



Preparedness Indicators - How to achieve, challenges and solutions

5.1 Evacuation Map – Guidelines, Map Standards

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Tsunami Ready Indicator

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.
7	PREP-4. Outreach or educational activities are held at least 3 times a year.
8	PREP-5: A community tsunami exercise is conducted at least every two years.
III	RESPONSE (RESP)
9	RESP-1. A community tsunami emergency response plan is approved.
10	RESP-2. The capacity to manage emergency response operations during a tsunami is in place.
11	RESP-3. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place.
12	RESP-4. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place.

4. PREP-1
 Easily understood tsunami evacuation maps are approved

Tsunami Evacuation Maps

The evacuation map should:

- Show evacuation zones, routes, safer areas as higher ground or tsunami shelter, assembly areas, critical and sensitive facilities
- Use the tsunami hazard map (inundation, flooding) as a basis for its preparation (deliverable of ASSESS-1)
- The community should be involved in its preparation to incorporate local knowledge



Evacuation map in Praia da Batata, Lagos, Portugal.

Tsunami Evacuation Maps

Tsunami Evacuation Maps, Plans and Procedures (TEMPP)

ITIC Training > Tsunami Evacuation Maps, Plans and Procedures (TEMPP)

TEMPP Pilot

Community preparedness is vitally important because it enables a rapid appropriate response to both official warnings and the natural signs of a possible tsunami. This is critical for saving lives for all tsunami events, and it is even more essential for locally generated tsunamis which can arrive in minutes and before an official tsunami warning is issued by authorities.

Two important components of preparedness are science-based tsunami inundation maps and community-developed tsunami evacuation maps and plans. Communities are best prepared when they are aware of their tsunami hazard, and together decide how they will be most ready for the next tsunami.



To describe the steps required to produce reliable and practical community-level tsunami evacuation maps, the IOC published *Preparing for Community Tsunami Evacuations: from inundation to evacuation maps, response plans and exercises* (UNESCO IOC Manuals and Guides 82, 2019) as a reference and training manual.

The manual was developed as an activity of the IOC Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS) and its Working Group on Disaster Management, Preparedness, and Risk Reduction, with input from the IOC Working Group on Tsunamis and Other Hazards related to Sea-Level Warning and Mitigation Systems (TOWS-WG) Task Team on Disaster Management and Preparedness.

It is based on the pilot, [Tsunami Evacuation Maps, Plans, and Procedures \(TEMPP\) Training Pilot](#), that was conducted in Honduras and Central America, led by the International Tsunami Information Center, between 2015 and 2017. In February 2017, with the completion of the TEMPP trainings, Honduras was able to recognize the Pacific community of Cedeño as [UNESCO IOC Tsunami Ready](#). The Pilot and effort was generously supported by the United States Agency for International Development ([USAID](#)) Office of U.S. Foreign Disaster Assistance ([OFDA](#)), US National Oceanic and Atmospheric Administration ([NOAA](#)), and the Intergovernmental Oceanographic Commission ([IOC](#)).

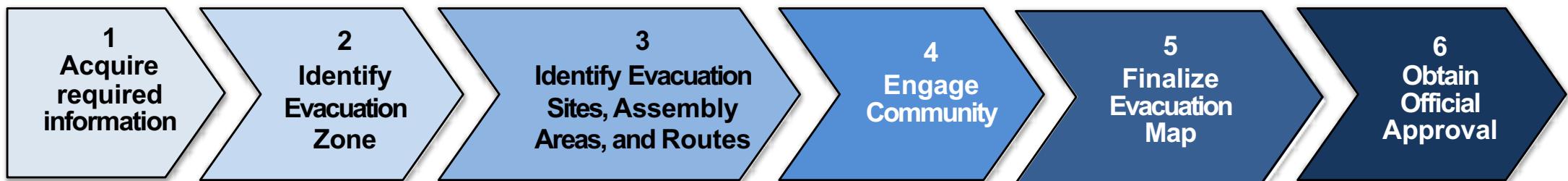


<https://tsunami.ioc.unesco.org/en/tempp>

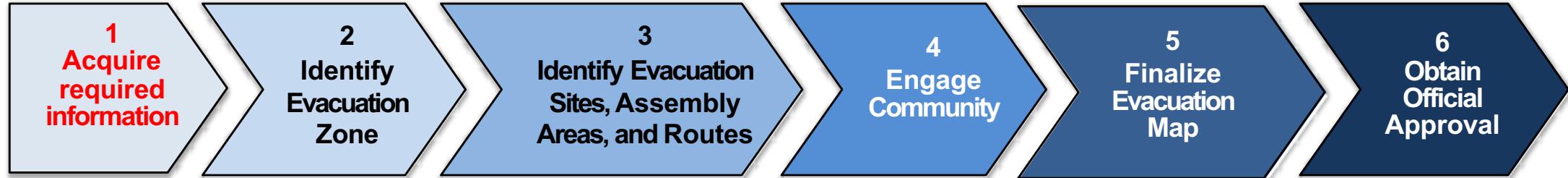
Steps to develop evacuation maps

Evacuation maps should be simple and easy to read and should include essential information

The following 6 steps should be followed to develop evacuation maps:

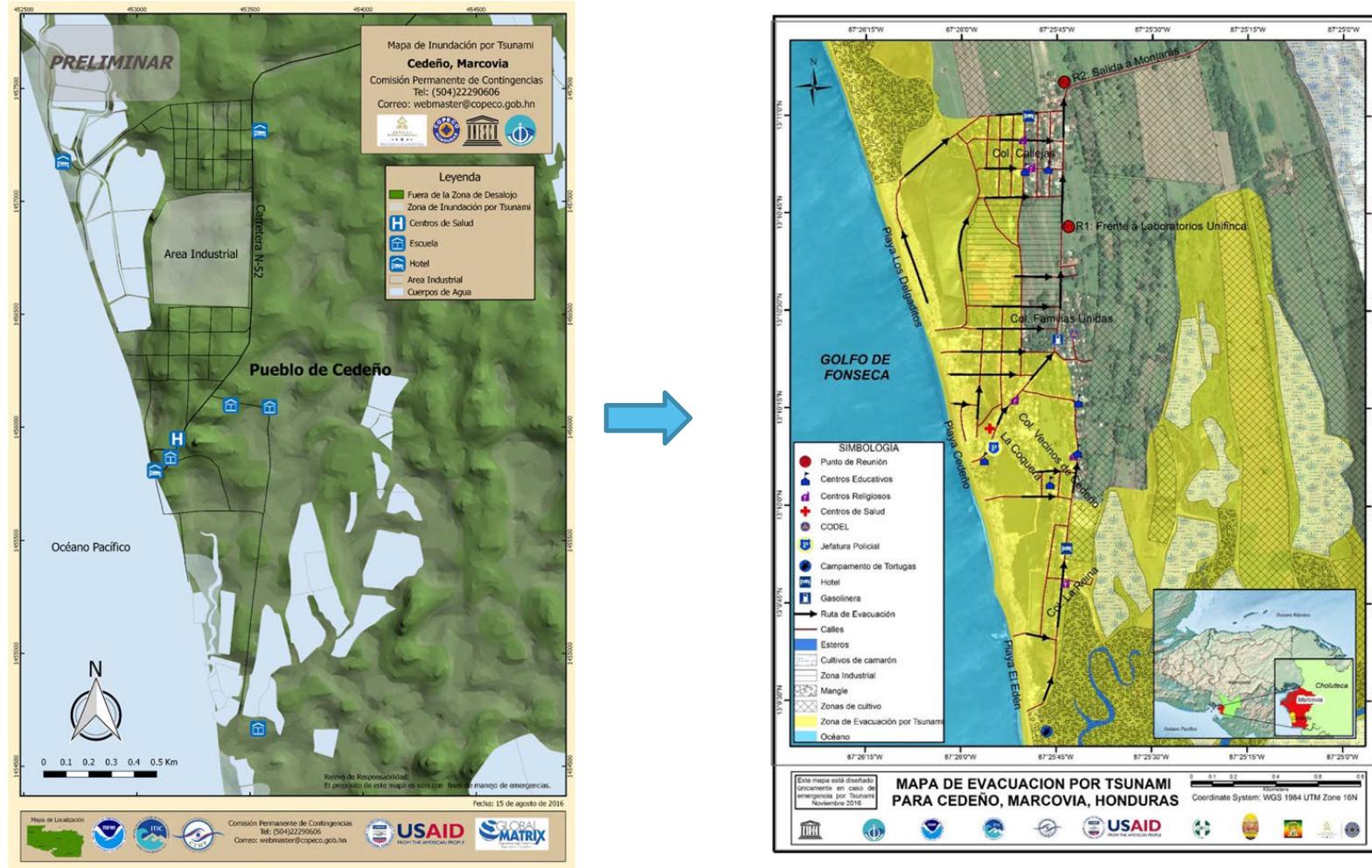


Steps to develop evacuation maps

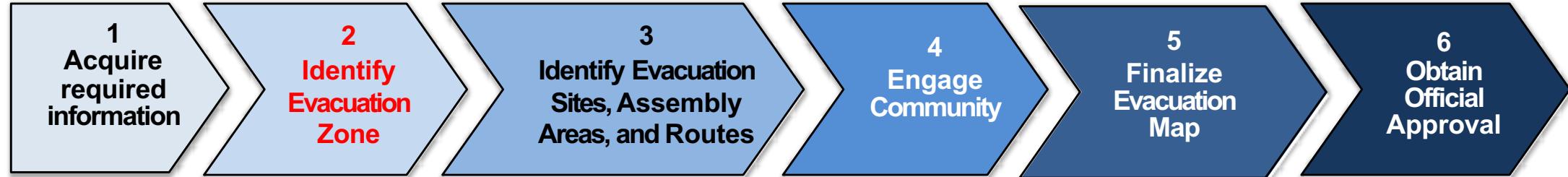


- Tsunami **inundation map** (gives flooding extent from worst case and credible tsunami scenario)
- Tsunami **wave arrival time** (useful to do the evacuation planning)
- **Geospatial data layers** (natural and built environment, population demographics, road systems, infrastructure and critical facilities, houses, etc)
- **GIS software** (QGIS, ArcGIS) and GIS mapping experts

From inundation map to evacuation map – example from Cedeño, Honduras



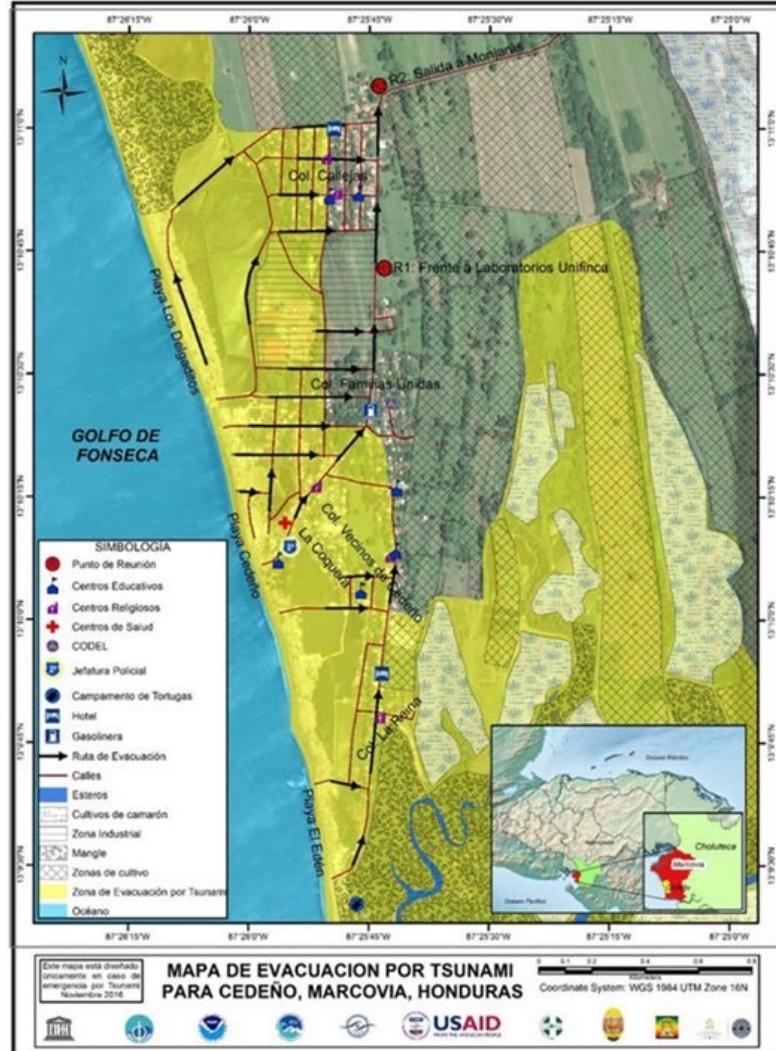
Steps to develop evacuation maps



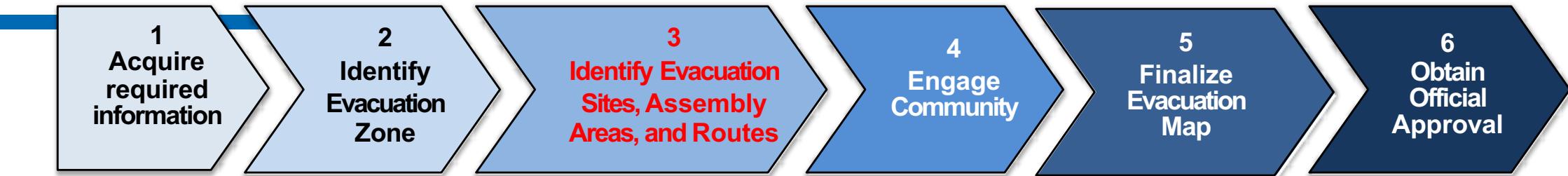
Safety factors to consider when drawing the evacuation zone line are:

- Proximity and location of high ground (hills, cliffs, man-made vertical refuges (berms, tall buildings, etc);
- Safety buffer for potential uncertainties in the inundation map;
- Knowledge of flood zones, types of roadways and locations;
 - Availability of identifiable landmark locations for easier evacuation routing;
 - Hazardous Materials (HAZMAT) sites and other potential hazards (secured gates or high fences, lumber yards or harbours with potential floating debris etc.) that could cause
- Evacuation problems;
 - Locations of special needs population in evacuation zone (i.e. hospitals, elder care or nursing facilities, schools, day care centres, non-English speakers, transient populations, etc.).

Sensitive Facilities – Cedeño, Honduras



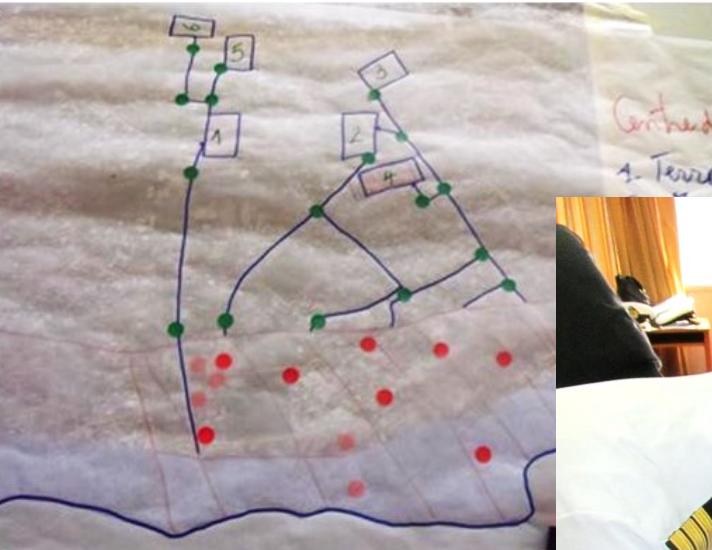
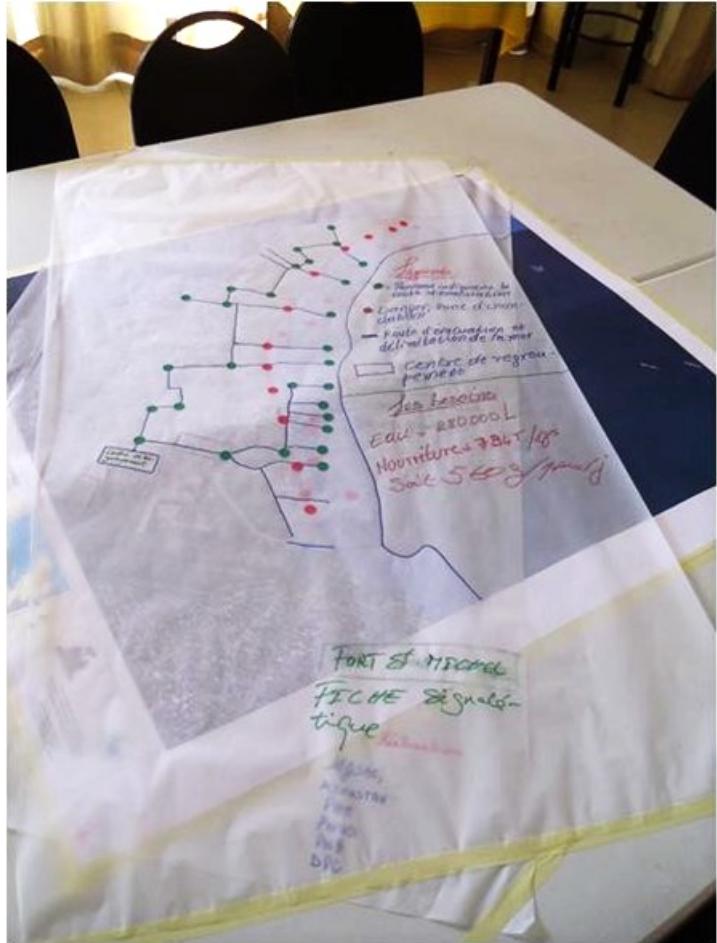
Steps to develop evacuation maps



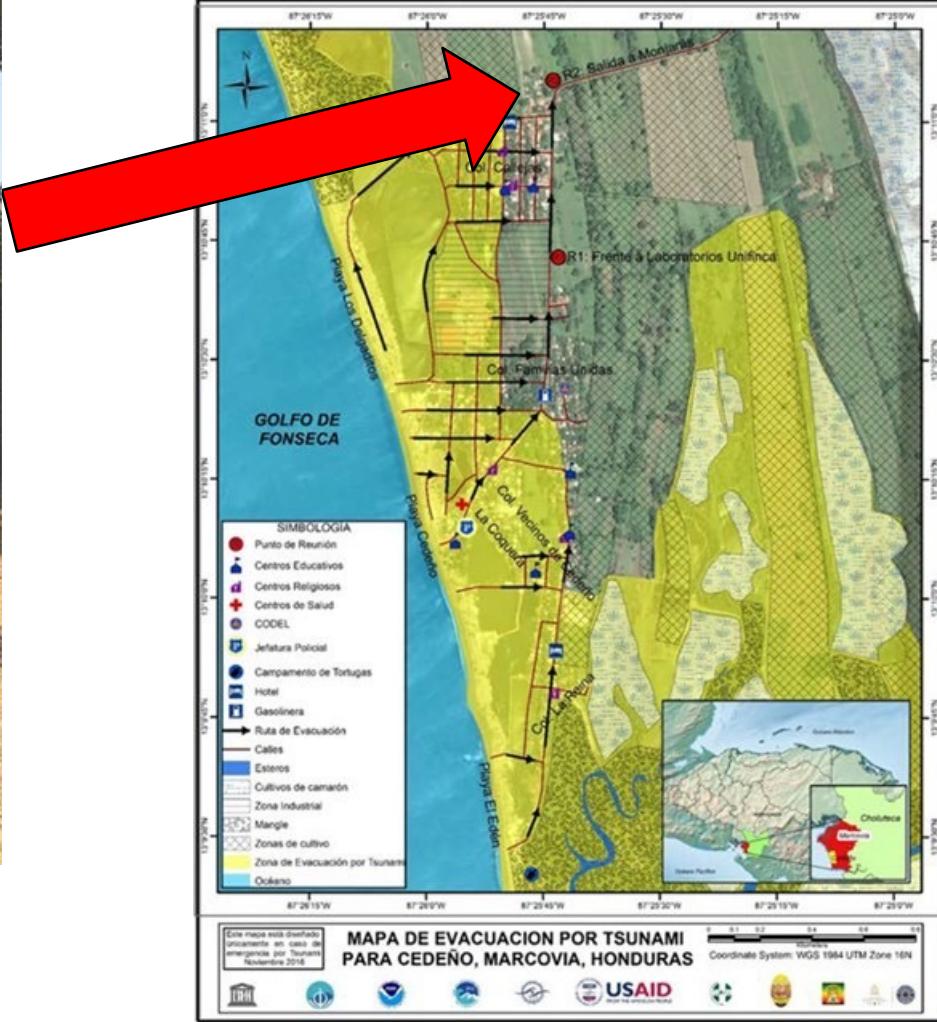
Decide criteria for determining assembly sites and evacuation route. The following are possible bases for selection of the site:

- Site is outside of identified Tsunami Evacuation Zone;
- Site can be reached by foot within the shortest possible time. Ease of egress by foot is the first priority, including for special needs populations;
- The total area of site can hold the expected number of people (or certain percentage of population of the community if several sites are selected);
- Site can be easily identified by residents, for example a prominent hill, a school, an open park among others
- Evacuation routes should avoid areas that could suffer damages from strong earthquakes such as collapsed bridges, buildings, power lines and landslides, which may block routes and cause hazardous conditions.
- Route and site can accommodate special needs populations (portion of the public sector that is willing, yet incapable of leaving the Evacuating Zone).

Working on Evacuation Maps



Meeting Point example – Cedeño, Honduras



Steps to develop evacuation maps

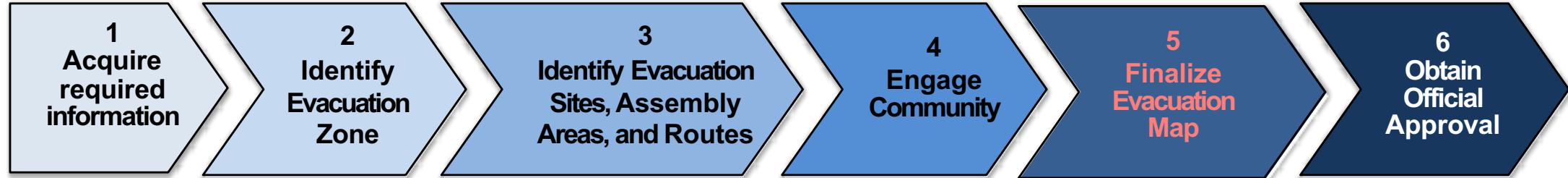


- At least one meeting should be held with the community and its leaders to obtain their input.
- Invite all stakeholders who have a response, coordination, or special needs requirement (e.g., hospitals, schools).
- Engage and explain inundation mapping results and draft evacuation zone, evacuation areas, assembly sites, refuges, or shelters, evacuation routes, and signage.
- Field visits to view topographic and built environment conditions may be needed. Evacuation routes should be walked by the community to confirm ease and timing for successful egress.

Community Engagement – Cedeño, Honduras

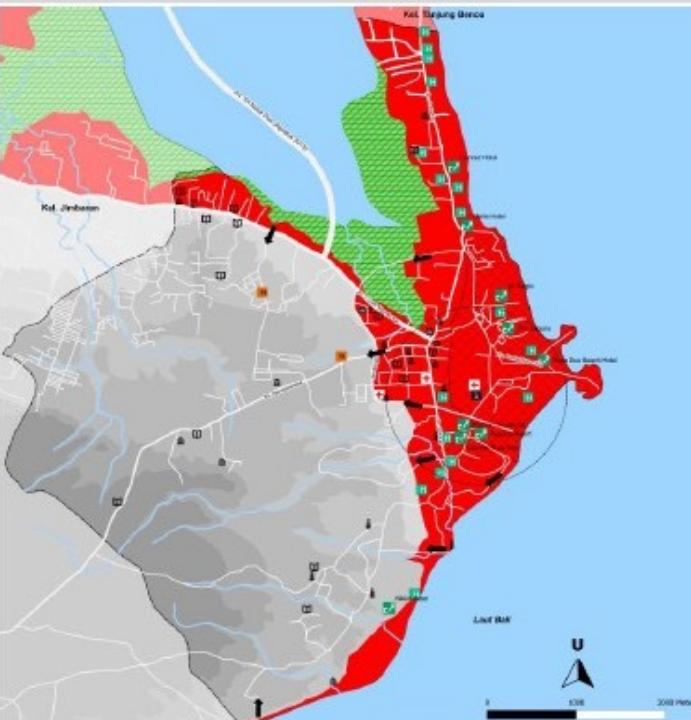


Steps to develop evacuation maps

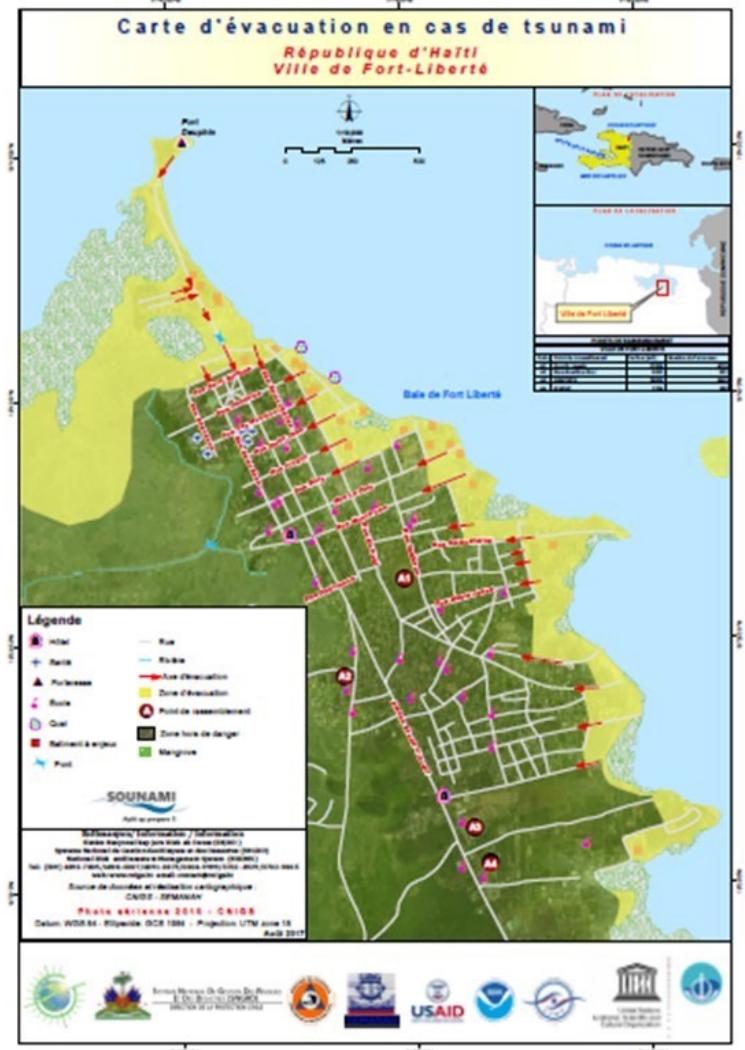


- The community input is needed to finalize the drawing of the lines, evacuation/areas and routes, and signage.
- Colours (zones, streets, routes, signage, symbols, topography if shown),
- Legend
- Inclusion of tsunami warning and safety information (awareness),
- Inclusion of evacuation information (instructions, guidelines).

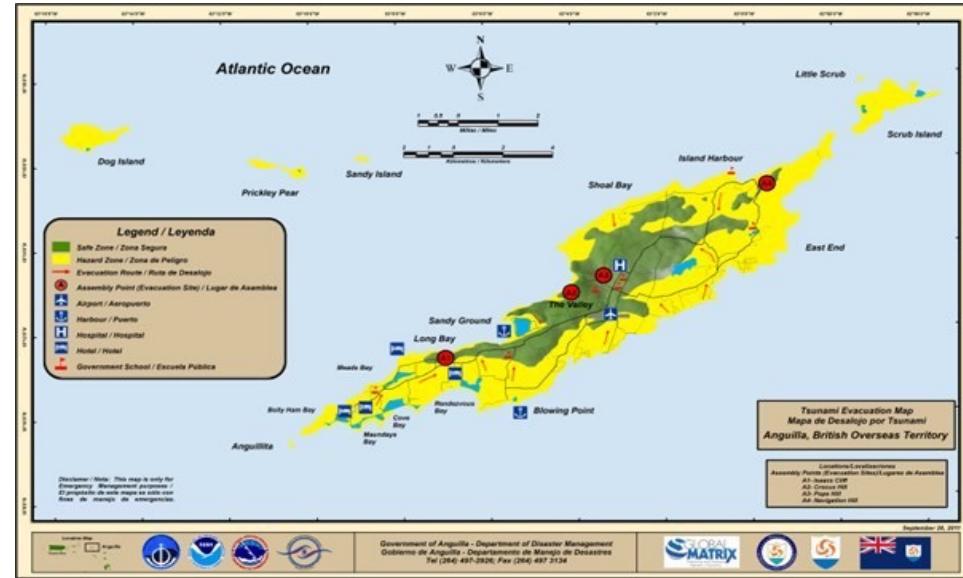
Indonesia

Tsunami Evacuation Procedure	Tsunami Evacuation Map for Benoa Peta Evakuasi Tsunami di Kelurahan Benoa	Prosedur Evakuasi Tsunami
<p>1. If you feel an earthquake - protect yourself</p> <ul style="list-style-type: none"> ▪ Don't panic! ▪ Drop, cover and hold! <p>2. After an earthquake, be aware that a tsunami may follow</p> <ul style="list-style-type: none"> ▪ Move away from the beach immediately as a precaution measure! ▪ Look for more information through TV and Radio! <p>3. After a strong and prolonged earthquake, evacuate immediately!</p> <ul style="list-style-type: none"> ▪ Don't wait for an official warning, leave the RED ZONE immediately if possible or look for shelter in higher buildings ▪ If you are around Pratama Street, look for shelter in one of the hotels with higher floors ▪ As a visitor in a hotel, please follow the instructions of hotel staff <p>4. The sound of the siren is the official call for evacuation</p> <ul style="list-style-type: none"> ▪ If the siren sounds, follow the evacuation procedure as indicated above (No. 3)! <p>Be aware that the siren may not be heard in all areas.</p> <p>After the first tsunami wave, more waves are likely to come!</p> <p>Wait for an official "All Clear" message before leaving shelter</p> <p>*Please note that BTDC has its own procedure</p>	<p>Tsunami Evacuation Map for Benoa Peta Evakuasi Tsunami di Kelurahan Benoa</p>  <p>Legend/Legends</p> <ul style="list-style-type: none"> ■ Tsunami Risk Zone Zona Bahaya Tsunami ■ BTDC Area Kawasan BTDC ■ Safe Zone/Zona Aman ■ Height of 25 m Ketinggian 25 m ■ Height of 50 m Ketinggian 50 m ■ Height of 75 m Ketinggian 75 m ■ Height of 100 m Ketinggian 100 m ■ Height of >100 m Ketinggian >100 m ■ Siren Shire ■ Public Vertical Evacuation Building Bangunan Evakuasi Vertikal Umum ■ Hotel Atm 3 Floors or more Hotel berlantai 3 lantai atau lebih ■ ATM/ Bank ATM ■ Hospital Rumah Sakit ■ School Sekolah ■ Village Office Kantor Kepala Desa ■ Community Hall Bala Banteng ■ Hindu Temple Pura ■ Traditional Market Pasar Tradisional ■ Street Network Jaringan Jalan ■ River/Creek Sungai/Kali ■ Admin Interactive Border Batas Administratif ■ Mangrove Hutan Bakau <p>Further Information / Informasi lebih lanjut: BPBD Kabupaten Badung Jln. Jaya Raya Sempol, Mengwi Tel. 0361-7811166</p>	<p>Prosedur Evakuasi Tsunami</p> <ol style="list-style-type: none"> 1. Jika merasakan gempabumi - lindungi diri anda <ul style="list-style-type: none"> ▪ Jangan panik ▪ Merunduk, berlindung dan berpegangan 2. Setelah gempabumi, sadari bahwa tsunami mungkin terjadi <ul style="list-style-type: none"> ▪ Segera tinggalkan daerah pantai sebagai langkah pencegahan awal ▪ Carih informasi lebih lanjut melalui TV dan Radio 3. Setelah gempabumi yang kuat dan lama, Segera Evakuasi! <ul style="list-style-type: none"> ▪ Jangan menunggu peringatan resmi, segera tinggalkan ZONA MERAH jika memungkinkan atau mencari tempat berlindung yang lebih tinggi ▪ Jika anda berada di sekitar Jln. Pratama, segera berlindung di bangunan bertingkat 3/lebih ▪ Jika anda pengunjung,ikuti arahan dari karyawan hotel 4. Bunyi sirene adalah panggilan resmi evakuasi <ul style="list-style-type: none"> ▪ Jika sirene berbunyi, ikuti prosedur evakuasi seperti diatas (No. 3)! <p>Sadari bahwa mungkin bunyi sirene tidak terdengar di semua area.</p> <p>Setelah gelombang pertama datang, gelombang yang lain mungkin akan menyusul.</p> <p>Tunggu pemberitahuan resmi "Tsunami telah berakhir" sebelum meninggalkan tempat perlindungan</p> <p>*Catatan: Ada prosedur khusus di area BTDC</p>

Haiti



Anguilla



Puerto Rico



Trinidad & Tobago



Text on back of Evacuation Map - Cedeño, Honduras

Mensajes Oficiales de Tsunami para Honduras



Alerta Roja

- Impacto de Tsunami Confirmado
- Mantenerse en los puntos de reunión
- Siga las instrucciones de los encargados de emergencias



Alerta Amarilla

- ¡Peligro de Inundación!**
- Si está en la zona de evacuación, salga, *Diríjase* hacia los puntos de reunión
- Siga las instrucciones de los encargados de emergencias



Alerta Verde

- Potenciales corrientes peligrosas
- Salir* del agua, playa, puertos marinos
- Estar en Observancia
- Siga las instrucciones de los encargados de emergencia



Boletín Informativo

- No hay peligro
- Estar atento a información oficial

Para Más Información
Comisión Permanente de Contingencias (COPECO)
<http://COPECO.gob.hn/>
y CODEL Cedeño
En caso de Emergencia llamar 911

En Honduras Sí Ocurren Tsunamis

Los Tsunamis en Honduras no son tan frecuentes pero sí han ocurrido y pueden volver a ocurrir en cualquier momento. Las costas Sur y Norte son vulnerables.

En Centro América han ocurrido unos 49 tsunamis desde los tiempos coloniales. Se generaron a consecuencia de terremotos en fallas cerca a las costas del Pacífico, como del Caribe y también distantes.

Uno de los tsunamis que afectó las costas hondureñas ocurrió el 4 de agosto de 1856. El mismo se generó en el Golfo de Honduras cerca de Belice y bañó toda la costa norte: Tela, La Ceiba, Trujillo y llegó hasta Gracias a Dios.

También se han registrado tsunamis en la parte sur, en el Golfo de Fonseca.

¿Qué es un Tsunami?

- Un tsunami es una serie de olas causada por una fuerte perturbación de un cuerpo de agua.
- Estas olas pueden llegar en unos minutos, pero continuar por horas. Las olas arrasan con todo lo que encuentran a su paso ya sea cuando inundan la costa o cuando retroceden.
- Los tsunamis pueden ser producidos por grandes terremotos localizados en la costa o en el fondo marino, un deslizamiento o una erupción volcánica.
- En Honduras se encuentran fuentes potenciales de tsunamis que se pueden generar localmente y también existen fuentes regionales y distantes, al otro lado del océano.

Alarma Personal Para Terremotos y Tsunamis LOCALES

Los Terremotos ocurren de forma súbita, y en el caso que sean cercanos y generen tsunamis, las olas pueden llegar antes que le llegue una alerta oficial. Siga estas recomendaciones:

Protéjase durante el terremoto:
Agáchese, Cúbrase y Sujétese

Salga rápidamente de la zona de evacuación por tsunami en cualquiera de las siguientes situaciones:

- Después de **SENTIR** un terremoto fuerte que te tumbe o dure más de veinte segundos
- Si **VE** un repentino aumento o disminución del nivel del mar
- Si **OYE** un ruido extraño o fuerte que viene del mar

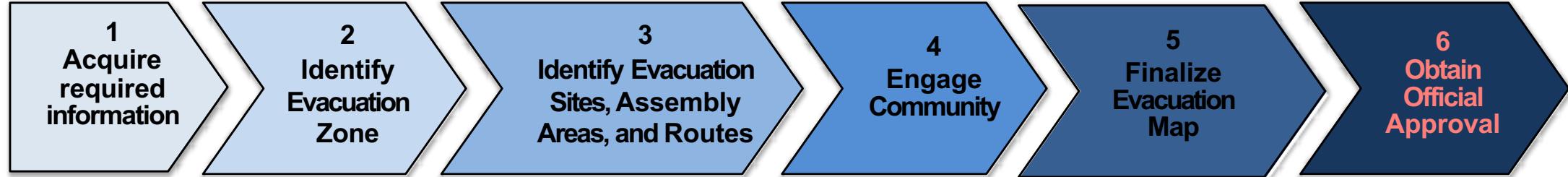
¡¡PROTÉJASE, VIVA PARA CONTARLO!!!

ZONA DE TSUNAMI
EN CASO DE TERREMOTO O AUMENTO DE NIVEL DEL MAR, SALGA RÁPIDAMENTE DE LA ZONA DE EVACUACIÓN

PUNTO DE REUNIÓN
ESPERE POR INFORMACIÓN OFICIAL

TSUNAMI

Steps to develop evacuation maps



Evacuation maps are **public safety products** that should be **approved** by the **appropriate local governing authority**. The type and placement of signage should also be approved by the appropriate authority.

Thank you Salamat po

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