

Tsunami Disaster Management in the Philippines

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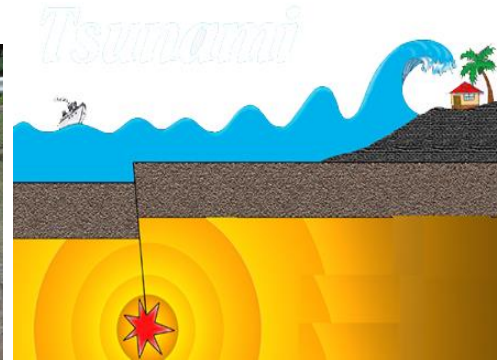


Natural Hazards in the Philippines

The Philippines is one of the countries in the world most exposed and at risk to natural hazards



Earthquake



Tsunami



Volcanic eruption



Typhoon



Storm surge



Flood

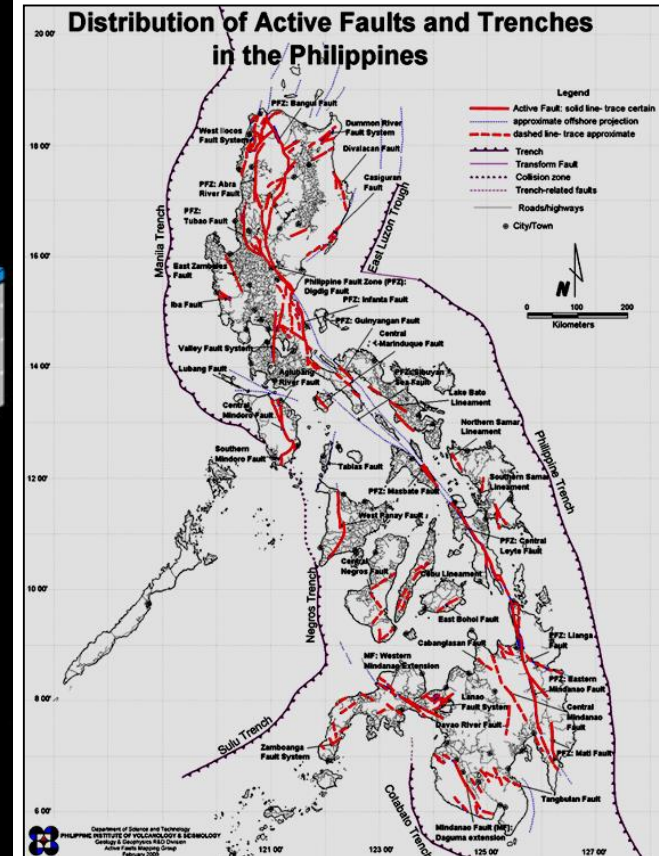
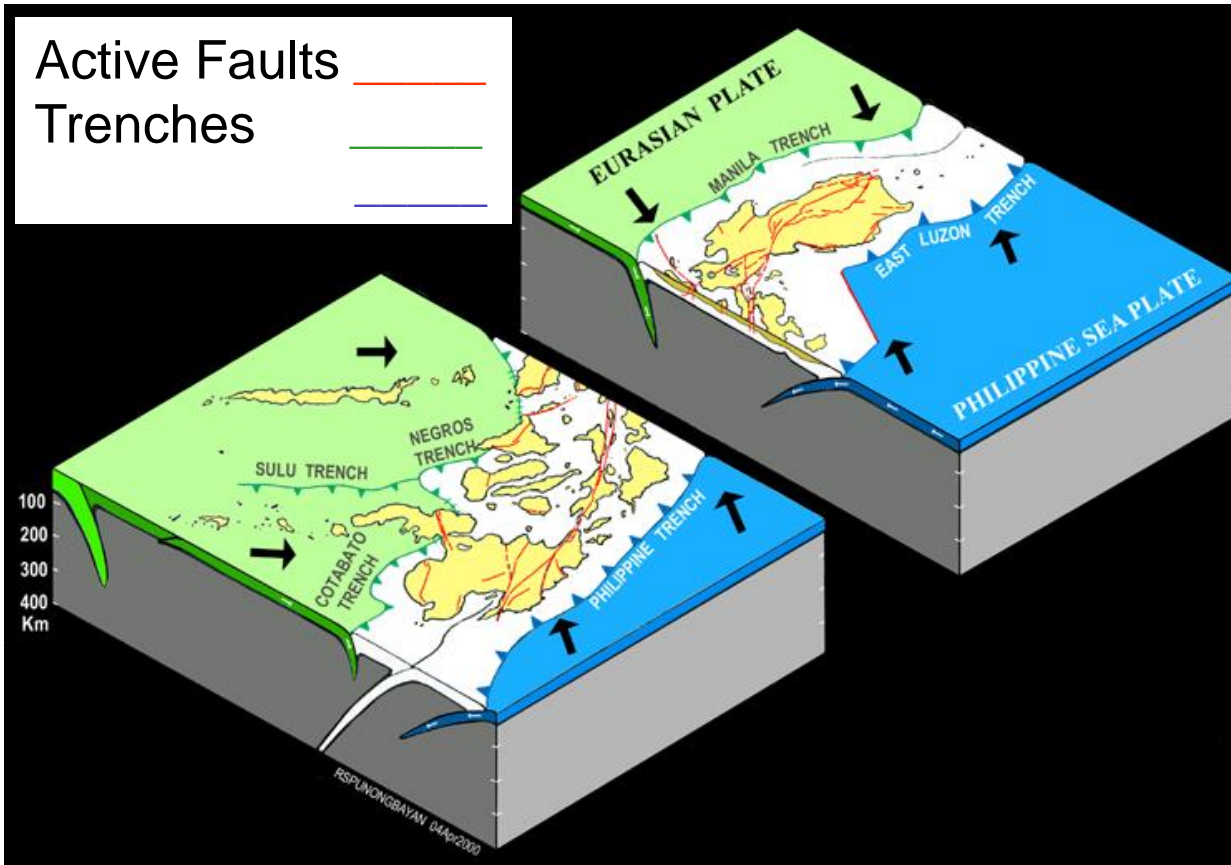


Landslide

Geotectonic Setting of the Philippines

Active Faults

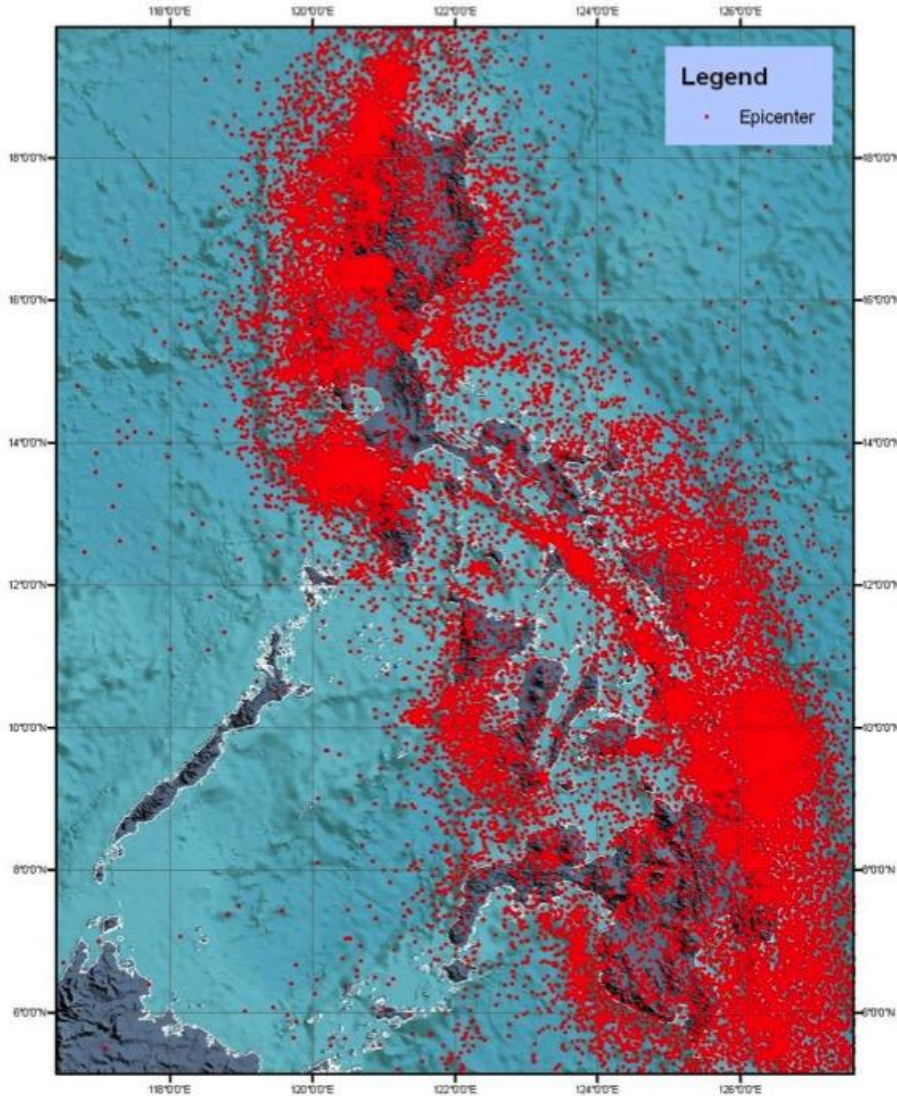
Trenches



Trenches and major active faults in the Philippines

Earthquake Activity in the Philippines

(~90 destructive earthquakes, for past 400 years)

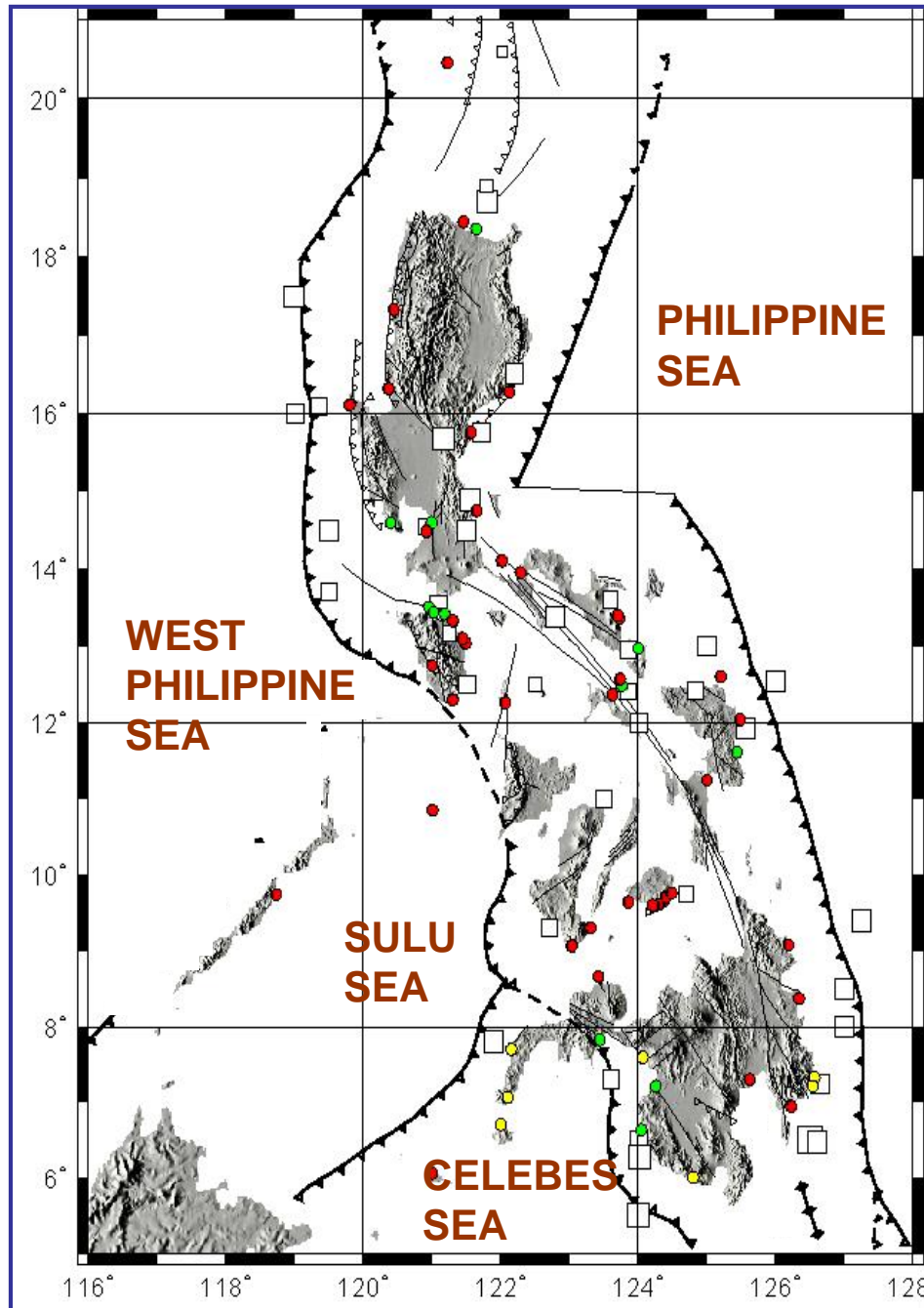


M6.9 2012 Negros Earthquake



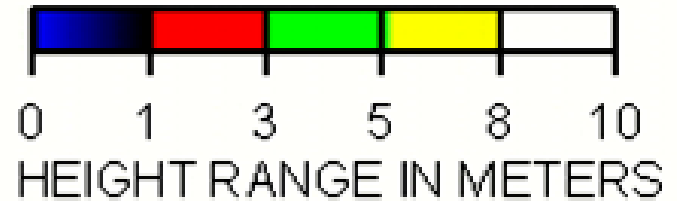
M7.2 2013 Bohol Earthquake

Local Tsunami-Affected Areas in the Philippines



Local Tsunami in the Philippines

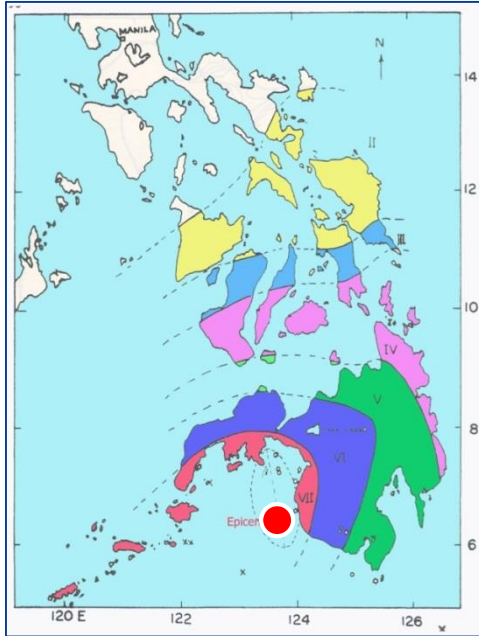
(~ 40 tsunamis for past 400 years – 1 in 10 years)



□ Epicenter of tsunamigenic earthquake

Coastal areas at eastern and western margins fronting major seas and inland seas have been affected by tsunamis

1976 M7.9 Moro Gulf Earthquake and Tsunami

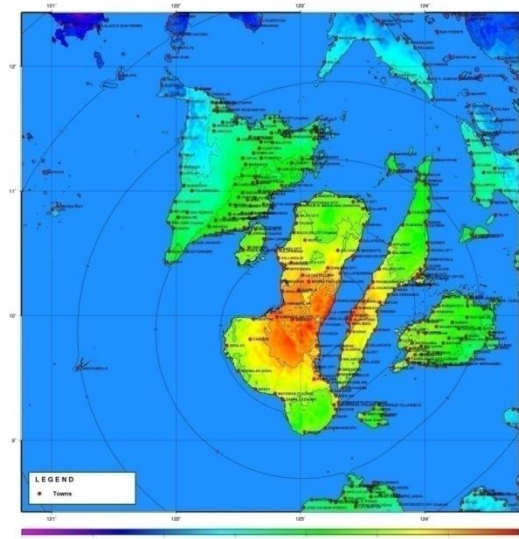


- 12:11AM, Shallow depth (<33 km)
- First tsunami wave reported within 2 to 5 minutes of the main shock
- Series of waves (~3- 7 waves reported), 1-5 minutes apart
- Tsunami height up to 9 meters
- Maximum inundation inland – 2 km
- Death ~6000
- Injury ~8000
- Rendered homeless ~90,000
- Damage PhP400 million (1976 value)

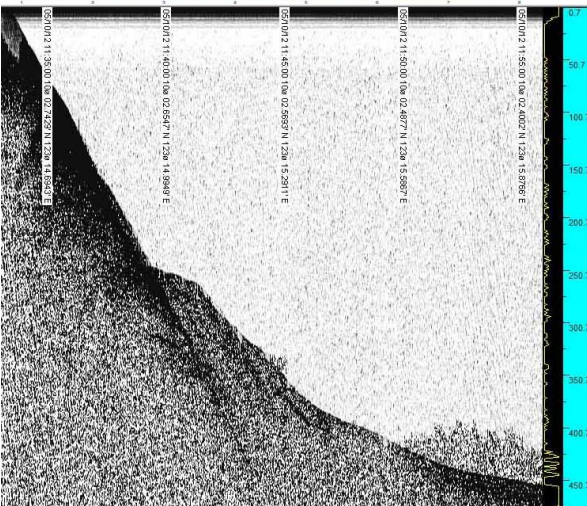


Village inundated by tsunami

2012 M6.9 Negros Earthquake and Tsunami



- Reverse fault, focus 10 km
- Earthquake triggered submarine landslide, -> tsunami
- Tsunami height up to 5 meters
- Inundation inland – 50 m
- Death ~ zero

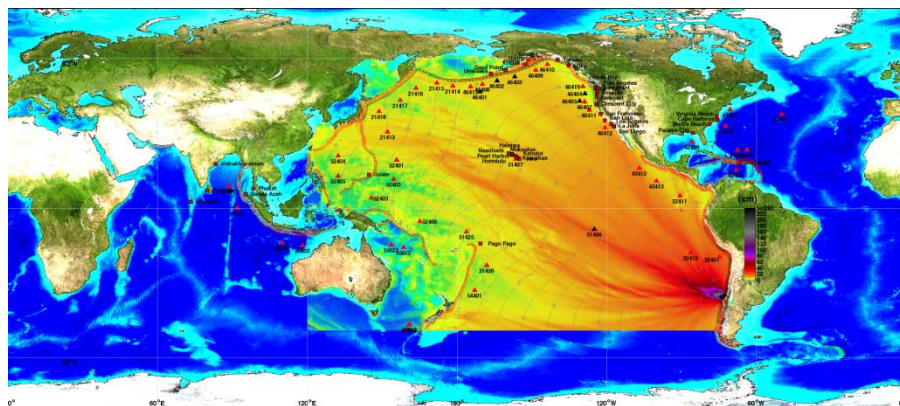
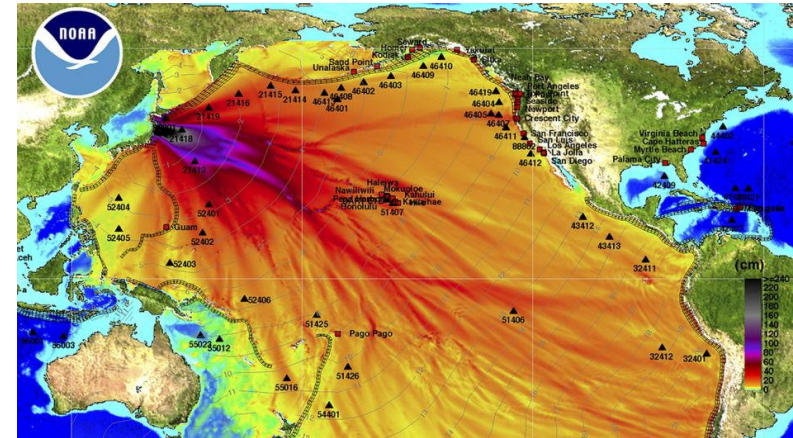


Submarine landslide

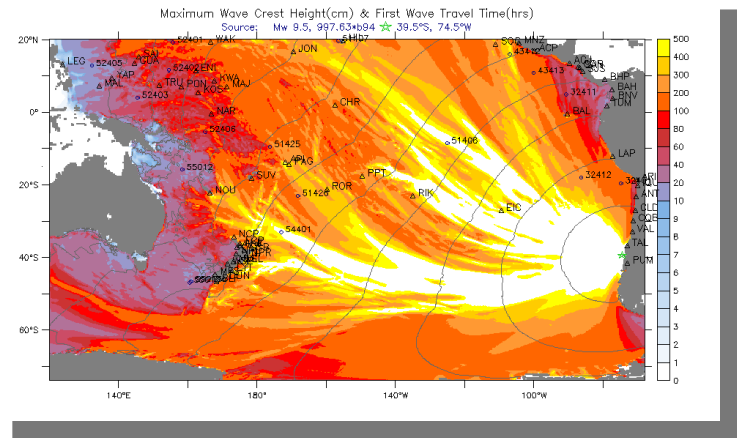


Distant Tsunamis Affecting Eastern Philippines

March 11, 2011 M9.0 Japan
height <1 m



Feb 27, 2010 M8.8 Chile
height ~1 m



May, 1960 M9.5 Chile
height 1-6 m; 20 dead

Key Actions for Tsunami Risk Reduction

- Know Hazards and Risks
 - <- Hazard and Risk Assessment
- Monitor
 - <- Monitoring
- Warn and Disseminate Information
 - <- Communication
- Respond Properly and Timely
 - <- Mitigation, Preparedness, Response, Recovery

Philippine Institute of Volcanology and Seismology (PHIVOLCS)

Focus on earthquakes, tsunamis, volcanic eruptions and related phenomena (ex. landslides)

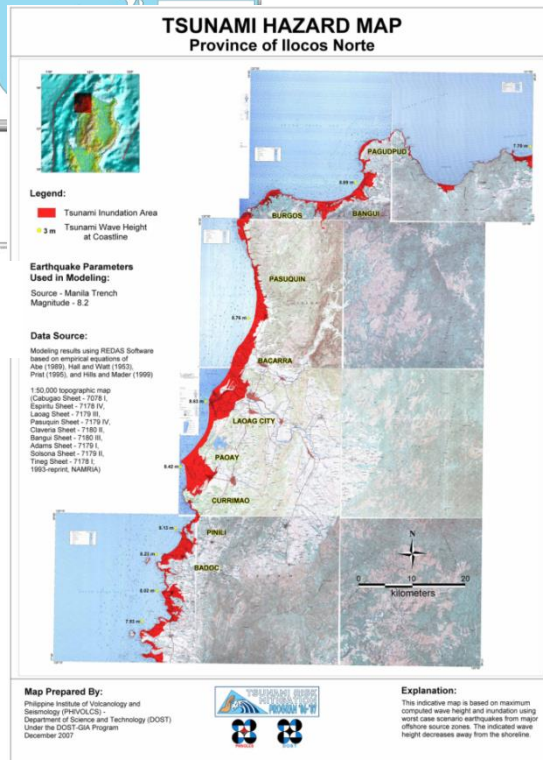
- Monitoring and warning
- Hazards and risk assessment
- Evaluation of earthquake and volcano eruption potential
- Public awareness, community preparedness, disaster risk reduction



Tsunami Hazard and Risk Assessment

- Inundation maps prepared at scales of 1:50,000 (national mapping) to 1:5,000 (detailed mapping of selected sites).
- Tsunami modeling to determine possible heights and inundation for the different tsunami prone coastal areas of the country to serve as inputs for warning and evacuation planning.
- Approximately 10 million people exposed to tsunami.

1:5,000



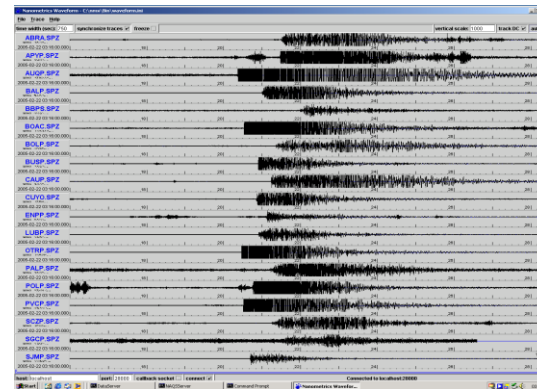
1:50,000

Earthquake Monitoring Network

- **82-station seismic network** (strong motion broadband, broadband, short-period)



Data Receiving Center at Main Office



Digital Seismic Record



Unmanned stations with satellite communication

Sea Level Monitoring Network

Network	Existing
Real-time tide gauges	*19 (PHIVOLCS thru JICA) 5 (PTWC, RIMES, GLOSS) 5 (PHIVOLCS thru Satreps)
Non Real-time tide gauges	40 (NAMRIA)
Community tsunami detection and warning system	10 (PHIVOLCS)

- *on-going completion*

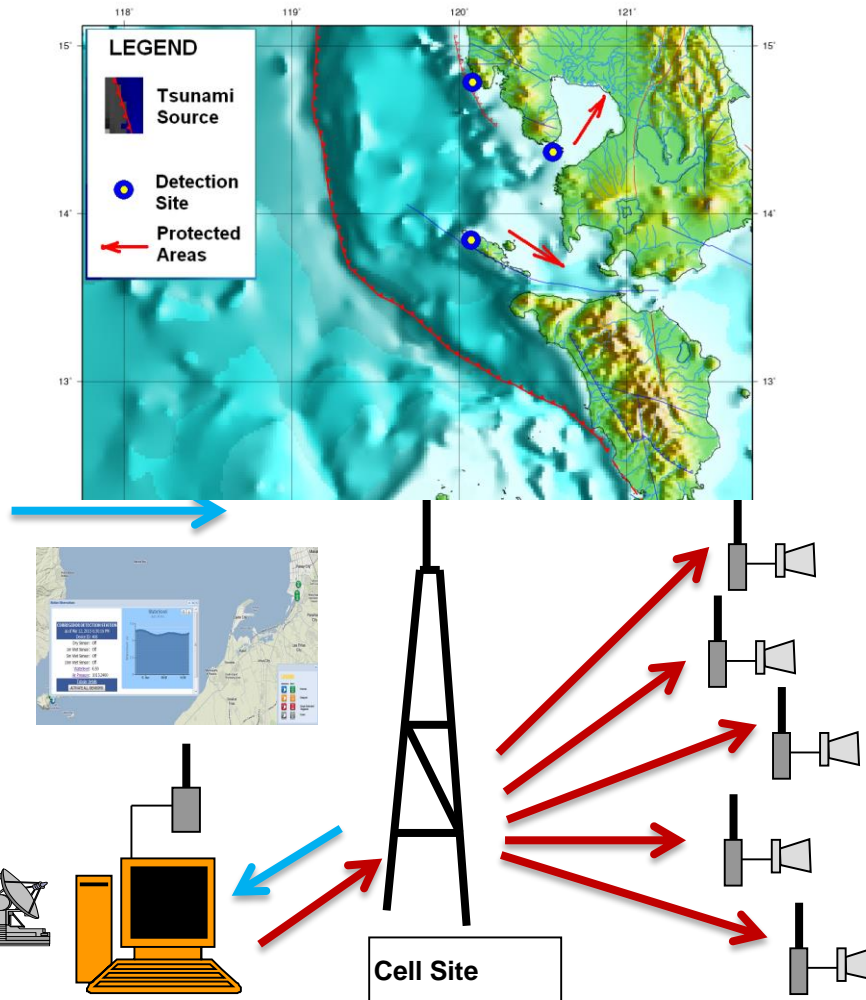
Dissemination of Warning

- telephone/fax, radio
- Broadcast media- radio, TV
- SMS
- Website - <http://www.phivolcs.dost.gov.ph>
- Twitter - /@phivolcs.dost
- Facebook - Philippine Institute of Volcanology and Seismology (PHIVOLCST)



Community Tsunami early Warning System – PHIVOLCS

Tsunami Detection Stations



PHIVOLCS/ASTI and LGUs
Tsunami Visualization and Decision Tool

Communities

Education, Awareness, Preparedness Campaigns

Educational materials, seminars, drills, media programs



07.03.2007 09:55



Philippine Institute of Volcanology and Seismology (PHIVOLCS)
Department of Science and Technology (DOST)

DEVELOPING A TSUNAMI PREPARED COMMUNITY

Together we can save lives

In the past, people have assumed that emergency planning and preparedness is the sole responsibility of the government. But as proven in the many disasters that have occurred in recent years, positive community response to a crisis can save more lives especially if all sectors in the community have a role to play in its disaster risk mitigation efforts.

The role of national government agencies is to help the local government units and the communities by developing and implementing national programs that would capacitate the communities for disaster preparedness. These include advocacy to policy makers and planners to integrate specific disaster mitigation plans in the national development plan and generating and providing the right information that can be used towards developing a disaster-resilient nation. However, the activities at the national level alone will not save any lives if people at the community level will not use the information made available and are not prepared mentally and physically to respond. For the case of tsunami hazard after a strong earthquake, the coastal communities must take on the responsibility for their own safety.



Why tsunami preparedness?

Specific interest is put on the importance of tsunami preparedness in the community level, as there is not sufficient time for warning from the national level in case of near-shore or locally-generated tsunamis. This fact has time and again been observed after major disasters such as the 1976 August Moro Gulf and 1994 November Oriental Mindoro tsunamis. In these events, it took only 2 to 5 minutes at the earliest up to 20 minutes after the earthquakes for the tsunami waves to hit the shores of Moro Gulf and Oriental Mindoro. Residents of the coastal communities must be prepared to evacuate and move to higher ground once signs of impending tsunami are observed.

But how does a community go about preparedness and planning for tsunami? There are various steps leading to a tsunami-prepared community. Openly discussing facts about tsunami disasters will actually increase awareness and interest instead of propagating speculations that could lead to spread of rumors if the issue on tsunami hazard is avoided. Any tsunami preparedness planning need not be expensive. There is no such thing as poor community that would not be able to prepare for tsunami as many risk-reduction activities are more people-driven. Lastly, tsunamis are considered infrequent but high-impact type events, and it is important to keep in mind that tsunami disasters can destroy any progress that a community has attained in an instant.



A jeepney in South Cebu destroyed by tsunami after the 1976 August Moro Gulf Earthquake

KNOW THE HAZARD



What is a tsunami? A tsunami is a series of sea waves commonly generated by under-the-sea earthquakes and whose heights could be greater than 5 meters. For so long, it has been erroneously called tidal waves and still often mistakenly associated with storm surges (tall coastal waves due to strong winds during a storm event). Tsunamis can occur when the earthquake is shallow-seated and strong enough to vertically displace parts of the seabed and disturb the mass of water over it.

The coastal areas in the Philippines can be affected by tsunamis that may be generated by local earthquakes. Locally-generated tsunamis can occur within very short time, with the first waves reaching the nearest shoreline from the epicenter in 2 to 5 minutes after the main earthquake, before any official warnings can be transmitted from the national level to the community level.

DOST



PHIVOLCS

The Broadcaster's InfoChart on Emergency Preparedness

v. 2013

National Disaster Risk Reduction and Management Council
(NDRRMC)

Philippine Institute of Volcanology and Seismology
(PHIVOLCS-DOST)

Office of Civil Defense
(OCD-DND)

Mines and Geosciences Bureau
(MGB-DENR)

Philippine Atmospheric, Geophysical and Astronomical Services Administration
(PAGASA-DOST)

Science and Technology Information Institute
(STII-DOST)

Philippine Information Agency
(PIA)

and the

Kapisanan ng mga Brodkaster ng Pilipinas
(KBP)



Contents

- Geological and Hydro-meteorological events
(Earthquake, **Tsunami**, Volcanic Eruption, Landslide, Typhoons and other weather systems)
- Hazards
- Terminologies
- Warning or Alert Schemes
- Proper response before, during and after



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Tsunami Drill

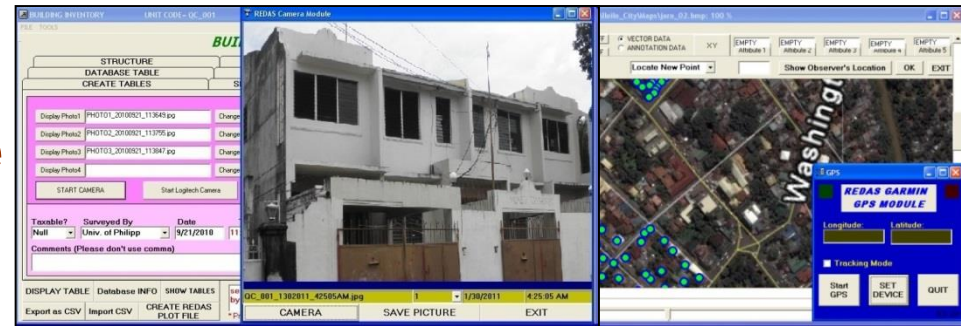
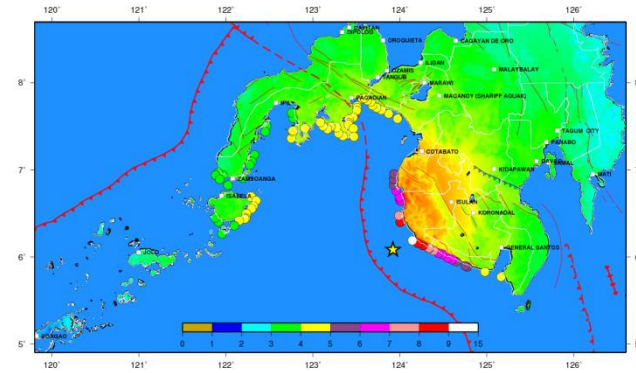
Mitigation

- **Land use planning**
 - Zone of Avoidance for settlement
 - Set back for coastal areas (based on Water Code)
- Coastal forest
 - Mangrove planting and protection

Hazard and Impact Assessment Software

Rapid Earthquake Damage Assessment System

- **Hazard assessment module**
 - tools for assessing earthquake hazards; preparing scenarios
 - static maps of various hazards (geological, hydro-meteorological) can be integrated
 - Used for land use planning
- **Exposure data base module**
 - contains database of elements at risk which can be updated by local government
- **Impact assessment module**
 - can estimate damage to buildings, casualty, economic loss
 - * *being shared with local governments, national agencies, academic partners*



Concluding Remarks

- The Philippines is prone to many geological hazards, including earthquakes and tsunami. We need to live safely with these perils.
- Currently, the Philippines' tsunami disaster management activities are focused on:
 - monitoring and warning
 - hazard and risk assessment to provide appropriate science-based scenarios
 - public awareness, education, preparedness to respond appropriately, mainstreaming risk reduction in development planning, coastal forest (mangrove planting and protection)
- Partnerships lead to significant gains in our risk reduction efforts.

THANK YOU!

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