## A. Overview

[For detailed guidance on how to fill out each section of the form, please consult the guidelines posted on the Trust Fund website.]

<table>
<thead>
<tr>
<th></th>
<th>ORGANIZATION SUBMITTING PROPOSAL</th>
<th>Intergovernmental Oceanographic Commission of UNESCO</th>
</tr>
</thead>
</table>
| 1 | FOCAL POINT AT ORGANIZATION AND RELEVANT CONTACT INFORMATION | Dr Thorkild Aarup  
Head of Tsunami Unit  
IOC UNESCO  
7 Place Fontenoy  
75352 Paris 07 - SP  
France  
Email: t.aarup@unesco.org |
|   |                                                   | Dr Srinivasa Kumar Tummala  
Head of the ICG/IOTWMS Secretariat,  
PO Box 1370,  
Level 3, 1 Ord Street  
West Perth, WA 6872  
Australia  
Email: sk.tummala@unesco.org |
|   |                                                   | Mr Ardito M. Kodijat  
Indian Ocean Tsunami Information Centre (IOTIC)  
UNESCO Office Jakarta  
Email: a.kodijat@unesco.org |
| 3 | PROJECT TITLE | Strengthening tsunami early warning in the North West Indian Ocean region through regional cooperation |
| 4 | BENEFICIARY COUNTRIES | India, Iran, Pakistan and Oman (Oman is not an ESCAP Country but will be participating with their own support) |
| 5 | TARGET GROUP(S) | Tsunami Warning Centres and Disaster Management Office (National and Local) of the NWIO; Communities in Tsunami Prone Area in the NWIO; Response Agencies in NWIO |
### Annex I

**Strengthening tsunami early warning in the North West Indian Ocean region through regional cooperation**

| 6 | TIME FRAME | Phase 1: 18 months (currently approved) from 1 May 2019 to 31 October 2020  
|   |            | Phase 2: 12 months  
|    |            | Subject to future budget availability from UNESCAP. |

| 7 | TOTAL BUDGET (US$) AND BREAKDOWN OF FUNDING SOURCES | Phase 1: 350,000 (currently approved)  
|    |           | Phase 2: 400,000 *  
|    |           | Subject to future budget availability from UNESCAP.  
|    |           | Additional in-kind counterpart contributions are detailed under Section M |

### Executive Summary

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. Subsequently, IOC-UNESCO was given the mandate to develop and implement an Indian Ocean Tsunami Warning and Mitigation System (IOTWMS). An Intergovernmental Coordination Group (ICG) for the IOTWMS was established by a resolution in the IOC Assembly in July 2005 with a mandate to set up an early warning system to efficiently identify and mitigate the hazards posed by tsunamis.

After several years of international collaboration and development, facilitated and coordinated by IOC-UNESCO, the IOTWMS became fully functional in March 2013 and the Tsunami Service Providers (TSPs) established by Australia, India and Indonesia assumed full responsibility for the provision of tsunami services for the Indian Ocean region. The TSPs now provide alerts to all Indian Ocean Member States, reaching millions of people who had no access to such warnings in 2004. IOC-UNESCO also established the Indian Ocean Tsunami Information Centre (IOTIC) in Jakarta.

An assessment of the status of IOTWMS undertaken during the international conference to commemorate the 10th anniversary of the Indian Ocean Tsunami (October 2014, Jakarta) revealed that the Indian Ocean is much safer against the threat of tsunamis than it was in 2004. However, due to the nature of the hazard, it is important for coastal communities to always be prepared and ready to respond. The conference also identified that the focus of IOTWMS for the next 10 years should be on sustaining the system now in place, enhancing down-stream ‘last-mile’ preparedness and also understanding tsunami hazard from the Makran...
Annex I

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

subduction zone. Accordingly, the ICG/IOTWMS, at its 10th session (Oman, March 2015) decided to (i) place greater emphasis on community awareness and preparedness to help ensure more appropriate response to tsunami warning information, and (ii) to establish a new Sub-Regional Working Group for the North West Indian Ocean (WG-NWIO). The ICG/IOTWMS during its 11th session (Putrajaya, Malaysia, April 2017) requested the IOTWMS Secretariat, IOTIC and the WG-NWIO and to prepare a project proposal for submission to the UNESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness based on the recommendations of the WG-NWIO composed of members nominated by India, Iran, Oman, Pakistan, Yemen, and other Member States in the Makran region to enhance end-to-end tsunami warning and community preparedness. In the backdrop of the recent Palu and Sunda Strait tsunamis in Indonesia, the ICG/IOTWMS during its 12th Session (Kish Island, Iran, March 2019), recognised the challenges involved in tsunami early warning for such “atypical”, near-source events and encouraged member States to (i) review their tsunami warning chains with a view to minimizing the number of steps, and clear authorization of responsibilities amongst stakeholders, especially for near-field tsunami threats and (ii) enhance community preparedness for near-field tsunamis, with emphasis on self-evacuation based on natural signs.

A powerful earthquake in the Makran region could generate destructive tsunami capable of inundating coastlines within 20 minutes, thus making it imperative for the Member States in the region to be well prepared. The WG-NWIO held three inter-sessional meetings (Muscat, October 2016; Tehran, February 2017; Hyderabad, July 2018). The meetings contributed to the assessment of the current status of end-to-end tsunami warning systems in each of the participating WG-NWIO Member States (India, Iran, Oman and Pakistan) and revealed that most coastal communities are still not prepared to respond effectively to a near-field tsunami threat from the Makran subduction zone.

The NWIO-WG meeting in February 2017 in Tehran was held back-to-back with a UNESCAP analytical workshop that addressed strategies for strengthening tsunami early warning in the North West Indian Ocean region through regional cooperation and forms the basis for this project proposal. All of the participating WG-NWIO Member States identified needs to strengthen self-protection capacities at the community level by enhancing national warning chains, develop evacuation plans to suit a near-field threat, develop hazard and inundation maps, enhance scientific understanding of dynamics in the Makran subduction zone, and enhance capacities for tsunami modelling by institutes in the region. A programmatic approach involving cooperation and information sharing amongst the Member States will enable (i) the development of context-specific guidelines/methodologies based on best practice, (ii) national adaption of the reference materials by Member States and (iii) local implementation at the community-level.

The project is designed to strengthen self-protection capacities at the community level in accordance with the Tsunami Ready framework of IOC-UNESCO. Once implemented, the participating communities will be in a position to fulfil the
indicators of the Indian Ocean Tsunami Ready (IOTR) initiative which is being piloted in the Indian Ocean and could be considered by IOC-UNESCO as pilot areas for the IOTR initiative. Furthermore, the project will strengthen the capacity of the countries in the Makran region and enhance the overall performance of the ICG/IOTWMS, thus contributing to the targets and priorities of Sendai Framework for Disaster Risk Reductions (2015-2030).

B. Needs Assessment
[Which specific policy, institutional, technical, system-wide or other capacity building needs does this project intend to address? What has already been done or is ongoing to address these needs?]

The international conference to commemorate 10th anniversary of the Indian Ocean Tsunami (Jakarta, November 2014) recognised the achievements made in the preceding decade and identified challenges still to be addressed. The conference highlighted that the focus over the next ten years will be to sustain the achievements and continuing to enhance the systems now in place. In addition, for locally generated tsunamis that may arrive in minutes, communities must be educated, aware and ready to respond to the natural warning signs. Hence there is a need for renewed focus on the down-stream ‘last-mile’. Further, while identifying that the Makran subduction zone hazard is not well understood, the conference recommended strengthening sub-regional collaboration in North West Indian Ocean for real-time data exchange and research collaboration to better understand the tsunami threat, particularly in India, Iran, Oman, and Pakistan.

This resulted in the ICG/IOTWMS, at its 10th session in 2015 resolving to (i) place greater emphasis on community awareness and preparedness to help ensure more appropriate responses to tsunami warning information and (ii) to establish a new Sub-Regional Working Group for the North West Indian Ocean (WG-NWIO) composed of members nominated by Member States India, Iran, Oman, Pakistan, Yemen, and other Member States in the North West Indian Ocean region to enhance end-to-end tsunami warning in the Makran region.

While Member States in the region currently receive regional tsunami forecast information from the IOTWMS TSPs, the timeliness of such information (especially in the context of local tsunami threat), efficiency of in-country mechanisms to quickly assimilate the information received from TSPs and disseminating national warnings to vulnerable communities, as well as ability of communities to understand the warnings and/or natural signs and responding appropriately to an impending tsunami threat needed thorough assessment. Towards this end, the WG-NWIO held three inter-sessional meetings, including the most recent one in July 2018 in Hyderabad. The second meeting in February 2017 in Tehran was held back-to-back with a UNESCAP analytical workshop which identified gaps in tsunami warning systems of the WG-NWIO Member States.

All the participating WG-NWIO Member States demonstrated a need to strengthen self-protection capacities at the community level through the short-term and medium-term measures identified in this proposal.
C. Problem Analysis
[How was the problem identified? How was the project designed? Which entities (organizations and/or individuals) were consulted? For each organization, briefly explain the process and reasons for consultation.]

The magnitude 8.1 earthquake and tsunami of 28 November 1945 in the eastern segment of the Makran subduction zone resulted in reported causalities of a few hundred to 4,000 in India and Pakistan, with damage also being reported in Iran and Oman, as per different sources of information. The more recent magnitude 7.8 earthquake and tsunami of 24 September 2013 is a reminder of the potential near field tsunami threat to vulnerable coastal communities in the region. A powerful earthquake in the Makran region could generate destructive tsunami waves capable of inundating coastlines within 20 minutes, thus making it imperative for the Member States in the region to be well prepared to respond.

In many tsunami events after the 2004 Indian Ocean tsunami (e.g. October 25, 2010, April 11, 2012, and March 2, 2016 events) the community response to natural and official tsunami warnings was often chaotic, not only in counties which were close to the tsunami source, but also in countries far away from the source. Some communities conducted self-evacuations or officially ordered evacuations, while many others panicked and did nothing. This demonstrates that the technological component of the warning system should closely engage with socio-cultural aspects of the community.

Further, the ICG/IOTWMS conducted Exercise Indian Ocean Wave 2016 (IOWave16) during September 07-08, 2016 with a view to exercise the end-to-end system as well as build community awareness. India, Iran, Pakistan and Oman conducted community evacuations during the Exercise. India involved 350 villages in the exercise wherein more than 40,000 people were evacuated to shelters / safe places. In Oman 5000 students from 6 schools participate in evacuations. Pakistan involved approximately 200 people representing schools, local residents, fishermen, government officials and NGO. Iran involved beachgoers in the exercise wherein around 30 people were evacuated and moved to safe places. While the IOWave16 exercise itself was very successful in terms of engaging vulnerable communities in 12 Indian Ocean Member States, an analysis of the results however indicated that several of these evacuations were not based on proper evacuation plans. IOWave18 conducted during September 04 - 05, 2018 attracted greater participation in terms of evacuations (116, 000) and piloting of Indian Ocean Tsunami Ready in a few communities in India and Oman, but the non-availability of evacuation plans in several member states still remains a challenge.

Recognising that most coastal communities of the tsunami prone region are still not prepared to respond appropriately to a near-field tsunami threat, and that the WG-NWIO Member States are indeed vulnerable to such a near-field threat from the Makran subduction zone, an assessment of the current status of end-to-end tsunami warning systems in each of the WG-NWIO Member States of India, Iran, Oman and Pakistan was undertaken in the inter-sessional meetings of the WG-
NWIO. Representatives of the National Tsunami Warning Centres, Disaster Management Offices, Non-Governmental Organizations (NGOs) as well as tsunami preparedness practitioners and university researchers participated in these meetings.

To cope with near-field tsunamis, the following considerations were discussed during the NWIO-WG meeting in Tehran and further considered in preparing this proposal:

- Set-up of early warning systems, policies and procedures must be designed in a way to be executed realistically in the short time frame available. The required procedures and decision making processes for near-field tsunamis most possibly will differ from already established procedures in the downstream part for other hazards with longer warning times.

- Tsunami early warning is complementary and people should never wait for an official warning. People must be able to recognize natural warning signs and act on them.

- Tsunami warning is essential, especially in cases where the earthquake was not felt strongly but has the potential to trigger a tsunami (slow earthquakes). Early warning systems are required to call off an evacuation process if data shows that the previously felt earthquake does not have potential to trigger a tsunami and to issue an "all clear" message once the tsunami threat is over.

- The threat of near-field tsunamis requires strengthening the capacities of the communities at risk towards self-protection. In this regard, it is considered important that communities have a high level of awareness and sufficient knowledge to react independently and properly during a tsunami threat. National and local authorities must provide all necessary services and references to enable the communities for this, especially timely warnings and evacuation plans based on scientific hazard assessments.

D. Target Group

[Briefly describe the policies the project aims to influence and/or the institutions whose capacity the project aims to build.]

The focus in this project is on India, Iran, Pakistan and Oman. For Iran, Pakistan and Oman the main threat from the Makran subduction zone are near-field tsunamis, with minimum travel times of less than 30 minutes. Oman is not an ESCAP Member State, but is a member of the WG-NWIO and considered as a self-funded partner. India is in a slightly different situation with minimum tsunami travel times from the Makran subduction zone of less than 1 hour. The programme explicitly addresses the challenges and requirements of tsunami early warning in the context of near-field tsunamis. It is worth noting that India faces near-field tsunamis threat in the eastern Indian Ocean along the Andaman Islands and hence the interventions in this project will accrue substantial benefits for India.

From each participating Member State, it is proposed to involve representatives of the National Tsunami Warning Centre, National Disaster Management Agency,
E. Project Strategy
[What is the overall strategy of the project in addressing the problem referred to in Section B?]

Several interventions are identified to enhance end-to-end tsunami warning system in the NWIO region, especially to strengthen self-protection capacities at the community level.

Rather than attempting to implement these interventions in an isolated manner, it is recommended to adopt a programmatic approach breaking down the project into 3 phases with short, medium and long-term term goals, as follows:

**Phase-1: Short-term (within the next 18 months) – Currently approved**

- Better understanding of the risk knowledge based on scientific research.
- Improvement of warning services at NTWC level and the organization of the national warning chains (with an end to end perspective) to assure timely warnings and rapid response with due emphasis on self-protection for near source events

**Phase-2: Medium-term (18 to 30 months) – subject to future budget availability from UNESCAP**

- Development of hazard and inundation maps by enhancing capacities on tsunami modelling.
- Development of evacuation plans in line with the requirement of the threat by near-field tsunamis.

**Phase-3: Long-term (30 to 60 months) - subject to future budget availability from UNESCAP**

- Enhancing national tsunami early warning systems in the countries by all stakeholder involved and the public in general
- Up-scaling of the tested and validated approaches to support self-protection at local level developed in Phase 1.
- Tsunami risk assessment and development of mitigation strategies looking at a multi-hazard risk management approach and considering risk transfer / financing solution where appropriate.
- Strengthening of self-protection arrangements at local level: establishment of local 24/7 mechanism and warning dissemination technologies, promotion of the development of sub-district and institutional evacuation plans in line with the district or city plans, development of strategies to strengthen tsunami awareness and knowledge at community level including public and private sectors.
Annex I

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

- Strengthening tsunami emergency response plans as well as response capabilities.
- Continue to strengthen the understanding of the dynamics in the Makran subduction zone based on research by the science community.

The current proposal details the interventions to be undertaken in phase-1 short-term and phase-2 medium-term in the participating Member States, for which substantial consultations have already been undertaken with representatives of India, Iran, Pakistan and Oman. Depending on the availability of budget, phase-1 and phase-2 could also be taken up sequentially. Further, details of the long-term interventions will be worked out as a phase-3 of the project.

These interventions are best possible through regional collaboration by (i) enabling development of context-specific guidelines/methodologies based on best practice, (ii) national adaption by Member States and (iii) local implementation at the community-level. The project will adapt and combine experiences and good practices that already exist in the region as well as from other basins, work with and build the capacity of national and local officials based on the available training programme and modules, and work with them to ensure they are able to widely use the built capacity in-country at national and local level.

The Intervention strategy would cover:

**Phase-1 (Currently approved):**

**Better understanding of the dynamics in the Makran subduction zone based on research by the science community.**

The project will support the establishment of a Regional Working Group and working process between NWIO countries on risk knowledge. The Working Group will comprise of two national experts from each country to meet and discuss on understanding the risk of Makran subduction zone. In addition, international experts on the Makran subduction zone will be invited to contribute to the discussion. The working group will identify several pressing issues to be studied such as maximum magnitude and source mechanism for tsunami modelling. The project will provide co-funding for specific fields of tsunami research and studies to ensure updated scientific information on the risk of the Makran subduction zone. The project will then facilitate an international scientific meeting to share the results from research and studies and to agree as common understanding on the risk knowledge in the region.

**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**

The intervention strategy to improve warning chains is built around a working process on national level in each of the Makran countries involved. The project will support on the regional level in creating momentum and conditions for the intended change process by bringing together high level representatives from the countries to highlight the need for the further development of the tsunami early warning system and the related processes in order to cope with near-field
Annex I

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

tsunamis and to motivate to establish the necessary conditions for the proposed national working process.

Further on, the project will provide technical assistance to adapt the national warning chains and SOPs, through a series of regional SOP training/workshop. Two NTWC representatives and two NDMO representatives will be trained and be responsible for coordinating and establishing the National SOP. Additional technical assistance to backstop the National Working Groups could be offered to support the country. Once the national warning chains and related SOPs have been adapted, specific arrangements and SOPs for public media will be addressed to assure a functioning channel for warning dissemination to the communities at risk. Along the entire working process, a close link between the National Working Group and the selected pilot areas will be established to understand the requirements, capacities and possibilities of tsunami early warning at local level. Throughout the process emphasis will be laid on enhancing the capacities of communities for rapid response, and self-protection based on identification of natural signs for near source events.

India, Iran, Pakistan and Oman participated in the IOWave16 exercise held in September 2016 and tested their end-to-end warning chains and SOPs (receipt of TSP information until public evacuation). The performance was documented by the detailed post-exercise evaluation questionnaire and summarised in the IOWave16 exercise report. Further the 2nd March 2016 Southwest of Sumatra Earthquake and Tsunami Event triggered issue of tsunami forecast information by the IOTWMS TSPs which resulted in a national response in India, Iran and Pakistan. While this event did not result in public evacuation in these countries, it did result in testing the warning chains and SOPs of the NTWCs and DMOs. The results are summarised in the detailed post-event assessment report. These inputs provide a good benchmark of the current status/gaps in the SOPs and Warning Chains of the participating countries.

Benefits accrued by implementing the enhanced warning chains and SOPs in the current project can be tested and quantified during future tsunami drills and real event responses.

Phase-2 (subject to future budget availability from UNESCAP):

Development of hazard and inundation maps by enhancing capacities on tsunami modelling.

The project will support the establishment of a regional working group to foster regional cooperation and exchange of knowledge on tsunami modelling and inundation mapping. The group will aim to develop a unified way for tsunami modelling in order to assure state of the art results and inter-comparable results throughout the region. The project will facilitate two capacity building workshops of two experts from each country to discuss and agree on inundation mapping approaches. Following the first workshop the experts will be required to work on tsunami modelling and inundation mapping in the country. External experts with practical experience in the context of IOTWMS (such as AWI, BOM, INCOIS, IH
Cantabria) can be involved to support any limitations due to unavailability or inadequate data, as well as assist on requirements of hazard assessments and inundation mapping for mitigation and preparedness planning and to agree on priority areas to be covered. The second workshop will focus on agreeing to the inter-comparable results of the region.

The development of evacuation plans in line with the requirement of near-field tsunamis

On the regional level, the project will provide information on existing approaches, standards, methodologies and best practices for tsunami evacuation planning as well as recommendations for the NWIO countries what fits best and how to proceed regarding the development of a set of own policies, standards and approaches for evacuation planning. Further on, the project will support training for selected staff from partner institutions of the Makran countries to build a pool of national experts, who will facilitate and accompany evacuation processes in the selected pilot areas. The training will provide a methodology for the planning process, information on technical aspects like the development of evacuation strategies, zoning, map design and evacuation procedures as well as facilitation techniques to assure a participatory and consultative approach at community level. The project will also provide backstopping during the planning processes in pilot communities to strengthen capacities of the facilitators, to assure quality in the processes and outputs as well as to obtain feedback for possible adaptations of the methodology based on local experiences and requirements. Technical guidance and advice should be provided for example by building on and leveraging the distinct downstream experiences from other Indian Ocean countries. The developed evacuation plans and procedures in all four countries within this initiative shall be tested during a future tsunami drill Learning from the planning processes in the pilot areas shall be brought into the National Working Group responsible for the development of policies and standards. Time-wise, it is not expected that the National Working Group has finalized their tasks before starting planning processes in pilot areas. On the contrary, the experiences from the pilot areas are considered valuable inputs to design these policies and standards in an adequate way. In Iran, the community would be in Chabahar and Konarak. In India and Pakistan the selection of the community will be identified after national consultations within the stakeholders.  

F. Results Framework

[What is the longer term goal (positive impact) that the project aims to contribute to?]

The project aims to enhance end-to-end tsunami warning system in the NWIO region, especially to strengthen self-protection capacities at the community level. The expected outcomes, performance indicators and outputs are provided below. Annex 1 provides the results framework in tabular form. Annex 2 provides the result framework and the contribution from the project and expected from the participating countries.
[What are the outcomes (changes in policy and institutional capacity) that the project aims to contribute to (what will change as a result of the project)? For each outcome, please include performance indicators specifying how you will know if the outcome has been accomplished.]

Expected Outcomes:

Phase-1 (Currently approved)

1. Better understanding of the risk knowledge based on scientific research.
   - Availability of latest scientific insights on the tsunami hazard from the Makran subduction zone as an input for risk assessment activities in the countries
   - Concept and inputs for a unified regional tsunami hazard map

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
   - A mechanism for steering and coordination for the tsunami early warning system at national level in each country considering integration into a multi-hazard approach;
   - The design of a tsunami warning chain for a near-field tsunami threat
   - Revised SOPs along the warning chain
   - Policies and SOPs for public media for warning dissemination

Phase-2 (subject to future budget availability from UNESCAP)

3. Development of hazard and inundation maps by enhancing capacities on tsunami modelling
   - Specifications for a unified approach for tsunami modelling and inundation mapping for the NWIO region
   - Increased capacities and knowledge on tsunami modelling in the participating countries
   - Improved databases for tsunami forecasting at NTWC level
   - Increased coverage of areas with scientifically robust inundation maps for tsunami, storm surges and seiches as well as information for risk-sensitive planning

4. Development of evacuation plans in line with the requirement of near-field tsunamis
   - A set of national policies, standards and approaches for evacuation planning in the participating countries
   - Tested and approved tsunami evacuation plans in selected pilot areas providing references for further up-scaling
   - National mechanism to support the development of evacuation plans at community level in remaining tsunami prone areas in all four countries
Performance Indicators:

Phase-1 (Currently approved)

1a) Presentations of results from studies on critical issues as prioritized by the Regional Working Group at the regional science meeting

1b) Availability of a concept document regarding a unified regional hazard map has been developed by the Regional Working Group

2a) Documentation of revised warning chains and SOPs for near field tsunamis (in each of the participating countries) with due emphasis on self-protection for near source events

2b) Agreements with media on SOPs for tsunami early warning (in each of the participating countries).

Phase-2 (subject to future budget availability from UNESCAP)

3a) Availability of concept document for a unified approach for tsunami modelling in the NWIO.

4a) National policy, guidelines, and support mechanism established for tsunami evacuation planning (in each of the participating countries).

4b) Reports on the testing of the developed evacuation plans (one pilot community per country) in a future tsunami drill.

[What are the main outputs (products and services) that will be produced under this project?]

Outputs:

Phase-1 (Currently approved)

1.1 Gap analysis and strategy for regional cooperation to develop a unified regional tsunami hazard map developed by a NWIO working group on risk knowledge

1.2 Results from studies on critical issues such as maximum magnitude and source mechanism for tsunami modelling implemented by international scientific partner institutions

1.3 Exchange of latest scientific results and studies from international studies on the tsunami hazard in the Makran subduction zone
Annex 1

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

2.1 Advocacy, promotion, invitation and organization of a high level meeting to discuss and reflect on national strategies for tsunami early warning, warning chains and community preparedness in the context of near-field tsunamis

2.2 A regional workshop to analyse and revise warning chains and discuss the implications for the related SOPs

2.3 A regional media workshop to share experiences, mechanisms to involve media in tsunami warning dissemination, and outline requirements for related SOP development

2.4 Backstopping to national Working Groups as requested

Phase-2 (subject to future budget availability from UNESCAP)

3.1 Gap analysis on tsunami modelling and inundation mapping

3.2 Capacity development for members of a NWIO regional working group on tsunami modelling and inundation mapping including the provision of inputs from international expertise

3.3 Support of regional working group meetings on tsunami modelling and inundation mapping with the aim to develop specifications for a unified approach for tsunami modelling in the region

4.1 Information package on existing approaches, standards, methodologies and best practices for tsunami evacuation planning as well as tailored recommendations for the NWIO countries including concrete steps for the development of context-specific policies, standards and approaches

4.2 A regional training workshop for selected participants from the member countries to build the required capacities to facilitate and provide technical expertise for evacuation planning processes at local level

4.3 Backstopping during the evacuation planning processes in pilot communities to strengthen capacities of the facilitators, to assure quality in the processes and outputs as well as to obtain feedback for possible adaptations of the methodology based on local experiences and requirements

G. Contribution to Regional Coordination/Cooperation

[How will the project contribute to regional coordination and/or cooperation towards the functioning of a regional early warning system for coastal hazards in the Indian Ocean and Southeast Asian region?]

This project will provide the right platform for bringing together organisations, institutions and experts working in tsunami hazard assessment, warning systems,
Annex I

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

awareness and preparedness, and also build upon similar work already implemented in other regions.

Further, strengthening the capacity of the countries in the Makran region will enhance the overall performance of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS), and hence this project will be dovetailed into the formal work plan of ICG/IOTWMS.

Once implemented, the communities which will benefit from the proposed project interventions will be in a condition to fulfil the indicators of the Indian Ocean Tsunami Ready (IOTR) initiative which is being piloted in the IOTWMS based on the recommendations of the TOWS-WG and the recent session of the ICG/IOTWMS-XII. These communities could even be considered by ICG/IOTWMS as test areas for the design of specific indicators for the IOTR initiative and to provide feedback for the further development of the Tsunami Ready initiative on global level.

The ICG/IOTWMS-XII decided to continue Working Group 1 on Tsunami Risk, Community Awareness and Preparedness; Working Group 2 on Tsunami Detection, Warning and Dissemination; and the Sub-Regional Working Group for the North West Indian Ocean. A Task Team on IOWave 20 was also established to plan for and organise an Indian Ocean wide tsunami exercise in 2020. The IOWave20 Exercise will provide a good opportunity to test some of the interventions implemented as part of Phase-1 this proposal.

The ICG/IOTWMS-XII also endorsed the recommendations of the Expert Consultation on Scientific Tsunami Hazard Assessment for the Makran Subduction Zone (8 March 2019, Kish Island) and set up 2 Task Teams on (i) tsunami preparedness for a near filed tsunami hazard and (ii) scientific tsunami hazard assessment of the Makran Subduction Zone that align closely with the Phase-1 objectives of this proposal. Further, the ICG appreciated the support from UNESCAP as part of the Trust Fund for Tsunami, Disaster and Climate Preparedness and recommended that UNESCAP be invited as an Observer to the ICG/IOTWMS WG-NWIO to ensure closer collaboration among stakeholders in the Makran Subduction Zone, as part of its programmatic approach.

H. Gender Considerations
[How will the project address gender-related issues?]

The project implementation will follow UNESCO Priority Gender Equality Action Plan 2014-2021 and the Policy and Practical Guidelines: Making Disaster Risk Reduction Gender-Sensitive, developed by ISDR, UNDP and IUCN. Gender equality will be considered in all aspects of project implementation. Woman experts will be included as trainers and facilitators. Equal priority will be given to female participants while selection for training and workshops. In working with coastal communities for tsunami preparedness, the project will also address the issue of gender, noting that women are particularly vulnerable in tsunami events.

I. Partners
Annex I

[What partners at the regional, national and (as appropriate) local levels will be involved in the implementation of the project, and what will the specific role of each partner be?]

IOC-UNESCO will lead and provide the expertise in the implementation of this project. In addition, the project will also tap to external expertise and technical assistance with the required experience, i.e. GIZ’s expertise and experience in Indonesia; OXFAM’s expertise and experience in local level activities in Pakistan; NDWC of Thailand on their expertise and experience in warning chain and siren systems, ASEAN Coordinating Centre for Humanitarian Assistance on disaster managements (AHA Centre) on their expertise with preparedness & response, etc.;

As the implementation of support process goes hand-in-hand with partner processes in the four countries, a steering and coordination mechanism at the regional and national level will be established based on the already existing arrangements in the ICG/IOTWMS and its WG-NWIO.

The WG-NWIO is represented by the NTWCs and DMOs of all the four countries (India, Iran, Pakistan and Oman) who have been involved in the project preparation phase will be the major partners in project implementation. The project will work also with the main stakeholders in disaster risk reduction mainly with the National Tsunami Warning Centre (NTWC) and the National and Local Disaster Management Office (N/LDMO);

India: Indian National Centre for Ocean Information Services (INCOIS), National Disaster Management Authority (NDMA). In addition, stakeholders that will be involved in the specific activities are

- National Centre for Seismology (NCS),
- Gujarat State Disaster Management Authority (GSDMA),
- National Disaster Management Authority (NDMA),
- Maharashtra State Disaster Management Authority
- Disaster Management, Andaman & Nicobar Administration.

Iran: National and local institution that will be involved in this project as a whole would be the Iranian National Institute for Oceanography and Atmospheric Science and the National Disaster Management Organization. In addition, stakeholders that will be involved in the specific activities are

- Iranian National Institute for Oceanography and Atmospheric Science
- National Disaster Management Organization
- International Institute of Earthquake Engineering and Seismology
- University of Tehran Institute of Geophysics
- Geological Survey & Mineral Explorations of Iran
- Iran National Cartographic Center
- I.R. of IRAN Meteorological Organization
Pakistan: Pakistan Meteorological Department and the National Disaster Management Agency of Pakistan, and the Provincial Disaster Management authority (PDMA).

Oman: Directorate General of Meteorology and the National Committee for Civil Defence (NCCD)

Further, the ICG/IOTWMS has a network of Tsunami National Contacts (TNCs) identified through formal channels who would facilitate in-country policy level support.

J. Capacity
[What is the internal capacity of the organization submitting this proposal to undertake activities and achieve the expected deliverables?]

The IOC-UNESCO ICG/IOTWMS Secretariat in Perth, Western Australia and the IOC-UNESCO Indian Ocean Tsunami Information Centre (IOTIC) housed in UNESCO Office Jakarta building will be in charge of the overall project coordination and implementation. Both have diverse practical experiences in the field of tsunami exercises, project management, development of SOP at local level, trainings on timeline driven SOPs, media involvement and awareness

Further, the project will also draw upon the experience and tools which have been developed by various initiatives and projects in the context of the IOTWMS and other ocean basins especially focussing on near-field tsunami threat. The longstanding experiences in Indonesia in applying a structured approach to develop tsunami preparedness, development warning chains and evacuation planning which have been well-tested and validated, as well as TsunamiKIT developed through the GITEWS/PROTECTS1 project are all considered relevant for Phase 1 of the project. The approach of Thailand to establish a warning chain which links the NTWC directly with the communities at risk might be another interesting reference for the NWIO countries and an opportunity for Thailand to share their experience and lessons learned. Further, experiences and tools developed and documented by various international initiatives, like the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES), the AHA Centre, the International Tsunami Information Center (ITIC) and the North-Eastern Atlantic, Mediterranean and connected seas Tsunami Information Centre (NEAMTIC) will be considered.

Over the last 12 years, the ICG/IOTWMS Secretariat has successfully coordinated the development of the Indian Ocean Tsunami Early Warning System in collaboration with three TSPs, 24 NTWCs and several international partners. The Secretariat also established a proven track record in implementing numerous regional projects and capacity development initiatives for development of integrated TSP/NTWC/DMO Standard Operating Procedures (SOPs) for tsunami warning and emergency response in the Indian Ocean. The ICG/IOTWMS
Secretariat has also been coordinating regular communications test and the Indian Ocean Tsunami Exercises (IOWave).

The IOC-UNESCO Indian Ocean Tsunami Information Centre (IOTIC) housed in UNESCO Office Jakarta was initiated in 2012 with a mandate to developing education, awareness, and preparedness materials for Indian Ocean Member States. IOTIC implemented several regional activities and projects with funding support from different organizations such as Canadian International Development Agency (CIDA), International Strategy for Disaster Reduction (ISDR), UNESCAP, Indonesian Funds in Trust (IFIT), Malaysian Funds in Trust (MFIT), Japan Funds in Trust (JFIT), Global Fund for Disaster Risk Reduction of World Bank, DFAT-Australia, and UNESCO Regular Programme. IOTIC has been actively participating in policy development and formulation in Indonesia both at national as well as sub-national level (i.e. Padang and Aceh) by supporting the development of tsunami evacuation maps, plans and procedures.

The ICG/IOTWMS Secretariat and IOTIC jointly implemented several UNESCAP-funded projects resulting in the publication of manuals and guidelines, e.g. "Tsunami Risk Assessment and Mitigation for the Indian Ocean: Knowing your tsunami risk and what to do about it", 2015; Training Modules, e.g. "Training Modules on Tsunami Exercise" and "Training Modules on Policy Support for Tsunami Risk Reduction", 2015; and several national guidebooks, e.g. "National Guidebook for Tsunami Exercise for Timor Leste and Myanmar", "National Tsunami Risk Reduction Programme and Policy for Myanmar", 2015. IOC-UNESCO has also published the booklet "Remembering the 1945 Makran Tsunami: Interviews with Survivors beside the Arabian Sea" (2015) based on an UNESCAP-funded initiative. Also, IOTIC and the ICG/IOTWMS Secretariat implemented training workshops for SOP in tsunami warning and emergency response in Pakistan, Vietnam, and Myanmar as well as supported the capacity building on tsunami preparedness in Mozambique, Tanzania, Seychelles and Mauritius.

K. Knowledge Management and Results Dissemination

[How will results and experiences from the project be documented and disseminated?]

Knowledge management will be an integral part of the project. The experience gained from project phase-1 will be transferred to phase-2 in support of up-scaling. As in the case with other IOC-UNESCO projects, outputs from this project will be documented in the form of publications such as manuals, guidelines, training modules and other material. Online versions will be made available through websites of IOC-UNESCO (www.ioc-tsunami.org) and IOTIC (www.iotsunami.info). Information will also be linked to other relevant websites within IOC-UNESCO and the Tsunami Information Centres.

Knowledge sharing will be promoted through presentations at the meetings of the IOTWMS Working Groups, ICG/IOTWMS sessions and IOTWMS presentation to the TOWS-WG and the IOC Assembly. A regional workshop at the end of the
project will be held to enable experiences to be shared with other IOTWMS Member States.

L. Sustainability
[How will sustainability beyond project end be facilitated? Please explain how the results of the project would be sustained beyond the end of the project.]

The support process as part of this project will focus on providing strategic inputs, capacity development and piloting Tsunami Ready in the Indian Ocean. Implementation to all at risk communities will be responsibility of the participating Member States and requires allocation of adequate human resources and budget. Conditions for sustainability of outcomes and further up-scaling of the supported measures will be identified and adequate mechanisms will be agreed with the partner countries to assure sustainability and future roll-out. Towards this goal, substantial consultations have already been undertaken during the proposal preparation phase with the key project partners from India, Iran, Pakistan and Oman and objectives of the project aligned with their urgent requirements.

Sustainability shall be reached by strengthening partner processes, building capacities in the countries as well as developing tools and processes. Further, a workshop is also being planned for policy makers to encourage incorporation of tsunami awareness and response programs into national disaster management plans, which will contribute to sustainability of the project outcomes.

M. Counterpart Contributions
[What are the expected counterpart contributions (in-kind and cash) from your organization towards this project?]

IOC-UNESCO will contribute an approximate of 128 person days (equivalent to USD 67, 158) of IOTIC and IOTWMS Secretariat staff time in addition to activity and operational costs (equivalent to USD 24, 926) for Phase-1 of the project.

In-country project partners shall make in-kind contributions through participation of their personnel in the project activities, in-country activities and provision of logistics for hosting workshops.

Further, the Directorate General of Meteorology, Government of Oman will co-fund its participation in this project with in-kind contribution

N. Monitoring, Evaluation and Audit
[Explain the proposed monitoring, evaluation and audit arrangements. Please see guidelines for further details.]

A steering and coordination mechanism at the regional and national level will be established based on the already existing arrangements in the ICG/IOTWMS and its WG-NWIO. Project monitoring mechanisms shall include:

- Monthly meetings of the project team for reporting of progress updates, including delivery of outputs, problems met and solutions needed, and activity planning and coordination.
Annex I

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

- Quarterly reporting from project partners on progress of in-country activities, including efforts in sustaining project activities.
- Semi-annual meetings of project team and partners to review project progress against the project framework, including follow-up actions, and receive feedback, including good practices, lessons learned, and steps taken to ensure sustainability of project outcomes.

The project team will prepare bi-annual progress reports to IOC-UNESCO and ICG/IOTWMS. Further, IOC-UNESCO will provide regular six monthly reports to UNESCAP as well as a closing report at the end of the project. Each report will contain a narrative section and a statement of financial expenditure.

The project will rely on UNESCO internal monitoring and audit mechanisms. With the support of the Administrative Officers in UNESCO Offices in Jakarta and Paris, all activities will be monitored and checked to comply with UNESCO administrative regulations and procedures.

IOC-UNESCO will arrange an independent evaluation of the project by the end date of project. The evaluation will be conducted according to the guidelines from the Internal Oversight Service of UNESCO.

O. Annexes

[Please provide a table of contents outlining the number and title of each Annex Sample Table of Contents.]

<table>
<thead>
<tr>
<th>Annex Number</th>
<th>Annex Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-A</td>
<td>Phase -1 Logical Framework Outcome and Outputs</td>
</tr>
<tr>
<td>I-B</td>
<td>Phase -1 Logical Framework Outputs and Contributions</td>
</tr>
<tr>
<td>I-C</td>
<td>Phase -1 Activity Work Breakdown Structure and Budget</td>
</tr>
<tr>
<td>I-D</td>
<td>Phase -1 Revised Calendar of Activities: 18 Months Duration from May 2019 to November 2020</td>
</tr>
</tbody>
</table>

P. Budget and Payment Schedule.

[Excel form in separate file, “Budget and Payment Schedule Template”.] An initial payment of USD 192,183 will be provided by ESCAP upon signature of the Agreement by both to start activities as in indicated in the attached Project Budget and Payment Schedule (Annex-3) and Calendar of Activities (Annex-4).

Subsequent payments will be provided upon approval by ESCAP of a written request for payment from the IOC-UNESCO, together with the relevant progress reports containing both substantive and financial sections every 6 months (as further detailed in section Q below) and will take into account the progress of the project and projected liquidity needs, as contained in the Budget Payment Schedule and Expense Report.

19
Q. Reporting requirements

<table>
<thead>
<tr>
<th>Instalment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>First instalment (USD 192,183)</td>
<td>Payable upon signature of the LoA</td>
</tr>
<tr>
<td>Second instalment (USD 48,285)</td>
<td>Payable upon receipt of a satisfactory progress report and financial report for the period May 2019 - October 2019</td>
</tr>
<tr>
<td>Third instalment (USD 96,070)</td>
<td>Payable upon receipt of an interim financial report by 31 December 2019 as well as a satisfactory progress report and financial report for the period November 2019 - April 2020</td>
</tr>
<tr>
<td>Fourth instalment (USD 13,462)</td>
<td>Payable upon receipt of a satisfactory terminal report as well as a final financial report for the entire period of the project. The amount payable shall not exceed the total actual expenditures for the entire project.</td>
</tr>
</tbody>
</table>

Any overpayment on previous instalments not substantiated by the progress reports will be returned to ESCAP as soon as the project completes.

Financial report should include the details of any equipment purchased including the quantity and value of such equipment.
## Annex I-A: Logical Framework Outcomes and Outputs

<table>
<thead>
<tr>
<th>PHASE-1</th>
<th>PHASE-1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcomes</strong></td>
<td><strong>Performance Indicators</strong></td>
</tr>
<tr>
<td>Changes in policy and institutional capacity that the project aims to contribute to (what will change as a result of the project)?</td>
<td>For each outcome include performance indicators specifying how you will know if the outcome has been accomplished</td>
</tr>
<tr>
<td><strong>1</strong> Better understanding of the risk knowledge based on scientific research</td>
<td>• Presentations of results from studies on critical issues as prioritized by the Regional Working Group at the regional science meeting</td>
</tr>
<tr>
<td>1. Availability of latest scientific insights on the tsunami hazard from the MSZ as an input for risk assessment activities in the countries</td>
<td>• Availability of a concept document regarding a unified regional hazard map has been developed by the Regional Working Group</td>
</tr>
<tr>
<td>2. Concept and inputs for a unified regional tsunami hazard map</td>
<td></td>
</tr>
<tr>
<td><strong>2</strong> 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.</td>
<td>• Documentation of revised warning chains and SOPs for near field tsunamis (in each of the participating countries).</td>
</tr>
<tr>
<td>1. A mechanism for steering and coordination for the TEWS at national level in each country considering integration into a multi-hazard approach;</td>
<td>• Agreements with Media on SOP for tsunami early warning (in each of the participating countries).</td>
</tr>
<tr>
<td>2. The design of a tsunami warning chain for a near-field tsunami threat</td>
<td></td>
</tr>
<tr>
<td>3. Revised SOPs along the warning chain</td>
<td></td>
</tr>
<tr>
<td>4. Policies and SOPs for Public Media for warning dissemination</td>
<td></td>
</tr>
</tbody>
</table>
## Annex I-B: Logical Framework Outputs and Contributions

### PHASE 1

<table>
<thead>
<tr>
<th>Outputs</th>
<th>ESCAP Contribution</th>
<th>Partner Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Products and services that will be produced under this project</em></td>
<td><strong>Main activities (Study, consultancy, workshop, funding) and budget estimation for each Output in accordance with outlined intervention strategy</strong></td>
<td><strong>Main activities at national and local level and budget estimation for each Output in accordance with outlined intervention strategy</strong></td>
</tr>
<tr>
<td><strong>1 Better understanding of the risk knowledge based on scientific research</strong></td>
<td>• Establishment of a regional working group and working process between NWIO countries on risk knowledge in Oman: Expert meeting consist of 16 persons: NWIO Chair, ICG/IOTWS Secretariat, IOTIC, 2 person each representing Makran Region, and 2 Experts of MZS + 1 consultant</td>
<td>• National governments assign staff from relevant institutions to a regional working group on risk knowledge to exchange experiences and discuss concepts and methods for tsunami risk assessment.</td>
</tr>
<tr>
<td>1. Gap analysis and strategy for regional cooperation to develop a unified regional tsunami hazard map developed by a NWIO working group on risk knowledge</td>
<td>• IOC and external facilitators/consultant technical assistance for the coordination of the expert meeting and Gap Analysis and Strategy for the Regional Coordination for a Unified Regional Tsunami Hazard Map.</td>
<td>• National institutions will consider these inputs for the development of national standards, concepts and policies for risk assessment and collaborate on the development of an unified hazard map.</td>
</tr>
<tr>
<td>2. Results from studies on critical issues such as maximum magnitude and source mechanism for tsunami modelling implemented by international scientific partner institutions</td>
<td>• Co funding on studies on critical Issues for Risk Knowledge in MSZ - 4 Study Package (India, Iran, Pakistan)</td>
<td>• Organization of a scientific exchange meeting by hosting country (to facilitate the participation from diverse countries, and simplify logistic and visa issues, the regional scientific meetings may be hosted in Oman)</td>
</tr>
<tr>
<td>3. Exchange of latest scientific results and studies from international studies on the tsunami hazard in the MSZ</td>
<td>• Organization of a scientific exchange meeting in Oman: Scientific meeting of 50 participants 2 from country representatives (India, Iran and Pakistan), NWIO Chair, 10 experts, 1 External facilitator, Local Experts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Activity staff and coordination cost</td>
<td></td>
</tr>
</tbody>
</table>
## Annex I-B: Logical Framework Outputs and Contributions

<table>
<thead>
<tr>
<th>Outputs</th>
<th>ESCAP Contribution</th>
<th>Partner Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Products and services that will be produced under this project</em></td>
<td>Main activities (Study, consultancy, workshop, funding) and budget estimation for each Output in accordance with outlined intervention strategy</td>
<td>Ensuring participation of high level representatives at a regional meeting to discuss and reflect on national strategies for TEW, warning chains and community preparedness in the context of near-field tsunamis.</td>
</tr>
<tr>
<td><strong>2</strong> 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</td>
<td>• IOC and external technical assistance on coordination and assessment on studies and models of existing end to end warning chain and back stopping for the working groups on the SOPs for near field tsunamis, warning chain and Media SOP</td>
<td>• Set-up and steering of National Working Groups to discuss and revise national strategies for TEW, warning chains and community preparedness in the context of near-field tsunamis as well as to adapt related SOPs with an end-to-end perspective including specific arrangements and SOPs for public media</td>
</tr>
<tr>
<td>1. Advocacy, promotion, invitation and organization of a high level meeting to discuss and reflect on national strategies for TEW, warning chains and community preparedness in the context of near-field tsunamis</td>
<td>• High Level Conference on Near Field Tsunami in the Makran Region in Oman: 2 days meeting attended by three high level representative of NTWC, NDMO and 1 supporting staff of each country in the region</td>
<td>• Assign members from National Working Group to assist regional SOP workshop and assure feedback into the National Working Group</td>
</tr>
<tr>
<td>2. A regional workshop to analyse and revise warning chains and discuss the implications for the related SOPs</td>
<td>• Two 4 days Regional trainings /workshops on Tsunami Early Warning and Tsunami Emergency Response SOP workshop (in Iran and in Pakistan). 4 participants (2 NTWC and 2 NDMO) from each country.</td>
<td>• Establish working relations with relevant public media regarding tsunami warning dissemination and promote participation of selected representatives in the regional media workshop</td>
</tr>
<tr>
<td>3. A regional Media workshop to share experiences and mechanism to involve media in tsunami warning dissemination and outline requirements for related SOP development</td>
<td>• Two 4 days Regional Media workshops on Tsunami Emergency Warning and Response (1 in Iran and 1 in India). 4 participants (1 NTWC and 1 NDMO and 2 Media) from each country.</td>
<td>• Organize a working process between the National Working Group and public media representatives to agree on roles and responsibilities, arrangements and procedures for warning dissemination by the media</td>
</tr>
<tr>
<td>4. Backstopping to National Working Groups as requested</td>
<td>• Activity staff and coordination cost</td>
<td>• Provision of the necessary human and financial resources to run the agreed processes</td>
</tr>
</tbody>
</table>