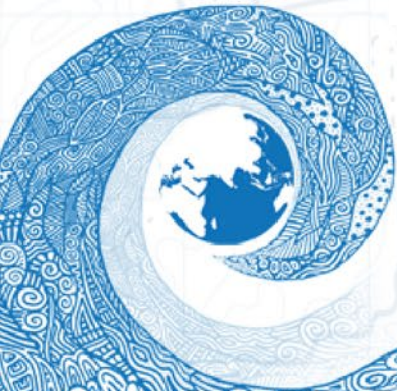


# UNESCAP funded project: Strengthening Tsunami Warning in the North-West Indian Ocean Through Regional Cooperation

*Rick Bailey, Ardito Kodijat, Nora Gale  
May 2023*



# Phase 1 UNESCAP TTF-29 Project

Project Funder: UNESCAP Tsunami Trust Fund

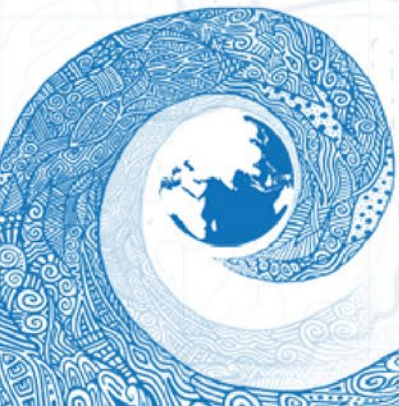
Participating Member States: India, Iran, Pakistan, *Oman & UAE as self-funded*

Target Groups: NTWCs, national DMOs, Media, Communities, Response Agencies

Project Duration: 24 Months - completed

## Outcomes:

- 1** Better understanding of the risk knowledge based on scientific research
- 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.



# Phases 2a and 2b UNESCAP TTF-31 Project

Project Funder: UNESCAP Tsunami Trust Fund

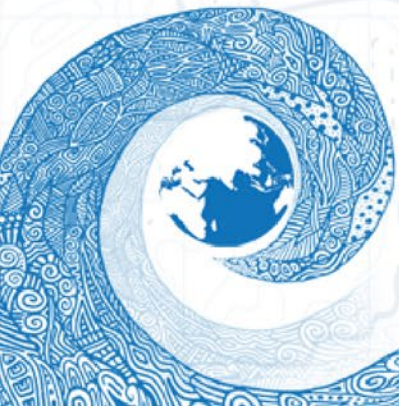
Participating Member States: India, Iran, Pakistan, *Oman & UAE as self-funded*

Target Groups: NTWCs, national and local DMOs, Broadcast Media, Response Agencies

Project Duration: 12 Months: December 2021 – December 2022

## Outcomes:

- 1 Finalisation of Phase-1 activities in tsunami risk knowledge and strengthening of national tsunami warning chains.**
- 2 Gap analysis and development of guidance on tsunami inundation mapping and evacuation planning in the NWIO region.**





# Phases 2a and 2b and 2c

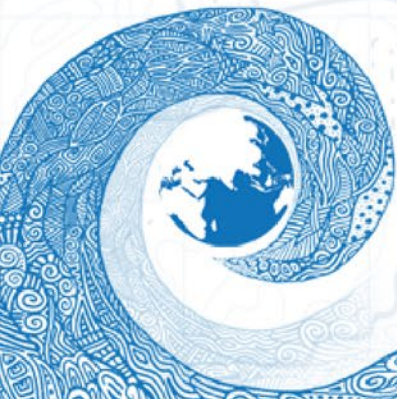
Participating Member States: **India, Iran, Pakistan** (+Oman and UAE self-funded)

Target Groups: National Tsunami Warning Centres (NTWCs), national and local Disaster Management Organisations (DMOs), Response Agencies, Broadcast Media, and local Communities

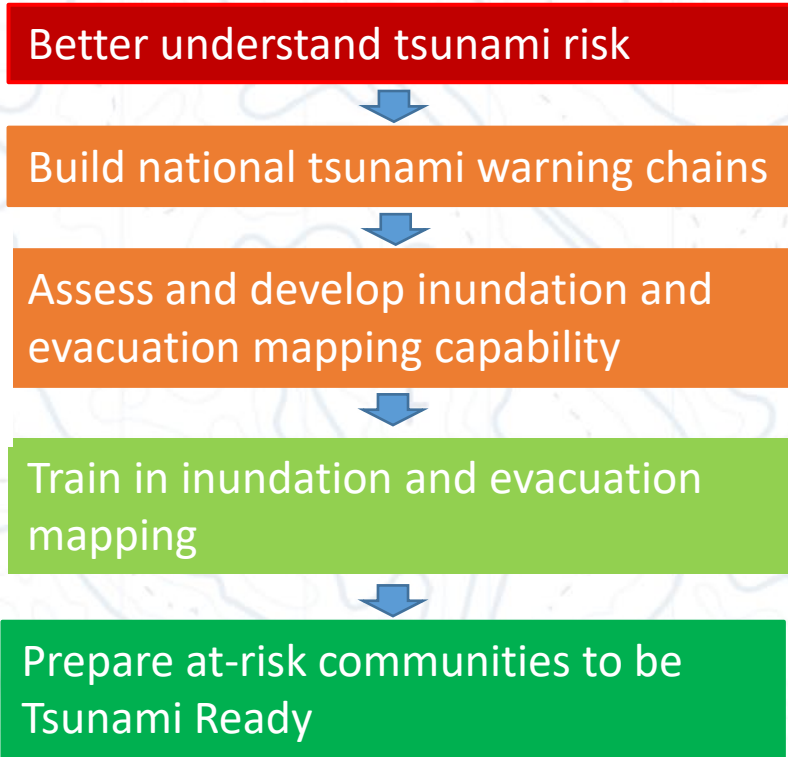
Project Duration: 12 Months

## Outcomes:

- 3** Finalisation of some Phase-1 remaining activities in tsunami risk knowledge and strengthening of national tsunami warning chains (Phase 2a)
- 4** Gap analysis and development of guidance on tsunami inundation mapping and evacuation planning in the NWIO region (Phase 2b)
- 5** Inundation and evacuation mapping capacity development in the NWIO region (Phase 2c)



# Programmatic Approach:



Phase 1 completed

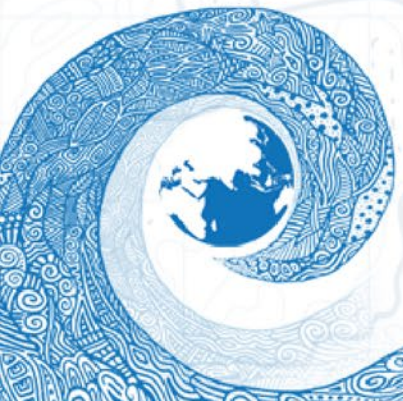
Phase 2a

Phase 2b

Finish  
21/12/22

Phase 2c (proposed)

Phase 3 (proposed)



# TTF-29 and TTF-31 supported by consultancies

## Key Tasks

- *Coordination in-country*
- *Help with development of training & briefing materials*
- *Identification of best practices in inundation & evacuation mapping*
- *Workshop & meeting preparation*
- *Reporting outcomes*

## TTF-31 Consultants

- *Indian National Center for Ocean Information Services (INCOIS)*
- *Dr. Mehdi Masoodi (Iran)*
- *Ms. Ghazala Naeem (Pakistan)*
- *Mr. Harald Spahn (International)*
- *Dr. Jorn Lauterjung (International)*



# TTF-29 and TTF-31 consultative approaches

## National consultation

- *Tsunami National Contacts (TNCs) established by IOC-UNESCO for all Member States of the Intergovernmental Coordination Group for Indian Ocean Tsunami Warning & Mitigation System (ICG/IOTWMS)*

## Regional consultation

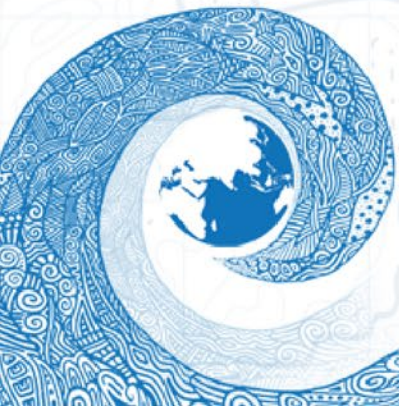
- *ICG/IOTWMS*
- *Subregional Working Group for the North-West Indian Ocean*
- *Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone*
- *Task Team on Tsunami Preparedness for a Near-Field Tsunami Hazard*

# Draft Phase 2c Calendar of Events 2023/24

Activity	Modality	Date
Prepare tsunami inundation maps for pilot areas	Offline	Jun – Oct 2023
Tsunami inundation modelling workshop	Hybrid	29 – 31 Oct 2023
Prepare tsunami evacuation planning training materials	Offline	Jun – Oct 2023
Tsunami Evacuation Planning Workshop	Hybrid	29 Oct – 2 Nov 2023
RWG-NWIO in-person meeting	Hybrid	2 Nov 2023
Prepare evacuation plans for pilot communities	Offline	Nov 2023 – Mar 2024
Evacuation drills	In-person	Mar 2024
RWG-NWIO project outcome review	Online	Mar 2024
Project evaluation	Online & offline	Mar – May 2024



# PHASE 2a: Finalisation of Phase-1 remaining activities in tsunami risk knowledge and strengthening of national tsunami warning chains



# Output 3.1 Exchange of latest scientific results and studies from regional/international studies on the tsunami hazard in the MSZ

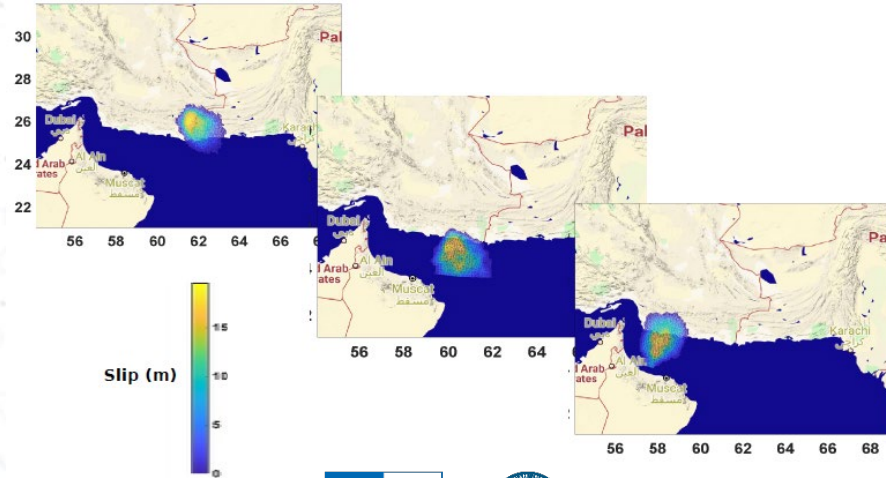
## Progress:

- Arabian Sea tsunami hazard simulations completed (GFZ/INGV)
- Red Sea and Persian Gulf tsunami hazard simulations completed (INCOIS/India)
- INCOIS/INDIA to host PTHA results for NWIO Member State use



**Workshop on Makran Subduction Zone Science  
Strengthening Tsunami Warning and Preparedness**  
Abu Dhabi, United Arab Emirates, 14 – 16 Nov 2022

## Probabilistic Tsunami Hazard Assessment (PTHA) Makran subduction M8.5 slip distribution examples



A. Babeyko; PTHA for NWIO

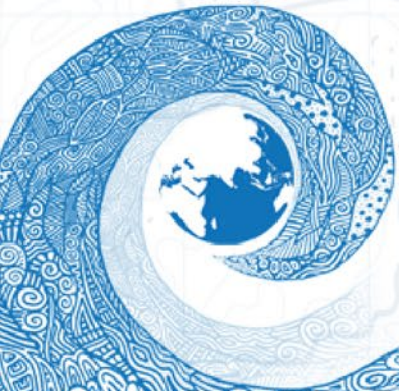
# Project Impacts

With the help of experts outside the region, Makran countries are taking ownership of producing a unified **Probabilistic Tsunami Hazard Assessment (PTHA)** for their region.

Enhanced regional scientific understanding of the **Makran Subduction Zone** and its potential tsunami hazard is improving through expert discussion and sharing of recent science among North-West Indian Ocean countries.

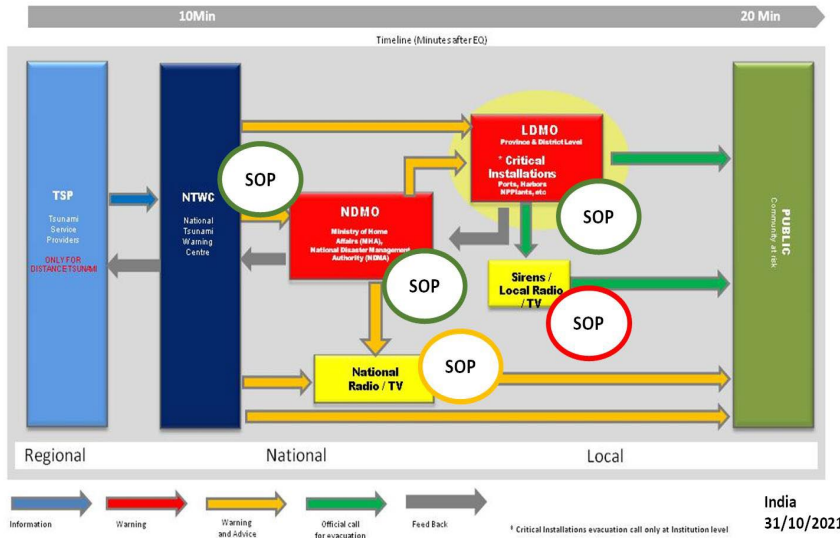
Through international collaboration, **scientists in Makran countries are enhancing their expertise in seismology, modelling and tsunami hazard assessment** and building networks with like-minded researchers.

By highlighting the tsunami hazard to Makran countries, the regional **PTHA will help influence disaster mitigation initiatives** such as community education, land use planning, and tsunami emergency response plans and procedures.

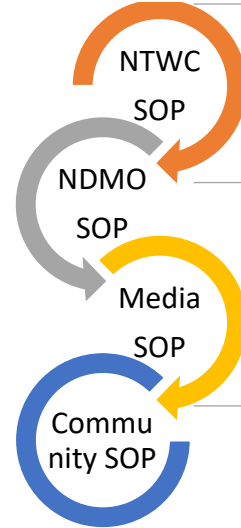




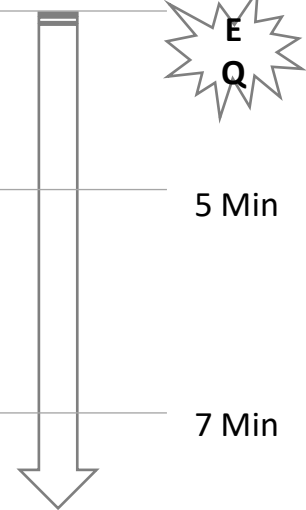
# Output 3.2: Regional NTWC-DMO (N/L) and Media workshop to share experiences and provide mechanism to involve media in tsunami warning dissemination and outline requirements for related SOP development



Integrated



Timeline-driven



Final SOP NTWC/DMO/Broadcast Media Training Hybrid Workshop  
31 October – 3 November 2022



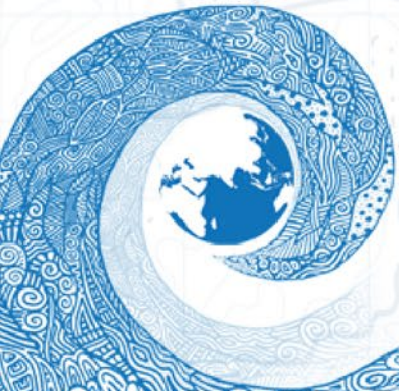
# Project Impacts

Much improved national tsunami warning chains to help get warnings to all at-risk communities

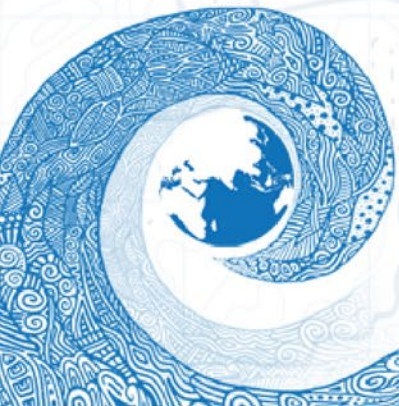
Revised SOPs for NTWCs and DMOs along the national warning chains

Policies and SOPs for Public Media for warning dissemination

SOPs tested and exercised



# Phase 2b: Gap analysis and development of guidance on tsunami inundation mapping and evacuation planning in the NWIO region



# Output 4.1 Regional working group meetings on tsunami modelling and inundation mapping with the aim to undertake a gap analysis and develop specifications for a unified approach for tsunami modelling in the region, including the provision of inputs from international expertise

## Progress:

- **Regional Working Group** formed and met online
- Cooperation and exchange of knowledge on tsunami modelling and inundation mapping
- Gap analysis of tsunami inundation capabilities in the region almost complete

## Key Players

- National Tsunami Warning Centres, Regional Researchers/Academics, and International Experts
- Consultant undertaking a NWIO Region Inundation Modelling Gap Analysis

1. **PTHA modelling incorporation in unified approach and method for tsunami modelling and inundation mapping for the NWIO region discussed at science exchange meeting 14 - 16 Nov 2022, Abu Dhabi, United Arab Emirates.**
2. **Unified approach and method for tsunami modelling and inundation mapping for NWIO region presented at Indian Ocean Tsunami Ready Workshop, 22-26 Nov 2022, Bali, Indonesia.**

# Output 4.2 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

## Progress:

- **National Working Groups** formed and met
- Questionnaire of national capabilities
- Gap analysis of evacuation mapping capabilities in the region

## Key Players

- Disaster Management Organisations (local/provincial DMOs, national DMOs)
- Community Leaders and other local-level stakeholders
- International consultant supported by national consultants to assist with compilation of National Tsunami Evacuation Mapping Gap Analysis

Information package (including some translations) on existing approaches, standards, methodologies, and best practices for tsunami evacuation planning for the NWIO region presented at Indian Ocean Tsunami Ready Workshop, 22-26 Nov 2022, Bali, Indonesia.



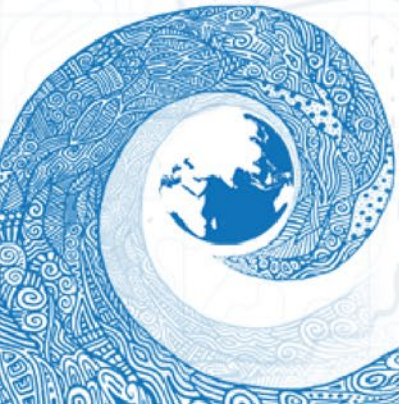
# Project Impacts

A better understanding of the capabilities in each Member States to guide where capacity building is required for inundation and evacuation mapping

Helping build and develop networks and relationships between stakeholders involved in helping prepare at-risk communities against the tsunami hazard

Specifications for a unified approach for tsunami modelling and inundation mapping for the NWIO region

Help develop national policies, standards and approaches for evacuation planning in the participating countries



# Summary

- Significant progress has been made in assisting NWIO countries have the tools and capabilities to:
  - i. Better understand the tsunami hazard in the region to be able to enhance awareness
  - ii. Implement national tsunami warning chains to reach everybody
  - iii. Determine capacities to prepare communities against the tsunami threat
- While Phase 1 focused on authorities at national level, phases 2a and 2b also focused on authorities at provincial/local level, including support for translators
- Phase 2c will focus on preparing inundation maps and training on evacuation planning
- Proposed Phase 3 will focus on helping at-risk coastal communities be Tsunami Ready
- Supporting NWIO region stakeholders participate in broader Indian Ocean capacity development activities to maximise exposure and benefit