DRAFT Executive Summary

Capacity Assessment of Tsunami Preparedness in the Indian Ocean

Status Report, 2024

INTRODUCTION

On 26 December 2004, a massive undersea earthquake with a magnitude of 9.1 struck off the west coast of northern Sumatra, Indonesia, triggering the Indian Ocean (Aceh) tsunami. This catastrophic event resulted in more than 230,000 deaths and displaced over one million people across coastal communities in the region, making it the deadliest tsunami in recorded history.

In response to the urgent need for a coordinated early warning system, the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS) was established in 2005. Formed as a subsidiary body of the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the ICG/IOTWMS was tasked with reducing the risks posed by both local and distant tsunamis throughout the Indian Ocean.

Following years of international collaboration led by UNESCO-IOC, the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS) became fully operational on 31 March 2013. At that point, the Tsunami Service Providers (TSPs) of Australia, India, and Indonesia assumed full responsibility for delivering tsunami advisory services across the Indian Ocean region.

To support the system's coordination, the ICG/IOTWMS Secretariat was established in Perth, Australia, and has been hosted and funded by the Australian Bureau of Meteorology (BoM) since 2005. Additionally, the Indian Ocean Tsunami Information Centre (IOTIC), based in Jakarta, Indonesia, has been hosted and supported by the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) since 2014.

Between May and September 2005, UNESCO-IOC conducted missions to 16 Indian Ocean countries to assess their capacity-building needs for tsunami preparedness. These missions informed the 2005 regional assessment (IOC/INF-1219), which outlined existing capabilities and identified support requirements for establishing an effective and sustainable tsunami warning and mitigation system.

Recognizing the need to update this baseline, the ICG/IOTWMS established an inter-sessional Task Team in 2017 to conduct a follow-up assessment. Using a comprehensive

online survey covering all components of the end-to-end tsunami warning system, the Task Team gathered responses from 20 Member States, providing a refreshed overview of regional preparedness and capacity gaps.

To mark the 20th anniversary of the 2004 Indian Ocean tsunami, the ICG/IOTWMS launched the 2024 Capacity Assessment of Tsunami Preparedness during its 13th session (Bali, Indonesia, November 2022). Building on the 2018 assessment, the 2024 survey retained core questions while introducing a new section on the UNESCO-IOC Tsunami Ready Recognition Programme (TRRP).

The assessment gathered responses from twenty-two (22) Indian Ocean Member States, offering a comprehensive snapshot of current tsunami preparedness across the region. It identifies key capacity gaps and prioritises development needs at both national and regional levels, with the overarching goal of strengthening the end-to-end tsunami warning and mitigation system.

GOVERNANCE AND STRUCTURE

The IOTWMS is an important component within the IOC-UNESCO framework for Tsunamis and Other Hazards related to Sea-Level Warning and Mitigation Systems (TOWS). The governance of IOTWMS is provided through an Intergovernmental Coordination Group (ICG), a primary subsidiary body of IOC-UNESCO that reports directly to the IOC Assembly. All 27 Member States within and bordering the Indian Ocean are members of the ICG. During the 2022 to 2024 intersessional period, the work programmes of the ICG were pursued through the following bodies that provide for wide representation and contributions by all the IOTWMS Member States as well as other experts:

- Steering Group
- Working Group 1 on Tsunami Risk, Community Awareness and Preparedness
- Working Group 2 on Tsunami Detection, Warning and Dissemination
- Working Group 3 on Tsunami Ready Implementation
- Sub-regional Working Group for the North-West Indian Ocean
- Task Team on Exercise Indian Ocean Wave 2023

The ICG/IOTWMS Secretariat plays a central role in facilitating, coordinating, and supporting the system's activities. It is hosted and funded by the Government of Australia through the Bureau of Meteorology in Perth.

Complementing this, the Indian Ocean Tsunami Information Centre (IOTIC), based in Jakarta, supports disaster risk reduction efforts across the region. It focuses on tsunami awareness and preparedness through the development and dissemination of educational

materials and programmes. IOTIC is hosted and funded by the Government of Indonesia via the Agency for Meteorology, Climatology and Geophysics (BMKG).

GLOBAL FRAMEWORKS

The UNESCO-IOC Tsunami Programme plays a vital role in advancing global disaster risk reduction through its alignment with several international frameworks, particularly within the context of the United Nations' Decade of Ocean Science for Sustainable Development (2021–2030), the Early Warnings for All (EW4All) initiative, and the 2030 Agenda for Sustainable Development.

In 2021, UNESCO-IOC launched the Ocean Decade Tsunami Programme (ODTP) under the UN Decade of Ocean Science. Its goals are to a) Provide timely tsunami warnings to 100% of at-risk coastlines and b) Ensure all vulnerable communities are prepared and resilient by 2030, supported by initiatives like the Tsunami Ready Recognition Programme (TRRP).

The UNESCO-IOC Tsunami Programme supports global disaster risk reduction efforts through its role in Multi-Hazard Early Warning Systems (MHEWS). It aligns closely with the EW4All initiative, launched in 2022, which aims to ensure everyone is protected by early warning systems for weather, water, and climate hazards by 2027. Although focused on geophysical threats, tsunami warning systems often share infrastructure and responsibilities with other hazard responses, contributing directly to EW4All goals.

The UNESCO-IOC Tsunami Programme also advances the UN Sustainable Development Goals, especially SDG 11 (Sustainable Cities) and SDG 14 (Life Below Water), and supports targets of the Sendai Framework for Disaster Risk Reduction, including reducing mortality, economic loss, and increasing access to early warning systems.

2024 INDIAN OCEAN CAPACITY ASSESSMENT OF TSUNAMI PREPAREDNESS

The 2024 Capacity Assessment of Tsunami Preparedness in the Indian Ocean was conducted to benchmark the status of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS), identify capacity gaps, and prioritise development needs at both regional and national levels. Building on the 2018 assessment, the 2024 survey retained a similar structure while introducing a new section on the UNESCO-IOC Tsunami Ready Recognition Programme (TRRP), enabling comparison of progress over time.

The assessment was carried out through an online questionnaire covering all components of the end-to-end tsunami warning and mitigation system. It included six sections: 1) Basic information; 2) Risk assessment and reduction; 3) Detection, warning and dissemination; 4) Public awareness, preparedness and response; 5) Tsunami Ready Recognition Programme; and 6) Narrative. Each section required inputs from relevant national stakeholders to be

coordinated by the Tsunami National Contact. The survey was distributed in May 2024 and timed to align with Member States' reporting to the 14th session of the ICG/IOTWMS (Banten, Indonesia, November 2024), eliminating the need for separate national reports.

A total of twenty-two (22) Member States responded, marking an increase from the 2018 assessment. While some countries that participated in 2018 did not respond in 2024, others participated for the first time, resulting in slight variations in the sample. To ensure consistency, an independent analysis was conducted using only the countries that responded to both surveys. The trends observed were consistent across both the full and matched datasets, confirming the reliability of the findings.

The University of Huddersfield supported the analysis and compilation of the data, which was reviewed by an expert team during the Validation Workshop (Bangkok, Thailand, September 2024). The final assessment also incorporated insights from ICG/IOTWMS Working Groups, the IOWave23 Exercise Task Team, and ongoing evaluations of national tsunami warning chains and standard operating procedures.

REGIONAL OVERVIEW OF IOTWMS STATUS AND CAPACITY SUPPORT REQUIREMENTS

POLICIES, PLANS AND GUIDELINES

Compared to the 2018 survey, the 2024 Capacity Assessment shows a consistent proportion of countries reporting the availability of national and local tsunami policies. In 2024, 91% of countries indicated having a national tsunami policy (up slightly from 90% in 2018), and 64% reported having a local policy (compared to 60% in 2018). In both cases, most countries incorporate tsunami risk within broader multi-hazard frameworks. To support continued progress, training is recommended for Member States in developing both integrated multi-hazard and stand-alone tsunami policies across all levels of governance—from community to national.

Similarly, the availability of tsunami risk reduction plans in 2024 remains strong or has improved since 2018. All responding countries reported having some form of tsunami plan, with the majority integrating these within multi-hazard frameworks. Plan availability is highest at the national level, followed by local and community levels. Most countries also reported that their national tsunami guidelines cover all phases of disaster management (i.e., rehabilitation and reconstruction, emergency response, preparedness, and prevention and mitigation). Continued training is recommended to support the development of comprehensive, multi-level tsunami plans.

The 2024 results also show an increase in the availability of national tsunami guidelines across all disaster management phases compared to 2018. All surveyed countries reported having some form of guideline, with a mix of standalone and multi-hazard approaches, particularly in the prevention and mitigation phase. In other phases, tsunami guidelines are predominantly integrated within national multi-hazard frameworks. Member States are encouraged to strengthen their capacity to develop specific tsunami guidelines within these broader frameworks.

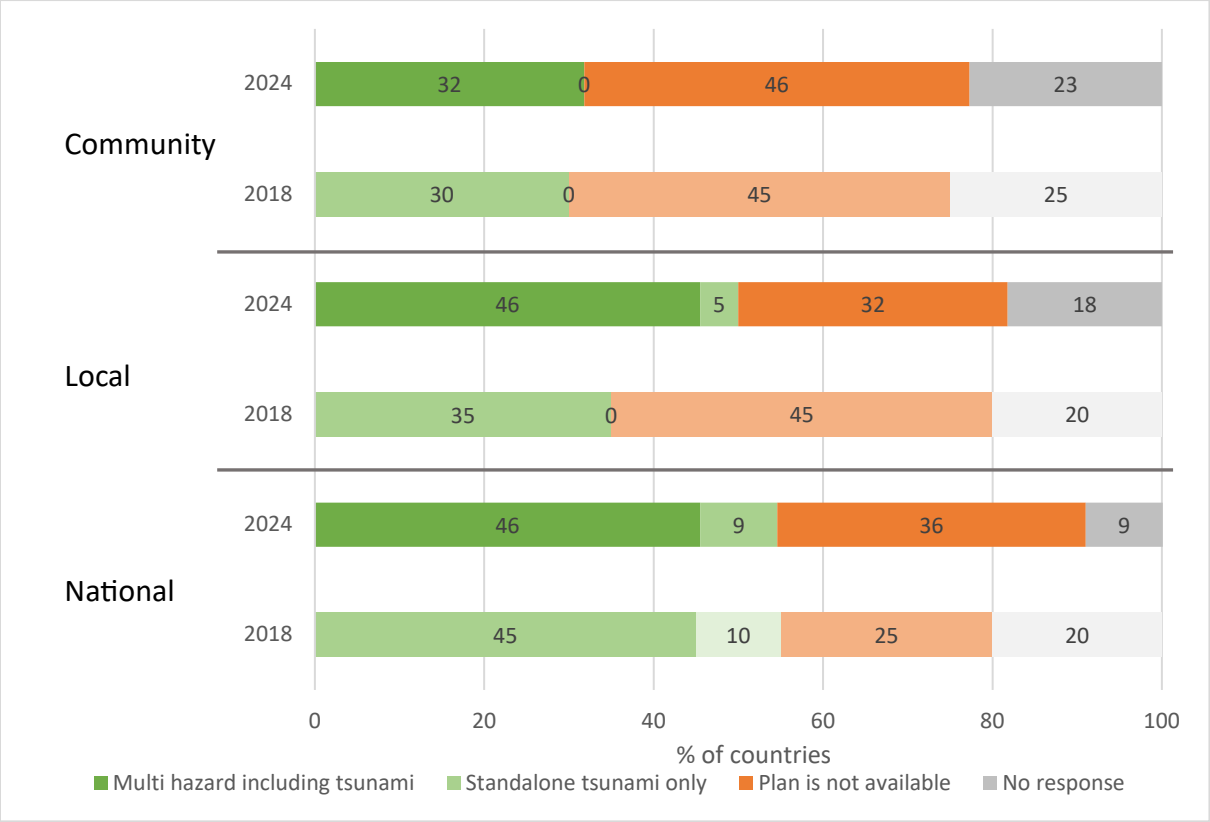

Figure 13. Types and phases of national tsunami guidelines.

Recommendations (Policies, Plans, Guidelines)

1. Deliver training on developing integrated national MHEWS and standalone tsunami policies and plans for authorities and stakeholders at all levels—national, provincial, local, and community—including DMOs, local governments, research institutions, and communities.

2. Provide training on developing tsunami-specific guidelines within a multi-hazard framework, covering:

- Urban and spatial planning for DRR, including city-level (1:25,000) and sub-district-level (1:5,000) plans.
- Contingency and operational plans for tsunamis from seismic, non-seismic, and complex sources.
- Prevention and mitigation measures, such as tsunami building codes, critical facility readiness, and hotel preparedness.
- Integration of tsunami DRR into planning processes, including zoning laws and resilient infrastructure.
- Inclusive approaches across all tsunami-related activities, from research and education to evacuation and recovery.
- Sustainable coastal protection, using grey and green infrastructure like mangrove and coral reef restoration.
- Rehabilitation and recovery planning, applying lessons learned to build back better.

RISK ASSESSMENT AND REDUCTION

All countries bordering the Indian Ocean face some level of tsunami risk. Even relatively small tsunamis (i.e. around one metre in height) can generate hazardous currents and cause coastal inundation, threatening lives and disrupting key sectors such as fisheries, tourism, and port operations.

Hazard Assessment

In the 2024 assessment, 96% of surveyed countries reported conducting tsunami hazard assessments, a slight decrease from 100% in 2018. The only exception was one country that had not yet undertaken such an assessment. As in 2018, evacuation mapping remains the

top priority for capacity improvement, followed by hazard and inundation mapping. Notably, the UNESCAP-funded initiative on strengthening tsunami early warning in the North-West Indian Ocean has advanced seismic analysis and developed a Probabilistic Tsunami Hazard Assessment (PTHA) for the Makran region. Expanding this work across the Indian Ocean and incorporating non-seismic and complex tsunami sources is recommended to enhance regional preparedness.

Areas of tsunami hazard assessment	RII	2024 Rank (2018 Rank)
Evacuation map	0.85	1 (1)
Hazard map	0.81	2 (2)
Inundation map	0.81	2 (3)
Deterministic tsunami hazard analysis	0.76	4 (4)
Probabilistic tsunami hazard assessment (PTHA)	0.75	5 (6)
Field studies on tsunami impacts	0.67	6 (5)

Table. Ranking of priority areas for capacity improvement in tsunami hazard assessment.
RII (Relative Importance Index) = WAxN (0≤R≤1) where W is the weightage given to each factor, A is the highest weight, and N is the number of respondents.

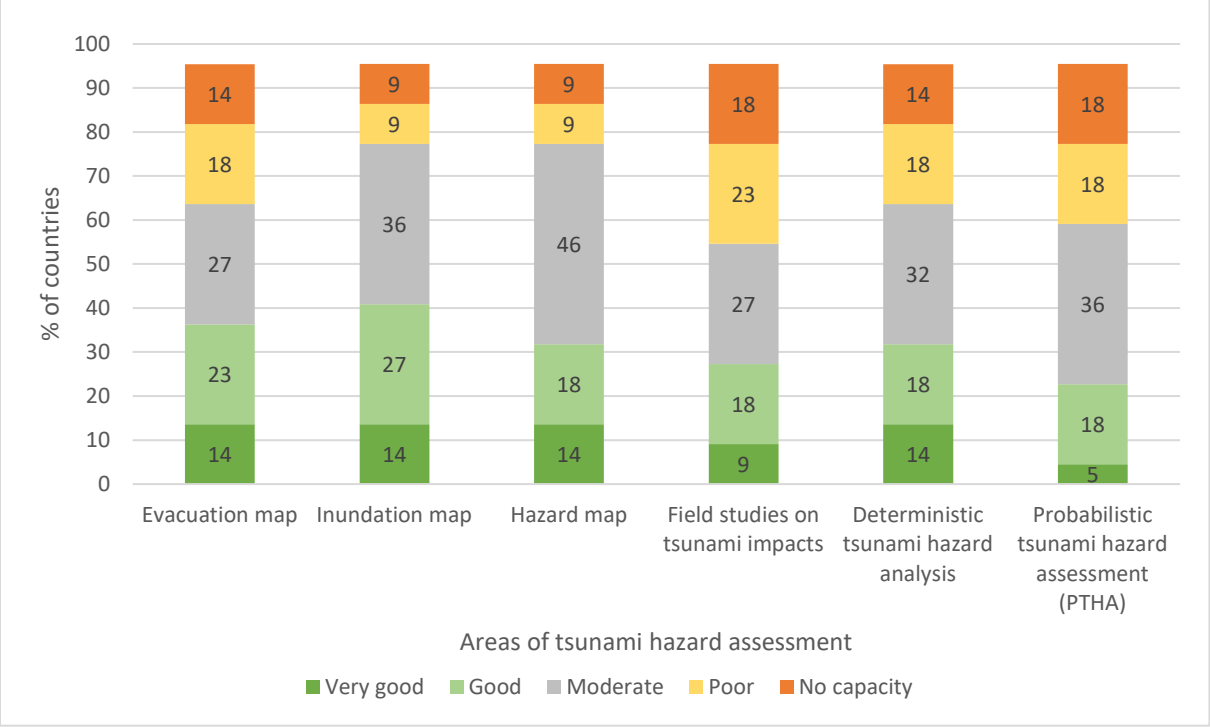

Figure: Capacity to give training and/or consultancy on tsunami hazard assessment to other countries.

Risk Assessment

Regarding risk assessment, 86% of countries reported conducting tsunami risk assessments in 2024. Among those undertaking multi-hazard assessments, all included tsunami risk, alongside other common hazards such as flooding, cyclones, and earthquakes. City-level risk assessment was identified as the highest priority for capacity development, followed by national and regional levels. To improve preparedness, countries are encouraged to continue integrating tsunami risk assessments into multi-hazard frameworks and to strengthen national capacities to conduct assessments down to the local level.

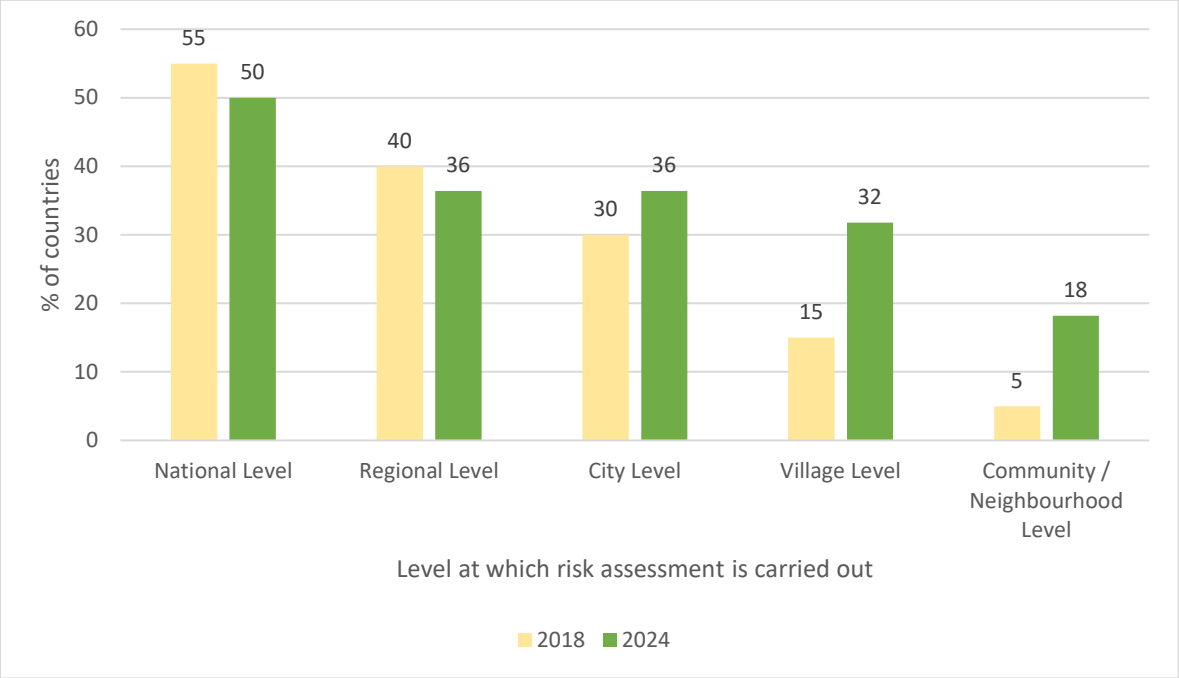

Figure . Levels at which the tsunami risk assessment is carried out.

Recommendations (Risk Assessment and Reduction)

1. **Enhance awareness of Indian Ocean tsunami risks by:**
   - Leveraging international expertise to update best practices for Probabilistic Tsunami Hazard Assessment (PTHA), including non-seismic and complex sources
   - Promoting good practice sharing to develop and update multi-hazard tsunami assessments across the region
2. **Strengthen national capacity to conduct tsunami hazard and risk assessments within a multi-hazard framework, down to the local level as needed.**

DETECTION, WARNING AND DISSEMINATION

Following the introduction of the Interim Advisory Service (IAS) in 2005, which provided basic tsunami alerts to National Tsunami Warning Centres (NTWCs), the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS) became fully operational in 2013. Since then, Tsunami Service Providers (TSPs) in Australia, India, and Indonesia have delivered tsunami threat information to NTWCs across the region, primarily for events caused by subduction earthquakes. In 2024, the service was expanded to include tsunamis generated by non-seismic sources, such as undersea volcanic activity. TSP Australia now also provides regional threat information for volcanic tsunamis. NTWCs use these products—alongside their own assessments where available—to issue appropriate warnings to their communities.

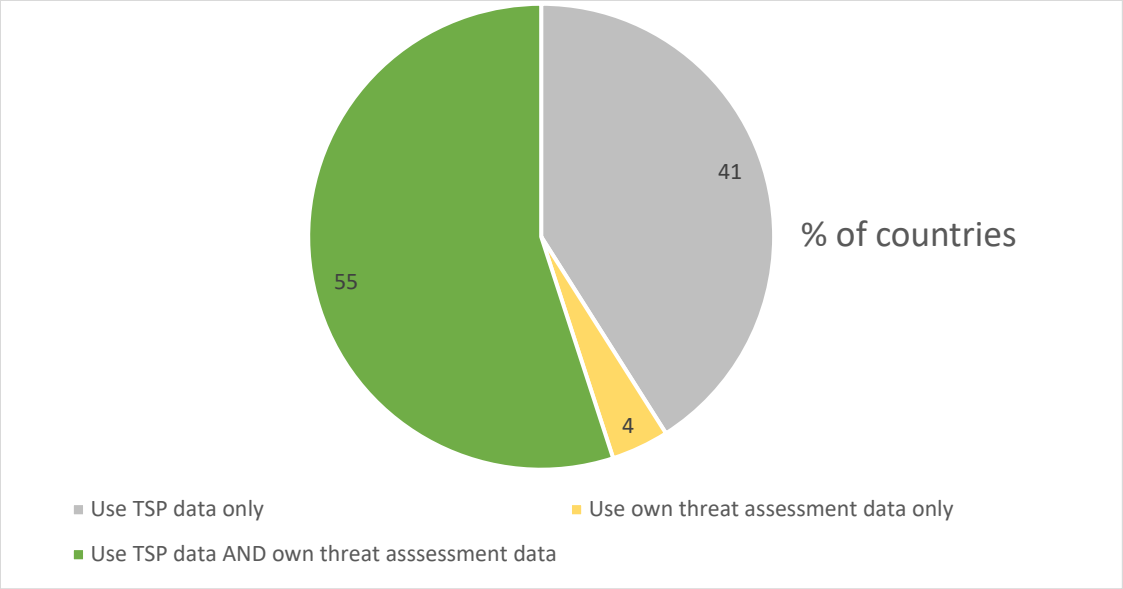

Figure. Data used by National Tsunami Warning Centres for determining national tsunami threat.

All countries surveyed in 2024 confirmed they have national capabilities to receive and assess tsunami threat information and issue warnings. Most (91%) operate their warning centres 24/7. However, only 55% reported the ability to analyse real-time seismic and sea-level data, and 46% have tsunami modelling capabilities to support threat forecasting. To improve the timeliness and accuracy of warnings, countries are encouraged to enhance their observing systems, adopt emerging technologies such as SMART cables and GNSS networks, and ensure real-time data sharing. Integrating tsunami warnings into broader multi-hazard frameworks can also help optimise resources and promote best practices.

In terms of dissemination, countries primarily use email, SMS, radio, and television to communicate tsunami warnings and public safety messages. Since 2018, there has been a notable decline in the use of fax and a significant rise in the use of social media platforms. Member States are responsible for ensuring that tsunami warnings reach at-risk communities through reliable and timely channels. This requires robust national warning chains supported by clear, time-sensitive standard operating procedures (SOPs). Redundant communication methods are essential to reduce the risk of delivery failure.

Strengthening NTWC capacity through 24/7 operations, training in threat analysis, and SOP development remains a key priority.

Recommendations (Detection, Warning and Dissemination)

1. **Support ODTP Objective #1 by improving the timeliness and accuracy of tsunami warnings through:**
   - Designing and optimizing seismic and sea level observing systems
   - Sustaining, expanding, and fully utilizing existing observational networks
   - Piloting advanced technologies (e.g. SMART cables, GNSS networks)
   - Demonstrating the impact of real-time data gaps on warning effectiveness
   - Ensuring real-time data sharing among National Tsunami Warning Centres (NTWCs) and Tsunami Service Providers (TSPs)
   - Training and engaging sea level network operators to enhance readiness and network sustainability
   - Developing guidelines and training on the use of artificial intelligence and machine learning for integrated data analysis and improved tsunami modeling and decision-making
2. **Strengthen National Tsunami Warning Centres (NTWCs) by:**
   - Ensuring 24/7 operations
   - Providing adequate staffing and infrastructure
   - Training in real-time data analysis and tsunami threat assessment
   - Developing SOPs for detecting and warning of non-seismic and complex-source tsunamis
   - Integrating tsunami warnings into a multi-hazard framework through shared best practices
3. **Ensure people-centred tsunami warnings reach all community members by:**
   - Regularly reviewing warning chains and SOPs to identify and fix gaps
   - Providing targeted training on SOP development, especially for DMOs and media, using regional expertise (e.g. NWIO project)
   - Promoting use of standardized warning formats like the Common Alerting Protocol (CAP)
   - Continuously evaluating and upgrading communication channels (e.g. internet, SMS, satellite, social media) to ensure timely, inclusive dissemination and coordination

AWARENESS, PREPAREDNESS AND RESPONSE

For tsunami warnings to be effective, communities must be prepared and know how to respond. Achieving this level of readiness is central to the goal of the UN Ocean Decade Tsunami Programme, which aims for 100% of at-risk communities to be tsunami-resilient by 2030. UNESCO-IOC's collaboration with the United Nations Office for Disaster Risk Reduction (UNDRR) and the United Nations Development Programme (UNDP) is advancing this goal through global awareness events like World Tsunami Awareness Day and the development of school-based education and training programmes. These efforts also complement the broader objectives of the UN "Early Warnings for All" initiative, which shares many common elements with tsunami preparedness.

Public Awareness

Public awareness efforts continue to rely on widely used materials such as posters, leaflets, booklets, and videos. Educational tools like school curricula and information boards are also used, though less consistently. Activities targeting schools and children, tsunami drills, and participation in global awareness days have increased, with 73% of countries now engaging in International Disaster Risk Reduction Day. Since 2005, there has been significant progress in producing and distributing awareness materials, but further support is needed—particularly in translating resources into local languages and tailoring them to community needs.

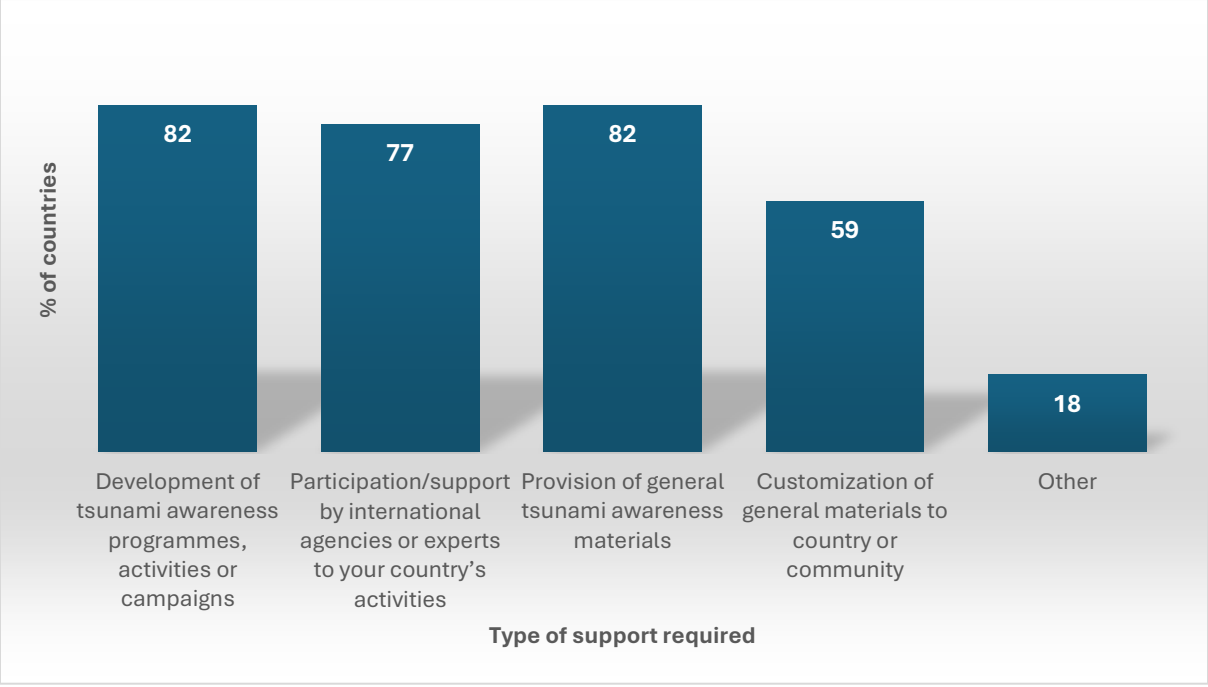

Figure 46. Support required for public awareness activity.

Raising awareness remains the foundation of effective tsunami preparedness. Outreach should continue through diverse platforms, including materials developed by IOTIC and other Information, Education and Communication (IEC) tools. Leveraging international observances such as World Tsunami Awareness Day (5 November) and integrating tsunami education into school curricula are effective strategies for building long-term community resilience.

Standard Operating Procedures

Most countries reported having standard operating procedures (SOPs) for key upstream functions, including 24/7 emergency operations centres (86%), receiving information from NTWCs (96%), and decision-making processes (91%). However, many still require support to strengthen SOPs, particularly in human resources and infrastructure. Ensuring that SOPs are integrated across the entire tsunami warning chain—especially in downstream components—is essential for timely and effective community response.

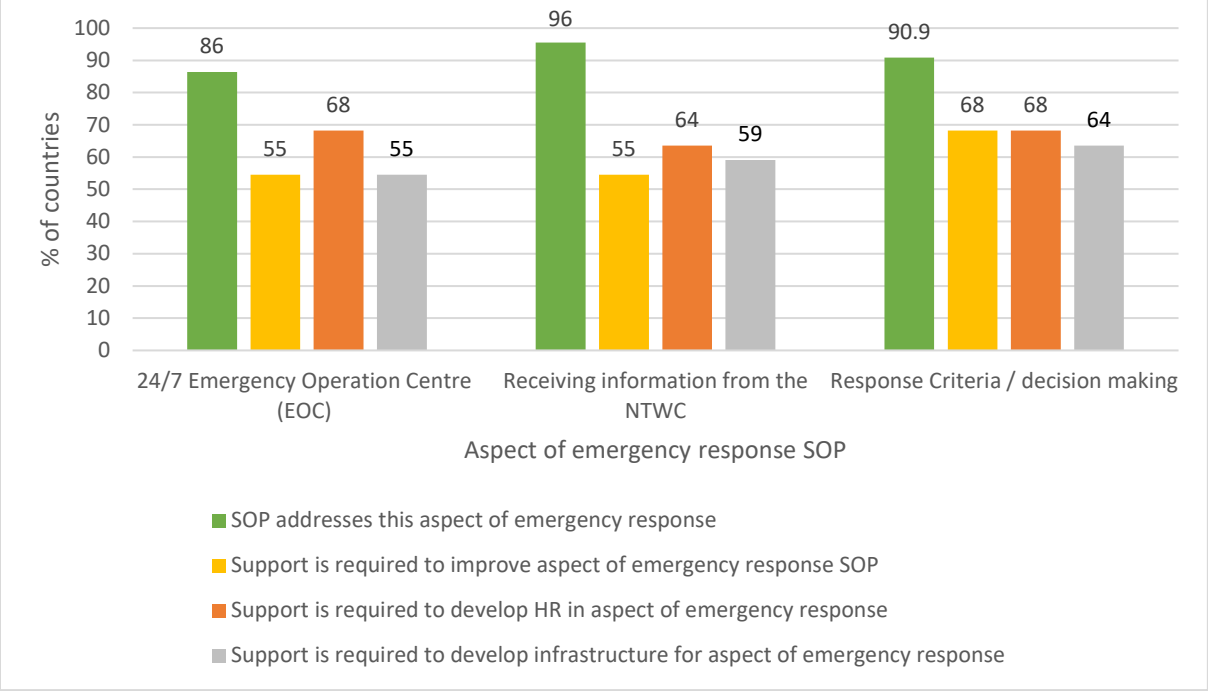

Figure 37. Support required to develop upstream emergency response SOP.

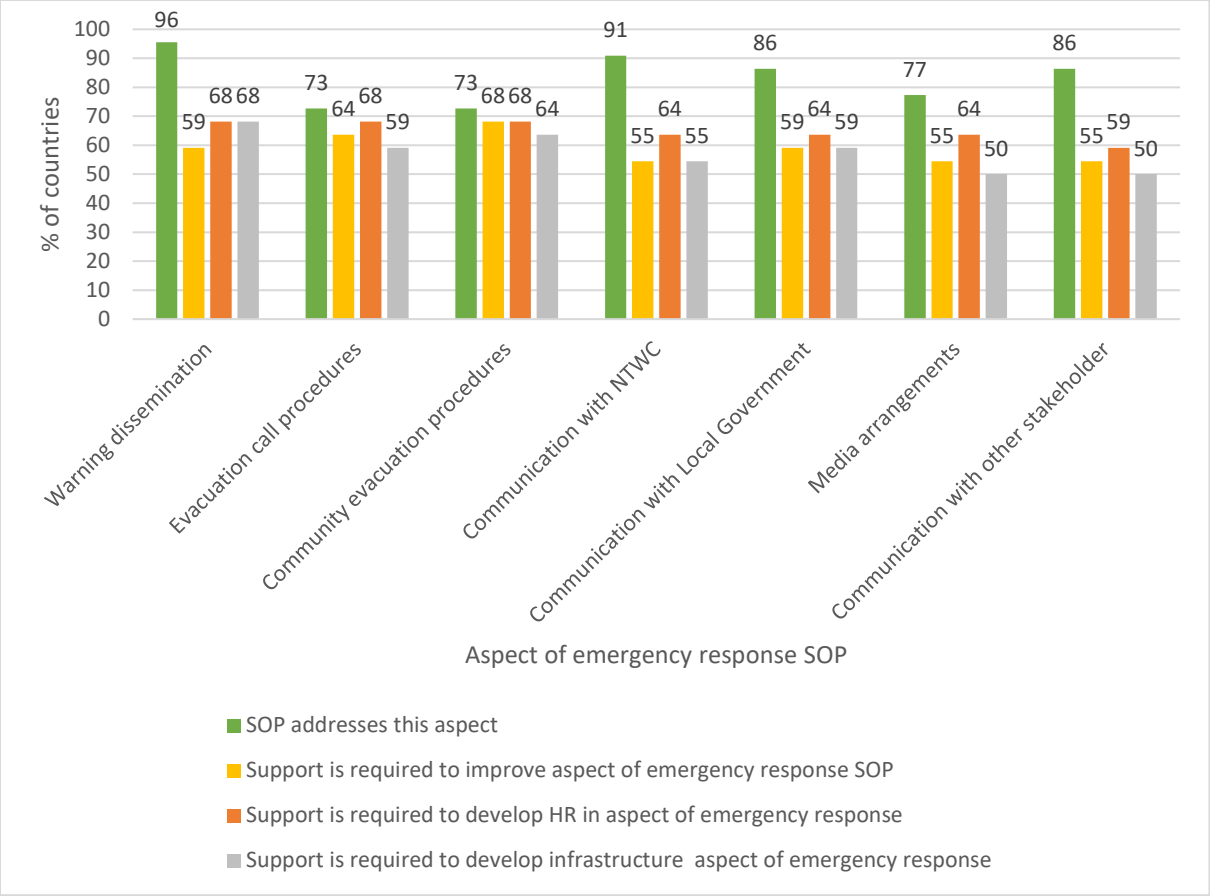

Figure 38. Support required to develop downstream emergency response SOP.

Evacuation Infrastructure

Evacuation infrastructure has improved since 2018, with 68% of countries now reporting the availability of evacuation shelters. Natural or artificial hills for vertical evacuation are also common (59%), while signage (41%) and vertical evacuation structures (32%) are less widespread. Around two-thirds of countries have incorporated evacuation infrastructure into their plans. These elements are key components of UNESCO-IOC's Tsunami Evacuation Maps, Plans, and Procedures (TEMPP) training and contribute to the Tsunami Ready Recognition Programme. Continued training and national activities are recommended to support best practices in evacuation planning, including vertical evacuation strategies.

Recommendations (Awareness, Preparedness and Response)

1. **Raise community awareness of tsunami risks by:**
   - Sharing tsunami awareness materials from IOTIC, other TICs, and national sources—tailored, inclusive, and translated as needed
   - Disseminating content across diverse formats and platforms (e.g. print, social media, video)
   - Engaging international experts and agencies in national awareness efforts
   - Leveraging global events like IDDRR (13 Oct) and WTAD (5 Nov) for outreach

2. **Strengthen national tsunami evacuation planning by:**
   - Expanding NWIO evacuation training and best practices to other regions through hands-on, collaborative learning
   - Providing regional training on vertical evacuation, with expert input and national criteria for shelter evaluation
   - Sharing best practices in tsunami signage, aligned with UNESCO-IOC TOWS-WG TTDMP recommendations
3. **Improve tsunami awareness and preparedness in schools by:**
   - Continuing development of school-focused IEC materials and training with UNDP and IOTIC
   - Integrating tsunami preparedness into national school curricula

Tsunami Exercises

Tsunami exercises remain a vital part of preparedness. While participation in IOWave exercises remains high (96%), the overall number of countries conducting exercises has declined slightly since 2018. However, there has been an increase in exercises at the city and school levels. Regular national exercises between IOWave events—particularly at the community level—are encouraged to maintain readiness.

Recommendations (Tsunami Exercises)

1. Continue and enhance biennial IOWave Exercises to strengthen tsunami preparedness by:

- Including nighttime and weekend scenarios to test 24/7 readiness
- Objectively testing and validating SOPs across warning chains
- Scheduling exercises in two different seasons to avoid conflicts with other hazard responses
- Expanding participation to local and community levels
- Involving international experts for evaluation and feedback

2. Increase national tsunami exercises to strengthen preparedness by:

- Establishing regular drills in cities, villages, communities, and schools between IOWave exercises
- Developing additional guidance beyond IOC MG58 and MG86 for tabletop and similar exercises to routinely test SOPs and maintain readiness, especially in countries without recent tsunami experience

Tsunami Ready

Thirteen countries, representing 59% of respondents, confirmed that they have already begun participating in the UNESCO-IOC Tsunami Ready Recognition Programme (TRRP). In contrast, eight countries reported that they are not currently involved in the programme. Among those not yet participating, six indicated that they plan to join the initiative, while two stated they have no such plans. Additionally, six countries, accounting for 27% of respondents, reported that they are currently implementing other tsunami preparedness initiatives or programmes outside of the TRRP framework.

Five countries, or 23% of those surveyed, reported having established a National Tsunami Ready Board. These boards are responsible for guiding communities through the steps required for Tsunami Ready recognition, as well as reviewing and approving community applications for the programme.

An assessment of national capacities to implement the Tsunami Ready indicators revealed several areas where countries expressed a strong need for international technical support. More than 25% of countries identified the following as priority areas: training communities to identify and estimate the population living within tsunami hazard zones; conducting inventories of local economic, infrastructural, political, and social resources to reduce

tsunami risk; collaborating with communities to develop tsunami evacuation maps, plans, and procedures; and building the capacity of communities to develop their own Emergency Operation Plans. The most significant challenges reported in implementing the Tsunami Ready programme were limited resources and a general lack of awareness.

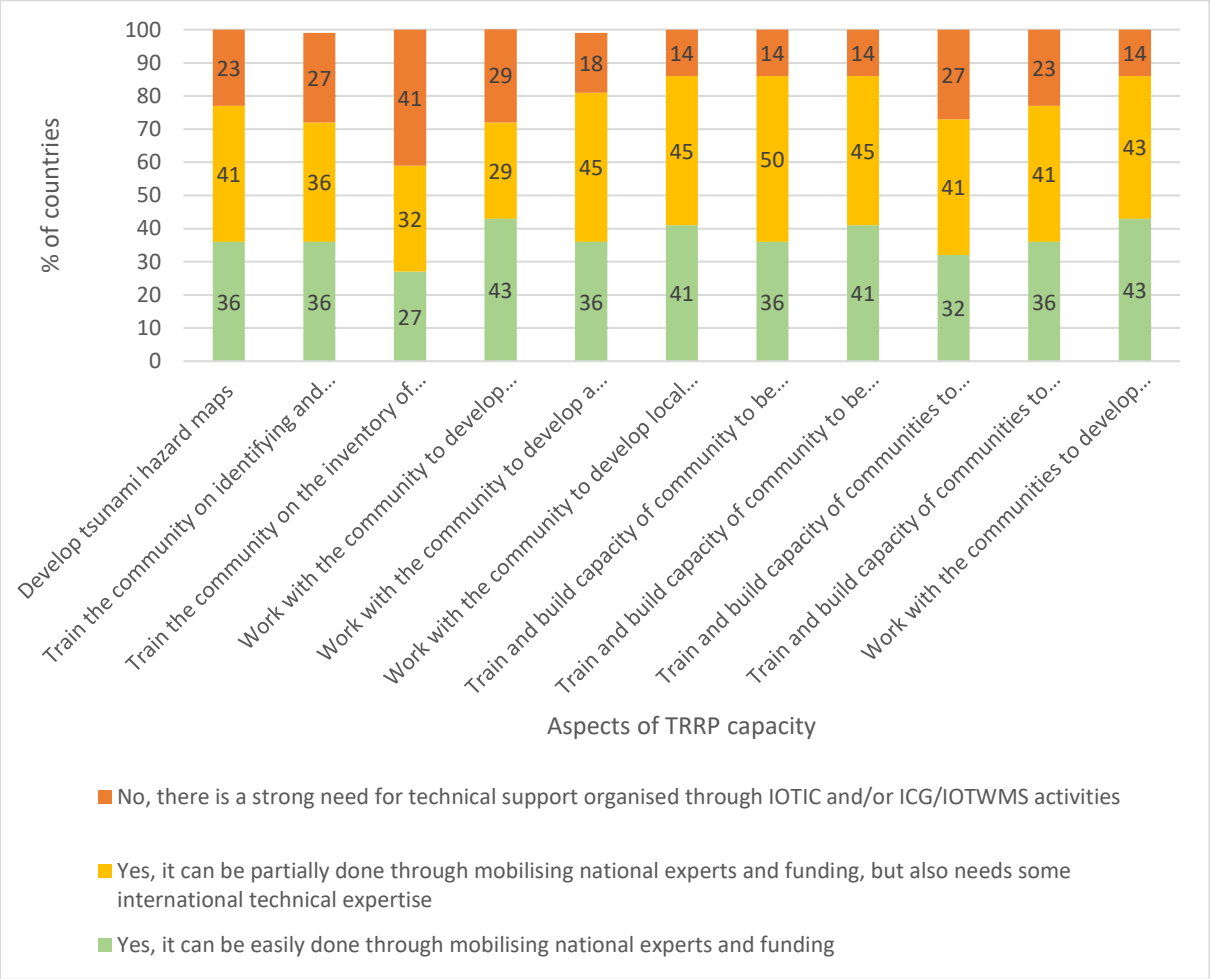

Figure. Summary of national capacity according to different aspects of the TRRP.

While countries such as India and Indonesia have initiated substantial national programmes to support tsunami preparedness, there remains a pressing need for additional support to scale up these efforts across the region, particularly at the community level. To effectively implement the TRRP or similar national initiatives, countries require significantly more resources and support at the national level. The challenges associated with implementing the UNESCO-IOC TRRP have been clearly identified, and there is a strong need for training and technical assistance to help countries overcome these barriers.

Facilitating the exchange of experiences among Member States in initiating and implementing the programme would provide added value. Promoting community ownership

of the TRRP or similar initiatives is also essential. This can be achieved by strengthening local capacities, encouraging community engagement in the development of preparedness plans, and ensuring that activities align with the TRRP indicators. Sustained commitment at the community level is crucial. Furthermore, integrating the TRRP approach with other ocean-related and multi-hazard preparedness strategies can enhance overall resilience and effectiveness.

Recommendations (Tsunami Ready)

1. Train regionally and nationally—prioritizing SIDS, LDCs, and African States—on implementing the UNESCO-IOC Tsunami Ready Recognition Programme (TRRP) or similar initiatives to build community resilience by:

- Supporting Tsunami Ready Focal Points (TRFPs) and National Contacts (TNCs) with training, advocacy, and IEC materials, including translations
- Sharing best practices and success stories among Member States to encourage adoption
- Assisting countries in reviewing their tsunami preparedness against the 12 TRRP indicators

2. Expand national Tsunami Ready Recognition Programmes (TRRP) or similar initiatives to strengthen community resilience by:

- Identifying tsunami risk and raising awareness among communities and stakeholders
- Exploring integration with existing national programmes or securing seed funding to launch TRRP
- Establishing or designating a National Tsunami Ready Board (NTRB)
- Mapping tsunami-prone communities to prioritize TRRP implementation
- Co-developing locally tailored education materials with at-risk communities
- Promoting community ownership through capacity building and engagement aligned with TRRP indicators
- Involving the private sector, NGOs, and international partners in implementation
- Integrating TRRP with broader ocean and multi-hazard strategies

COMPARISION OF INDIAN OCEAN TSUNAMI PREPAREDNESS CAPACITY CRITERIA: 2005, 2018 and 2024

Between 2005 and 2018, significant progress was made in developing robust regional and national tsunami warning and mitigation systems. Survey results from 2018 and 2024 show that tsunami policies, plans, and guidelines have either increased or remained stable. Nearly all countries reported conducting tsunami hazard assessments in both surveys, with a growing number also undertaking risk assessments.

While core components of tsunami warning systems—detection, warning, and dissemination—have plateaued since 2018, community preparedness has notably advanced. There has been marked growth in standard operating procedures for evacuation, tsunami drills in schools and cities, and the installation of tsunami information boards and signage. This rise in community-level activities is likely linked to the expansion of the UNESCO-IOC Tsunami Ready Recognition Programme.

	Capacity Criteria	2005	Capacity Criteria	2018	2024
Policies, Plans and Guidelines	• Legal framework in place for disaster warning formulation, dissemination and response • National platform or other mechanism in place for guiding disaster risk reduction in general • National Tsunami Warning and Mitigation and Coordination Committee or some other coordination mechanism in place • Disaster coordination mechanisms at community level established • Tsunami emergency plans, tsunami evacuation plans and/or signage exist indicating routes to safety or higher ground	59% 94% 59% 75% 19%	• National tsunami policy in place • Local tsunami policy in place • National tsunami disaster risk reduction plan in place • Local tsunami disaster risk reduction plan in place • Community tsunami disaster risk reduction in place • National tsunami guidelines established • Local tsunami guidelines established	90% 60% 75% 55% 40% 70% 60%	91% 64% 86% 59% 50% 100% 77%
Risk Assessment and Reduction	• Tsunami hazard evaluation conducted prior to 26 December 2004	44% 37%	• Tsunami hazard assessment conducted	100%	96%

	• Historical record of past earthquakes and tsunamis documented • Tsunami vulnerability assessment conducted • Numerical modelling studies conducted to calculate inundation from tsunamis • Accurate bathymetry and topography data exist for the coastlines	22% 22% 25%	• Tsunami risk assessment conducted • Numerical modelling conducted for hazard assessment (PTHA and/or DTHA) • Bathymetry used for tsunami hazard assessment • Topography used for hazard assessment	75% 35% 85% 80%	86% 41% 77% 86%
	Capacity Criteria	**2005**	**Capacity Criteria**	**2018**	**2024**
Detection, Warning and Dissemination	• International tsunami warnings received for teletsunamis from PTWC and/or JMA • Agency receiving warnings staffed 24x7 • National or regional tsunami warning centre to monitor and warn of regionally or locally generated tsunami in operation • Warning centre staffed 24x7 • Real-time seismic data received • Sea level data available real-time to the central monitoring site, or available in near real-time	94% 94% 28% 31% 41% 41%	• National capability to assess and/or receive potential tsunami threat information and advise and/or warn coastal communities • Warning centre staffed 24x7 • Access to national or international seismic networks • Access to national or international sea level networks	100% 90% 90% 85%	100% 91% 91% 68%
Standard Operating Procedures **Tsunami Exercises**	• Local government disaster preparedness and emergency response assessed • Community and ordinary citizen disaster preparedness and emergency response assessed • Response procedures for regional or locally	59% 25% 19% 19%	• Warning dissemination SOPs in place • Evacuation call SOPs in place • Community evacuation SOPs in place • Media arrangement SOPs in place	90% 80% 60% 80% 70% 55% 35% 50% 50%	96% 73% 73% 77% 59% 41% 50% 46% 32%

	generated tsunami in place • Response procedures have been tested or exercised		• Tsunami exercises conducted at national level • Tsunami exercises conducted at regional level • Tsunami exercises conducted at city level • Tsunami exercises conducted at village level • Tsunami exercises conducted at community level • Tsunami exercises conducted at school level	30%	46%

	Capacity Criteria	2005	Capacity Criteria	2018	2024
Awareness, Preparedness and Response	• Public is aware of what a tsunami is and how to respond to both locally generated and distant tsunamis • Community level education and preparedness programmes for national hazards or tsunami exist • Tsunami education and public outreach programme in place • Earthquake and tsunami hazards and preparedness is incorporated into educational curricula for school children • Training programmes for the media on tsunami hazards, mitigation, warning and preparedness exist	37% 47% 6% 12% 22%	• Tsunami related education and awareness material - Leaflets or flyers - Posters - Booklets - Information Boards - Tsunami signage - Video or other visual/oral media - Indigenous knowledge - Teaching kits - School curricula - Public evacuation maps	65% 70% 60% 30% 25% 65% 35% 50% 45% 25%	59% 73% 64% 41% 32% 55% 18% 23% 41% 23%

Table 1. Comparison of status of IOTWMS in 2005, 2018 and 2024. The percentage columns refer to the percentage of countries participating in each survey answering "yes" to the related question, with a "partial yes" in the 2005 assessment counted as a "half yes". The 2005 percentages are based on responses from 16 countries and the 2018 percentages are based on responses from 20 countries (with 14 countries in common to 2005). The 2024 responses are based on 22 countries (with 14 countries in common to 2005 and 18 countries in common to 2018). Given the differences between the assessments, the table is intended to provide a broad comparison only to indicate the scale of capacity improvement in the IOTWMS since 2005.

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>> *IOTWMS Roadmap from 2004 to 2024 & beyond*. {Insert updated version} <<