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Intergovernmental Oceanographic Commission

UNESCAP Project:

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

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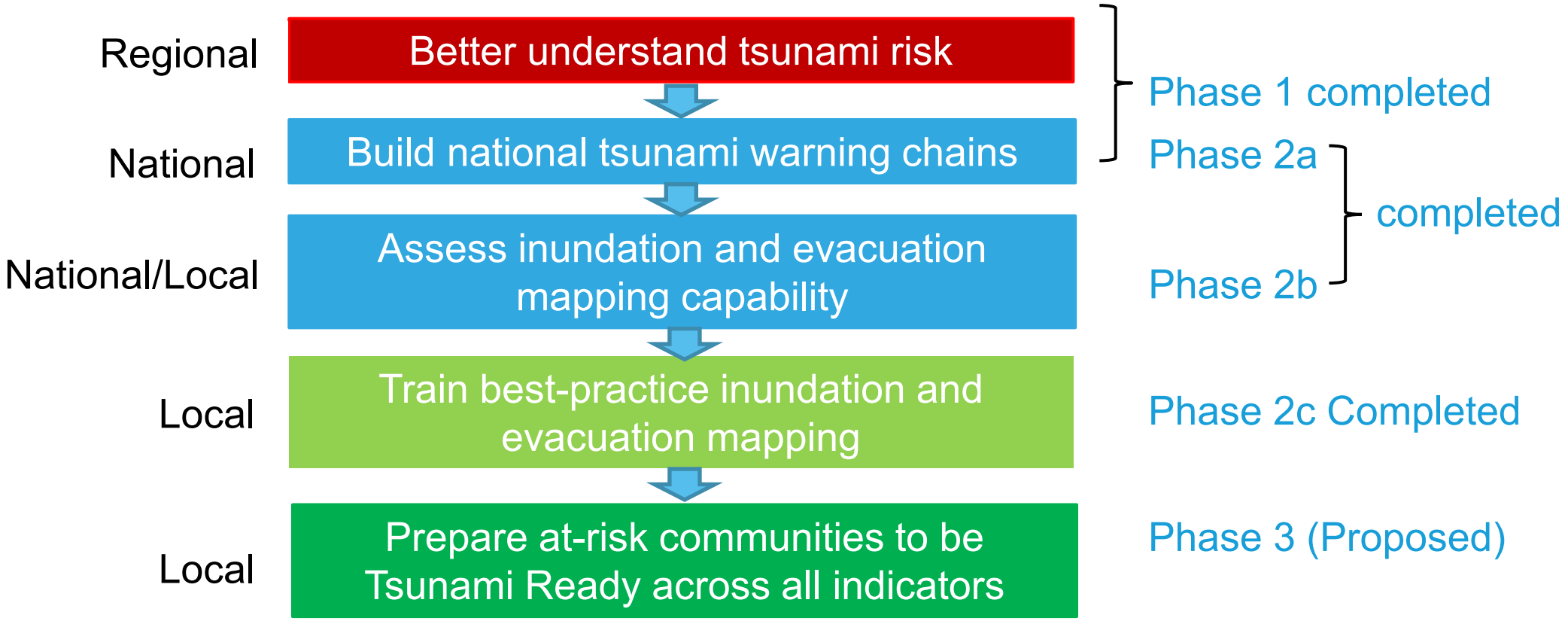
Objectives

Programmatic Approach



This project was presented at the UNESCAP 81st Session Side Event on Resilient Coasts: Enhancing Disaster Preparedness Through Regional Collaboration in Asia and the Pacific.

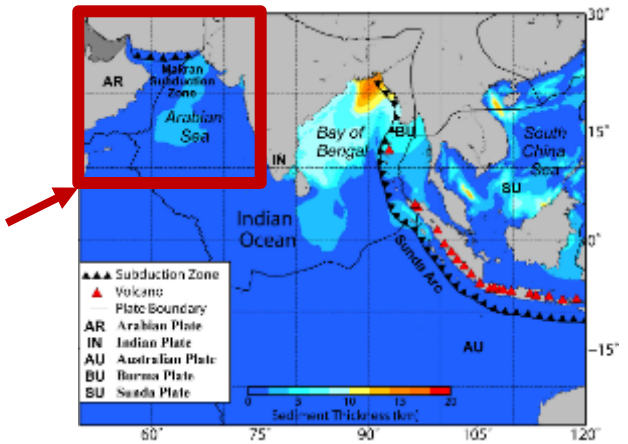
Risk Assessment

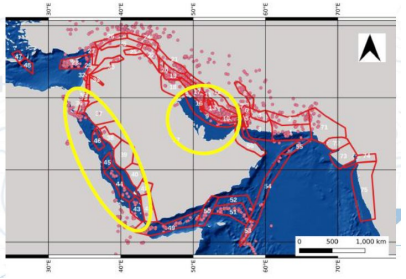
Phase 1 & 2a: Completed

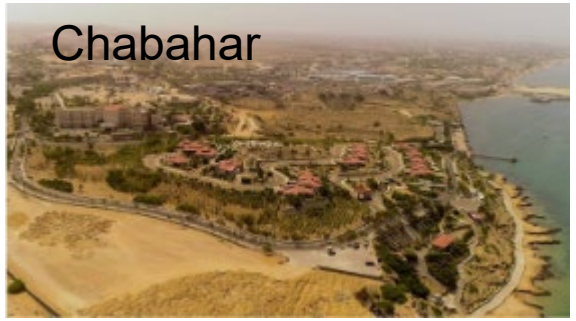
Hazard and risk assessments inform countries on preparedness required

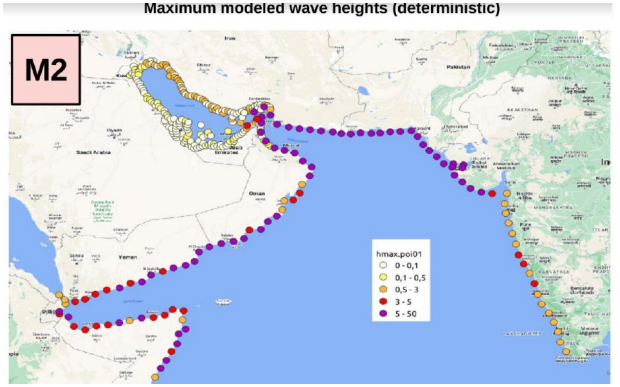
Better understanding of the tsunami risk knowledge to inform and underpin warning and mitigation systems in the NWIO to enable appropriate and effective community responses to the tsunami threat.

- With additional in-kind support from global tsunami modelling experts from Germany (GFZ), Italy (INGZ), Norway (NGI), and India (INCOIS), a **Probabilistic Tsunami Hazard Assessment (PTHA)** has been completed for NW Indian Ocean
- Indian Centre for Ocean Information Services (INCOIS) will host output and make available for NWIO countries
- UNESCO-IOC Intergovernmental Coordination Group for Indian Ocean Tsunami Warning & Mitigation System (ICG/IOTWMS) will further utilize to include different source mechanisms and expand to whole of Indian Ocean









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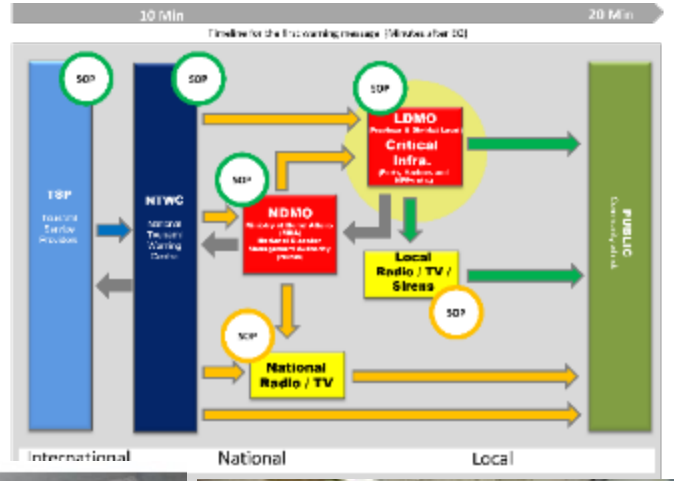
Tsunami Warning Chaing and SOP

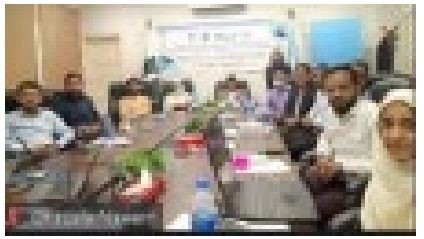
Phase 1 & 2a: Completed

Improvement of warning services at NTWC level and the organization of the national warning chains to assure timely warnings.

For at-risk communities to respond to the tsunami threat, the warnings must reach all in the community efficiently in the very short time available

- Each country has different authorities and links in the national tsunami warning chain, therefore the required national stakeholder relationships and working groups were established
- Every link in the national chains (National Tsunami Warning Centre (NTWC), Disaster Management Offices (DMOs), other relevant authorities, broadcast media, and public) and underpinning SOPs have been reviewed and revised through regional and national workshops
- UNESCO-IOC Intergovernmental Coordination Group for Indian Ocean Tsunami Warning & Mitigation System (ICG/IOTWMS) assists countries to test their warning chains and SOPs through tsunami warning exercises in each ocean basin every two years (IOWave)





Gap Analysis

Phase 2b: Completed

Identify where national expertise exists and where capacity development is required

Inundation Mapping

- **Regional Working Group for Tsunami Inundation Modelling and Mapping (RWG-TIMM)** was established to help coordinate existing experts in the region and to provide a regional ongoing optimal mass
- **Global experts provided awareness of latest best-practices** and to help identify capacity building requirements
- **Regional workshop "Makran Subduction Zone Science Strengthening Tsunami Warning and Preparedness"** 14-16 November 2023 Abu Dhabi – UAE
- UNESCO-IOC Intergovernmental Coordination Group for Indian Ocean Tsunami Warning & Mitigation System (ICG/IOTWMS) will utilize the identified latest best practices to expand inundation mapping capability across the Indian Ocean

	India	Iran	Oman	Pakistan	UAE
Shallow Water Bathymetry	200 m Res. GEBCO	450 m Res. (15 arcsec GEBCO) Industry data	450 m Res. (15 arcsec GEBCO)?	Variable, 10 m in Pilot Regions	450 m Res. (15 arcsec GEBCO)
DEM	5-10m SRTM	30 m SRTM	SRTM	10 m SRTM	10 m High resolution Satellite Data
Land Use Information	Maps 1:5000	Not available	Not available	Not available	Basic map
Model Used	Tunami-N2 ADCIRC	ComMit GEOWAVE MIKE-21 Tunami-N2	COMCOT	GUITAR TOAST GeoClaw	ComMIT
Type of Studies	Deterministic	Deterministic/ Probabilistic	Deterministic/ Probabilistic	Deterministic	Deterministic

Output 3: Gap Analysis

Phase 2b: Completed

Identify where national expertise exists and where capacity development is required

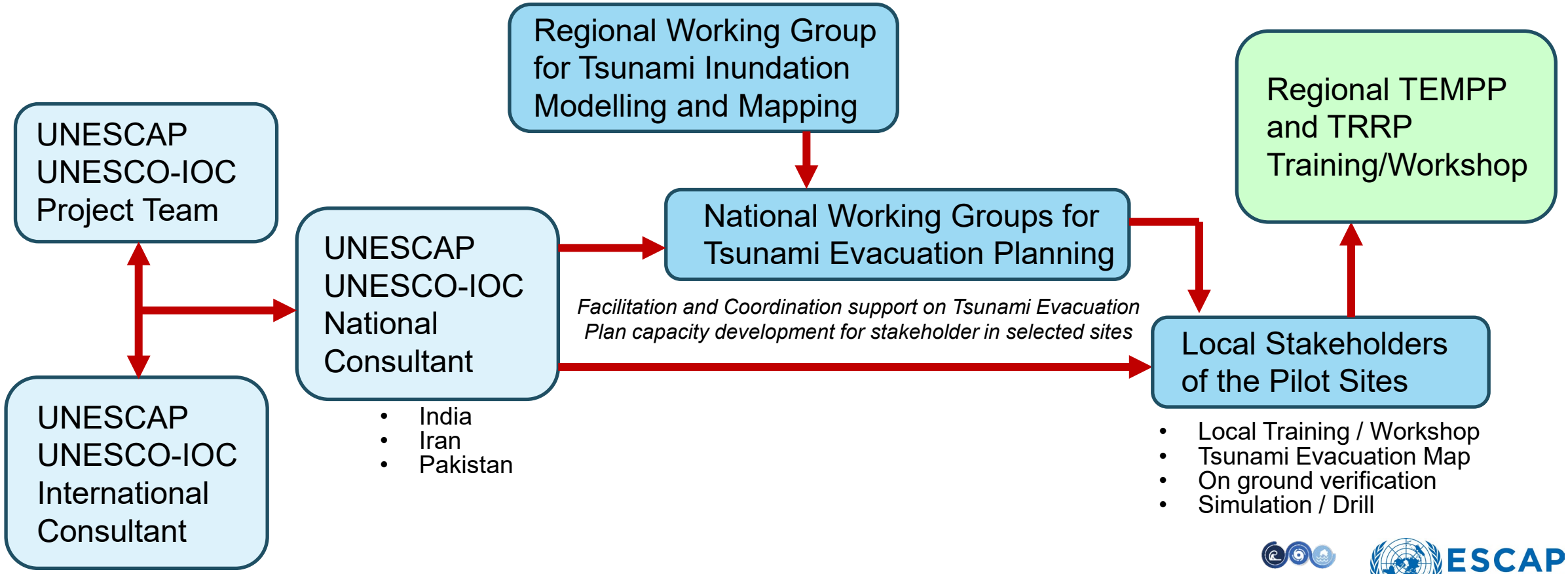
Evacuation Mapping:

- **National Working Groups for Tsunami Evacuation Planning (NWG-TEP) were established** in each country to help coordinate existing experts in general evacuation mapping planning, who can be utilised to develop tsunami evocation maps
- **Tsunami Evacuation Planning Information Package** (and translated into Farsi), detailing best-practices
- Representatives from each country were supported to attend the **UNESCO-IOC INDIAN OCEAN TSUNAMI READY HYBRID WORKSHOP, 22 – 26 November 2022, in Bali Indonesia**, to further benefit from first-hand experiences and training in best-practices**.**
- UNESCO-IOC Tsunami Ready Recognition Programme (TRRP) helps countries to make at-risk communities prepared for the tsunami threat

Piloting in In country Selected Sites

Phase 2c: Completed

Training in development of tsunami inundation maps and evacuation plans to facilitate effective community responses to the threat from near-field tsunamis.



Hazard and inundation mapping capabilities

Phase 2c: Completed

Training in development of tsunami inundation maps by enhancing capacities in tsunami modelling

Muscat, Oman 19 – 23 April 2024

- Discussed the roadmap for the further implementation and development of the PTHA.
- Prepared local inundation maps: strategy, approach and uncertainties.
- Discussed the role of scientists (modelers) in the implementation of national and local DRR strategies.
- Discussed expectations and needs of evacuation planning from the modelers.
- Presented and discussed the progress inundation modelling in 5 pilot regions around NWIO to be addressed in the TEP meeting.

Evacuation mapping capabilities

Phase 2c: Completed

Training in development of evacuation plans to facilitate effective community responses to the threat from near-field and far-field tsunamis.

Muscat, Oman 21-15 April 2024

- Reviewed designated hazard and inundation maps
  - Outlining evacuation zone(s)
  - Identifying vulnerable groups and elements
- Worked on the overall evacuation strategy
- Identify evacuation routes and signage requirements
- Defined evacuation procedures
- Discussed features of a public evacuation map
- Discussed methods for consultation and process for approval of a draft TEP
- Discussed strategies and methods to make the approved TEP known and understood by the public
- Discussed policies for exercising and revision processes

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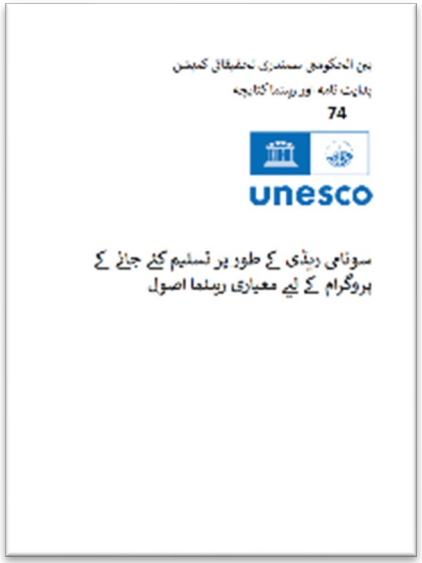
Translate Manual and Guides

Phase 2c: Completed

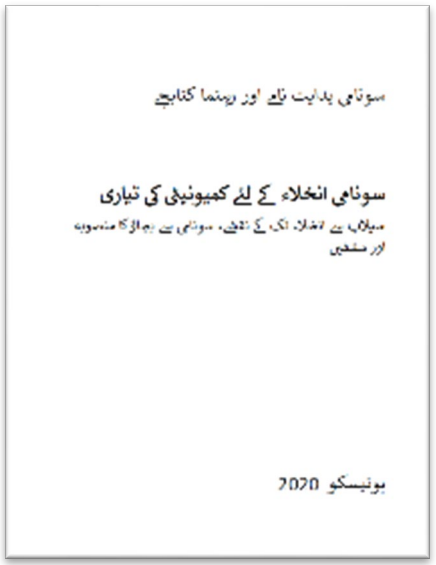
Manual and Guides translated and printed to Farsi and Urdu

Translation of MG 74 (Tsunami Ready) to Farsi

Translation of MG 82 (Preparing For Community Tsunami Evacuation) to Farsi



Translation of MG 74 (Tsunami Ready) to Urdu



Translation of MG 82 (Preparing For Community Tsunami Evacuation) to Urdu

The Karachi Folio
Impact of 1945 Tsunami

Tsunami Evacuation Maps Plans and Procedures

Phase 2c: Completed

The TEMPP training capitalized on lessons learnt of the Makran and Eastern Indian Ocean regions' experience toward the implementation of Tsunami Ready for better Indian Ocean Tsunami Resiliency

- Tsunami Inundation Modeling and Mapping (TIMM): 3 days
- Tsunami Evacuation Maps, Plans and Procedures (TEMPP): 5 days
- Tsunami Ready Implementation Planning (TRIP): 3 days

The training was participated by 35 participants (14 female, 21 male) from 17 countries and 14 trainers (10 male, 4 female) from UNESCO IOC, India, Indonesia, and Japan.

IOTIC- BMKG Indian Ocean Capacity Building (IO-CAP) 2025

Training Workshop on

Tsunami Evacuation Maps, Plans, and Procedures and the UNESCO-IOC Tsunami Ready Recognition Programme for the Indian Ocean Member States

15-23 April 2025

UNESCO Category2Centre, International Training Centre for Operational Oceanography (ITCOOcean), Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, India

	Parallel Sessions			Joint Session						
Monday 14 April 25	Day 1 Tuesday 15 April 25	Day 2 Wednesday 16 April 25	Day 3 Thursday 17 April 25	Day 4 Friday 18 April 25	Day 5 Saturday 19 April 25	Day 6 Sunday 20 April 25	Day 7 Monday 21 April 25	Day 8 Tuesday 22 April 25	Day 9 Wednesday 23 April 25	Thursday 24 April 25
	1	2	3	4	5		6	7	8	
Arrival of All Participants	Join Opening TIMM (Day 1)	TIMM (Day 2)	TIMM (Day 3)	TIMM-TEMPP (Day 1)	TIMM-TEMPP (Day 1)	Free Day	TEMPP (Day 3)	TEMPP (Day 4)	TEMPP (Day 5)	Departure of all Participants
	1	2	3							
	TRRP (Day 1)	TRRP (Day 2)	TRRP (Day 3)							

17 Countries.
Australia, Comoros, Bangladesh, India, Indonesia, Iran, Kenya, Malaysia, Madagascar, Maldives, Mauritius, Oman, Seychelles, South Africa, Sri Lanka, Timor Leste, United Arab Emirates.

Strengthening tsunami warning in the North-West Indian Ocean through regional cooperation: Independent Assessment

Relevance

- Project fully aligns with the IOTWMS MTS and the 4 pillars of the UNESCAP Trust Fund.
- Successfully addressed the needs and requirements of the countries and fully involved RWG NWIO in design and implementation.
- All interviewees supported the goals and objectives and confirmed its relevance in strengthening their national TWS

Key Achievements

- Capacity and knowledge in tsunami inundation modelling strengthened in 5 countries.
- Development of scientifically robust tsunami inundation maps for pilot communities in India, Pakistan, Iran, Oman, and UAE.
- Draft tsunami evacuation plans created for pilot sites in all five countries, verified in India and Pakistan.

Recommendations for Phase 3

- Focus on implementing the Tsunami Ready Recognition Programme in vulnerable communities.
- Facilitate strategic discussions for commitment and allocation of resources for TR.
- Develop capacity of national facilitators to implement TR at the community level.

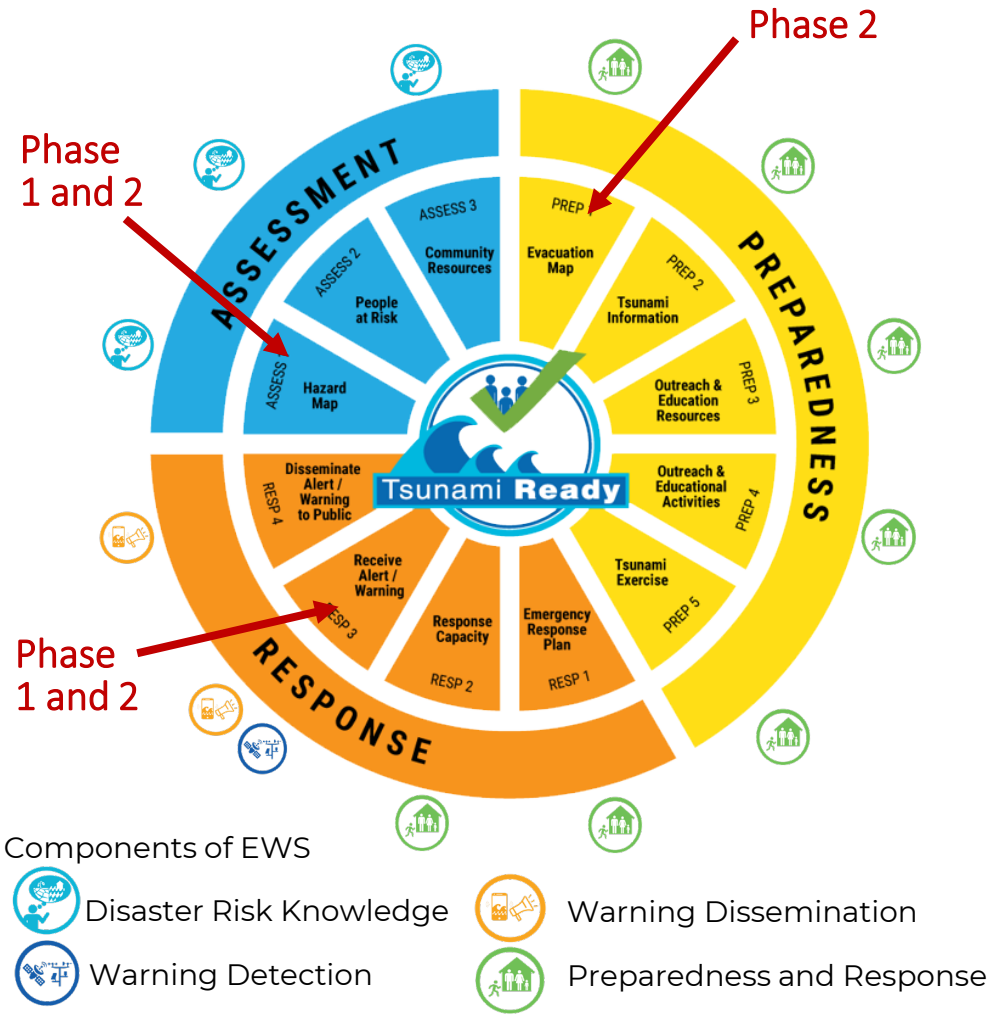
Phase 3: Tsunami Ready Implementation in Pilot Sites

Objective

6. Improved community capacities for tsunami preparedness and response that are in line with the set of indicators of the UNESCO Tsunami Ready Recognition Programme (TRRP) in the 5 participating countries.

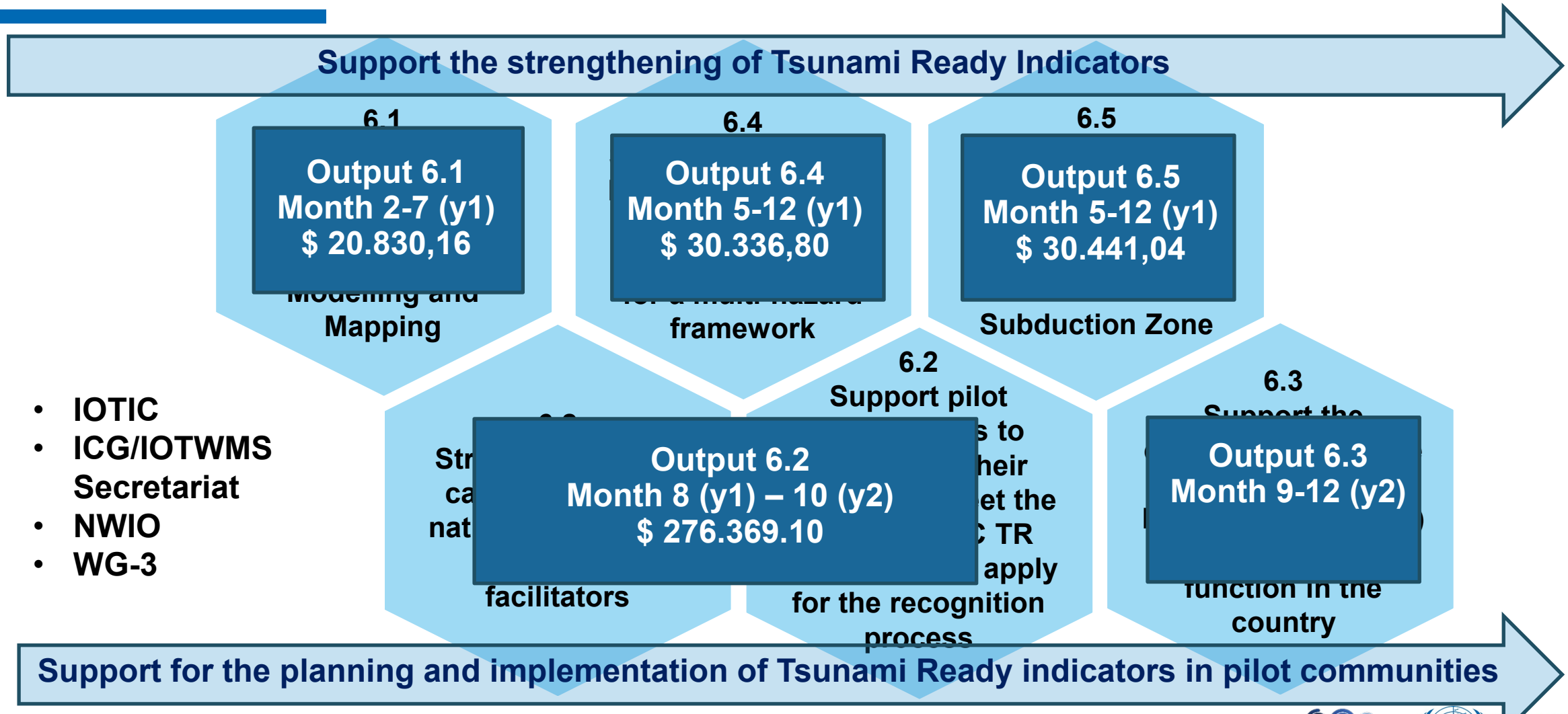
Proposed for 24 months

Phase 3 proposal will be presented to the 26th Advisory Council Meeting for the Trust Fund for Tsunami, Disaster and Climate Preparedness on 19 June 2025 for consideration of funding.



Phase 3: Tsunami Ready Implementation in Pilot Sites

Output



Phase 3: Tsunami Ready Implementation in Pilot Sites

Pilot Sites for Tsunami Ready Implementation

Pakistan - Gwadar

Iran - Chabahar

India - Kerala

Sri Lanka - Ambalangoda

Pakistan - Karachi

Iran - Jask

India - Gujarat

Maldives - Dhifusi - Fuvahmulah

The tentative pilot communities (and populations) are **India**: Kerala (Purakkad (29,782); Alappad (21,655)) and/or Gujarat (Okha (62,052); Pingleshwar (1,218)), **Iran**: Chabahar (106,739) and Jask (16,860), **Oman**: Alhail North (506), **Pakistan**: Gwadar (70,852) and Karachi (18,868,021), **Maldives**: Diffushi Island (1,270) and Fuvahmulah city (9177), **Sri Lanka**: Ambalangoda (56,961) and **UAE**: Fujairah (114,356).

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THANK YOU