INC?IS ▥ UCL

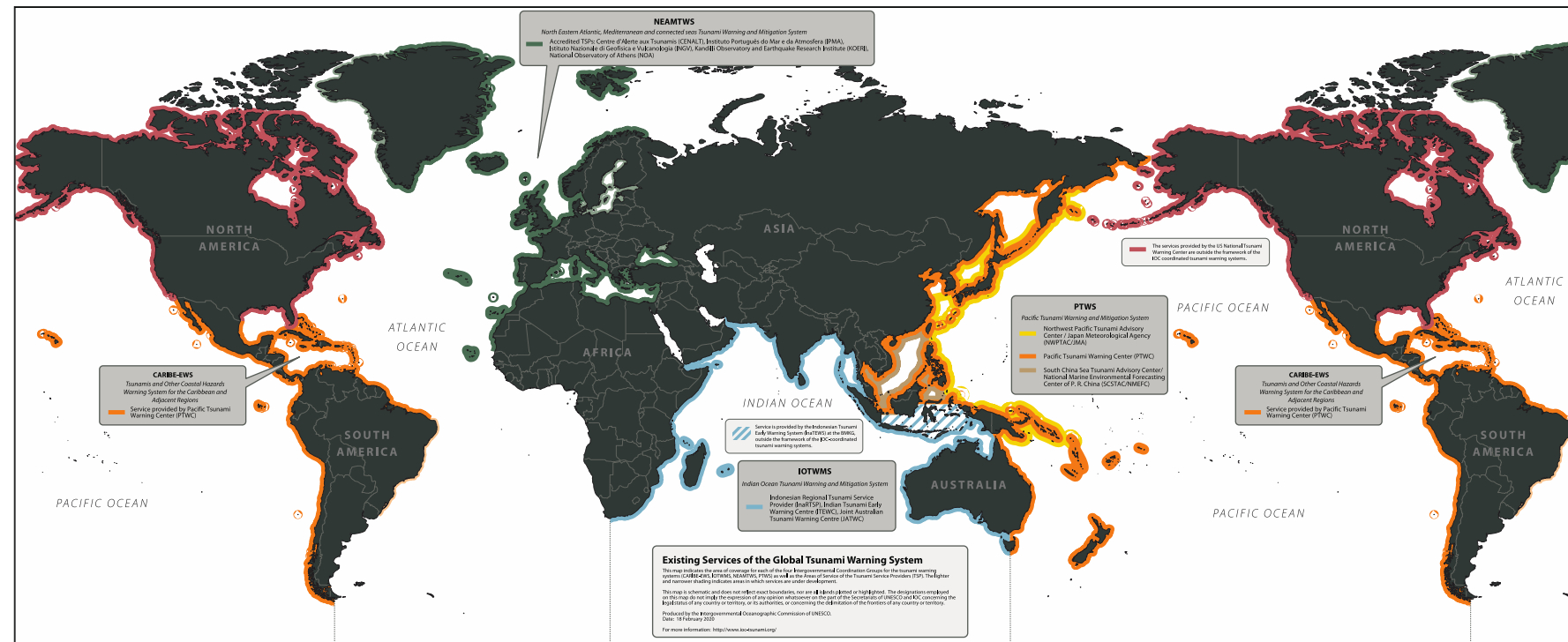# People-centred Tsunami Early Warning for India (PCTWIN)

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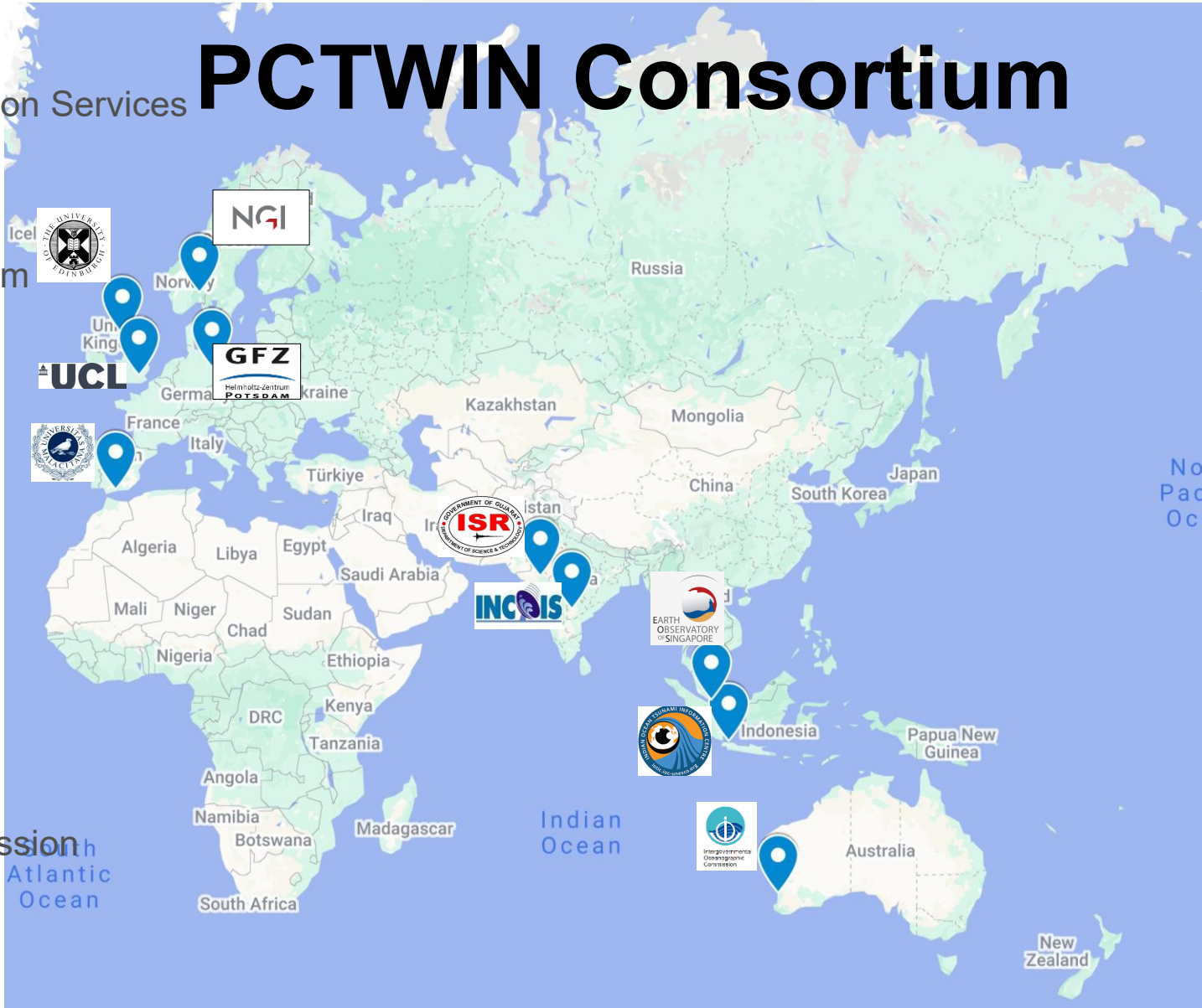
Earth Observatory of Singapore

Intergovernmental Oceanographic Commission - UNESCO

Indian Ocean Tsunami Information Centre

PCTWIN Vision: To provide a socially grounded understanding of tsunami risk drivers from earthquakes and landslides along the Indian coastlines, to catalyse the concept for the next generation of early warning systems, and to enhance community resilience to local and regional, seismic, and non-seismic tsunamis.

The objectives of PCTWIN are aligned with the pillars of people-centred early warning:

Improving disaster knowledge

Improved detection, observation, and forecasting of tsunamis

More inclusive tsunami warning communication; increased awareness and preparedness

To realise the desired objectives and impact, **PCTWIN** is divided into four work packages:

1. **WP1 Knowledge Hub** (Lead NGI) will unravel the fundamental physics and processes of earthquake and landslide tsunamis, to improve baseline tsunami hazard, exposure, and risk information (***obj#1***).

2. **WP2 Early Warning** (lead INCOIS) is the operational core of the project. It aims to improve and boost the technical and operational capabilities of ITEWC at the national level and the IOTWMS at the regional level (***obj#2***).

3. **WP3 Resilience Hub** (Lead UCL) focuses on participatory activities aiming at increasing public awareness and the level of preparedness of communities to respond to tsunamis (***obj#3***).

- Task 1.1 Fundamental of Earthquake Physics (**UE**, INCOIS, Earth Observatory of Singapore)

- Task 1.2 Seismic Sources (**ISR**, UE, INCOIS, GFZ)

- Task 1.3 Landslide Sources (**NGI**, INCOIS, IOC-UNESCO)

- Task 1.4 Probabilistic tsunami hazard analysis (**INCOIS**, ISR, NGI, UMA, GFZ, IOC-UNESCO)

- **Task 1.5 Exposure Mapping (UCL, INCOIS, NGI)**

- Task 1.6 Probabilistic Tsunami Risk Analysis (**UCL**, INCOIS, NGI)

o Systematic collection and processing of data for tsunami risk exposure mapping along the Indian Coastlines:

➢ human exposure

➢ road links

➢ critical infrastructure such as schools, hospitals, shelters, and fire stations) along the coastlines

o Extract human exposure patterns for different times of the day and night for weekdays and weekends.

Puri		
Area	20
Buildings	51057
SE Data	53805

Area	781
Buildings	166758
SE Data	25156

Areaj	55
Buildings	48333
SE Data	109393

Area	1655
Buildings	218385
SE Data	169517

Area(km²)	947
Buildings	509104
SE Data	37549

Area	433
Buildings	661564
SE Data	1690831

Area(km²)	528
Buildings	204650
SE Data	45038

Area	270
Buildings	103810
SE Data	196576

Area(km²)	96
Buildings	140552
SE Data	127973

Area(km²)	18
Buildings	20111
SE Data	22606

Source: Mahendra R.S., INCOIS

- Task 2.1 Rapid Source Characterization Using GNSS (**INCOIS**, GFZ, IOC-UNESCO)

- Task 2.2 Tsunami inundation emulation using Machine-Learning (**NGI**, UCL)

- Task 2.3 Probabilistic Tsunami Forecasting (PTF) (**INCOIS**, NGI, UCL, GFZ, UMA)

- Task 2.4 Impact Forecasting (**INCOIS**, UCL, NGI)

- Task 2.5 Communication of Uncertainties in Warnings (**UCL**, INCOIS, IOC-UNESCO, IOTIC)

- Assess risk perceptions, situational awareness, and behavioural readiness for tsunamis in communities in Odisha and Kerala

- Understand human responses, decisions, and reactions to natural signs and official tsunami warnings.

- Co-design inclusivity markers that, alongside Tsunami Ready's existing 12 preparedness indicators, can measure the level of inclusiveness of preparedness actions.

PCTWIN embraces inclusive, local, and participatory methods for increasing the preparedness of the communities at tsunami risk.

This is facilitated by synergies with UNESCO initiatives in the Indian Ocean region such as the Tsunami Ready Recognition Program.

- Task 3.1: Human perceptions and behaviour (**UCL**, INCOIS, IOC-UNESCO)

- Task 3.2: Inclusivity KPIs (**INCOIS**, UCL, IOC-UNESCO)

- Task 3.3: Private sector and business continuity (**UCL,** INCOIS)

- Task 3.4: Tsunami Ready Kit (**INCOIS**, UCL, IOC-UNESCO)

o **Deliverable 3.1:** Tsunami risk perception and readiness to respond (Report, Dataset)

- Assess risk perceptions, situational awareness, and behavioural readiness for tsunamis in communities in Odisha and Kerala (including vulnerable groups identified in T3.2)

- Understand human responses, decisions, and reactions to natural signs and official tsunami warnings.

- Provide contextual insights to inform the co-design of warning communications in WP2.

- **Methods:** Semi-structured interviews, focus groups, surveys.

o Co-design inclusivity markers that, alongside Tsunami Ready's existing 12 indicators, can measure the level of inclusiveness of preparedness actions.

o Building on the gender markers developed in UN Gender-Marker Toolkit, propose indicators which consider e.g. age and disabilities in an intersectional approach to Tsunami Ready Indicators.

o Develop and contextualize these markers in addition to Tsunami Ready's indicators to measure inclusiveness in preparedness actions and planning.

o **Methods:** Focus groups

TSUNAMI READY INDICATORS	
I	**ASSESSMENT (ASSESS)**
1	**ASSESS-1**. Tsunami hazard zones are mapped and designated.
2	**ASSESS-2**. The number of people at risk in the tsunami hazard zone is estimated.
3	**ASSESS-3**. Economic, infrastructural, political, and social resources are identified.
II	**PREPAREDNESS (PREP)**
4	**PREP-1**. Easily understood tsunami evacuation maps are approved.
5	**PREP-2**. Tsunami information including signage is publicly displayed.
6	**PREP-3**. Outreach and public awareness and education resources are available and distributed.

What does _inclusion_ mean?

	Type of Inclusion	What it means?	What are the implications?
Increasing inclusion →	Passive Inclusion	Named on a list	Vulnerable groups included on a contact list. Few or no opportunities for them to shape the process to work for them.
	Active Inclusion	Enabled to act	Broad social participation enabled. Support provided for effective actions to take place.
	Local Ownership	**Resilience building through independence**	Requires local decision makers to develop collaborative governance mechanisms to enable full participation of all. Develop local capacities to act without external aid.

o Involves the private sector in participatory activities.

o It will do so by delivering focus groups with tabletop exercises and conducting local surveys aiming to understand possible gaps in governance, practices and policies that could limit the effective delivery of early warnings in enterprises.

o The goal is supporting the implementation of new synergies and continuity management procedures that could be transferred across networks of practices, such as the United Nations Alliance for Disaster Resilient Societies Engaging the private sector (UNDRR, ARISE network).
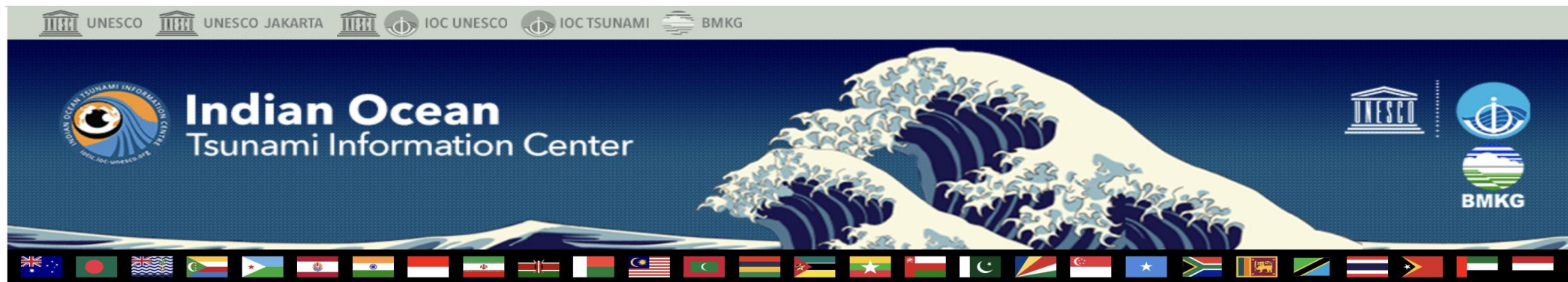
o Inspired by GITEWS Tsunami Kit, this task co-designs and co-develops simple and user-friendly tools that facilitate the uptake of the Tsunami Ready procedures by more local communities (e.g., simple hazard/risk maps, simple inundation contours), guidelines for communication of warnings and inclusive tsunami response planning.

PCTWIN embraces inclusive, local, and participatory methods for increasing the preparedness of the communities at tsunami risk.

This is facilitated by synergies with UNESCO initiatives in the Indian Ocean region such as the Tsunami Ready Recognition Program.

PCTWIN's pathway to long-term impact:

A. Reducing the number of casualties due to tsunamis (*Pathway A: Save lives)*

B. Contributing to collective knowledge of the processes generating tsunamis and their potential risks to the communities (*Pathway B: Share knowledge*)

C. Increasing the capacities of the local communities to be prepared for tsunami threats (*Pathway C: Enhance resilience*).

Thank you

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