



UNESCO/IOC – NOAA ITIC Training Program in Hawaii (ITP-TEWS Chile)  
TSUNAMI EARLY WARNING SYSTEMS  
AND THE PACIFIC TSUNAMI WARNING CENTER (PTWC) ENHANCED PRODUCTS  
TSUNAMI EVACUATION PLANNING AND UNESCO IOC TSUNAMI READY PROGRAMME  
19-30 August 2024, Valparaiso, Chile

# Learning Activity – What Happens When during an event Tsunami Warning Chain

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# END-TO-END TSUNAMI WARNING

**EQ  
Tsunami**

EQ  
TSU  
FORECAST

TWC - Science

Intl / Natl

**Country Alert System**

**Emergency Alert System & Mass Media**

DMO / EMA – Safety

Natl / Prov / Local Govt

**TSUNAMI WARNING!  
EVACUATE**

TSUNAMI HAZARD ZONE  
IN CASE OF EARTHQUAKE, GO TO HIGH GROUND OR INLAND

Public

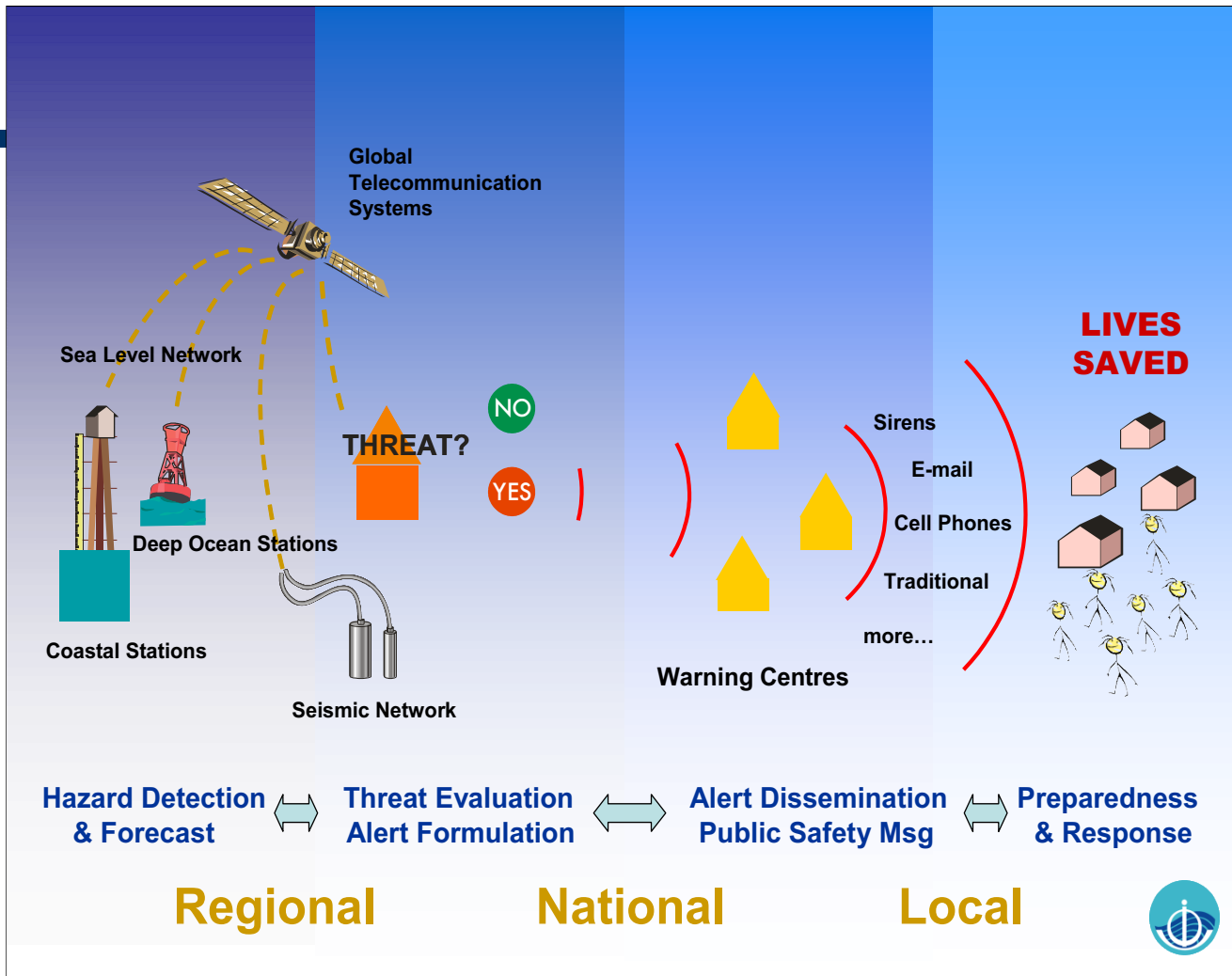
Community

**EQ  
T=0**

Race against Time

LIVES  
SAVED

**WAVE  
T=20 min**



# Activity – What Happens and When?

- ❑ Put activities in chronological occurrence
- ❑ Work Individually – 20 min
- ❑ Plenary Discussion – 40 min

## LEARNING ACTIVITY: TSUNAMI EVENT CHRONOLOGY TSUNAMI WARNING TIMELINE: WHAT HAPPENS AND WHEN DOES IT HAPPEN?

During the occurrence and unfolding of a local tsunami event, reaction time is of the essence. Put the following activities in order of chronological occurrence from 1 to 24 for a local / regional tsunami scenario. Some activities may occur nearly simultaneously. Assume power and communications are still operable after the strong earthquake.

*Each major activity undertaken by government should be described by an SOP.*

- \_\_\_\_\_ Drop, Cover, and Hold (Protect yourself from earthquake shaking damage)
- \_\_\_\_\_ Earthquake is detected by a seismic station
- \_\_\_\_\_ Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC)
- \_\_\_\_\_ Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP)
- \_\_\_\_\_ National Press Conference
- \_\_\_\_\_ Initial Magnitude calculated (M<sub>w</sub>, M<sub>JMA</sub>, M<sub>L</sub>, M<sub>b</sub>)
- \_\_\_\_\_ TSP issues initial threat message
- \_\_\_\_\_ Search and rescue operations begin
- \_\_\_\_\_ National Tsunami Warning Center (NTWC) cancels Tsunami Warning



# WHAT HAPPENS WHEN ITP-TEWS CHILE 2024

__2__	Drop, Cover, and Hold (Protect yourself from earthquake shaking damage)
__1__	Earthquake is detected by a seismic station
__9__	Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC)
__11__	Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP)
__14__	National Press Conference
__3b__	Initial Magnitude calculated (Mwp, MJMA, ML, Mb)
__5a__	TSP issues initial threat message
__15__	Search and rescue operations begin
__13__	National Tsunami Warning Center (NTWC) cancels Tsunami Warning
__10__	Deep-ocean instrument pressure sensor (DART or other) shows 2 cm signal
__8__	Coastal sea level sensor(s) show 5 m zero to peak
__7__	Expected Tsunami Arrival Times calculated (TSP, NTWC)
__1__	Strong earthquake is felt
__6a__	DMO or Authority issues Evacuation order (except Chile which issues Evacuation before warning)
__16__	TSP issues final message
__2b__	Telephones at National TWFP/NTWC/DMO start ringing
__17_/18	All-Clear issued allowing Public to return to tsunami evacuation zone
__7__	Evacuation of coastal areas
__4a__	NTWC/DMO issues Tsunami Warning
__19__	NTWC, TSP post-event evaluation
__3a__	Public moves quickly to higher ground (self-evacuates)
__4b__	Media disseminate Tsunami Warning Broadcast
__6a__	Sirens sounded
__12__	TSP issues Enhanced Graphical Products
__17 /18 __	Road clearing/debris removal begins

# WHAT HAPPENS WHEN ITP-HAWAII 2023

_2_	Drop, Cover, and Hold (Protect yourself from earthquake shaking damage)
_1_	Earthquake is detected by a seismic station
_8_	Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC)
_9_	Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP)
_13_	National Press Conference
_3_	Initial Magnitude calculated (Mwp, MJMA, ML, Mb)
_7_	TSP issues initial threat message
_13_	Search and rescue operations begin
_12_	National Tsunami Warning Center (NTWC) cancels Tsunami Warning
_10_	Deep-ocean instrument pressure sensor (DART or other) shows 2 cm signal
_6_	Coastal sea level sensor(s) show 5 m zero to peak
_4_	Expected Tsunami Arrival Times calculated (TSP, NTWC)
_1_	Strong earthquake is felt
_5_	DMO or Authority issues Evacuation order
_14_	TSP issues final message
_4_	Telephones at National TWFP/NTWC/DMO start ringing
_15_	All-Clear issued allowing Public to return to tsunami evacuation zone
_5_	Evacuation of coastal areas
_5_	NTWC/DMO issues Tsunami Warning
_16_	NTWC, TSP post-event evaluation
_3_	Public moves quickly to higher ground (self-evacuates)
_5_	Media disseminate Tsunami Warning Broadcast
_5_	Sirens sounded
_11_	TSP issues Enhanced Graphical Products
_13_	Road clearing/debris removal begins

# WHAT HAPPENS WHEN. ITP-Hawaii 2019

3	Drop, Cover, and Hold (Protect yourself from earthquake shaking damage)
2	Earthquake is detected by a seismic station
14	Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC)
16	Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP)
19	National Press Conference
5	Initial Magnitude calculated (Mwp, MJMA, ML, Mb)
8	TSP issues initial threat message
21	Search and rescue operations begin
20	National Tsunami Warning Center (NTWC) cancels Tsunami Warning
17	Deep-ocean instrument pressure sensor (DART or other) shows 2 cm signal
15	Coastal sea level sensor(s) show 5 m zero to peak
7	Expected Tsunami Arrival Times calculated (TSP, NTWC)
1	Strong earthquake is felt
10	DMO or Authority issues Evacuation order
23	TSP issues final message
6	Telephones at National TWFP/NTWC/DMO start ringing
24	All-Clear issued allowing Public to return to tsunami evacuation zone
13	Evacuation of coastal areas
9	NTWC/DMO issues Tsunami Warning
25	NTWC, TSP post-event evaluation
4	Public moves quickly to higher ground (self-evacuates)
12	Media disseminate Tsunami Warning Broadcast
11	Sirens sounded
18	TSP issues Enhanced Graphical Products
22	Road clearing/debris removal begins





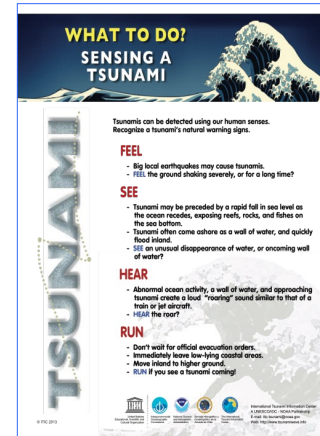
# Each major activity should have an SOP

- 1   Strong earthquake is felt
- 2   Protect yourself from earthquake (Drop, cover, hold)
- 3   Public moves quickly to higher ground

- 7   Rapid sea level change = Tsunami arrives

## *Local Tsunami SOP for public*

- *Know, Recognize, React to Natural Warning Signs*
- *Feel, Hear, See, Run*



3

Public moves quickly to higher ground

4

NTWC issues Tsunami Warning / RTSP issues msg

5

Sirens sounded

5

Media issues Tsunami Warning Broadcast

5

DMO or Local Authority issues Evacuation

**Each major activity should have an SOP**

### ***DMO SOP for Evacuation***

- ***Decide if community threatened***
- ***Issue public safety action (evacuate) by multiple methods (voice, text, siren, video)***
- ***Enable Coastal Evacuation (roadblocks, evacuation routes, designated safe areas buildings)***



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# Thank You

# Muchas Gracias

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