

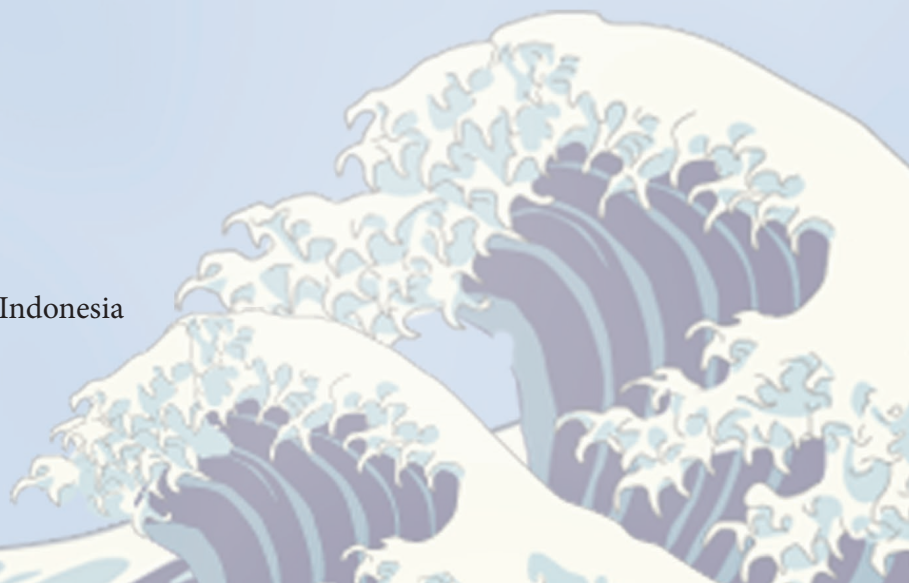
INTERNATIONAL CONFERENCE TO COMMEMORATE THE
10TH ANNIVERSARY OF THE INDIAN OCEAN TSUNAMI

The Indian Ocean Tsunami Warning and Mitigation System 10 years after the Indian Ocean Tsunami: Achievements, Challenges, Remaining Gaps and Policy Perspectives

Summary Statement

24 – 25 November 2014
BMKG Auditorium
Jakarta, Indonesia

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The Conference

The conference was attended by 160 participants from 28 countries, 10 UN agencies, 10 media organisations and many NGOs, research institutions, universities and private organisations. The participants came from a variety of backgrounds, including physical and social scientists, warning system operators, emergency and response managers, planners, journalists, policy and decision makers. The conference was organised by the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the Indonesian Agency for Meteorology for Climatology and Geophysics (BMKG) with support from the UNESCO Jakarta office and the Indian Ocean Tsunami Information Centre (IOTIC). The primary objectives were to recognise the achievements of the last 10 years, to highlight work that still needs to be done, and to seek re-commitment to investment in the Indian Ocean Tsunami Warning and Mitigation System (IOTWS) to secure its long term sustainability.

The conference was officially opened by Minister for Research, Technology and Higher Education of Indonesia, Prof. Drs. H. Muhammad Nasir, Msi, Akt., Ph.D. In his opening remarks, the Minister called for further cooperation amongst the countries of the Indian Ocean region in protecting the coastal communities of Indonesia and all other countries from natural disasters such as tsunamis. In her opening remarks, the Executive Secretary of IOC-UNESCO, Dr Wendy Watson-Wright, emphasised the importance of the intergovernmental process in coordinating the development of a complex ocean-wide system across political boundaries and what this process has delivered, and called on the Member States of the IOTWS to look forward to the work that remains to be done and to re-commit to the challenges that lie ahead.

Background

The Indian Ocean tsunami on 26th December 2004 resulted in the loss of over 230,000 lives and the displacement of over 1.6 million people around the Indian Ocean, with estimated economic losses of \$14 billion. At the time no tsunami warning system existed for the Indian Ocean and the catastrophe brought renewed focus on the need for a regional tsunami warning system to serve the Indian Ocean countries. Two key international meetings were organized by IOC-UNESCO in early 2005 (Paris, France, 3-8 March 2005 and Grand Baie, Mauritius, 14-16 April 2005). These meetings established the principles and organizational arrangements for coordination of tsunami warning systems. Subsequently, IOC-UNESCO was given the mandate to develop and implement an Indian Ocean Tsunami Warning and Mitigation System

(IOTWS). An Intergovernmental Coordination Group (ICG) for the IOTWS was established by the IOC Assembly in July 2005 (Resolution IOC-XXIII-12). Further mandates were given to IOC-UNESCO by the UN General Assembly through Resolutions 61/132 and 62/91. After 6 years of international collaboration and development, facilitated and coordinated by IOC-UNESCO, the IOTWS became operational on 12th October 2011, and the Tsunami Service Providers (TSPs) established by Australia, India and Indonesia assumed full responsibility for the provision of tsunami advisory services for the Indian Ocean region on 31st March 2013.

The IOTWS has been designed and implemented through the joint efforts and contributions of its Member States and other partners under the coordination of IOC-UNESCO. To ensure its long term sustainability, the IOTWS will require policy support at the intergovernmental and national levels within the framework of global, regional and national disaster risk reduction strategies.

Objectives

The objectives of the conference were:

- To report on and document the achievements of the last 10 years.
- To highlight gaps in the system and work that still needs to be done.
- To seek re-commitment of Member States and other partners to continue investing in the IOTWS to ensure its long term sustainability.
- To launch the Indian Ocean Tsunami Information Centre.
- To provide input to the 3rd UN World Conference on Disaster Risk Reduction to be held in Sendai, Japan from 14-18 March 2015.

Format

The conference was organised in six sessions, each including presentations followed by a moderated discussion among presenters and invited panellists focusing on key policy issues for the future of the IOTWS. Member States of the IOTWS and other partners were given the opportunity to report on their achievements, future developments and outstanding needs. The main synthesis and policy implications of each session are provided in the following sections. Details of the programme, moderators, presenters, panellists and participants are available at: <http://www.ioc-unesco.org/IOTconference2014>.

Session 1

Development of the IOTWS since 2004. What has been achieved? What is different? Is the Indian Ocean region safer than it was in 2004?

Moderator: Mr Rick Bailey, Head, Tsunami Warning & Ocean Forecast Services, Australian Bureau of Meteorology and Chair of ICG/IOTWS

The achievements of the last 10 years were reviewed and the present status of the IOTWS was compared to what was available in 2004. The presenters reported on achievements in the context of the 3 pillars of the IOTWS: (i) tsunami risk assessment and reduction; (ii) tsunami detection, warning and dissemination; and (iii) tsunami awareness and response. Gaps and weaknesses, and future plans for the IOTWS were also highlighted. It was concluded that the Indian Ocean is indeed much safer against the threat of tsunami than it was in 2004 but can never be completely safe due to the nature of the hazard. However, it is important that coastal communities remain ready to respond to the threat.

Key highlights and recommendations:

- In 2004, the risk of a tsunami in the Indian Ocean was considered low, resulting in almost no real-time seismic and sea level detection systems in place, no regional and very limited national tsunami warning systems to alert communities, and almost no community awareness and preparedness to be able to respond to the threat.
- Following the Indian Ocean tsunami of 2004, countries from within and outside the region quickly worked together to build the Indian Ocean Tsunami Warning and Mitigation System (IOTWS).
- In the ten years since 2004 there have been significant achievements. A warning system has been fully developed and extensive efforts have gone into identifying, educating and preparing many (but not all) of the communities at risk to be able to respond to the tsunami threat.
- The challenge over the next ten years will be to focus on sustaining the achievements and continuing to enhance the systems now in place, including detection and warning systems, community awareness and preparedness.
- There is a need to continue to exercise the IOTWS to ensure warning systems are not only ready for the next tsunami, but communities also remain aware and prepared to respond.
- For locally generated tsunamis, where the tsunami may arrive in minutes, communities must be educated, aware and ready to respond to natural warning signs.

- While the tsunami risk in the Indian Ocean is less than in the Pacific Ocean, there is a danger that communities will not remain aware and prepared for the threat. Community awareness and preparedness against the tsunami threat should be considered as part of a multi-hazard approach.

Session 2

Outstanding needs and future developments. What still needs to be done? What future developments are planned?

Moderator: Dr Andi Eka Sakya, Director General of the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)

This session focused on what is still lacking in the IOTWS and what future developments are planned, and included presentations from IOTWS Member States, UN agencies and other international partners. The system status in selected countries representing different regions in the Indian Ocean was reviewed from the perspective of capacity development, future developments and outstanding needs.

Key highlights and recommendations:

- Master plans for tsunami early warning with legislated and appropriated budgets are required for all countries at national and regional scales. Master plans should include technical requirements, arrangements for the dissemination of information, and a plan of activities between the key stakeholders to harmonise the programme.
- Risk assessment and reduction:
 - Understanding of the tsunami risk at the national level should be extended through subregional collaboration between neighbouring countries.
 - In order to increase the trust of the public, it is essential to communicate scientific findings in a manner that the public understands and respects.
 - In the northwest Indian Ocean, the Makran subduction zone hazard is not well understood. A research collaboration to better understand the tsunami threat is recommended, particularly in India, Pakistan, Iran and Oman.
- Tsunami detection, warning and dissemination:
 - Strengthening subregional collaboration in the northwest Indian Ocean for real time data exchange will provide better detection of the earthquake and tsunami hazard of the Makran zone.
 - Oman's National Multi-Hazard Early Warning System is exploring the possibility of extending its

services to neighbouring countries to strengthen the capacity and the capability for reducing the impact of tsunami and other sea level hazards from the Makran zone to the western part of Indian Ocean.

- National Tsunami Warning Centres that operate continuous GNSS/GPS and wave radar should explore the possibility to enhance the capability of Tsunami Early Warning System operations.
- Tsunami awareness and response:
 - Capacity development for public awareness and preparedness for self-protection is a continuing programme at the national level.
 - There is evidence to suggest that the public now accepts the scientific basis for earthquake detection and tsunami warning. However, there is still a lack of trust in the warning system in some countries due to the lack of understanding of the 11 April 2012 West of North Sumatra earthquake and tsunami event, which led to mass evacuations in many Indian Ocean countries.
 - The media plays an important role in disseminating national warnings and in education coverage. Each National Tsunami Warning Centre should strengthen its links with the media to ensure that information can be conveyed to the public in an understandable format.
 - Warning messages understandable to the public should be assessed and enhanced with public involvement in the development of the messages.
- The following IOTWS Member States took the floor to list their outstanding needs for tsunami warning and emergency response: Australia, Bangladesh, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Myanmar, Oman, Pakistan, Seychelles, South Africa, Sri Lanka, Tanzania, Thailand, Timor Leste and Yemen.

Session 3

Donor perspectives. What have been the outcomes and impacts of donor interventions?

Moderator: Mr Rajan Gengaje, Head of Indonesia Office, UN-OCHA

Donor countries, UN agencies, academia and other regional organisations reported on the outcomes of their contributions to the IOTWS. Ongoing and future planned interventions were also discussed to align with the gaps and outstanding needs highlighted in Session 2.

Key highlights and recommendations:

- Through the Indonesia-German bilateral agreement, Germany has supported the development of an end-to-end national tsunami warning system in Indonesia, including establishment of detection, monitoring and warning systems, and improvement of awareness, preparedness and response at community level. German contributions have also addressed the legal and organizational framework, and cultural acceptance and sustainable maintenance of initiatives, which is crucial for cultivating ownership at regional, national and local levels.
- ESCAP's Multi-donor Trust Fund for Tsunami, Disaster and Climate Preparedness has been used to strengthen early warning of coastal hazards in the Indian Ocean and Southeast Asia region in the context of Disaster Risk Reduction. There are several gaps that ESCAP has identified: risk and vulnerability assessment needs to be expanded; broadcast media should be incorporated into the warning chain; Standard Operating Procedures need to be updated and tested regularly; and warning systems for other hazards need to be strengthened to match those for tsunami warning.
- UNDP has implemented regional programmes focused on capacity building for sustainable recovery and risk reduction, and building risk knowledge to enhance early warning, preparedness and mitigation. UNDP's key priorities are: minimum common standards for comparability of disaster statistics; disaster statistics to provide an accountability framework for reporting; national capacity development for improved understanding of risks; and improved disaster data analysis for analyzing trends and patterns of disaster risks.
- USAID contributions have built on the forty years of USA tsunami experience from the Pacific Ocean. The USA has focused on a multi-hazard approach, regional mechanisms and local action within a participatory framework, and integrating plans for long term sustainability. USAID currently works on resilience and has a number of active programmes on coastal community resilience in Indonesia.
- There is a need to strengthen the role of science for early warning, to strengthen regional mechanisms for tsunami early warning, and to enhance the engagement of universities and the private sector for mitigating risks and improving resilience.
- The following key recommendations were made:
 - To strengthen the role of science and technology for effective early warning.

- To integrate early warning systems into overall Disaster Risk Reduction initiatives.
- To strengthen regional cooperation and partnerships.
- To enhance engagement of universities in enabling research and development of tsunami warning systems.
- To focus on resilience by enhancing community engagement, improvement of skills and knowledge.

Session 4

Sustainability of the IOTWS. What is the way forward for sustaining the IOTWS in the long term?

Moderator: Dr Ray Canterford, Division Head; Hazards, Warnings and Forecasts, Australian Bureau of Meteorology

This session focused on the long term sustainability of the IOTWS now that it is fully operational. Presentations and discussions covered the governance of the IOTWS, financial models and resource mobilisation for maintenance, training and capacity development needs, and the need for international and national policies to ensure that the IOTWS is sustained for the long term.

Key highlights and recommendations:

- The three components of sustainability are: system maintenance, financial resources and intergovernmental coordination.
- Intergovernmental coordination is essential for good governance. The Intergovernmental Coordination Groups have promoted national visibility, and further work on sustainability must build on the intergovernmental arrangements now in place through IOC-UNESCO.
- The combined annual operational and maintenance costs for the IOTWS Tsunami Service Providers to provide a service for the Indian Ocean region is US\$5-8 million per year.
- The indicative cost of operating the entire IOTWS including all regional and national system components but excluding mitigation measures is estimated to be US\$90 million per year +/- US\$10 million.
- A stronger downstream part will enhance the sustainability of the entire IOTWS. This will require a more strategic approach focusing on stronger integration of tsunami early warning into national and local disaster management and other public and private sectors, and a stronger client orientation for tsunami warning services.

- Local authorities need to develop evacuation plans to use as a basis for educating communities.
- To maintain the commitment of governments and donors to sustaining the IOTWS in the long term, national tsunami programmes should be codified in law and the key functions should be institutionalised.
- To sustain vital detection and monitoring networks, the relevant national agencies need to be advised on equipment procurement and maintenance needs so that resources can be prioritised. International collaboration should be optimised to share resources such as ship time and technical expertise.
- Continued awareness-raising about tsunami threat and tsunami warning system development is critical to sustain the interest of and allocation of funding from governments.
- More needs to be done to educate the public on the nature of tsunami hazards, particularly to explain that not all tsunamis are damaging, as the public finds the concept of non-damaging tsunamis difficult to understand. The Indian Ocean Tsunami Information Centre (IOTIC) has an important role to play in providing information to the public on past tsunami events.
- Capacity should be developed through scientific research and development of knowledge bases as well as through education and training.
- To ensure their long term sustainability, tsunami warning systems should:
 - Link to the disaster management community and civil protection
 - Form part of a multi-hazard warning system

Session 5

Strengthening international cooperation: the role of international organisations in tsunami warning.

Moderator: Prof Yutaka Michida, University of Tokyo and Vice-Chair of IOC

This session focused on the critical role that international organisations have played and can continue to play in the further development of the IOTWS, including coordination, enhancing community awareness and preparedness, and strengthening Member States' capacity through scientific research, training workshops and the development of information and education resources, including the Indian Ocean Tsunami Information Centre (IOTIC).

Key highlights and recommendations:

- There was no warning system in Indian Ocean in

2004. After the Indian Ocean Tsunami, the Member States of the Indian Ocean rim and the United Nations General Assembly gave IOC-UNESCO a mandate to lead the establishment of a tsunami warning system for the Indian Ocean.

- IOC-UNESCO should continue to lead the coordination toward globally harmonized, workable, effective and sustainable tsunami warning systems in close cooperation with partner organizations such as WMO, IHO, ISDR and ESCAP to:
 - Ensure the robust, efficient and effective performance, and global coverage of interoperable tsunami warning systems.
 - Enhance the network of stakeholders, including operators, scientists, policy makers and mass-media.
 - Facilitate data and information exchange.
- IOC-UNESCO as an intergovernmental organization should facilitate dialogue by organizing international meetings to exchange scientific knowledge and best practices for tsunami warning systems.
- IOC-UNESCO's oceanographic data exchange policy can be utilised at national and regional levels as well as in the international framework.
- International organizations are the key players to develop capacity in the Member States to improve their Information Technology infrastructure to ensure timely and reliable sharing of data and information.

System: Bangladesh, Iran, Kenya, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Myanmar, Oman, Pakistan, Seychelles, Sri Lanka, Tanzania, and Yemen.

Speakers and Panellists

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Session 6

Towards the 3rd UN World Conference on Disaster Risk Reduction in Sendai, Japan, 14 to 18 March 2015

Moderator: Dr Sang-Kyung Byun, Korea Ocean Research & Development Institute and Chair of IOC

The moderators of the panel discussions of each session summarised the outcomes of their respective sessions and this summary statement was framed for conveyance to the 3rd World Conference on Disaster Risk Reduction in Sendai, Japan, 14 to 18 March 2015. This statement recognises the achievements of the IOTWS in the last 10 years and records the commitment of the IOTWS Member States, UN agencies and other international partners to sustain and strengthen the IOTWS through regional cooperation.

The following Member States took the floor to put on record their continued commitment to support the Indian Ocean Tsunami Warning and Mitigation



United Nations
Educational, Scientific and
Cultural Organization



Intergovernmental
Oceanographic
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