



Intergovernmental
Oceanographic
Commission



UNESCO/IOC – NOAA ITIC Training Program in Hawaii (ITP-Hawaii)
TSUNAMI EARLY WARNING SYSTEMS
AND THE PACIFIC TSUNAMI WARNING CENTER (PTWC) ENHANCED PRODUCTS
TSUNAMI EVACUATION PLANNING AND UNESCO IOC TSUNAMI READY PROGRAMME
7-18 August 2023, Honolulu, Hawaii USA

TR PREP-1: Community-based Evacuation Maps Guidance

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Tsunami Ready Indicators



UNESCO IOC 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 is publicly displayed
6	PREP-2. Outreach and public awareness and education resources are available and distributed
7	PREP-3. Outreach or educational activities <u>are held at least three times a year</u>
8	PREP-4. A community tsunami exercise is conducted at least every two years
III RESPONSE (RESP)	
9	RESP-1. A community tsunami emergency response plan (ERP) 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



Prep-1 Easily understood tsunami evacuation maps are approved

Manual and Guide 74:

- Based on Tsunami Hazard Zone.
- Prepared with community consultation to incorporate local knowledge.
- Approved by local authorities.
- In accordance with the community's Tsunami Emergency Response Plan



Prep-1 Easily understood tsunami evacuation maps are approved

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 as a basis for its preparation (deliverable of ASSESS-1)
- The community should be involved in its preparation to incorporate local knowledge

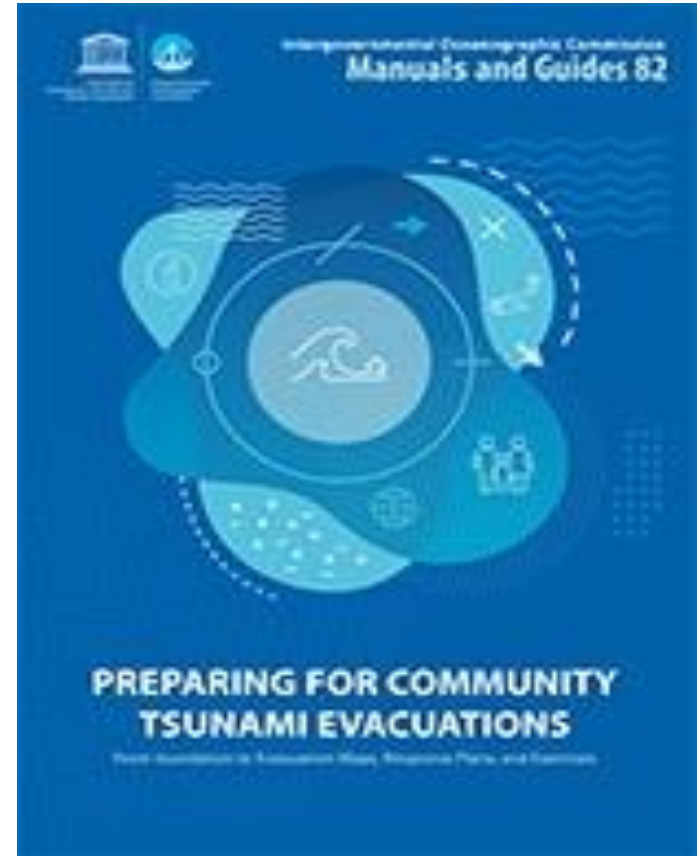


Evacuation map in Praia da Batata, Lagos, Portugal.

TEMPP, and UNESCO IOC Manuals and Guides, 82, 2020: *Preparing for Community Tsunami Evacuations: from inundation to evacuation maps, response plans and exercises.*



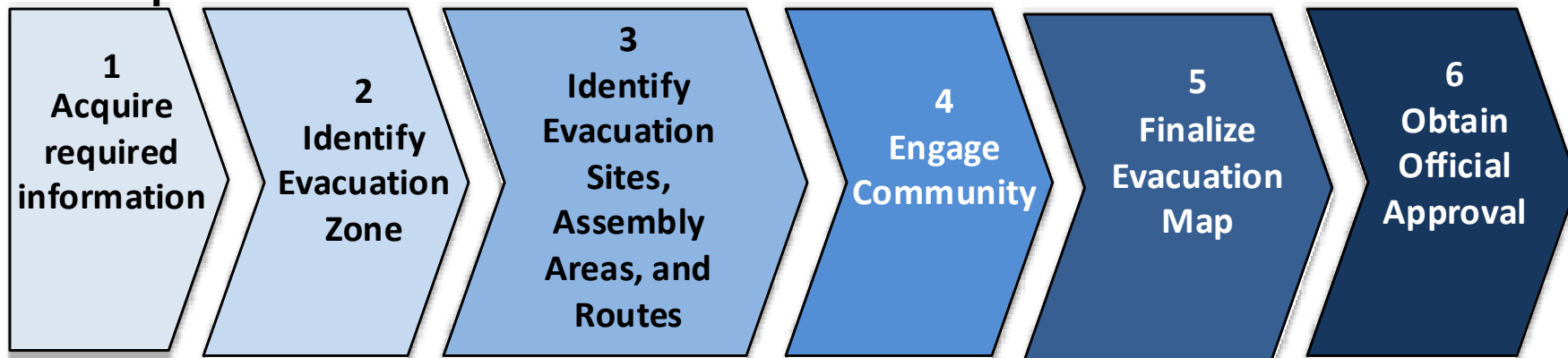
Preparing for Community Tsunami Evacuations
From Inundation to Evacuation Maps, Response Plans,
and Exercises ... communities knowing what to do and where to go



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:



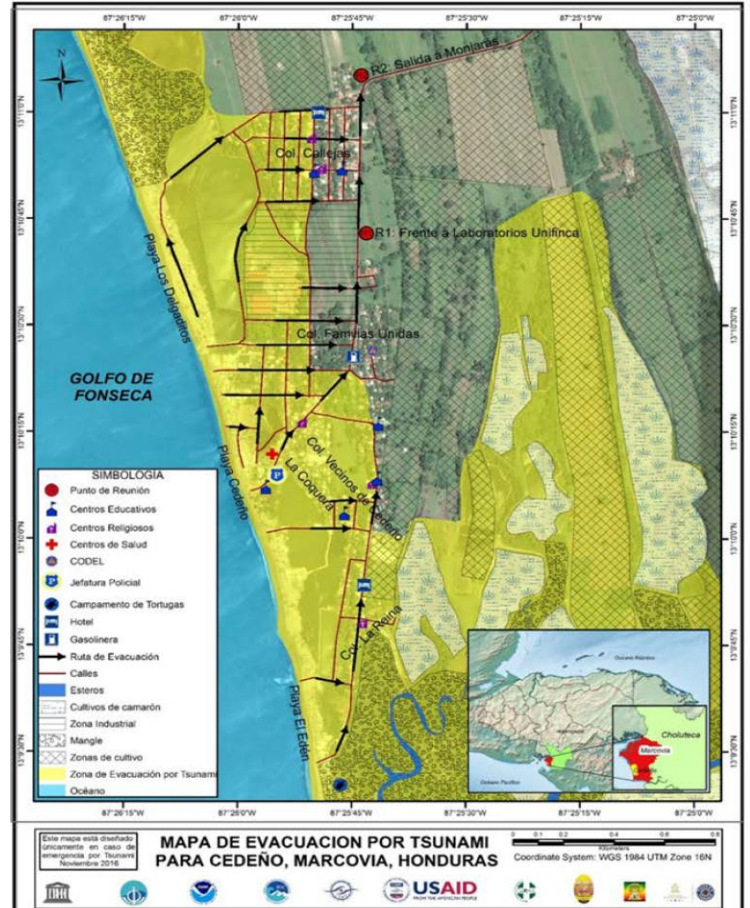
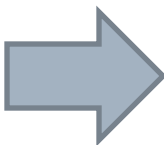
Steps to develop evacuation maps



- **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



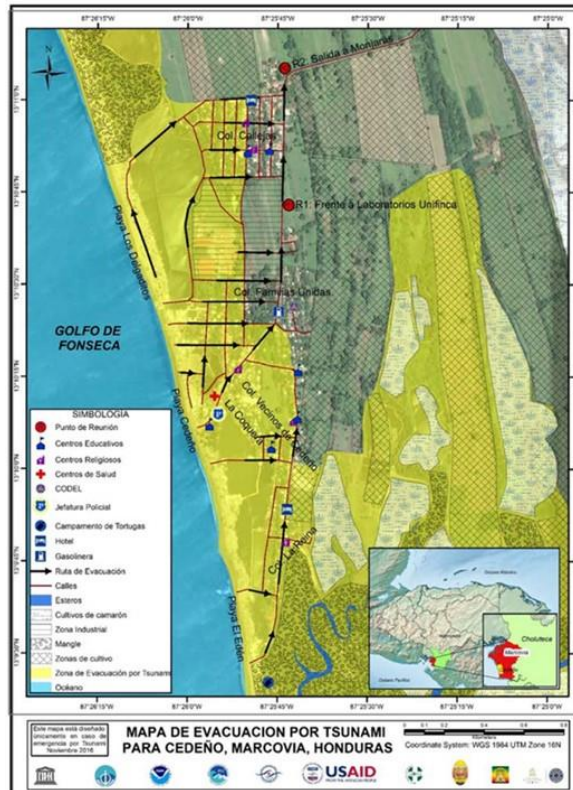
Steps to develop evacuation maps



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

- 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.).
- Proximity and location of high ground (hills, cliffs, man-made vertical refuges (berms, tall buildings, etc);

Sensitive Facilities – Cedeño, Honduras



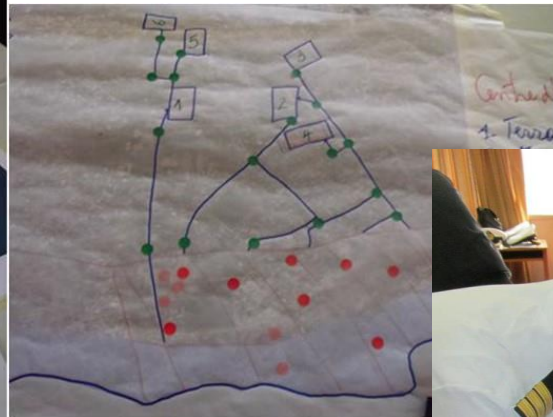
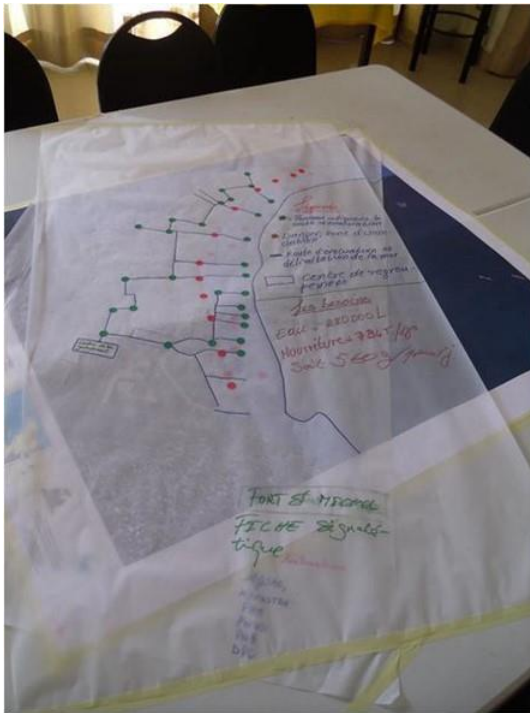
Steps to develop evacuation maps



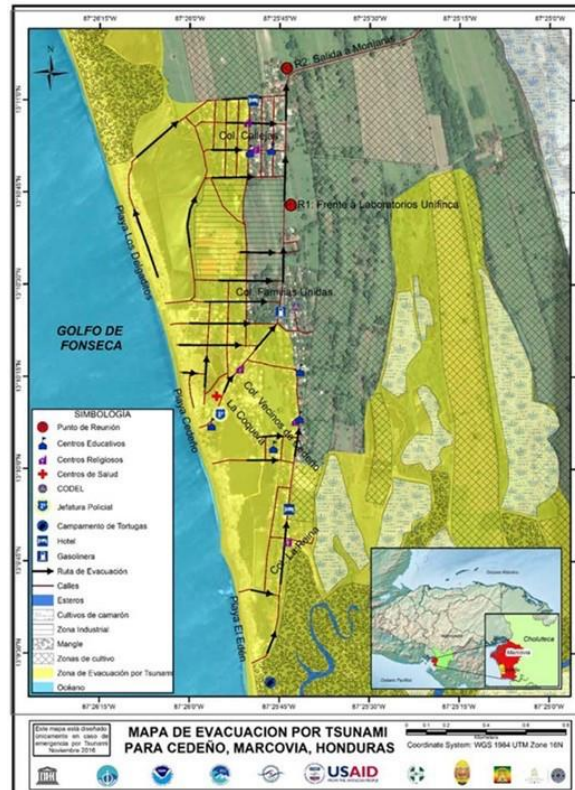
Decide criteria for determining assembly sites and evacuation route. The following are possible bases for selection of the site:

- **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 1st priority, including for special needs populations;**
- **Total area of site can hold expected number of people (or certain percentage of population of the community if several sites 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 (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 public sector willing, yet incapable of leaving Evacuating Zone).**

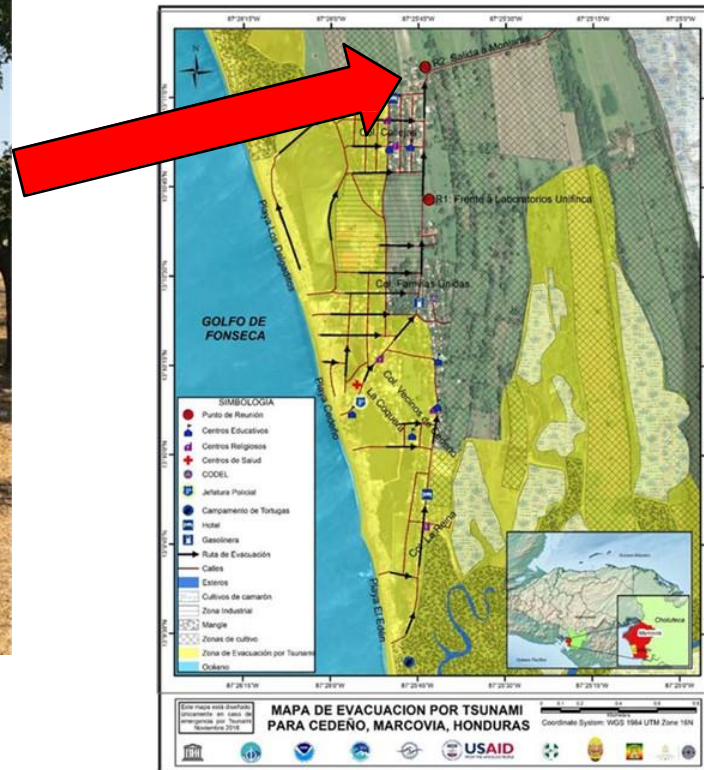
Working on Evacuation Maps



Sensitive Facilities – Cedeño, Honduras



Meeting Point – Cedeño, Honduras example



Steps to develop evacuation maps

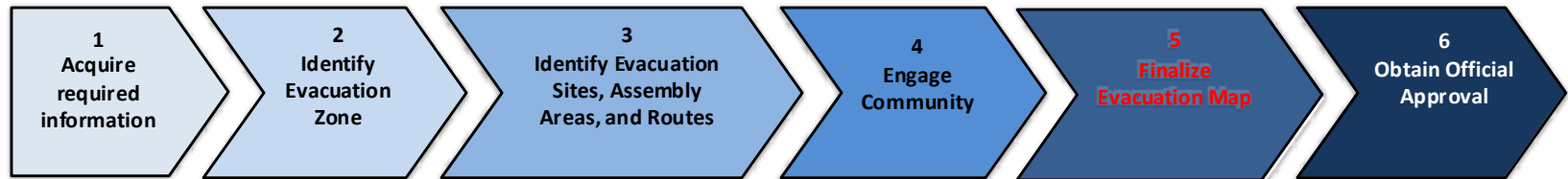


- Meeting(s) should be held with the community and its leaders to obtain their input.
- Invite all stakeholders who have a response, coordination, or special needs requirement (e.g., hospitals, schools).
- Engage and explain inundation mapping results and draft evacuation zone, evacuation areas,
- Assembly 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



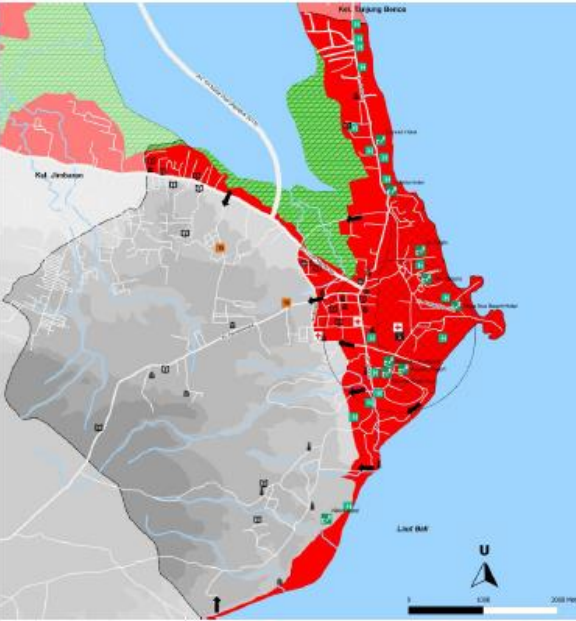
Steps to develop evacuation maps



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).**

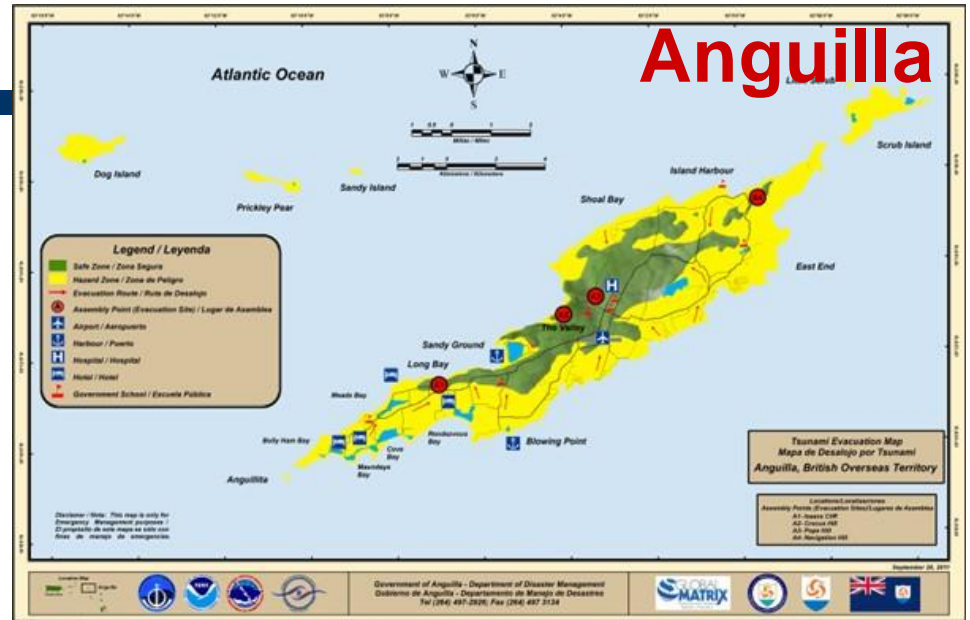
Indonesia

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>Legend/Legend</p> <table border="1"> <tr> <td>Tsunami Risk Zone Zona Risiko Tsunami</td> <td>Siren</td> <td>Community Hall Bala Banjar</td> </tr> <tr> <td>BTDC Area Kawasan BTDC</td> <td>Public Medical Evacuation Building Bangunan Evakuasi Medikal Umum</td> <td>Tempat Tempil Paku</td> </tr> <tr> <td>Safe Zone/Zona Aman</td> <td>Hotel with 3 Floors (or more) Hotel bertingkat 3 atau lebih</td> <td>Traditional Market Pasar</td> </tr> <tr> <td>Height of 25 m Ketinggian 25 m</td> <td>Assembly point Titik Kumpul</td> <td>Street Network Jaringan Jalan</td> </tr> <tr> <td>Height of 30 m Ketinggian 30 m</td> <td>Hospital Rumah Sakit</td> <td>Road/Highway Jalan/Sungai</td> </tr> <tr> <td>Height of 75 m Ketinggian 75 m</td> <td>School Sekolah</td> <td>Administrative Border Batas Administrasi</td> </tr> <tr> <td>Height of 100 m Ketinggian 100 m</td> <td>Police Station Kantor Kepolisian</td> <td>Marginal Muar Benoa</td> </tr> <tr> <td>Height of 150 m Ketinggian 150 m</td> <td></td> <td></td> </tr> </table> <p>December / Desember 2012</p> <p>Further Information / Informasi lebih lanjut: DPSD Kabupaten Badung Jln. Raya Raya Sempidi, Mengwi Tel. 0361-761166</p>	Tsunami Risk Zone Zona Risiko Tsunami	Siren	Community Hall Bala Banjar	BTDC Area Kawasan BTDC	Public Medical Evacuation Building Bangunan Evakuasi Medikal Umum	Tempat Tempil Paku	Safe Zone/Zona Aman	Hotel with 3 Floors (or more) Hotel bertingkat 3 atau lebih	Traditional Market Pasar	Height of 25 m Ketinggian 25 m	Assembly point Titik Kumpul	Street Network Jaringan Jalan	Height of 30 m Ketinggian 30 m	Hospital Rumah Sakit	Road/Highway Jalan/Sungai	Height of 75 m Ketinggian 75 m	School Sekolah	Administrative Border Batas Administrasi	Height of 100 m Ketinggian 100 m	Police Station Kantor Kepolisian	Marginal Muar Benoa	Height of 150 m Ketinggian 150 m			<p>1. Jika merasakan gempa bumi - lindungi diri anda</p> <ul style="list-style-type: none"> Jangan panik Merunduk, berlindung dan berpegangan <p>2. Setelah gempa bumi, sadari bahwa tsunami mungkin terjadi</p> <ul style="list-style-type: none"> Segera tinggalkan daerah pantai sebagai langkah pencegahan awal Cari lah informasi lebih lanjut melalui TV dan Radio <p>3. Setelah gempa bumi yang kuat dan lama, Segera Evakuasi!</p> <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 <p>4. Bunyi sirene adalah panggilan resmi evakuasi</p> <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>
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Haiti



Anguilla



Puerto Rico



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

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



- No hay peligro
- Estar atento a información oficial

Boletín Informativo

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

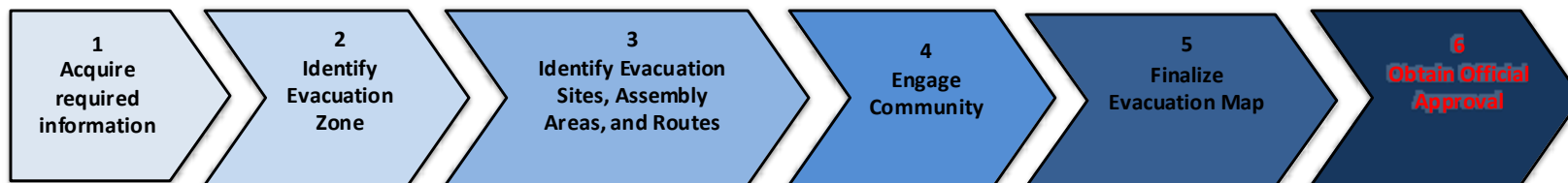
¡¡PROTÉJASE, VIVA PARA CONTARLO!!!



Trinidad & Tobago



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.



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Thank You

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