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Oceanographic
Commission

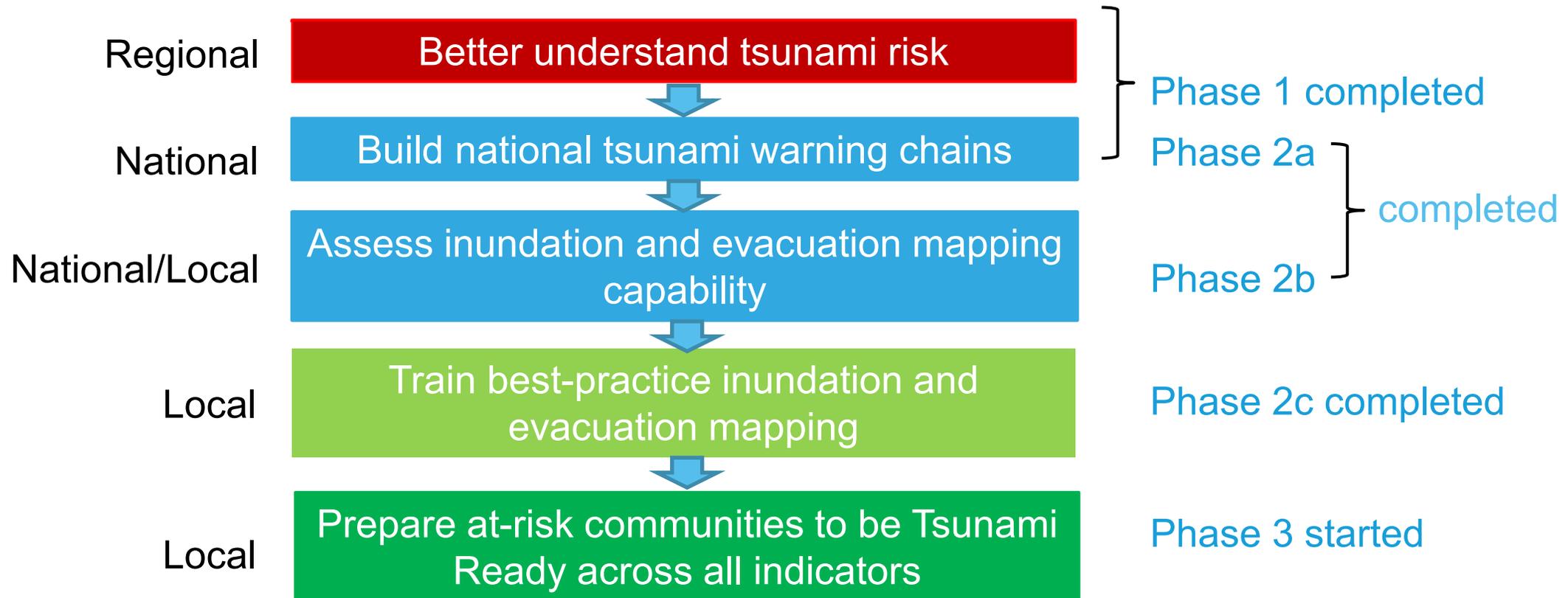
Strengthening tsunami early warning in the North-west Indian Ocean region through regional cooperation

Phases 1 & 2

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Objectives

Programmatic Approach



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

Phase 1:

Project Cost US\$ 147,470
(2019-2021)

- 1) 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.
- 2) Improvement of warning services at NTWC level and the organization of the national warning chains to assure timely warnings.

Phase-2a:

Project Cost US\$ 280.442,-
(2022-2023)

1. Finalisation of some Phase-1 remaining activities in tsunami risk knowledge and strengthening of national tsunami warning chains

Phase-2b:

2. Gap analysis and development of guidance on tsunami inundation mapping and evacuation planning in the NWIO region

Phase-2c:

Project Cost US\$ 298.834,-
(2024-2025)

Training in development of 1) tsunami inundation maps and 2) Tsunami evacuation plans to facilitate effective community responses to the threat from near-field and far-field tsunamis.

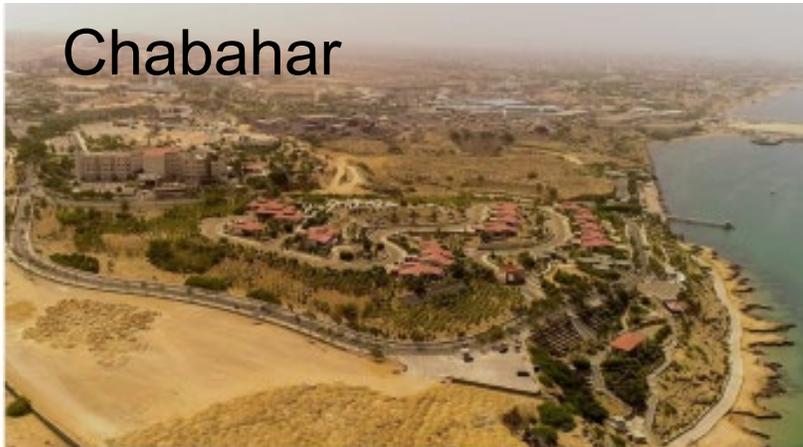
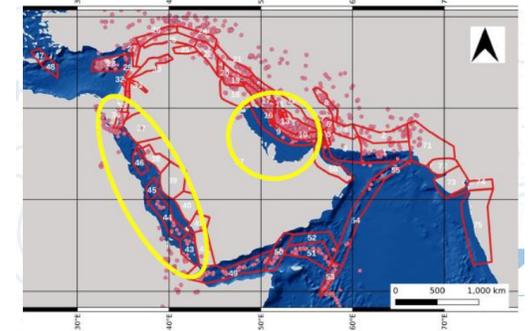
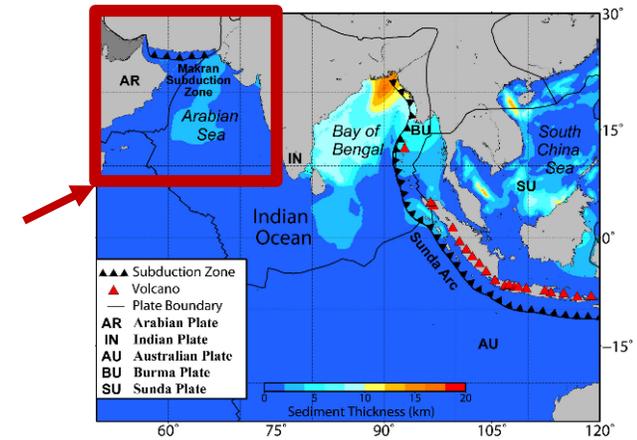
Risk Assessment

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



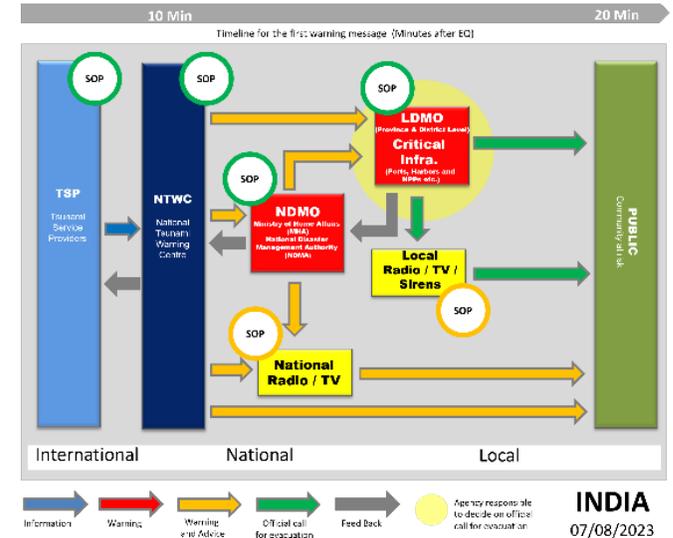
Tsunami Warning Chains and SOPs

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 (IOWave25).



Gap Analysis

Phase 2b: Completed

Inundation Mapping

Identify where national expertise exists and where capacity development is required

- **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

Gap Analysis

Phase 2b: Completed

Evacuation Mapping

Identify where national expertise exists and where capacity development is required

- **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** (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



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



Phase 2: Testimonies

Miss Hira Lodi, Assistant Professor, NED University Karachi, Pakistan

“The events were fruitful as it was not only a learning experience but also helped develop professional contacts and collaborations are expected in near future.”

Dr. Alfred Johny, Hazard Analyst, Kerala Disaster Management Authority (KSDMA), India

“Every time we gather, we come to know different experiences of other states and lessons learnt in specific community. This gave us great opportunity to improve ourselves and take advantage of experienced people on field”

Mr Abdolkarim Haghighi, Hormozgan Disaster Management Organization, Iran

“I have transferred the experiences of these workshops to my organization and now, besides myself, the entire Hormozgan disaster management team is involved in the activities and a good familiarity with the experiences with other countries has been established.”



Translate Manual and Guides

Phase 2c: Completed

Engaged with National Consultant to support the translation of UNESCO-IOC Manual and Guide .



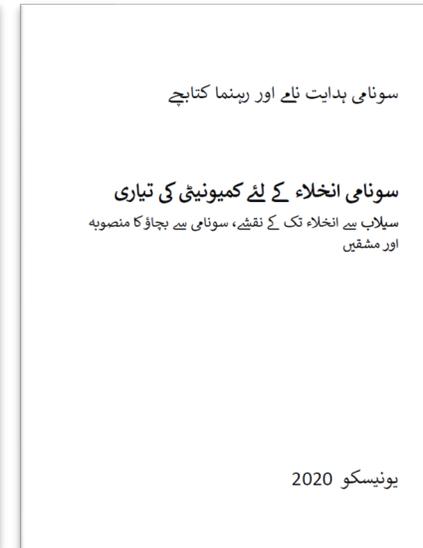
Translation of MG 74
(Tsunami Ready) to Farsi



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

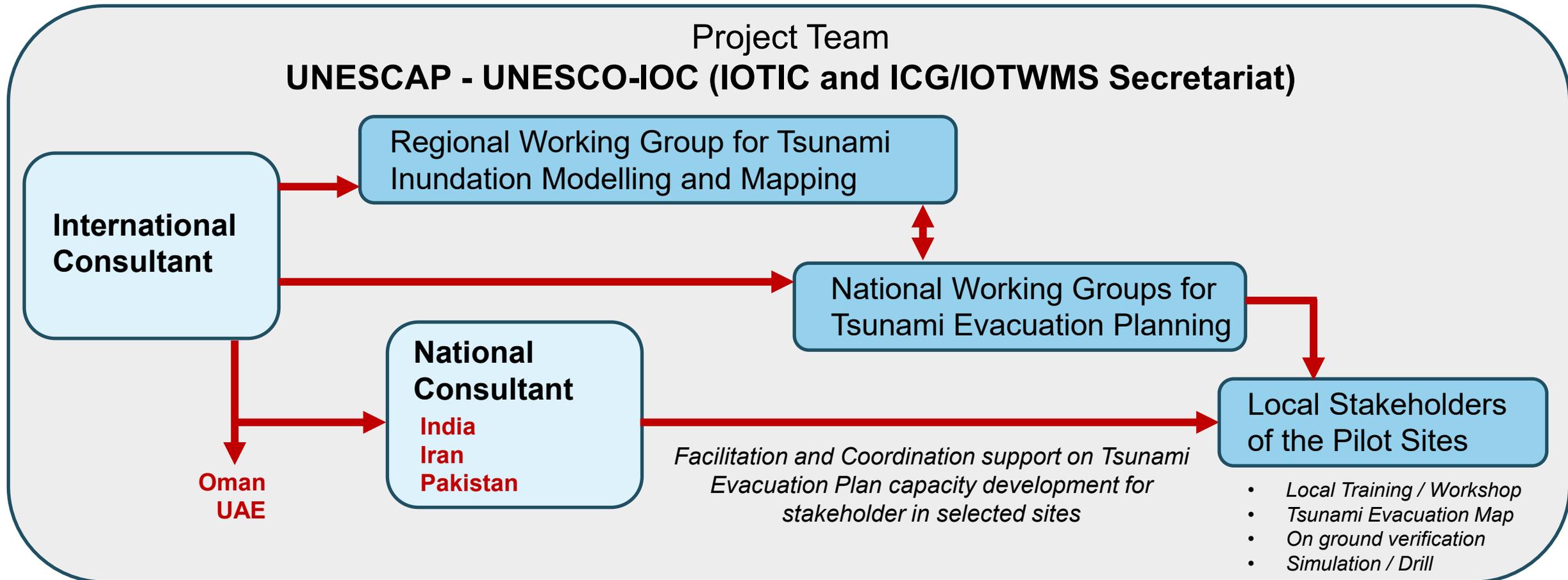


The Karachi Folio
Impact of 1945 Tsunami

Project Modalities

Phase 2c: Completed

Engaged with **National Consultants** to support the facilitation coordination at the local level to Pilot Tsunami Evacuation Plan in selected sites in the country.



Project Stakeholders & National Consultants

National Consultants

- Nagma Firdaus (India)
- Medhi Masoodi (Iran)
- Ghazala Naeem (Pakistan)

India

- Indian National Centre for Ocean Information Services (INCOIS)
- Kerala State Disaster Management Authority (KSDMA)
- 9 Pilot Coastal Gram Panchayats
- National Disaster Management Authority (NDMA)
- National Disaster Response Force (NDRF)
- India Meteorological Department (IMD)
- National Centre for Seismology (NCS)
- State Disaster Management Authorities (SDMAs)
- District Disaster Management Authorities (DDMAs)
- Municipalities and Panchayats
- Police, Health, and Education Departments
- IIT Madras, IIT Kharagpur
- National Institute of Disaster Management (NIDM)
- State universities
- Fisherfolk associations
- Local NGOs and community groups
- Schools and media outlets

Iran

- Iranian National Institute for Oceanography and Atmospheric Science (INIOAS)
- LDMO Jask
- National Disaster Management Organization (NDMO)
- Provincial DMOs (Hormozgan; Sistan and Baluchistan)
- National Tsunami Warning Centre (IRIMO)
- Governorates (e.g., Jask)
- City Councils and Municipalities
- Police, Health, Education, Agriculture, Fisheries, Water, Roads and Urban Development Departments
- University of Hormozgan
- Chabahar Maritime University
- Red Crescent Society
- Local NGOs
- Religious leaders (Sunni clerics, seminaries)
- Community representatives

Oman

- Civil Aviation Authority (CAA)
- National Multi-Hazard Early Warning Center
- Muscat, Barka, and Sub Municipalities
- Royal Oman Police
- Health and Education Directorates
- National Survey Authority
- Sultan Qaboos University
- Community leaders in Al-Hail North
- School administrations
- Local NGOs
- Media outlets

Pakistan

- Pakistan Meteorological Department (PMD)
- National Disaster Management Authority (NDMA)
- Provincial DMAs (Baluchistan, Sindh)
- District Disaster Management Authorities (Gwadar, Malir, Kemari)
- Deputy Commissioners
- Gwadar Development Authority (GDA)
- Municipal Committees
- Police, Health, and Education Departments
- NED University
- Gwadar Development Authority engineers
- Gwadar Port Authority
- Building and Road Department
- Community groups
- Schools
- Religious institutions
- Local media

United Arab Emirates

- National Center of Meteorology (NCM)
- National Emergency Crisis and Disaster Management Authority (NCEMA)
- Municipalities of Fujairah, Dibba, Kalba, Khor Fakkan
- Police and Civil Defence
- Health and Education Departments
- NCM modelling teams
- UAE University
- University of Sharjah
- Local NGOs and volunteer groups
- Port authorities
- Community representatives
- Media outlets

National Consultant Output: India

“Towards Empowering Local Communities to get Tsunami Ready”



UNESCO
Intergovernmental
Oceanographic
Commission

**Indian Ocean
Tsunami Information
Centre**

**UNITED NATIONS
ESCAP**
Economic and Social Commission for Asia and the Pacific

UNESCO FUNDED PROJECT TTF32

“Strengthening Tsunami Early Warning
in the
North-West Indian Ocean Region through Regional Cooperation (Phase 2c)”

“Towards Empowering Local Communities to get Tsunami-Ready”








**“COMPREHENSIVE REPORT ON
NATIONAL PROCESSES, OUTPUTS/RESULTS & ACTIVITIES
ON TSUNAMI EVACUATION MAPPING & EVACUATION PLANNING IN INDIA”
(May – December 2024)**



**TOWARDS EMPOWERING LOCAL COMMUNITIES
TO GET TSUNAMI READY IN INDIA**
TSUNAMI EVACUATION PLANNING IN COASTAL DISTRICTS OF
THE STATE OF KERALA-“THE INTEGRATED APPROACH”

1. VALIYAPARAMBA
2. AZHAKODE
3. COCHERANCHERY
4. VELIYANCODE
5. ERIVAD
6. EDAVANAKKAD
7. PURAKKAD
8. BILAPPAD
9. KARUMKULAM
9. COASTAL DISTRICTS
9. COASTAL GRAM PANCHAYATS

STATE LEVEL STAKEHOLDER CONSULTATION HELD – MAY 2024

JOINT KOSMA – UNESCO FIELD VISITS TO PILOT LOCATIONS UNDER TAKEN – MAY, OCTOBER, NOVEMBER 2024

PRE-PLANNING MEETINGS IN ALL 9 PILOT GPs HELD – JUNE & JULY 2024

COMMUNITY HANDBOOK & GUIDANCE SOPs ON TRP PREPARED FOR OF STAKEHOLDERS – JULY 2024

PREPARATION OF GP LEVEL TSUNAMI EVACUATION MAPS (TEM) – SEPTEMBER – OCTOBER 2024

STAKEHOLDER WORKSHOPS ON PREPARATION OF TSUNAMI EVACUATION MAPS & PLANS AT 9 GPs – OCTOBER 2024

DETAILING OF LEVEL TSUNAMI EVACUATION MAPS (TEM) – OCTOBER 2024 ONWARDS

DETAILING OF LEVEL TSUNAMI EVACUATION PLANS (TEP) – OCTOBER 2024 ONWARDS

COMMENCEMENT OF INFORMATION, EDUCATION AND COMMUNICATION (IEC) ACTIVITIES – OCTOBER 2024 ONWARDS

CONDUCT OF MOCK-DRILLS IN PILOT GRAM PANCHAYATS – NOVEMBER 2024 ONWARDS

UNESCO Project - “Strengthening Tsunami Early Warning in the North-West Indian Ocean Region through Regional Cooperation (Phase 2C) in India”



Kerala - India



Gujarat - India

National Consultant Output: Iran



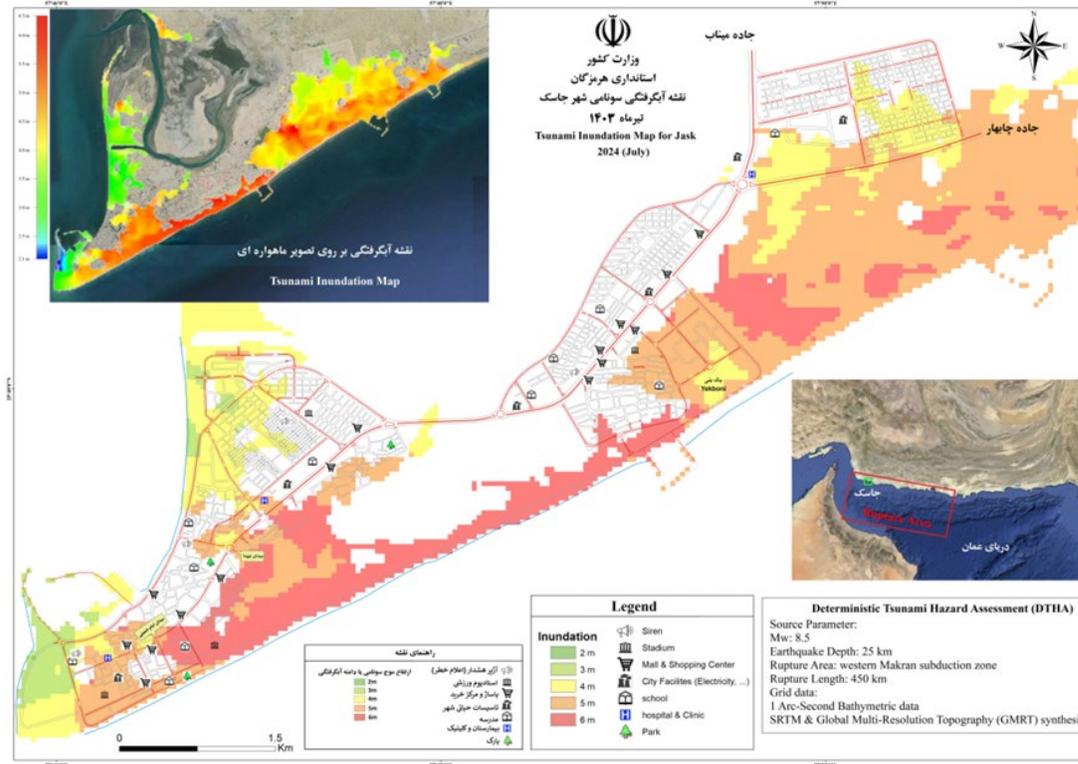
Report on Socialization, and the Use (Adaptation, Adoption, or Improvement) of a Tsunami Inundation Map– IRAN

UNESCAP TTF Project: “Strengthening Tsunami Warning in the North-West Indian Ocean through Regional Cooperation –

Phase 2c”

Dec 2024

Submitted by
Mehdi Masoodi
National Consultant IRAN



Tsunami Ready Pilot Sites



Jask - Iran



Chabahar - Iran



National Consultant Output: Pakistan

Tsunami Ready Pilot Sites



Gwadar - Pakistan

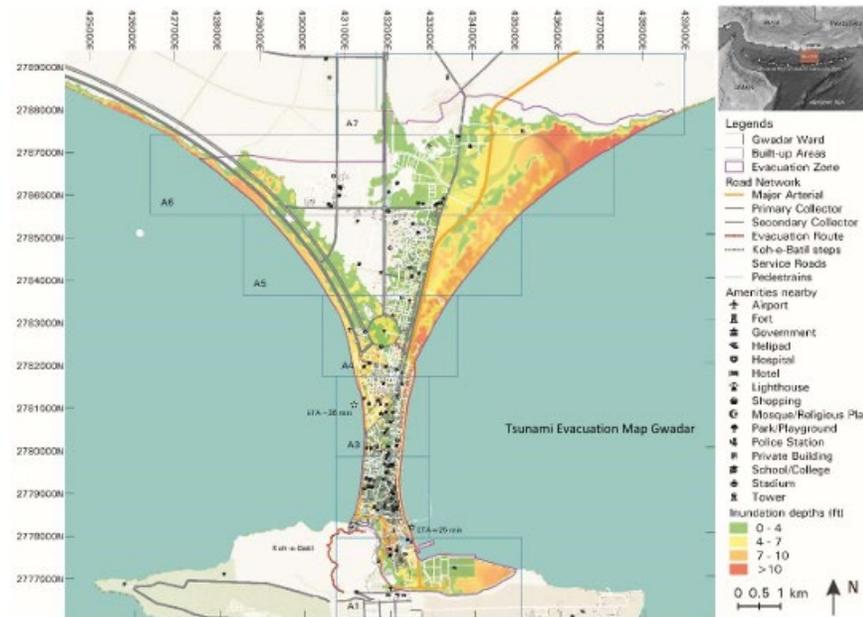


Karachi - Pakistan

STRENGTHENING TSUNAMI EARLY WARNING SYSTEM IN THE NORTH WESTERN INDIAN OCEAN (NWIO) THROUGH REGIONAL COOPERATION- PHASE 2C

National Activities Pakistan

April to December 2024





THANK YOU