INTERSESSIONAL MEETING OF STEERING GROUP

Online Meeting
16-17 December 2020

Participants

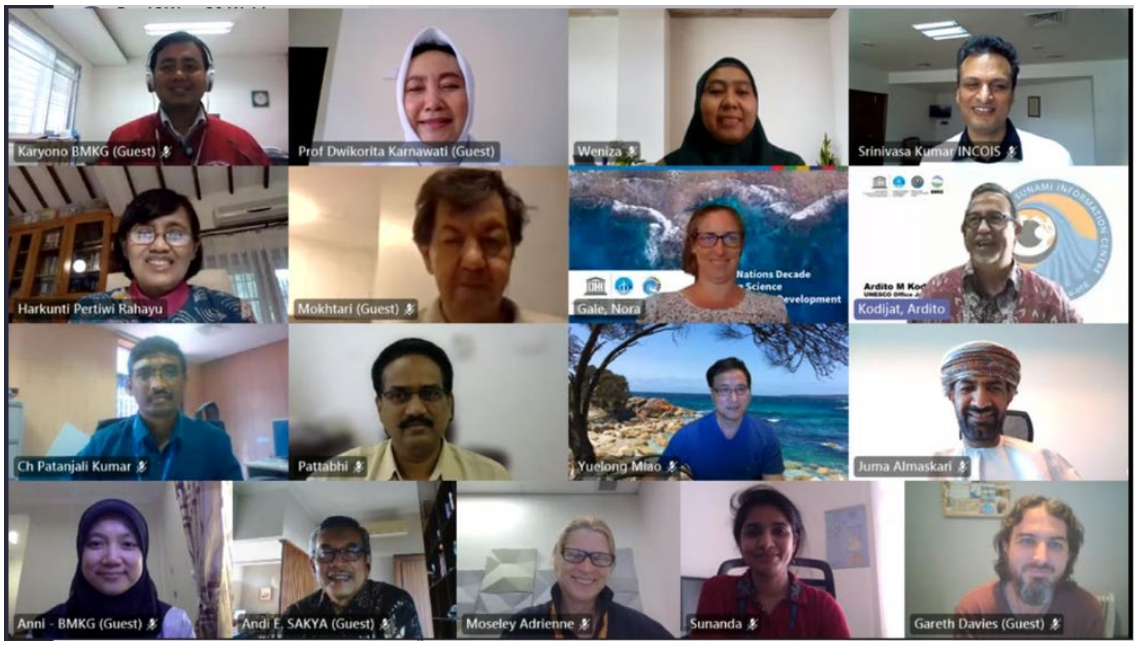
Prof. Dwikorita Karnawati, Chair (Indonesia)
Mr. Pattabhi Rama Rao Eluri, Vice-Chair (India)
Prof. Behrouz Abtahi, Vice-Chair (Iran)
Dr. Gareth Davies (Australia)
Dr. Yuelong Miao (Australia)
Ms. Adrienne Moseley (Australia)
Mr. Patanjali Kumar Chodavarapu (India)
Ms. V. Sunanda Manneela (India)
Dr. Srinivasa Kumar Tummala (India)
Dr. Karyono (Indonesia)
Dr. Harkunti Rahayu (Indonesia)
Dr. Andi E. Sakya (Indonesia)
Mrs. Weniza (Indonesia)
Dr. Mahmood Reza Akbarpour Jannat (Iran)
Dr. Mohammad Mokhtari (Iran)
Mr. Alyaqdhan (Oman)
Dr. Juma Said AlMaskari (Oman)

Invited Experts

Dr. Robert Greenwood (Australia)
Dr. Muhamad Sadly (Indonesia)

UN Agencies

Ms. Nora Gale, ICG/IOTWMS Secretariat, UNESCO-IOC
Mr. Ardito Kodijat, IOTIC, UNESCO Jakarta



Participants at the Intersessional Meeting of ICG/IOTWM Steering Group,

Online Meeting, 16-17 December 2020

1.1 OPENING

Opening remarks were given by Prof. Dwikorita Karnawati, Chair of ICG/IOTWMS. Prof. Karanwati welcomed the distinguished members, Vice-Chairs of IOTWMS, Chairs of the ICG/IOTWMS Working Groups and Task Teams, Ms Nora Gale, Mr. Ardito Kodijat, and all invited participants to the Steering Group meeting. As tsunamis do not know geographical boarders, it is important for neighboring countries to work together on tsunami warning and mitigation. She drew reference to the Makran project, the Capacity Assessment of Tsunami Preparedness, the Covid-19 guideline and reports of WG-1 and WG-2, as well as he first Tsunami Ready communities in the Indian Ocean region and the importance of the programme. She noted that the ICG should also consider Tsunami Ready recognition for critical infrastructure bodies (i.e. ports, harbors etc.)

The agenda for the Steering Group meeting was presented for adoption (refer to Annex 1). Dr. Srinivas Kumar Tummala suggested the inclusion of an agenda item on the UN Ocean Decade and it was agreed this would be discussed under any other business.

Prof. Karnawati reviewed the membership and terms of reference of the ICG/IOTWMS Steering Group. The terms of reference are to coordinate and integrate the work of ICG/IOTWMS in the inter-sessional periods, as implemented through the various Working Groups and Task Teams to:

1. Oversee the execution of the Decisions and Recommendations of the ICG.
2. Monitor the overall performance of the IOTWMS.
3. Identify areas of priority for action following assessments, communications tests, exercises and real tsunami events.
4. Ensure the IOTWMS is implemented in line with the guidance of the TOWS-WG for the harmonisation of global tsunami warning and mitigation systems.
5. Identify and assess resource requirements to support implementation of the IOTWMS.

The list of participants is provided at the start of Section 4 with more details provided in Annex 2.

1.2 SECRETARIAT REPORT

Ms. Nora Gale reported on the activities of the Secretariat during the period October 2019 to December 2020. Notably, Dr. Srinivas Kumar Tummala resigned from UNESCO-IOC in August 2020 to take up the position of Director of INCOIS. Ms. Gale will act as interim Head of Secretariat during the recruitment process.

Ms. Gale shared information on the terms of reference, staffing, meetings, events, publications, UNESCO-IOC Tsunami Ready, Exercise IOWave 2020, the UNESCAP-funded Makran project on *Strengthening tsunami early warning in the North West India Ocean regional through coordination*, and upcoming work. The Capacity Assessment of Tsunami Preparedness in the Indian Ocean and its Executive Summary have been published, providing an update to the 2005 report and identifying gaps and priorities for capacity development. Further, guidelines for tsunami warning services, evacuation and sheltering during Covid-19 have been published by WG-1 and Impacts of Covid-19 pandemic on IOTWMS Monitoring Networks and Tsunami Service Providers have been published by WG-2. Ms. Gale noted the call for proposals for the UN Decade of Ocean Science preparatory phase with more information available at https://oceandecade.org.

1.3 REVIEW OF ACTIONS

Ms Nora Gale of the ICG/IOTWMS Secretariat reviewed the Steering Group actions and recommendations. Seven (7) items were closed during the 15th Steering Group meeting (refer to table below).

#	Closed Action	Update from SG-15 2020
SG 13.03	Consider approving a 1-day Special technical session on the Palu earthquake and tsunami back to back with the Centennial Conference of the Institute Technology Bandung (ITB) schedules during 4-7 November 2019 in Bali, Indonesia	**SG-15:** Closed.
SG 13.13	Working Group 1 to prepare a special edition journal series dedicated for IOTWMS as part of the IJDRBE (International Journal of Disaster Resilience in the Built Environment) focusing on all 3 pillars of the IOTWMS and report to the ICG-XII	**SG-15:** Closed and completed
SG 13.22	IOC-UNESCO to send congratulatory message addressed to the Permanent Delegations and UNESCO National Commissions of the IOTWMS Member States that participated in community evacuations and IOTR piloting during IOWave18	**SG-15:** Closed and completed. Included in CL-2783
SG 13.24	IOTIC to finalise the report on ITST-Palu for presentation at the ICG-XII, explore organising a scientific conference on lessons learnt from Palu event, archive data collected from the ITST initiatives and prepare a summary report on behalf of the IOC for submission to Government of Indonesia	**SG-15:** Closed and completed

SG 14.03R	The Steering Group approves the work plans of the Working Groups, Task Teams, and IOTIC.	**SG-15:** Closed and completed
SG 14.02	WG-1 to develop the infographic on IOTWMS Status Report to be circulated to the policy makers.	**SG-15:** Closed and completed
SG 14.04	Members of the Steering Group to provide feedback on the IOTWMS Status Report and IOTWMS Fact Sheet to the Secretariat by 18 October 2019. Secretariat to publish the IOTWMS Status Report and Fact Sheet after incorporating feedback from the Steering Group members.	**SG-15:** Closed and Completed

Thirteen (13) actions remained open and will be the subject on ongoing work (refer to table below).

#	Open Action	Update from SG-15
SG 11.03	WG-2 to engage with WG-NWIO to assist with assessment of seismicity for the Makran following the next meeting of the NWIO (project/proposal/ESCAP)	**SG-15:** Ongoing - Underway as part of UNESCAP project
SG 11.06	Develop integrated event database and KPI reporting system (WG-2)	**SG-15:** Ongoing. KPI reporting system online at TSP-India.
SG 11.17	WG2 to initiate a study of Green's Law applicability/exceptions in the Indian Ocean, especially relating to islands, bays and coastlines with coral reefs.	**SG-15:** Ongoing. TSPs to conduct case studies where high-resolution bathymetry datasets are available.
SG 12.04	**Training of Operators:** Requests WG-2 to explore the option of exchange of operators amongst the TSPs	**SG-15:** Outstanding

SG 13.02	Consider updating the Probabilistic Tsunami Hazard Assessment (PTHA) for Indian Ocean based on recent work by Geoscience Australia	**SG-15/WG1-2020** Ongoing – Makran PTHA under development as part of UNESCAP project. A natural progression would be to undertake the IO PTHA following the completion of the Makran PTHA noting lessons learnt during the initiative. regarding Hazard Assessment for MSZ.
SG 13.05	Continue to include an additional one-day session on TWC and Seismic Network Operations as part of all future SOP trainings	**SG-15:** In-person workshops on hold due to Covid-19.
SG 13.06	Consider mechanisms to strengthen cooperation between UNESCAP, PTC, APDIM and IOTWMS, especially in the context of integrating tsunami warning systems into a multi-hazard framework	**SG-15:** Ongoing. Cooperation growing through UNESCAP Makran project.
SG 13.21	Working Groups to prioritise future Capacity Development requirements of IOTWMS Member States based on results of the TT-CATP survey	**SG-15:** Ongoing.
SG 13.23	IOTIC to continue to support the implementation of IOTR and communication and documentation of future IOWave exercises	**SG-15:** Ongoing. Due to Covid-19, Exercise IOWave20 was scaled back to communication test only.
SG 14.01R	The Steering Group decides to prepare a 2-page strategic communique articulating the urgent and critical needs for sharing of real time sea level, seismic and GNSS data as well as coastal bathymetry and topography for enhancing tsunami warning systems. Adrienne Moseley will lead the preparation of this paper along with Juma Al-Maskari, Harkunti Rahayu, Mohammad Sadly and Pattabhi Rama Rao. This declaration will be presented to the TOWS-WG in	**SG-15:** Presented to TOWS-WG 2020; to be linked to decade initiatives.

	February 2020 and also link to the decade initiatives.	
SG 14.02R	The Steering Group decides to nominate the following representatives of the IOTWMS to the TOWS-WG Task Teams: TTDMP – Dr Harkunti Rahayu (Indonesia) and Mr Ardito Kodijat (IOTIC); TTTWO – Mr Pattabhi Rama Rao (India) and Dr Mohammad Mokhtari (Iran).	**SG-15:** Ongoing - Same representatives for TOWS-WG 2021 meetings.
SG 14.01	WG-1 to develop a communication plan for the IOTWMS. Harkunti Rahayu to present a draft to the next SG meeting.	**SG-15:** Ongoing.
SG 14.03	WG-2 to develop a competency framework for tsunami warning centre operators for both IOTWMS-TSPs and NTWCs drawing on similar initiatives at PTWS. Yuelong Miao to present a draft to the next Steering Group meeting.	**SG-15:** Ongoing. Discussed at TOWS-WG TTTWO (Feb 2020).

4.4 WORKING GROUP REPORTS

4.4.1 Working Group 1 on Tsunami Risk, Community Awareness and Preparedness

Dr. Harkunti Rahayu presented the Working Group 1 (WG-1) report. She reviewed the terms of reference, membership and progress on WG-1 activities. She shared the briefing papers related to the interface study and standard operating procedures for Sri Lanka's Tsunami Early Warning System. An ongoing activity of the Working Group is development of a IOC technical series publication with a self-assessment tool for governance of the upstream-downstream interface in tsunami early warning. Dr. Rahayu also drew attention to a project on implementing multi-hazard disaster preparedness during the Covid-19 pandemic, led by the University of Huddersfield.

4.4.2 Working Group 2 on Tsunami Detection, Warning and Dissemination

Dr. Yuelong Miao presented the Working Group 2 (WG-2) report. He reviewed the Working Group's terms of reference, membership and workplan. Each item of the workplan was reviewed and updated where appropriate. The results of message delivery success rates, web access and status reporting were shown for the past communication tests. The current impact of the Covid-19 pandemic on TSP operations and the seismic and sea level networks have been assessed as negligible. However, if the pandemic persists then

issues may arise. The agenda of the WG-2 sessional meeting was reviewed. The actions and recommendations from this meeting were presented for endorsement by the SG-15.

4.4.3 Sub-Regional Working Group for the North West Indian Ocean

Dr Mohammad Mokhtari noted that the Subregional Working Group for the North West Indian Ocean (WG-NWIO) is integrated with the work of the other working groups. He briefed on the terms of reference and membership before presenting actions and activities. He then reported on the meeting of the WG-NWIO and related Makran project including the *Regional workshop on harmonization of NTWC tsunami warnings and products in the NWIO* (November 2020). Future priorities and recommendations include data integration, data sharing, the NWIO probabilistic tsunami hazard assessment, and other tools for tsunami prediction.

4.5 TSUNAMI SERVICE PROVIDER (TSP) REPORTS

4.5.1 TSP-Australia

TSP –Australia was reported on by Ms. Adrienne Moseley. TSP Australia is a joint system operated out of Geoscience Australia (who are responsible for earthquake analysis) and the Bureau of Meteorology (who are responsible for sea level monitoring, tsunami forecasting, and issue of tsunami warnings) referred to as the Joint Australia Tsunami Warning Center (JATWC). Covid-19 has had limited impact on the services of TSP-Australia. Future developments include a planned rollout of upgraded tsunami Decision Support Tool, upgraded TSP-Australia services to match the Standard Service Definition Document version 4, accreditation for GA-JATWC duty staff and routine functional testing between Geoscience Australia and the Bureau of Meteorology. Other future developments include the ROBUST program (enhancement of all Bureau infrastructure and software systems), seismic array data processing, completion of ISO 9001:2015 accreditation, and to continue to contribute to IOTWMS activities.

4.5.2 TSP-India

TSP-India was reported on by Mr. Patanjali Kumar Chodavarapu. Developments since the last Steering Group meeting include a technology refreshment to the tsunami warning centre, real-time tsunami modelling using ADCRIC, upgrading the decision support system, proof of concept for Service Level 3, implementation of CAP for national and TSP services, and an event database and KPI generator. India participated in Exercise IOWave20 as a TSP as well as at national level. The communities as Venkatraipur and Noliasahi of Odisha State were recognised as Tsunami Ready by UNESCO-IOC. Future plans include to operationalize the KPI system, work on operational procedures for atypical tsunami sources, and ultise real-time GNSS and strong motion accelerometer data for earthquake rupture characterisation.

4.5.3 TSP-Indonesia

TSP-Indonesia was reported on by Dr. Karyono. They have 411 seismic monitoring stations in Indonesia and 93 international stations. The main earthquake and tsunami monitoring system is operated from BMKG in Jakarta with a back-up system operated from the island of Bali. The data process uses Seiscomp3 and TOAST. Developments since the last ICG include extended dissemination through social media (Twitter), upgraded Seiscomp3 and Decision Support System, and deployment of 194 new seismic stations (39 deployed this year). Development of the WRS-TSP, a real-time system to receive tsunami bulletins, was discussed and a video on WRS-TSP Indonesia was shown. There are plans to develop a system to handle warning for atypical events, generate KPIs automatically, and provide a CAP data feed.

4.6 TASK TEAM REPORTS

4.6.1 Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone

Dr. Juma Al-Maskari, Chair of the Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone (TT-MSZ), provided an activity report. The Task Team was established at ICG/IOTWMS-XII, Kish, March 2019 with 5 Terms of Reference:

1. Draft an agreement document for real-time exchange between Member States of seismic/sea-level/GNSS data in the Makran Subduction Zone (MSZ)

2. Specify optimal number and configuration of seismic/sea-level/GNSS and other observing networks needed for real-time tsunami warning in the MSZ

3. Investigate and report on the credible maximum earthquake magnitude in the Makran Subduction Zone and define a strategy to develop a unified hazard map

4. Investigate and report on the seismicity of the Makran subduction zone as well as the potential impact of tsunamis in the Red Sea and Persian Gulf with a view to including those zones in the IOTWMS Area of Service if there is a threat

5. Review and report on the status of research into modelling of secondary non-seismic effects tsunamis in Makran for potential use in the IOTWMS

Regarding Term of Reference 1, the importance of sharing data for tsunami modelling started as early as 2005 with the Mauritius Declaration. For the NWIO region, the discussion of real-time exchange of data began in Muscat 2015 when the WG-NWIO was established. Since this time there has been a bilateral seismic agreement between Sultan Qaboos in Oman and the University of Iran in Tehran to exchange two seismic stations bilaterally. To date data exchange agreements have only been obtained on a bilateral basis and this is not enough. The North West Indian Ocean Member States have discussed a multi-lateral agreement including IOTWMS-TSPs. A multi-lateral agreement for seismic/sea-level/GNSS was drafted by Ms. Adrienne Moseley and presented to TOWS-WG TTTWO (February 2020).

Terms of Reference 2-5 are being addressed within the UNESCAP-funded project on Strengthening Tsunami Warning in the North West Indian Ocean through Regional Cooperation. This project is now extended by 1-year due to COVID-19 with a completion date of 31 October 2021.

4.6.2 Task Team on Tsunami Preparedness for a Near-Field Tsunami Hazard

Dr. Mahmood Reza Akbarpour Jannat, Chair of the Task Team on Tsunami Preparedness for a Near-Field Tsunami Hazard (TT-Near Field), presented the terms of reference for the task team, which relate to activities of the UNESCAP-funded project on *Strengthening tsunami early warning in the North West Indian Ocean region through regional cooperation,* including the NTWC product harmonization, implementation of national tsunami boards and refinement of national warning chains and associated SOPs.

1. Assist Member States threatened by near-field tsunami threat to adapt and integrate their national warning chains and SOPs, particularly in relation to community preparedness for self-evacuation.

2. Guide the implementation of Indian Ocean Tsunami Ready recognition programme in the IOTWMS Member States with a near-field tsunami threat.

Dr. Akbarpour Jannat recalled that the last meeting of the Task Team that was held in Jakarta back-to-back with the Palu Symposium in 2019.

Dr. Akbarpour Jannat referred to the TOWS-WG TTTWO reference document for best practice for near-field tsunami response. Member States are encouraged to adapt their own guidelines noting the best strategy is self-evacuation based on natural warning signs. Official warning systems must have simple warning

chains. People must know not to wait for official warning before evacuation. Natural, official and unofficial warnings must be accounted for in the warning chain. Public education programmes should be based on natural warnings such as long and strong, get gone. The accepted best practice is to issue a warning within 5-10 minutes based on the best information available at the time. Error on the side of caution (i.e. plus 0.3 magnitude) noting that the magnitude can increase in the first 30 minutes.

4.6.3 Task Team on Exercise Indian Ocean Wave 2020

Ms. Weniza, Chair of Task Team on Exercise Indian Ocean Wave 2020, provided an activity report. She reviewed membership and the terms of reference of the Task Team:

1. Plan and coordinate the next IOWave Exercise (IOWave20), taking on-board suggestions from the post-IOWave18 lessons learnt workshop including an increased focus on LDMO down to community level and implementation of IOTR.

2. Prepare the Exercise Manual in accordance with the Guideline on "How to Plan. Conduct and Evaluate Tsunami Exercises" (IOC Manuals and Guides No. 58) at least 6 months in advance of the exercise.

3. Prepare the Exercise Report for ICG/IOTWMS-XIII.

Exercise IOWave20 was conducted during 6 – 20 October 2020. IOWave20 was the first time three scenarios were exercised placing the entire Indian Ocean region under tsunami threat. Due to the pandemic, the exercise only focused on the three upstream objectives. Member States were encouraged to review and update their standard operating procedures for the pandemic situation. Ms. Weniza reviewed the timeline of activities and level of participation. Nineteen Member States reported participation via an online survey with six of these involving the community. The post-IOWave evaluation and webinar captured recommendations from the Member States for improving future exercises (see Annex 3).

4.7 IOTIC REPORT

Mr. Ardito Kodijat, Head of IOTIC, reported on the progress of activities. At present there is on only one IOTIC supporting staff as the other two have resigned to do Master's degrees. IOTIC has implemented five projects since 2012 with external funding. Key activates include the organization of workshops, webinars, and outreach materials. IOTIC has provided substantial support to the UNESCO-IOC Tsunami Ready programme and Exercise IOWave20.A six-part online lecture series on UNESCO-IOC Tsunami Ready was conducted in September and October 2020. In alignment with World Tsunami Awareness Day 2020, a regional webinar on Tsunami Ready in Indian Ocean Island States was conducted. Another key programme focuses on preserving past tsunami information for future preparedness. The programme and activities for 2021 were presented, which included the provision of information on applying for Tsunami Ready recognition.

Mr. Kodijat noted that the IOTIC-BMKG partnership will end in October 2022. IOTIC and BMKG are discussing strengthening cooperation under the partnership agreement with a view to (hopefully) extending the partnership agreement beyond 2022.

4.8 UNESCAP MAKRAN PROJECT REPORT

Mr. Kodijat reported on the status of the UNESCAP-funded project on *Strengthening tsunami early warning in the North West Indian Ocean region through regional cooperation*. There are two outcomes to phase 1 of the project: 1) better understanding of the risk knowledge based on scientific research and 2) improvement of warning services at NTWC level and the organization of the national warning chains to assure timely warnings and rapid response with due emphasis on self-protection for near source events. Due to ongoing international travel restrictions associated with the Covid-19 pandemic, since March the project workplan has been entirely online with a focus on progressing both project outcomes. Progress has been achieved via

national consultation meetings, a regional workshop on Harmonization of NTWC Warnings and Products, and meetings on development of the Probabilistic Tsunami Hazard Assessment (PTHA) for the Makran region.

4.9 ICG MEETING

Ms. Gale briefed on the next sessional meeting, ICG/IOTWMS-XIII.

Ms. Gale an important discussion about the upcoming 13th session of the ICG/IOTWMS to be held in Indonesia and tentatively scheduled for early 2021. Indonesia noted that they could host this meeting as early as June depending on the inputs from other Member States. However, another alternative would be to hold the ICG as an online meeting.

In the backdrop of the ongoing Covid-19 pandemic and international travel restrictions, the Steering Group discussed either holding the 13th session of the ICG/IOTWMS as an:

1. Online Meeting during the 2nd half of 2021 (June or later) with a view to become a hybrid or physical meeting if travel permits OR
2. In person event in 2022 assuming international travel resumes. The host country Indonesia has suggested to hold the meeting in May back-to-back with the Global Platform for Disaster Risk Reduction.

The Steering Group agreed that the Secretariat would ask the Tsunami National Contacts for their preference and report back by the end of January 2021 at which time a final decision would be made.

4.10 ANY OTHER BUSINESS

4.10.1 Participation in UN Decade of Ocean Science

The Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System fully supports the UN Ocean Decade of Ocean Science for Sustainable Development. In the Indian Ocean region, Member States' national tsunami activities are being synthesized into regional programmes in support of the Ocean Decade. Contributions towards a predictable and safer ocean in the area of technology include SMART deep-sea cables, GNSS deployments and increased sea level measurements. In the spirit of the Ocean Decade, the ICG/IOTWMS requests Indian Ocean Member States' support timely sharing of seismic and other data to strengthen our Tsunami Warning System. Furthermore, Member States are encouraged to piloti the UNESCO-IOC Tsunami Ready programme and promote open access to high-resolution near shore bathymetry and topography data for accurate inundation and evacuation mapping in support of Tsunami Ready communities.

4.11 PROGRAMME AND BUDGET

Ms. Nora Gale reviewed the work program and budget for the intersessional period. There have been cumulative savings associated with overseas meetings being postponed and/or replaced with online events associated with international travel restrictions during the Covid-19 pandemic. However, Mr. Kodijat noted that the BMKG funding to IOTIC was not received as a result of reallocation of funds during the pandemic.

4.12 RECOMMENDATIONS AND ACTION

ICG/IOTWMS Steering Group Recommendations and Actions arising during the 15th meeting are provided below.

Recommendations:

Recommendation 1: Accept the reports of the ICG/IOTWMS Working Groups, Task Teams, IOTIC and the Secretariat.

Recommendation 2: Endorse the new actions and recommendations arising during the Working Group 1, Working Group 2 and North West Indian Ocean Working Group meetings held on 3, 10, and 8-9 December respectively.

Specifically,

Working Group 1:

WG1-2020.01R: Endorse the recommendations of the Capacity Assessment of Tsunami Preparedness [Status Report 2018] related to a) risk assessment and reduction and b) awareness, preparedness and response for consideration in the WG-1 work plan.

WG1-2020.01: Working Group 1 to support the developing and harmonizing local capacities for tsunami early warning project being undertaken with ITB and University of Huddersfield with case study taken in Indonesia funding from 2020 Newton Prize Winner (Harkunti P. Rahayu and Richard Haigh).

WG1-2020.02: Noting the kind offer of WG1 to assist with the upcoming Capacity Assessment of Tsunami Preparedness, a team consisting of Harkunti Rahayu, Dilanthi, Richard and Nora Gale to discuss the CAPT survey in more detail including incorporation of pandemic-related questions such as the extent to which tsunami preparedness measures have been adapted to Covid-19 conditions.

WG1-2020.03: Working Group 1 to support the integration of pandemic, tsunami and other multi hazard preparedness into Early Warning and Urban Planning project being undertaken in 2021-2021 by ITB and University of Huddersfield with major survey will be undertaken in Indian Ocean and implementing case studies will be in Indonesia and Sri Lanka.

Working Group 2:

***WG2-2020.01R*:** Consider conducting a follow-up survey to assess the potential impacts of prolonged COVID-19 on operations, data procurement and risks.

***WG2-2020.02R*:** Endorse the recommendations of the Capacity Assessment of Tsunami Preparedness [Status Report 2018] related to detection warning and dissemination for consideration in the WG-2 work plan.

***WG2-2020.03R*:** Consider conducting a small survey to find out what types of dissemination channels that NTWCs are finding useful and preferable, including but not limited to the current four – GTS, SMS, Email and Fax. This could be included as part of the next communications test survey or national report to ICG-XIII.

WG2-2020.01: A team comprising Mr. Padmanabham, Dr. Karyono and Dr. Miao to develop guideline of tsunami CAP standard for NTWCs, and to present the outcome to the next meeting of TOWS-WG TTTWO.

***WG2-2020.02*:** Mr. Kodijat to put Dr Robert Greenwood in contact with Ms. Weniza from TOWS-WG TTTWO ad-hoc team on best practices for non-megathrust and non-seismic source tsunamis hazard assessment, monitoring and response.

***WG2-2020.03*:** Update the IOTWMS Service Definition document (SDD) to include TSP products for the maritime community, in addition to adding a clarification at the end of point 9 that "This does not preclude TSPs from issuing SL-2 bulletins in situations that they have assessed as causing threat to the IOTWMS CFZs for earthquakes less than M8.0", and updating the word "Revised" with "Updated" in the IOTWMS TSP bulletins and templates. Table the updated SDD at the ICG-13 for endorsement.

WG2-2020.04: TSP Indonesia to facilitate access to its WRS-TSP by interested NTWCs, to evaluate the customer feedback and report back to the next WG2 meeting. TSPs to look into the effectiveness of the WRS-TSP proposed by TSP Indonesia as one of the dissemination tools of Tsunami Early Warning

WG2-2020.05**:** TSPs to implement sending TSP NAVAREA bulletins to NAVAREA Coordinators via email subscription.

WG2-2020.06**:** TSPs and interested NTWCs to conduct case studies to verify Cenalt's formula for modified Green's Law in localities where high-resolution bathymetry datasets and/or past event data are available, with the aim to develop a set of tailored formula suitable for different types of Indian Ocean coastlines.

WG2-2020.07**:** WG-2 to advise the Makran project team on best practice regarding issues relating to harmonization of NTWC warnings and products in the Makran region.

Subregional Working Group for the North West Indian Ocean*:*

WG-NWIO-2020.01R: Requests the ICG/IOTWMS to encourage all Member States to work on their tsunami warning chain with a view to minimize the number of steps (between the NTWC and Public) in the warning chain, and with clear authorization of responsibilities amongst the NTWCs, NDMOs, LDMOs and Public.

WG-NWIO-2020.02R: NWIO-WG member states are urged to exchange real-time data with the TSPs. It is also strongly suggested to go toward the multi-lateral.

WG-NWIO-2020.03R: The reaction to atypical tsunami events needs to be incorporated into tsunami early warning systems including community evacuation and emergency plans.

WG-NWIO-2020.01: On-job training also needs to be initiated among NWIO member countries, may be when international travel is safe we can start with one by one member state.

WG-NWIO-2020.02: Initiate building knowledge-based database of risk assessment (approaches adopted for hazard, vulnerability and risk assessment) that is accessible to all Member States (possibly IOTIC site or other portal).

WG-NWIO-2020.03: Paleotsunami study has been initiated in Iran by the University of Hormozgan, to be extended in the region, this can help us to know more historical seismicity and also achieve the required Mmax for hazard studies.

Recommendation 3: Consider the new recommendations presented by IOTIC related to the pre-IOWave20 SOP webinar, WTAD webinar, and post-IOWave20 webinar.

Recommendation 4: Approve the IOTIC program and activities plans for 2021.

Recommendation 5: Steering Group to guide and advise IOTIC on Terms of Reference and roles, online lecture series, and implementation of partnership agreement with IOTIC-BMKG.

Recommendation 6: Promote increased participation of higher-level DMO representatives in the UNESCO-IOC Tsunami Ready programme, and IOTIC-IOTWMS workshops and activities.

Recommendation 7: Encourage the participation of North West Indian Ocean representatives in webinars and workshops with a focus on the Makran region.

Recommendation 8: Chairs of WG1, WG2, WG-NWIO, and Task Teams to prepare a proposal for UN Ocean Decade with support from IOTIC and the Secretariat for enhancement by the Steering Group. Consider focusing on 1) Near-field tsunami warning and mitigation including: transforming tsunami warning services through new technology (GNSS, smart cables) through to community preparedness and infrastructure; and/or 2) Tsunami monitoring gaps in NWIO. In-particular enhancing the observing networks, PTHA development, and data sharing. These activities could be expanded to the entire Indian Ocean basin.

Action 1: WG1 and WG2 to review the TT-IOWave20 recommendations related to downstream and upstream activities.

Action 2: Working Groups to review the recommendations of the Capacity Assessment of Tsunami Preparedness: Status report 2018.

Action 3: WG-2 and WG-NWIO to provide advice to Makran project team on harmonisation issues of NTWC products and warnings in the NWIO.

Action 4: With guidance for the Steering Group, IOTIC to provide more detailed information to Member States on how to apply for Tsunami Ready recognition including a clear stepwise procedure and mechanism.

Action 5: Ocean Teacher Global Academy related activities should be jointly developed and ran between IOTIC, STC-Indonesia at BMKG, and R/STC-ITCOOcean at INCOIS.

Action 6: Secretariat to seek inputs from Member States by formal letter [email] regarding holding ICG-XIII as either 1) online meeting conducted in second semester (June or later) with a view to become a hybrid or physical meeting if travel permits, or 2) further postpone until international travel is instated (possibly 2022). ICG/IOTWMS Officers to reach a decision by the end of January regarding holding the next ICG.

4.13 CLOSING

Prof. Karnawati thanked all participants for their participation and active discussion throughout the 15th meeting of the ICG/IOTWMS Steering Group. over the last two days. She officially closed the meeting.

Annex-1

15th Meeting of the ICG/IOTWMS Steering Group

Agenda

16-17 December 2020

Day-1: Wednesday, 16 December (5:00 – 8:10 UTC)

Chair: Dwikorita Karnawati

Start Time (UTC)	Min.	#	Agenda Item	Speaker
5:00	30	**1.**	**Opening**	Dwikorita Karnawati
			In this session Prof. Karnawati will provide opening remarks, participants will introduce themselves, and the agenda will be presented for approval.	
5:30	20	**2.**	**Secretariat Report**	Nora Gale
5:50	20	**3.**	**Review of Actions**	Nora Gale
		4.	**Working Group Reports**	
6:10	20	4.1	WG-1 on Tsunami Risk, Community Awareness and Preparedness	Harkunti Rahayu
6:30	20	4.2	WG-2 on Tsunami Detection, Warning and Dissemination	Yuelong Miao
6:50	20	4.3	Sub-Regional Working Group for the North West Indian Ocean	Mohammad Mokhtari
		5.	**Tsunami Service Provider Reports**	
7:10	20	5.1	TSP-Australia	Adrienne Moseley
7:30	20	5.2	TSP-India	Patanjali Kumar
7:50	20	5.3	TSP-Indonesia	Karyono

Day-2: Thursday, 17 December (5:00 – 8:10 UTC)

Chair: Dwikorita Karnawati

Start Time (UTC)	Min.	#	Agenda Item	Speaker
		6.	**Task Team Reports**	
5:00	20	6.1	Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone	Juma Al-Maskari
5:20	20	6.2	Task Team on Tsunami Preparedness for a Near-Field Tsunami Hazard	Mahmood Reza Akbarpour Jannat
5:40	20	6.3	Task Team on Exercise Indian Ocean Wave 2020	Weniza
6:00	20	**7.**	**IOTIC Report**	Ardito Kodijat
6:20	20	**8.**	**UNESCAP Makran Project Report**	Ardito Kodijat
6:40	20	**9.**	**ICG Meeting**	Nora Gale
7:00	20	**10.**	**Any Other Business**	tbc
7:20	20	**11.**	**Programme and Budget**	Nora Gale
7:40	20	**12.**	**Review of Actions and Recommendations**	Nora Gale
8:00	10	**13.**	**Closing**	Dwikorita Karnawati

Annex-2

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

Intersessional Meeting of Working Groups and Steering Group

Online Meetings

3 – 17 December 2020

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Annex-3

UNESCO IOC
Intergovernmental Coordination Group for
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Recommendations from the IOTWMS-IOTIC POST-IOWave20 Webinar on Lessons Learnt during Exercise Indian Ocean Wave 2020

11 - 12 November 2020

The recommendations arising during the Post-IOWave20 webinar are directed towards (i) the Exercise IOWave Task Team and Secretariat, (ii) Working Group 1 on Tsunami Risk, Community Awareness and Preparedness and the Indian Ocean Tsunami Information Centre (IOTIC), and (iii) Working Group 2 on Tsunami Detection Warning, and Dissemination. They related to the areas of exercise planning, and the downstream and upstream tsunami warning system, respectively.

(i) Exercise Planning

- IOWave Exercises should use scenarios that are suitable for all Member States to participate, 3 scenarios worked well for coverage.
- Holding the scenarios 1-week apart worked well.
- The Exercise should be conducted in September to avoid the cyclone season [Australia; India] However, after IOWave18 it was noted that September is inconvenient for some countries due to Monsoon and Floods [Pakistan, India, Sri Lanka] and hot weather [Oman].
- Coordinate with PTWS to ensure Exercises occur in opposite years [Australia, Indonesia]. *This has been raised in TOWS-WG and can be raised again.*
- International observers should be included in future exercises (such as IORA) [India] and virtual observations should be utilised more widely.
- Consider informing more national leaders of the Exercise in addition to the Tsunami National Contacts.
- Document the lessons learnt and changes triggered from the Exercise (i.e. establish a monitoring mechanism).

(ii) Downstream

- Member States should update their SOPs for the pandemic situation with support from WG1-IOTIC.
- Where possible, communities should be encouraged to test/verify the UNESCO-IOC Tsunami Ready Indicators during the Exercise.
- Encourage countries to conduct regular exercises at least every year between IOWaves. They could align with communication tests.
- WG1-IOTIC should provide guidelines for conducting virtual table-top exercises.

(iii) Upstream

- Establish a work mechanism between NTWCs and TSPs to solve communication issues (i.e. non-receipt of messages).
- WG-2 to identify reliable tide gauge stations with fast transmission rates.

- Consider having the TSPs send an sms/email notification whenever there are tsunami product updates (ex. Tide gauge observations).
- Conduct a risk assessment of upstream tsunami warning including dissemination of tsunami warnings, reliable resources, etc.