Chair's Report for
## Intergovernmental Coordination Group Indian Ocean Tsunami Warning & Mitigation System (IOTWMS)

Prof Dwikorita Karnawati
Chair, ICG/IOTWMS

28 November 2022

ICG/IOTWMS

- **12th Session** in Kish Island, Iran in Mar 2019, with **8/25** Member States attending

- **Intersessional** Online Meeting in Nov 2021
  - Very successful, with over 100 participants from **19/25** Member States, including for first time large number representatives from Disaster Management Organisations (DMOs)

- **13th Session** Nov 2022 in Bali, Indonesia
  - Face-to-face and online participation to help maintain increased participation shown in intersessional meeting, with **17/25** Member States participating
  - Preceded by "Indian Ocean Tsunami Ready Workshop"

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Intergovernmental
Oceanographic
Commission
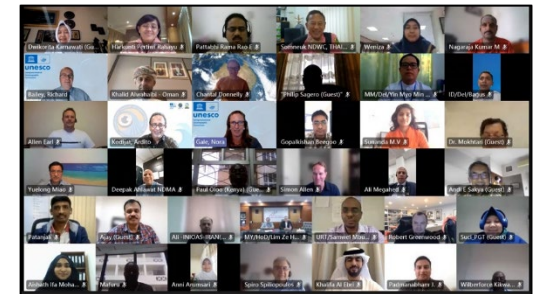
Support for 25 Active IOTWMS Member States

1. Ongoing support for further two years (2022-23) (USD$310K per year) from Govt of Australia, through Australian Bureau of Meteorology, to support ICG/IOTWMS Secretariat

2. ICG/IOTWMS Secretariat during intersessional has provided support for 18 meetings of ICG/IOTWMS , 12 other workshops or webinars, 25 UNESCAP activities, most in online or hybrid mode due to COVID

3. Support for further five years (2022-2027) (USD$130K per year) from Government of Indonesia, through BMKG, to support Indian Ocean Tsunami Information Centre (IOTIC)

4. Phase 1 of UNESCAP Project "Strengthening tsunami warning in the North-West Indian Ocean through regional cooperation" successfully completed 30 October 2021

5. Phase 2 of UNESCAP Project funding USD$280K on track to be completed Dec 2022

6. IOTIC and IOC Secretariat supported several activities on World Tsunami Awareness Days (WTAD) 2019, 20, 21, 22

Chair Support and Representation ICG/IOTWMS

- IOC Assembly (2019/21)
- IOC Assembly Exec Council (2020/22)
- TOWS-WG (2020/21/22)
- 13th Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (2022)
- Inter-sessional Meeting ICG/IOTWMS (2021)
- 12th Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (2019)
- ICG/IOTWMS Steering Group (2020/21/22)
- UNESCO-IOC Tsunami Ready Recognition to Venkatraipur and Noliasahi Villages in Odisha State, India by Virtual Ceremony (2020)
- Pre-IOWave20 Webinar on Standard Operating Procedures for Tsunami Early Warning and Emergency Response (2020)
- IOTWMS-IOTIC Post-IOWave20 Webinar on Lessons Learnt during Exercise Indian Ocean Wave (2020)
- ICG/IOTWMS Intersessional Meeting of Working Groups, and Steering Group (2020)
- ICG/IOTWMS Intersessional Meeting of Working Groups, Task Teams and Steering Group (2019)

IOTWMS - The Three Pillars

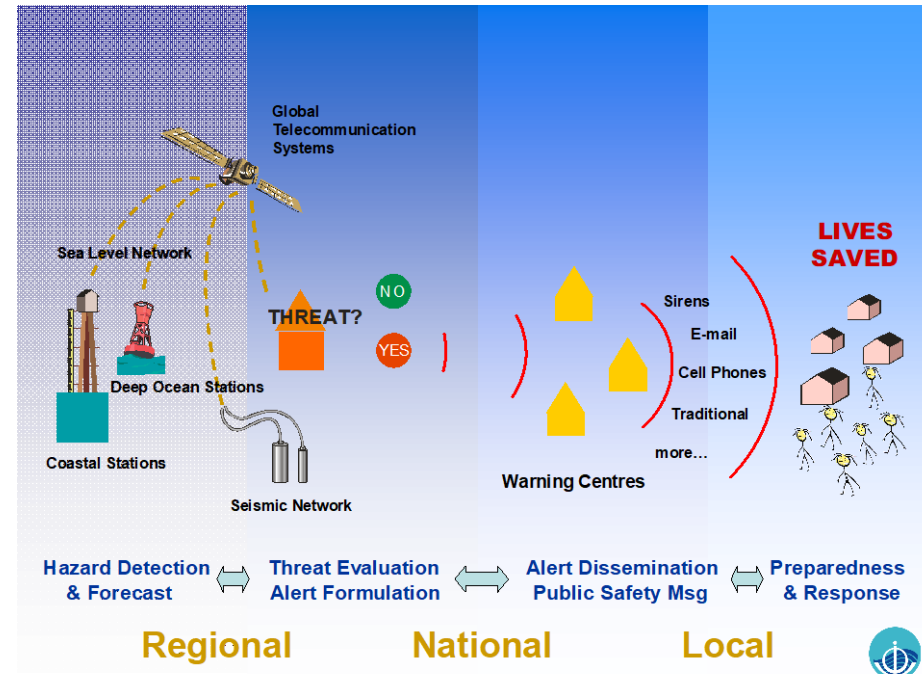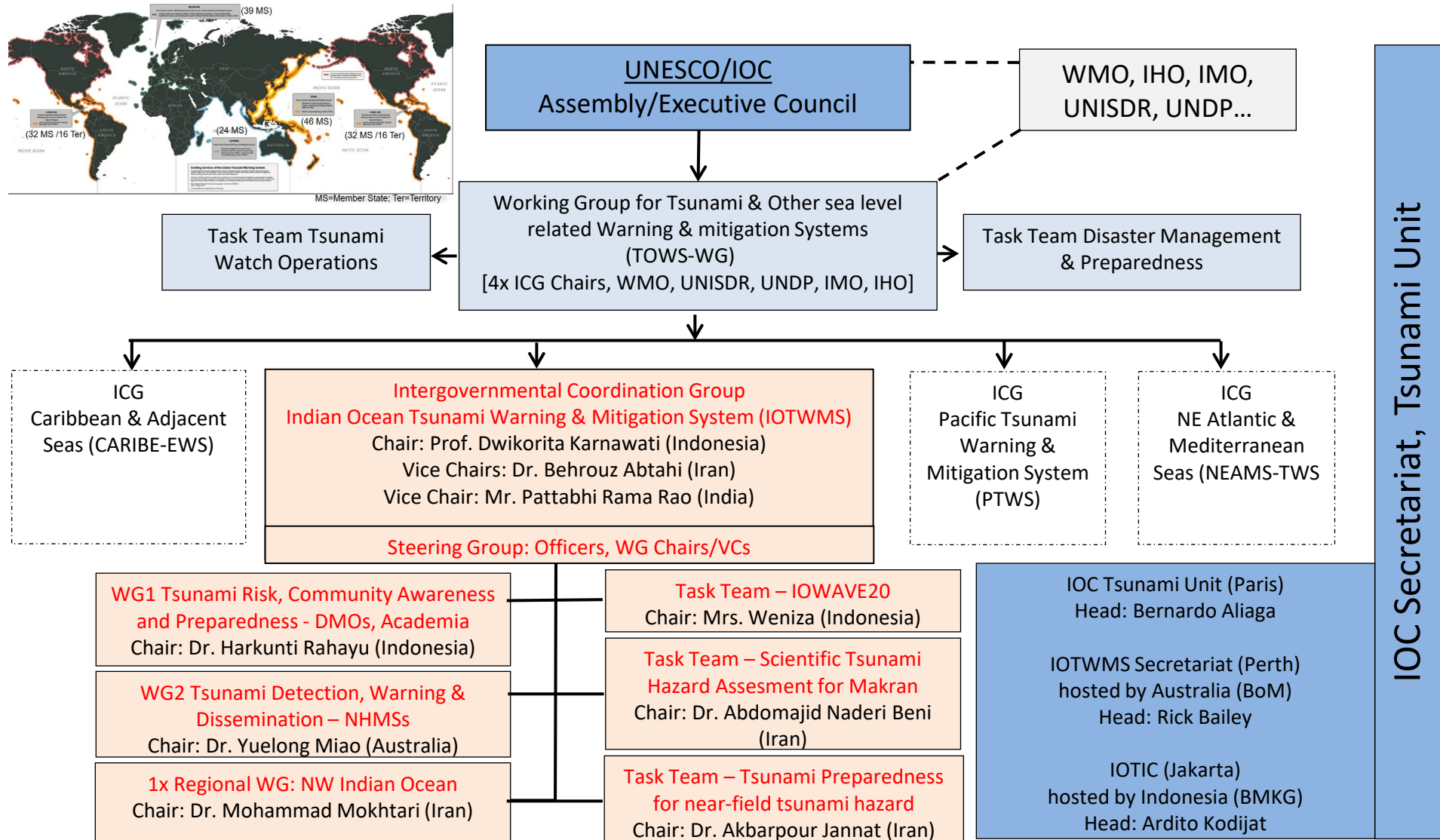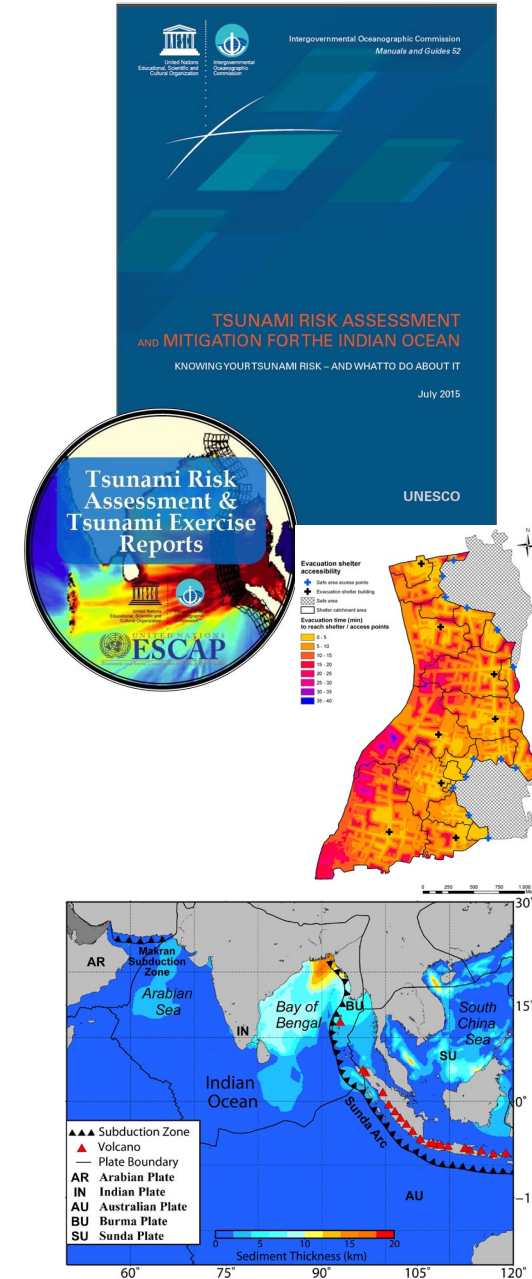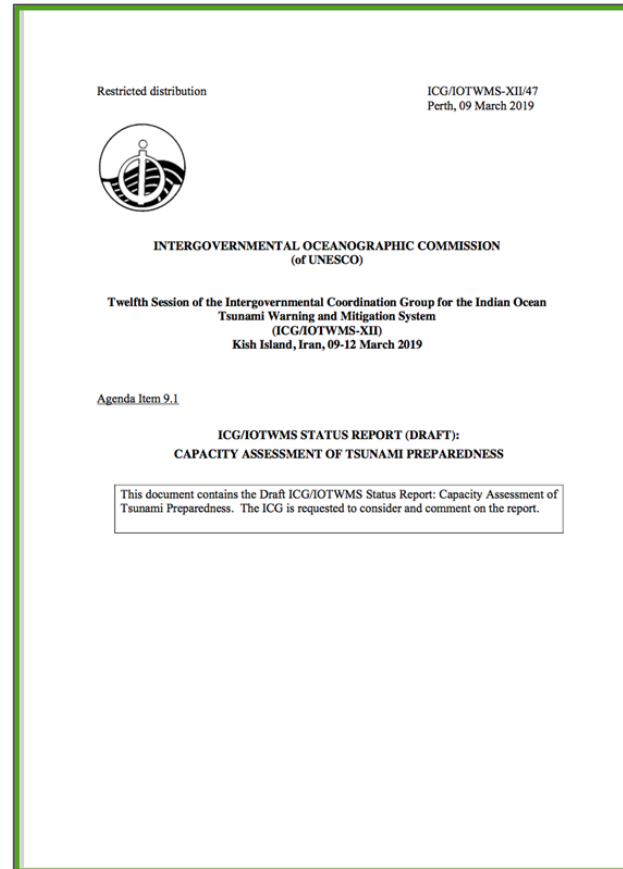| **Risk Assessment and Reduction**	**Detection Warning and Dissemination**	**Awareness and Response**
Systematically collect data and undertake risk assessments	*Develop hazard detection, monitoring and early warning services* *Communicate threat information and early warnings*	*Build national and community response capabilities*

Governance

UNESCO/IOC
Assembly/Executive Council

WMO, IHO, IMO, UNISDR, UNDP...

Working Group for Tsunami & Other sea level related Warning & mitigation Systems (TOWS-WG)
[4x ICG Chairs, WMO, UNISDR, UNDP, IMO, IHO]

Task Team Tsunami Watch Operations

Task Team Disaster Management & Preparedness

ICG
Caribbean & Adjacent Seas (CARIBE-EWS)

Intergovernmental Coordination Group
Indian Ocean Tsunami Warning & Mitigation System (IOTWMS)
Chair: Prof. Dwikorita Karnawati (Indonesia)
Vice Chairs: Dr. Behrouz Abtahi (Iran)
Vice Chair: Mr. Pattabhi Rama Rao (India)

Steering Group: Officers, WG Chairs/VCs

ICG
Pacific Tsunami Warning & Mitigation System (PTWS)

ICG
NE Atlantic & Mediterranean Seas (NEAMS-TWS

WG1 Tsunami Risk, Community Awareness and Preparedness - DMOs, Academia
Chair: Dr. Harkunti Rahayu (Indonesia)

WG2 Tsunami Detection, Warning & Dissemination – NHMSs
Chair: Dr. Yuelong Miao (Australia)

1x Regional WG: NW Indian Ocean
Chair: Dr. Mohammad Mokhtari (Iran)

Task Team – IOWAVE20
Chair: Mrs. Weniza (Indonesia)

Task Team – Scientific Tsunami Hazard Assesment for Makran
Chair: Dr. Abdomajid Naderi Beni (Iran)

Task Team – Tsunami Preparedness for near-field tsunami hazard
Chair: Dr. Akbarpour Jannat (Iran)

IOC Tsunami Unit (Paris)
Head: Bernardo Aliaga

IOTWMS Secretariat (Perth)
hosted by Australia (BoM)
Head: Rick Bailey

IOTIC (Jakarta)
hosted by Indonesia (BMKG)
Head: Ardito Kodijat

IOC Secretariat, Tsunami Unit

Pillar 1: Risk Assessment & Reduction

Working Group 1
Chair: Dr Harkunti Rahayu
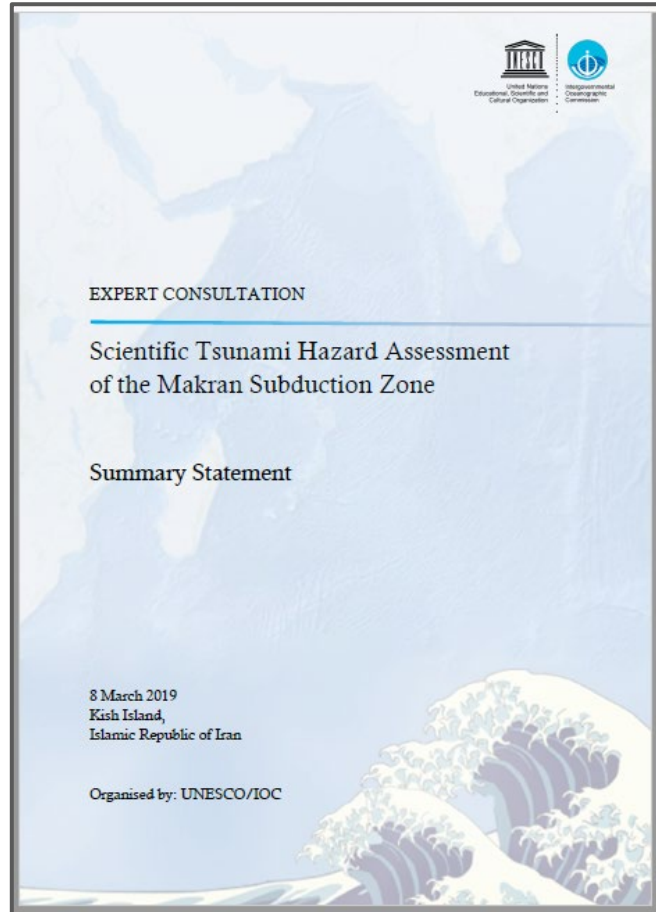
Pillar 2: Detection, Warning & Dissemination

Working Group 2
Chair: Yuelong Miao

Warning & Dissemination

- Tsunami Service Providers (TSPs) (Australian India, Indonesia)
- National Tsunami Warning Centres (NTWCs)
- Sea level and seismic monitoring networks

SEISMIC NETWORKS — SEA LEVEL NETWORKS — 2017

Pillar 3: Awareness & Response

Working Group 1
Chair: Dr Harkunti Rahayu

IOTIC
Ardito Kodijat
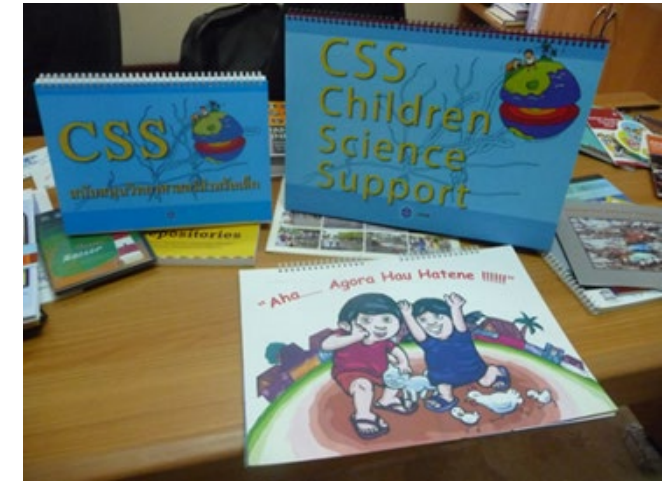
- Education Material for NTWCs, emergency managers, communities, schools, tourism, etc in multiple languages
- Indian Ocean Tsunami Ready (IOTR) Programme
- Indian Ocean Tsunami Information Center (IOTIC) supported by BMKG, Indonesia (2017-2022)
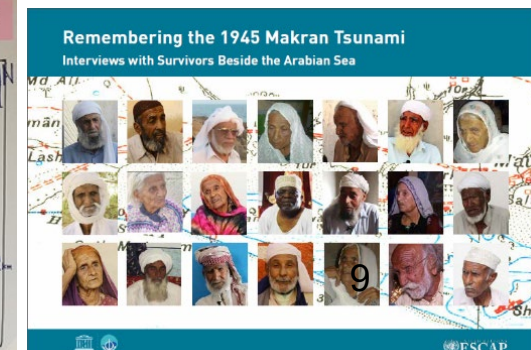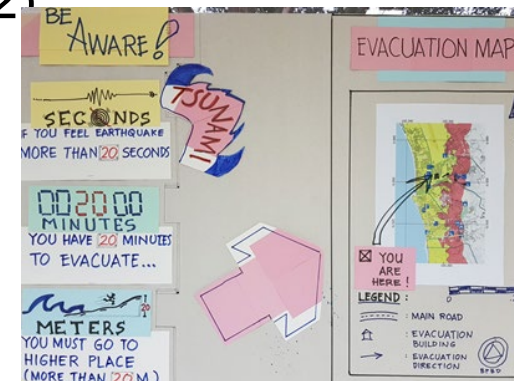
Regional Working Group: NW Indian Ocean

UNESCAP funded project "Strengthening tsunami warning in the North-West Indian Ocean through regional cooperation"

India, Iran, Pakistan Oman, UAE, Yemen)

Phase 1 (completed)

- Development unified Probabilistic Tsunami Hazard Assessment (PTHA)

- National tsunami warning chains and Standard Operating Procedure development
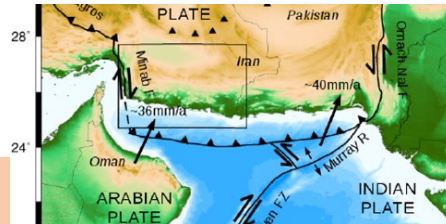
Phase 2a & 2b (nearly finished)

- Completion of PTHA and exchange of scientific knowledge

- Finalisation national tsunami warning chains and SOPs

- Identified best practices and capacity in inundation and evacuation mapping:

Phase 2c (proposed start 2023)

- Training in inundation modelling and evacuation planning for pilot communities
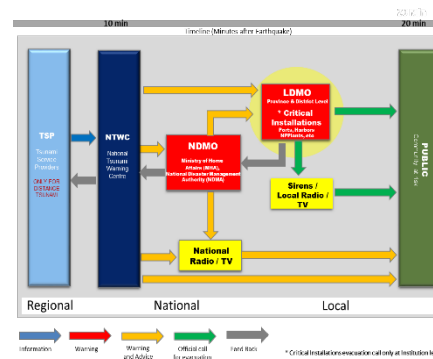
INDIAN OCEAN INFORMATION CENTRE 2017-22

UNESCO — Intergovernmental Oceanographic Commission

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

BMKG

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

25 Working with IOC Indian Ocean Member States *(active participation ICG/IOTWMS)*

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

3 Working with Tsunami Service Providers

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

5 Past Tsunamis

Information preserved:
- 1945 Makran Tsunami
- 1950 Ambon Tsunami
- Central Sulawesi Tsunamis (1938, 1968, and 2018)
- 1992 Flores Tsunami
- 1994 Banyuwangi Tsunami
- 1996 Biak Tsunami
- 2000 Banggai Tsunami (On going in 2022)

6 Projects

(2012-2022)
IFIT (1); MFIT (1); UNESCAP (3);
Charles Englehart Foundation (1)

1 IOYVC

Indian Ocean Youth Video Competition (2021)

187 Past Tsunamis Eyewitness Stories

IOTIC

ICG/IOTWMS Secretariat

IOWave

6 Support Indian Ocean Tsunami Wave Exercises (IOWave)

2009
2011
2014
2016
2018
2020

iowave.org

14 Tsunami Ready Animation Videos (2022)

1 Tsunami Ready Boardgame (2022)

8 IORW (Webinars)

(2017-2021) Indian Ocean Regional Workshops

4 IOCAP

(2017-2021) Indian Ocean Capacity Building Training

1 IOLS

(2020) Indian Ocean Lecture Series during COVID-19

6 Support Tsunami Ready Communities

India piloted Tsunami Ready Recognition Programme (2017-2022) .
2 communities in Odisha State India (Noliasahi and Venkatraipur) received Tsunami Ready Community Recognition in 2020
4 communities in Indonesia (Tanjung Benoa, Tambakrejo, Kalurahan Glagah, Panggarangan) received Tsunami Ready Community Recognition in 2022

Tsunami Ready

UNESCO — Intergovernmental Oceanographic Commission

Indian Ocean Tsunami Information Centre

BMKG

Contribution to Indian Ocean Capacity Development through Training Courses

STC Indonesia Tsunami Ready OTGA Training Course in 2021

STC Indonesia Advance Tsunami Ready OTGA Training Course in 2022

- **INCOIS in India** has been operating the International Training Centre for Operational Oceanography (ITCOocean) since 2013, providing several courses in support of Tsunami Programme in 2021/22

- **BMKG Training Center in Indonesia** now also serves as an OTGA Specialized Training Center (STC Indonesia)

Promoting TSUNAMI READY at the 7th Meeting
GLOBAL PLATFORM for DISASTER RISK REDUCTION
(GPDRR 2022) in Bali, Indonesia

The inauguration of Tsunami Ready Recognition of Tanjung Benoa community

Launching the Tsunami Ready board game and video series

Playing Tsunami Ready board game

Innovation Platform Booth: Recognizing Tsunami Ready Community

Mr Mohamed Djelid, Director of UNESCO Office Jakarta, handed the Tsunami Ready Board Game to Ms. Amina J. Mohammed, UN Deputy Secretary-General and Ms. Mami Mizutori, Special Representative of the Secretary-General for DRR and Head of UN Office for Disaster Risk Reduction (UNDRR) at the GPDRR.

- To promote the Tsunami Ready Programme, UNESCO-IOTIC and BMKG provided an exhibition at the Innovation Platform and launched the Tsunami Ready Communication Tools on the Ignite Stage of Rumah Resiliensi.

- In addition, the Tanjung Benoa community Tsunami Ready recognition was conducted as a part of promoting Tsunami Ready in the 7th GPDRR meeting in Bali

BEST PRACTICES of IMPLEMENTING TSUNAMI READY for CRITICAL INFRASTRUCTURE

BMKG has advocated **Kulonprogo International Airport (Yogyakarta) and Ngurah Rai Airport (Bali) implement Tsunami Ready**:

1. Developing tsunami hazard map for airport area
2. Evaluating tsunami evacuation facilities
3. Improving Airport Emergency Plan (including tsunami warning SOP)
4. Conducting earthquake and tsunami community education
5. Conducting tsunami drills
6. Providing/ensuring accessible earthquake information and tsunami warnings
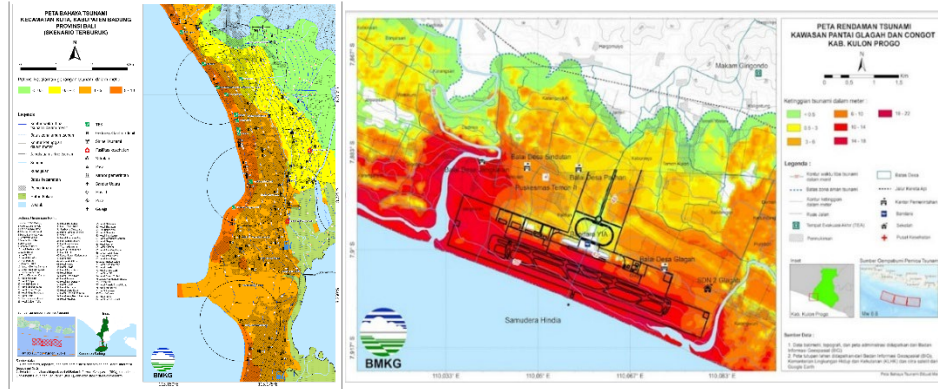
Airport Tsunami Hazard Map

Evaluating Tsunami Evacuation Facilities

Including Tsunami Warning SOP in the Airport Emergency Plan

Earthquake and Tsunami Education for Airport Attendants

Airport Tsunami Drill

Providing Accessible earthquake information and tsunami warning

EARLY WARNING, EARLY ACTION:
BRINGING the IDEA from GPDRR 2022 into ACTION

Cooperation and involvement of the Pentahelix (The government, private sector, media sector, academia, community) to accelerate the development of the End-to-end Early Warning System

Hotel Roof Top for Vertical Evacuation

Room for Evacuation

Evacuation Simulation

The Vertical Evacuation Shelter at the YIA

Evacuation Simulation to Shelter Evacuation

- The hotel investment on the DRR had been **a good promotion on ensuring the safety and security of guests**
- 7 hotels in Tanjung Benoa had committed to provide the vertical evacuation shelter:
  1. Peninsula Bay Resort
  2. Hotel Benoa Sea Suites Villas
  3. Grand Mirage Resort
  4. Hotel Ion Bali Benoa
  5. Hotel Rasa Sayang
  6. Hotel Novotel
  7. The Sakala Resort

The Yogyakarta International Airport evacuation shelter for airport officers and surrounding communities.

Commemoration of World Tsunami Awareness Day

78 Attendees

Indian Ocean World Tsunami Awareness Day Webinar

International Cooperation: A Strategic Pathway for the Indian Ocean Tsunami Warning and Mitigation System within the Context of UN Decade or Ocean Science

Indian Ocean World Tsunami Awareness Day Webinar 2021

INDIAN OCEAN YOUTH SHORT VIDEO COMPETITION ON TSUNAMI AWARENESS

10 November 2021

for more information: bit.ly/XXXXXXXX

2021: A total of 79 videos were successfully submitted by participants from 9 countries:

- Bangladesh 3,
- India 5,
- Indonesia 24,
- Kenya 4
- Malaysia 12,
- Maldives 2,
- Pakistan 25,
- Seychelles 3, and
- Tanzania 2.

Five (5) independent judges evaluated the videos based on 6 assessment: criteria theme/topic, information, originality, impact, concept, creativity.
Three winners for each of the four IO regions

Challenges

- Tsunamis are fortunately rare, but this also makes it **hard to maintain awareness and preparedness**. When they do occur their impacts can be catostrophic

- **Tsunamis are "short-fuse" events and so there is not much time available to respond**:
  - ➢ **Near-field** tsunami threat… tsunami can arrive in as little as 10-20 minutes from a nearby source
  - ➢ **Even far-field** tsunamis, generated by sources on the other side of the Indian Ocean….. can arrive in hours.

- **Timeliness #1 priority** and **Accuracy #2 priority** for warnings

Challenges

Tsunamis are commonly generated by underseas earthquakes, but can also be caused by non-seismic or atypical sources, such as submarine landslides, volcano collapses, and certain atmospheric conditions. These can be even harder to detect and warn for.

1. Original summit of volcano
2. Volcano collapses
3. Magma body is unroofed
4. Lateral blast
5. Fast-moving debris avalanche crashes into sea
6. Tsunami forms
7. Wave travels out to distant coastlines
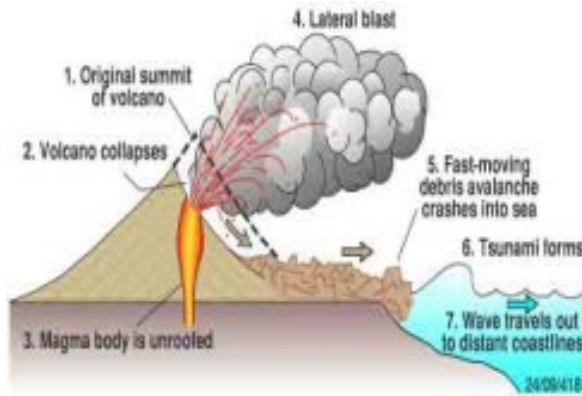
Eg Krakatoa, Indonesia (1883, 2018)

Opportunities

- **UN Ocean Decade** 2021 – 2030 Tsunami Programme.. includes Science Plan to be developed by TOWS-WG

- Development of Multi-hazard Framework by **WMO**

- Working closer with **UNDRR, UNDP,** …

- Utilising the expertise of **other international activities**, such as: Kyoto Landslide Commitment 2020, Augmenting Tsunami Monitoring Steering Committee, Joint Task Force Scientific Monitoring And Reliable Telecommunications (SMART) cables, German Tsunami Risk Project, UNESCAP Project Strengthening Tsunami Warning in the North-West Indian Ocean through Regional Cooperation

- **Lessons to be Learnt** from past and future tsunami events

The Science We Need for the Ocean We Want

The United Nations Decade of Ocean Science for Sustainable Development (2021-2030)

ICG/IOTWMS Way forward Next Session

1. **Review and implement Science & Implementation plans** to be developed by UN Ocean Decade Tsunami Programme Science Committee

2. **Implement outcomes from Multi-Hazard Early Warning Conference (MHEWC)** in Indonesia, May22 and translate Words-into-Action **in support of UN Sec General call for all communities to have access to early warning systems by 2027.**

3. **Expand number of Tsunami Ready (TR) communities and consider critical infrastructure**

4. **Utilise lessons learnt from UNESCAP project in NWIO** to benefit rest of Indian Ocean

5. **Secretariat to work with IOTIC, WGs and Training Centres/Programmes** to develop work plans to **address issues identified in 2018 IOTWMS Capacity Assessment and other assessments**

6. **Improve access to real-time data**

7. **Focus** on helping NTWCs develop **SOPs for warning of non-seismic and complex source tsunamis** following advice from TOWS-WG in early 2023

8. **SOP training workshops**: western Indian Ocean (many SIDS and LDCs) and eastern Indian Ocean (2023)

9. **Next IOWAVE** Exercise to be held in **Sep/Oct 2023**

THANK YOU

- www.ioc-tsunami.org/iotwms
- http://iotic.ioc-unesco.org/
- iotwms@unesco.org