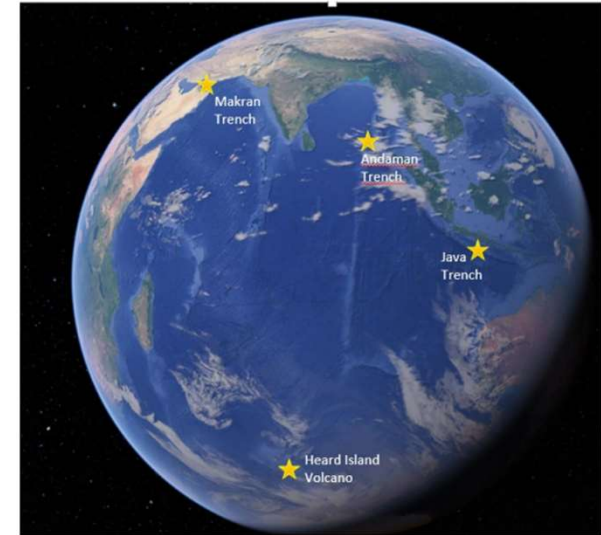


Exercise Indian Ocean Wave 2023

Scenario	1. Andaman Trench	2. Makran Trench	3. Heard Island Volcano	4. Java Trench
Date	4 October 2023 (Wednesday)	11 October 2023 (Wednesday)	18 October 2023 (Wednesday)	25 October 2023 (Wednesday)
Time	04:00 UTC	06:00 UTC	06:00 UTC	02:00 UTC
Magnitude	~M9	~M9	n/a	~M9
Depth	10 km	10 km	n/a	10 km
Latitude	7.20N	24.80N	53.10S	10.40S
Longitude	92.90E	58.20E	73.52E	112.80E
Location	Off west coast of Nicobar Islands, India	North-West Indian Ocean	Kerguelen Islands Region, Southern Ocean	South of Java, Indonesia

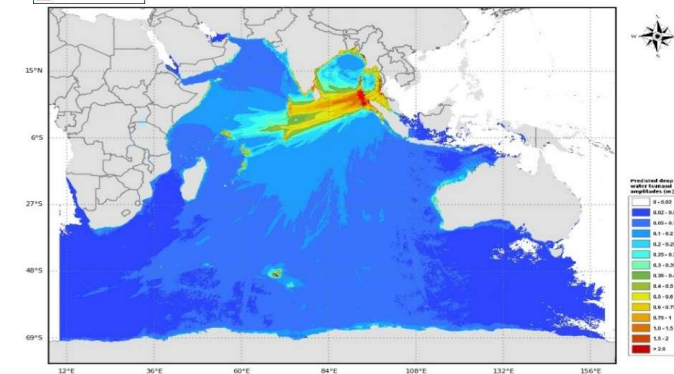
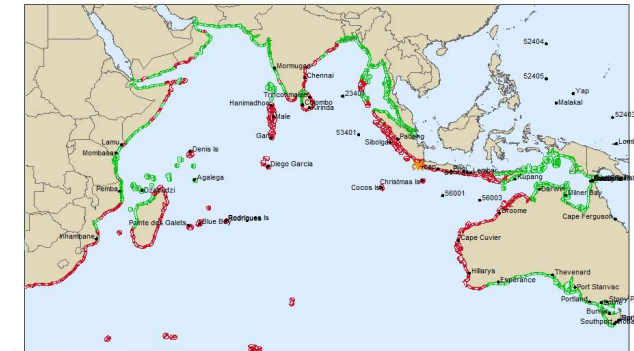
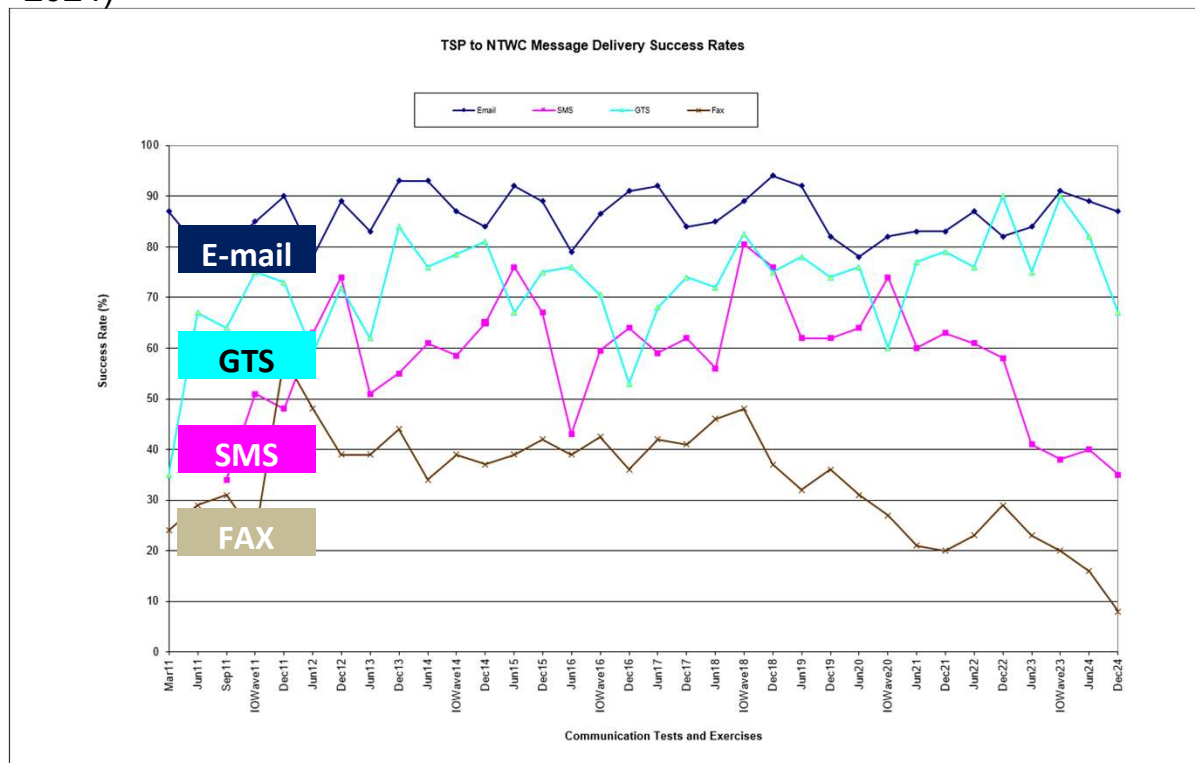
- Webinar on Lessons Learnt during Exercise Indian Ocean Wave 2023, online, 12-13 December 2023
 - 20 countries participated
 - Community evacuations held in 8 Member States with ~45,000 people evacuating
 - Tsunami Ready indicators tested in 7 Member States
 - New non-seismic products produced by TSP Australia were utilised

- Recommendations for the future
 - Plan and conduct the exercise in 2025
 - Consider performing exercises outside of working hours, in particular during the night or weekend
 - Encourage the Member States to ensure the participation of the community, especially those recognized as UNESCO-IOC Tsunami Ready Community



IOTWMS Communication Tests

- As of today, 7 IOWave Exercises and 28 Communication Tests were conducted.
- During the reporting period, 2 COMMS tests were conducted (June & December 2024)



IOTIC Achievement in a Flash (~ 2024)



unesco

- UNESCO IOC Tsunami Unit
- ICG/IOTWMS Secretariat
- ICG/IOTWMS SG / WGs / TTs
- TOWS Task Team for Tsunami Disaster Management and Preparedness
- UNESCO IOC Tsunami Information Centers (CTIC, ITIC, NEAMTIC)
- Ocean Teacher Global Academy Secretariat

BMKG

- BMKG Geophysics
- BMKG InaTEWS
- BMKG Training Centre (STC OTGA)

25 Work with Indian Ocean Member States
(Active IOTWMS Member States)

Australia
Bangladesh
Comoros
French Reunion
India
Indonesia
Iran
Kenya
Madagascar
Malaysia
Maldives
Mauritius
Mozambique
Myanmar
Oman
Pakistan
Seychelles
Singapore
South Africa
Sri Lanka
Tanzania
Thailand
Timor Leste
United Arab Emirates
Yemen

3 Work with Tsunami Service Providers

- Bureau of Meteorology (BOM), Australia
- Indian National Centre for Ocean Information Services (INCOIS), India
- Agency for Meteorology, Climatology, and Geophysics (BMKG), Indonesia

8 Projects
(2012-2020)

- IFIT (1); MFIT (1); UNESCOAP (5); Charles Englehart Foundation (1)



7 Support Indian Ocean Tsunami Wave Exercises (IOWave)
2009
2011
2014
2016
2018
2020
2023

9 Past Tsunamis

Information preserved

- 1945 Makran Tsunami
- 1950 Ambon Tsunami
- Central Sulawesi Tsunamis (1938, 1968, and 2018)
- 1979 Lembata Tsunami
- 1992 Flores Tsunami
- 1994 Banyuwangi Tsunami
- 1995 Dili Tsunami, Timor-Leste
- 1996 Biak Tsunami
- 2000 Banggai Tsunami (On Going)
- 2024 Seychelles and Maldives

383
Past Tsunamis Eyewitness Stories

48 Facilitate/support/process Tsunami Ready Community
26 communities in India and 22 communities in Indonesia recognised at UNESCO-IOC Tsunami Ready Community

3 NTRT
National Tsunami Ready Training (2023)
Seychelles, Timor-Leste, Maldives

2 Youth
Indian Ocean Youth Video Competition (2021)
TSUNAMI UNITED (2024)

3 Tsunami Ready Communication Tools

- 2 TR Boardgame (TR and RUNAMI)
- 21 TR E-Posters
- 14 Short Animation Videos

Key Achievements (2023-2024):

✓ Capacity Building & Training

- National Tsunami Ready Training in **Timor-Leste (Jul. 2023)**, **Seychelles (Nov 2023)**, and **Maldives (Aug 2024)**
- Workshops and Webinars, including **IORW**, **IOCAP**, and **IOSAP**

✓ Tsunami Ready Recognition Programme (TRRP)

- **48 communities recognized** (India -26 & Indonesia - 22)
- Development of **Tsunami Ready Training Modules & Tsunami Ready Board Game (RUNAMI)**

✓ Engagement & Outreach

- **TSUNAMI UNITED**: Indian Ocean Youth Video Competition
- **UNESCAP Project**: Workshops on tsunami modeling & evacuation planning ; **WTAD Webinars**: Promoting accessible early warning systems

✓ Preserving Past Tsunami Information

- **39 new documented eyewitness stories** from past Indian Ocean tsunamis were recorded in the year 2024 ; **Development of educational materials** on non-seismic tsunami warnings



10 IORW (Webinars)
(2017-2021) Indian Ocean Regional Workshop and WTAD

3 IOCAP
(2017-2023) Indian Ocean Capacity Building Training

2 IOLS
(2020-2023) Indian Ocean Lecture Series during COVID-19 and Tsunami Ready



Tsunami Evacuation Maps, Plans and Procedures (TEMPP)



- Training focused on a) Tsunami Inundation Modelling, b) Tsunami Evacuation Maps, Plans and Procedures & c) the UNESCO-IOC Tsunami Ready Recognition Programme
- Hosted by the Indian National Centre for Ocean Information Services (INCOIS), Ministry of Earth Sciences (MoES) at the facilities of the International Training Centre for Operational Oceanography (ITCOOcean), a UNESCO Category 2 Centre.
- 35 Participants from 17 countries and 14 trainers from UNESCO-IOC, India, and Indonesia.
- Held over 9-days: 15-23 April 2025



UNESCO-IOC Tsunami Ready Recognition Programme



- National Tsunami Ready Focal Point have been established for 19 Indian Ocean Member States (through IOC Circular Letter No 2978).
- 48 Indian Ocean communities have received the UNESCO-IOC Tsunami Ready Recognition (26 in India and 22 in Indonesia)
- National Tsunami Ready Training was conducted by IOTIC in Maldives, Seychelles, and Timor Leste in 2023-2024.
- In 2025, IOTIC plans to conduct one National Tsunami Ready Training.

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.



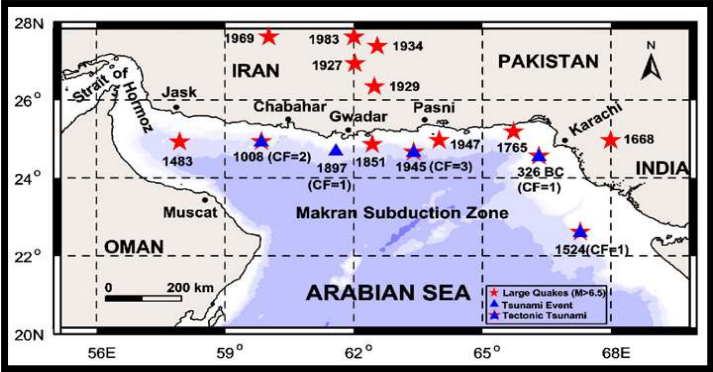
National Tsunami Ready Training in Timor Leste, July 2023

National Tsunami Ready Training in Seychelles, November 2023

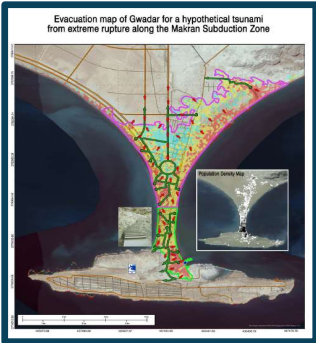
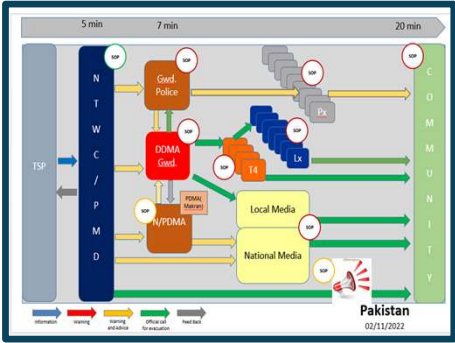
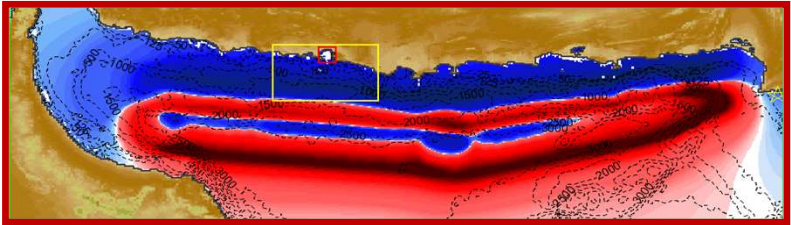
National Tsunami Ready Training in Maldives, August 2024

Strengthening tsunami warning in the North-West Indian Ocean through regional cooperation

✓ Funded by the UNESCO Multi-Donor Trust Fund, the project resulted in a unified Makran assessment, updated national tsunami warning chains, translated guidelines, and development of inundation & evacuation maps in **North West Indian Ocean Countries (India, Iran, Pakistan, Oman, UAE)**



Programmatic Approach



Tsunami Ready Implementation in Pilot Sites



2024 Capacity Assessment of Tsunami Preparedness in the Indian Ocean

Significant progress in tsunami warning systems has been achieved since 2004

In the last 5 years there has been significant progress in downstream community awareness and preparedness initiatives while the upstream warning and detection system has plateaued.

Risk Assessment & Reduction

- Progress: Almost all countries have undertaken both hazard and risk assessment to understand the tsunami threats.
- Gaps: Understanding of tsunamis generated by non-seismic and complex sources.
- Recommendation: Utilising international expertise and collaboration to provide an updated good-practice on Probabilistic Tsunami Hazard Assessment (PTHA) across the entire Indian Ocean, including tsunamis generated by non-seismic and complex sources.

Detection, Warning & Dissemination

- Progress: The upstream tsunami warning system components of detection, warning and dissemination have plateaued since 2018.
- Gaps: Adoption of new technologies such as SMART cables and GNSS networks and exchange of real-time data.
- Recommendation: Design optimal observing systems (seismic & sea level) to improve the timelines and accuracy of tsunami warnings.

Public awareness, Preparedness & Response

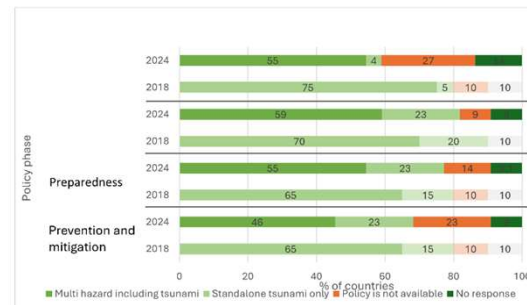
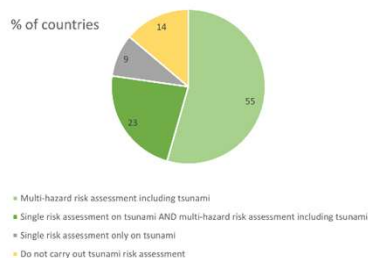
- Progress: IOWave exercises have more evacuations in 2024 when compared to 2018.
- Gaps: Evacuation signage and vertical evacuation shelters are at a similar level to 2018.
- Recommendation: Establishing regular programmes of tsunami exercises in cities, villages, communities and schools in addition to the biennial IOWave exercises.

Tsunami Ready Recognition Programme

- Progress: 48 communities have received UNESCO-IOC Tsunami Ready recognition in the Indian Ocean.
- Gaps: Only two Indian Ocean Member States (India & Indonesia) have recognised Tsunami Ready communities
- Recommendation: Train, both regionally and nationally (with priority for Small Island Developing States (SIDS), Least Developed Countries (LDCs), and African State), the implementation of UNESCO-UNESCO-IOC Tsunami Ready Recognition Programme (TRRP)

Policies, Plans & Guidelines

- Progress: Increase in availability of national tsunami guidelines.
- Gaps: Policies and plans have remained at similar levels between 2018 and 2024.
- Recommendation: Provide training in development of integrated national MHEWS and stand-alone tsunami policies and plans for authorities and stakeholders



UNESCO-IOC 2nd Global Tsunami Symposium Banda Aceh, Indonesia (10-14 Nov 2024)

Participants

Engaged many parties including Scientists, Policy Makers, Academia, Professionals, Practitioners, Private Sector, Schools, Communities, Youth, NGOs, UN Organizations

- 682 participants
- 170 online participants
- 1200 viewers of Youtube
- From about 32 countries

Banda Aceh Statement

Global Tsunami Warning and Mitigation: Building Sustainability for The next decade through Transformation and Innovation.

UNESCO and its partners call on States and civil society to drastically step up their investments and efforts to achieve 100% of Tsunami Ready Communities across the world by 2030.

14th Session of ICG/IOTWMS Banten, Indonesia (17-19 Nov 2024)

Decisions

- Establish a new intersessional Task Teams on a) Indian Ocean Wave 25 Exercise (IOWave25), b) New/Emerging Technologies for Observations and Forecasting, and c) Mid-Term Strategy (MTS)
- Continue the capacity development initiatives related to SOPs, TEMPP, TRRP and on-the-job training for warning center operators
- Design optimal sea level and seismic networks for the Area of Service (AoS) and work with Member States to fill identified gaps
- Extend the TSP services to include tsunamis generated by non-seismic and complex sources



Major Decisions from the 14th Session of ICG/IOTWMS

(14-19 Nov 2024, Jakarta, Indonesia)

- Include the instructions from 57th Session of the IOC Executive Council, and the recommendations from TOWS-WG XVI and XVII in the work plans of the ICG for the next inter-sessional period;
- ICG/IOTWMS Steering Group released the **Service Definition Document version 5.0 that covers templates for NAVAREA and Non-Seismic templates.**
- Extend the **TSP services to include tsunamis generated by non-seismic and complex sources**
- Instructs the Steering Group to **finalize the 2024 Capacity Assessment Report and Executive Summary** in 4 weeks, for further review by the Member States, incorporate feedback if any, and endorse the final report for publication as UNESCO-IOC Document
- Establish a new intersessional **Task Team on Indian Ocean Wave 25 Exercise (IOWave25)** reporting to the Steering Group
- Establish a new intersessional **Task Team on New/Emerging Technologies for Observations and Forecasting** under the WG2
- Establish a new intersessional **Task Team on Mid-Term Strategy (MTS)** to prepare a draft MTS
- Request the Steering Group to supervise the work of the Task Team and to **finalise the MTS 2025-2030** by early half of 2025
- Instructs the Steering Group, Working Groups and Task Teams to **consider the recommendations of the ODTP RDIP, IOWave23, 2024 Capacity Assessment and 2nd Global Tsunami Symposium** into their work plans.
- Decides to **continue the capacity development initiatives related to SOPs, TEMPP, TRRP and on-the-job training for warning center operators** by TSPs. TEMPP, hosted by INCOIS, is scheduled to take place in April 2025.
- Request the Steering Group to **explore if there is a need of expanding sub-regional working groups to address regional gaps and strengthen collaborations.**
- Develop the **summary statement of the 2nd UNESCO-IOC Global Tsunami Symposium** together with the Program Committee for publication as a UNESCO-IOC document.
- **Optimal sea level and seismic network design for the Area of Service (AoS) and work with Member States to fill identified gaps, including the strategic and coordinated submission of projects to the UN Ocean Decade and potential funding sources for support.**

THANK YOU

Mr. Eluri Pattabhi Rama Rao
Chair, ICG/IOTWMS

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