Guidebook for 3R (Risk Reduction and Resilience) Campaign for LGUs

DOST-PHIVOLCS

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Table of Contents

Message from the Director

A comprehensive and effective Disaster Risk Reduction and Management (DRRM) entails the alignment of strategies among national and local actors. Correspondingly, a synergy in information and knowledge between the national government and the local government units (LGUs) is a requisite in building disaster resilient communities.

To this end, the Department of Science and Technology - Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS) has developed, through the years, a great deal of science-based, combined with local knowledge, information materials, tools, and services that are beneficial in local DRRM and development planning. To better cascade these products and services to our local stakeholders, we launched the 3R (Risk Reduction and Resilience) Campaign for LGUs. It is with profound delight that we offer this accompanying guidebook to serve as a reference in accessing and using all relevant DOST-PHIVOLCS information materials, tools, and services.

In partnership with the Department of Interior and Local Government - Local Government Academy (DILG-LGA), we hope that this guidebook will be fully utilized towards knowledge-based DRRM and risk-informed decision making. May this set into motion purposeful actions towards a more resilient Philippines.

Dr. Renato U. Solidum, Jr.
Undersecretary, DOST
and Officer-in-Charge, PHIVOLCS

Message from Local Government Academy (LGA)

While the country and the people have shown great resilience in dealing with recovering from disasters, the time has come for us to take more proactive measures to the challenges of nature. The local government units (LGUs) are the frontliners in the response to any disasters caused by natural hazards, as mandated by law. They are the ones most familiar with their terrain and resources, the ones that deal directly with their citizens. Adverse phenomena bring unique challenges to a community, which accounts for the differences in planning that one encounters among LGUs. The Department of the Interior and Local Government (DILG) as Vice-Chair for Disaster Preparedness under the National Disaster Risk Reduction and Management Council (NDRRMC), Local Government Academy (LGA) recognized its role in strengthening the integration and performance of disaster risk reduction and management and climate change adaptation (DRR-CCA) actions for all LGUs. This guidebook was developed as reference material in guiding to improve the capacity of LGUs in engaging the DRR-CCA interventions on geological hazard impacts. This will able the LGUs to ensure that they are taking the correct steps in responding to the geologic hazards and their aftermath. This guidebook is one of the tools to minimize those mistakes that may cost lives and grave destruction to property. With the help and guidance of this publication, we urge all LGUs to utilize this guidebook to improve their disaster preparedness. As lead actors in the government, it is our responsibility to protect and serve our country to the best of our abilities. May we always bring the spirit of public service.

THELMA T. VECINA, CESO IV
Executive Director

Foreword

The Philippine Institute of Volcanology and Seismology (PHIVOLCS) is a service institute of the Department of Science and Technology (DOST) that is principally mandated to mitigate disasters that may arise from volcanic eruptions, earthquakes, tsunami, and other related geotectonic phenomena. With that said, DOST-PHIVOLCS has always aimed to assist and capacitate Local Government Units (LGUs) in their various Disaster Risk Reduction and Management (DRRM) activities to address the said hazards.

This guidebook has been developed to support DOST-PHIVOLCS' capacity development efforts for the LGUs – specifically as a reference material for the project titled, "3R (Risk Reduction and Resilience) Campaign for LGUs". Through the 3R Campaign and using this guidebook, DOST-PHIVOLCS hopes to improve the capacity of key stakeholders in the LGUs in engaging and conducting disaster risk reduction and resilience initiatives on volcano, earthquake, and tsunami impacts.

In addition, this guidebook serves as a step-by-step guide on how to access DOST-PHIVOLCS information materials, tools, and services which will aid LGU officials in the development of their DRRM- and other-related plans.

The specific target users of this guidebook are local DRRM officers at the provincial and city or municipal levels. With the help of these local DRRM partners, DOST-PHIVOLCS hopes that the appropriate risk knowledge, prevention and mitigation strategies, and preparedness strategies can be adapted in local communities across the Philippines.

Purpose of the Guidebook

- This Guidebook will provide LGU officials with information about volcano, earthquake, and tsunami impacts. This will also provide a step-by-step guide on how to access DOST-PHIVOLCS information materials, tools and services which will aid LGU officials in the development of their disaster risk reduction and management and other related plans.

Target Users

Provincial Disaster Risk Reduction Management Office (PDRRMO), Local Disaster Risk Reduction and Management Office (LDRRMO)

Parts of the Guidebook

1. Purpose of the Guidebook
2. Target users
3. Parts of the Guidebook
4. How to use this Guidebook
5. Overview of Disaster Resilience and Risk Reduction
6. Overview of DOST-PHIVOLCS
7. Modules

    8.1 Module Title

    8.2 Module Objective

    8.3 Learning Resources

    8.4 Discussion/Learning Activity

    8.5 Module Evaluation or Learning Activity Output

How to Use this Guidebook

This guidebook is a self-help guide to understand volcano, earthquake, and tsunami impacts, as well as to access various DOST-PHIVOLCS information materials, tools and services for use in local plans. Below is a step-by-step guide on how LGUs can use this guidebook for their specific needs.

1. The Guidebook has three modules:

   1.1 Understanding Geologic Hazards and their Impacts (with 4 sub-modules);

   1.2 DOST-PHIVOLCS Information Materials, Tools and Innovations, and Services (Guide to access the DOST-PHIVOLCS information materials, tools and services; with 3 sub-modules);

   1.3 Community and Family Preparedness (with 2 sub-modules).

2. Target users are expected to understand each module (if applicable in their area) before proceeding to the next module.

3. Understand the module objective.

4. Check the resources needed for the module. Each module has learning resources either attached inside a folder (digital) or inside the discussion.

5. Discussion: Discussion is the detailed content of the module. This can be in the form of:

   5.1 self-paced learning by reading and doing some activities;

   5.2 videos or recorded presentations;

   5.3 video teleconference (webinar).

6. Accomplish the Module Evaluation or Learning Activity Output at the end of each module.

7. Prepare an Action Plan.

Overview of Disaster Resilience and Risk Reduction

This section explains the different concepts and terminologies essential in understanding and achieving disaster resilience and in implementing risk reduction.

Resilience – the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. (https://www.unisdr.org)

Disaster Resilience Goals

- Reduce various losses (Risk Reduction)

  -Before occurrence of hazards

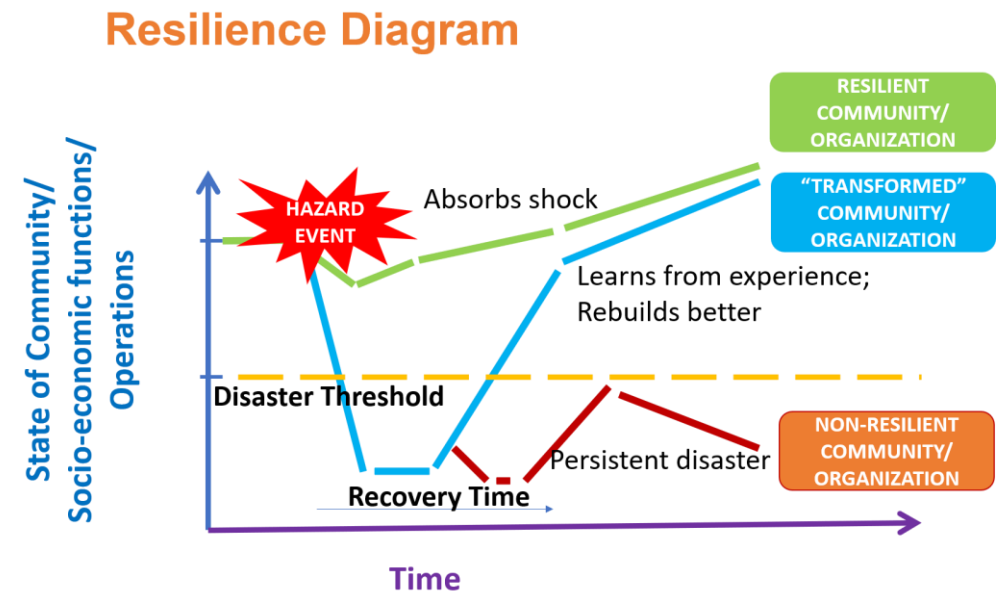
- Ensure effective and efficient disaster response

  -During and immediately after the hazard event

- Timely and efficient recovery, build forward better

  -After a significant impact; learn from past disaster, consider future risks

Resilience Diagram
(From Usec. Renato U. Solidum's lecture on
Disaster Resilience and the Role of DOST-PHIVOLCS)



RUSolidum (modified from IOTWS, 2007)

Key Actions for Disaster Resilience (DOST-PHIVOLCS)

- Know the Hazards and Risks
- Monitor and Forecast/Predict
- Warn and Disseminate the Information
- Respond Properly and Timely

Some terminologies related to Resilience and Risk Reduction:

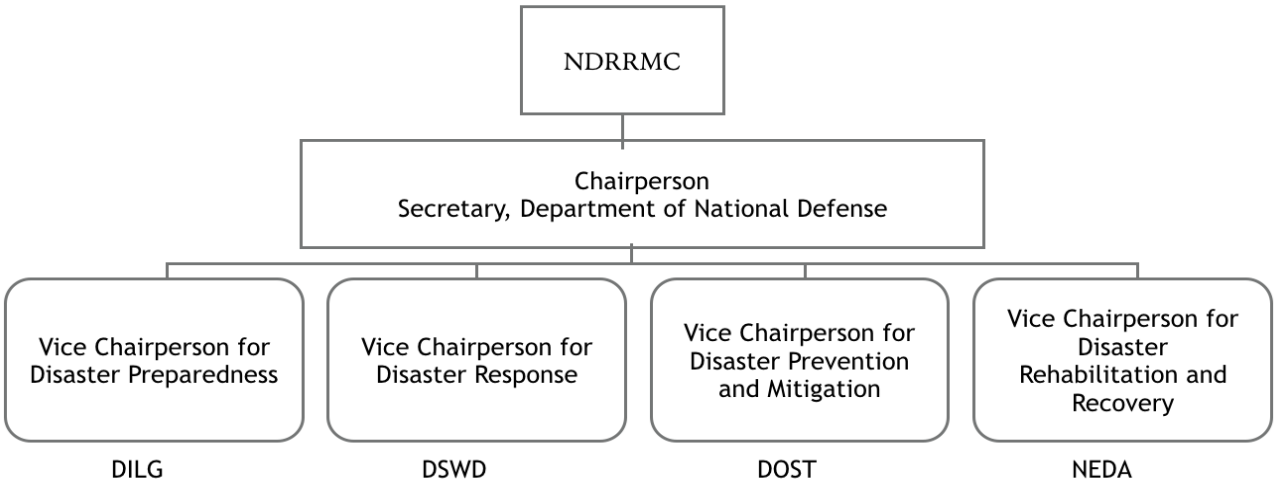
Terminology	Definition
Hazard	● a dangerous phenomenon, substance, human activity or condition that may cause: ○ loss of life ○ injury or other health impacts ○ property damage ○ loss of livelihood and services ○ social and economic disruption ○ environmental damage
Disaster	● a serious disruption of the functioning of a community or a society involving widespread human, material, economic, or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. Disasters = exposure to hazard + conditions of vulnerability that are present + insufficient capacity or measures to reduce or cope with the potential negative consequences.
Vulnerability	● the characteristics and circumstances of a community, system, or asset that make it susceptible to the damaging effects of a hazard. Vulnerability may include: ○ physical ○ social ○ economic ○ environmental ● Examples: ○ poor design and construction of buildings ○ inadequate protection of assets ○ lack of public information and awareness ○ limited official recognition of risks and preparedness measures ○ disregard for wise environmental management
Capacity	● combination of all strengths and resources available within a community that can reduce the levels of risk or the effects of a disaster. Capacity may include: ○ infrastructures and physical means ○ institutions ○ societal coping abilities ○ human knowledge, skills and collective attributes ○ social relationships ○ leadership and management
Elements-at-risks	● Elements that are exposed to hazards such as people, properties, services, livelihood and the environment on which they depend on are exposed to hazards.

Terminology	Definition
Disaster losses	● Losses in lives, health status, livelihood, assets and services, which have occurred to a particular community or a society over a time period because of a disaster. Examples of disaster losses are the following: ○ loss of life ○ injury ○ disease ○ other negative effects on human (physical, mental, social well-being) ○ damage to property ○ destruction of assets ○ loss of services ○ social and economic disruption ○ environmental degradation
Disaster Risk	● potential disaster losses in lives, health status, livelihood, assets and services which could occur to a particular community or a society over some specified future time period
Disaster Risk Reduction	● concept and practice of reducing disaster risks by analyzing and managing the causal factors of disasters. Disaster risk reduction may be achieved through: ○ reduced exposures to hazards ○ lessened vulnerability of people and property ○ wise management of land and the environment ○ improved preparedness for adverse events
Resilience	● The ability of a system, community or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. (https://www.unisdr.org)

Four (4) elements of disaster management	
1. Disaster preparedness	● knowledge and capacities developed by: - governments - professional response and recovery organizations - communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazards events or conditions. ● aim: to build the capacities needed to efficiently manage all types of emergencies and achieve orderly transitions from response to sustained recovery. ● Examples: ○ contingency planning ○ stockpiling of equipment and supplies ○ development of arrangements for coordination, evacuation and public information ○ training and field exercises

Four (4) elements of disaster management	
2. Disaster prevention and mitigation Disaster prevention Disaster mitigation	 ● outright avoidance of adverse impacts of hazards and related disasters. ● action taken in advance: ○ construction of dams or embankments that eliminate flood risks ○ land use regulations that do not permit any settlement in high-risk zones ○ seismic engineering designs ● lessening or limiting the adverse impacts of hazards and related disasters through: ○ engineering techniques ○ hazard-resistant construction ○ improved environmental policies ○ public awareness ● Mitigation - structural and non-structural measures aimed at minimizing the impact of disasters.
3. Disaster response	● provision of emergency services and public assistance during or immediately after a disaster in order to: ● save lives ● reduce health impacts ● ensure public safety ● meet the basic subsistence needs of the people affected
4. Disaster rehabilitation and recovery	● Measures taken to restore affected communities/areas to their proper or normal level of functioning or actual condition prior to the occurrence of the disaster or calamity

THE PHILIPPINE DISASTER MANAGEMENT FRAMEWORK



Reference: RA10121

Overview of DOST-PHIVOLCS

Learning Resources

1. PHIVOLCS AVP
2. PHIVOLCS Flyer

Discussion:

Your options:

1. Watch the PHIVOLCS AVP
2. Read the PHIVOLCS Flyer

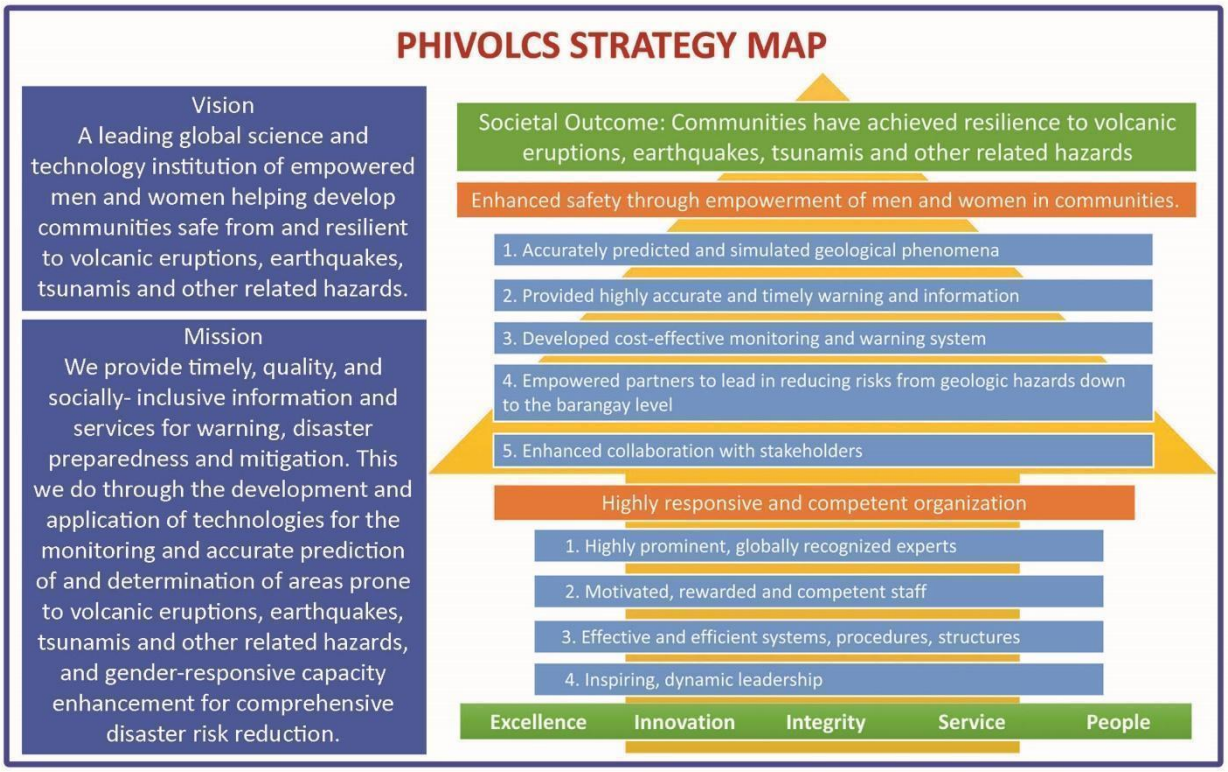
The **Philippine Institute of Volcanology and Seismology (PHIVOLCS)** is a service institute of the Department of Science and Technology (DOST) that is principally mandated to mitigate disasters that may arise from volcanic eruptions, earthquakes, tsunami and other-related geotectonic phenomena.

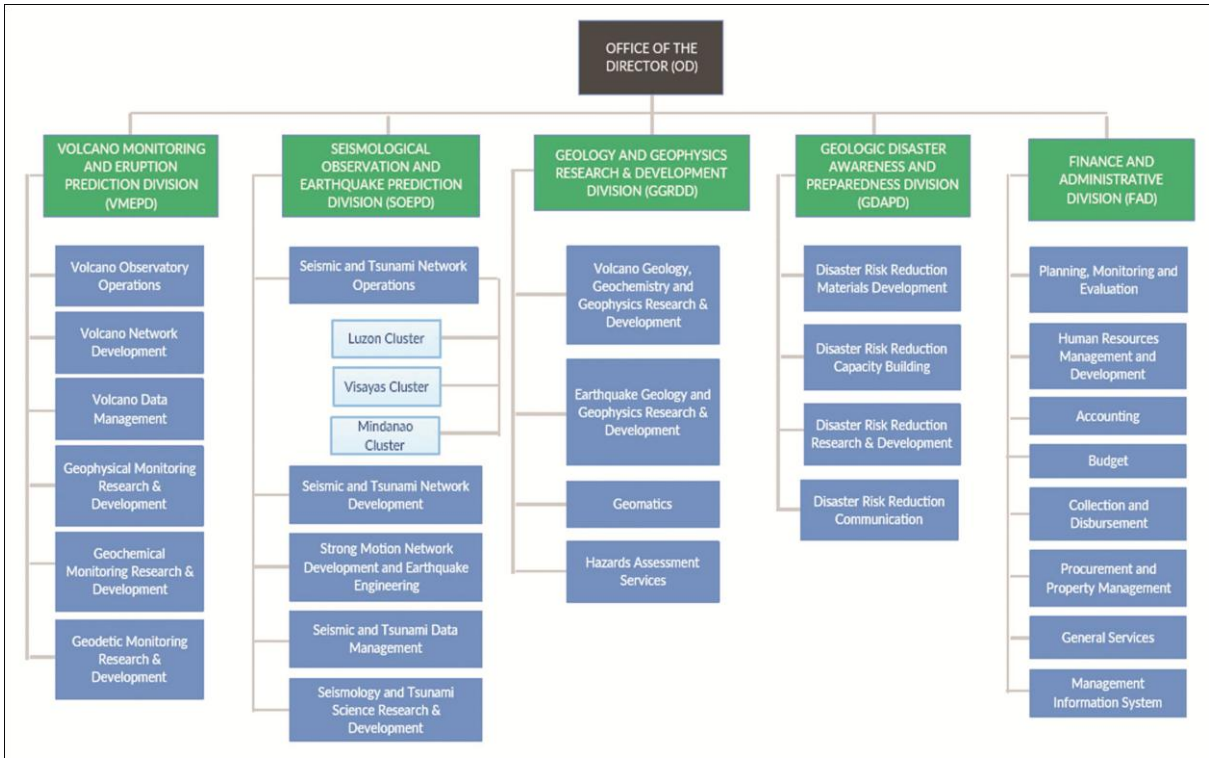
DOST-PHIVOLCS Programs:

- National Volcano Monitoring and Warning
- National Earthquake Monitoring and Information
- National Tsunami Monitoring and Early Warning
- Earthquake Hazards Assessment and Research and Development
- Volcano Hazards Assessment and Research and Development
- PHIVOLCS Risk Information Management and Assessment
- Landslide Monitoring, Early Warning and Risk Assessment
- Volcano, Earthquake and Tsunami Disaster Preparedness and Risk Reduction
- Leadership Enhancement and Development
- Strategic Human Resource Management and Development
- Strategic Performance Assessment and Development for Excellence
- Strategic ICT Management and Development
- Financial Management and Administrative Support

DOST-PHIVOLCS Divisions:

- Volcano Monitoring and Eruption Prediction Division (VMEPD)
- Seismological Observation and Earthquake Prediction Division (SOEPD)
- Geology and Geophysics Research and Development Division (GGRDD)
- Geologic Disaster Awareness and Preparedness Division (GDAPD)
- Finance and Administrative Division (FAD)


PHIVOLCS STRATEGY MAP
Vision
A leading global science and technology institution of empowered men and women helping develop communities safe from and resilient to volcanic eruptions, earthquakes, tsunamis and other related hazards.
Mission
We provide timely, quality, and socially- inclusive information and services for warning, disaster preparedness and mitigation. This we do through the development and application of technologies for the monitoring and accurate prediction of and determination of areas prone to volcanic eruptions, earthquakes, tsunamis and other related hazards, and gender-responsive capacity enhancement for comprehensive disaster risk reduction.
Societal Outcome: Communities have achieved resilience to volcanic eruptions, earthquakes, tsunamis and other related hazards
Enhanced safety through empowerment of men and women in communities.
1. Accurately predicted and simulated geological phenomena
2. Provided highly accurate and timely warning and information
3. Developed cost-effective monitoring and warning system
4. Empowered partners to lead in reducing risks from geologic hazards down to the barangay level
5. Enhanced collaboration with stakeholders
Highly responsive and competent organization
1. Highly prominent, globally recognized experts
2. Motivated, rewarded and competent staff
3. Effective and efficient systems, procedures, structures
4. Inspiring, dynamic leadership
Excellence
Innovation
Integrity
Service
People


OFFICE OF THE DIRECTOR (OD)
VOLCANO MONITORING AND ERUPTION PREDICTION DIVISION (VMEPD)
Volcano Observatory Operations
Volcano Network Development
Volcano Data Management
Geophysical Monitoring Research & Development
Geochemical Monitoring Research & Development
Geodetic Monitoring Research & Development
SEISMOLOGICAL OBSERVATION AND EARTHQUAKE PREDICTION DIVISION (SOEPD)
Seismic and Tsunami Network Operations
Luzon Cluster
Visayas Cluster
Mindanao Cluster
Seismic and Tsunami Network Development
Strong Motion Network Development and Earthquake Engineering
Seismic and Tsunami Data Management
Seismology and Tsunami Science Research & Development
GEOLOGY AND GEOPHYSICS RESEARCH & DEVELOPMENT DIVISION (GGRDD)
Volcano Geology, Geochemistry and Geophysics Research & Development
Earthquake Geology and Geophysics Research & Development
Geomatics
Hazards Assessment Services
GEOLOGIC DISASTER AWARENESS AND PREPAREDNESS DIVISION (GDAPD)
Disaster Risk Reduction Materials Development
Disaster Risk Reduction Capacity Building
Disaster Risk Reduction Research & Development
Disaster Risk Reduction Communication
FINANCE AND ADMINISTRATIVE DIVISION (FAD)
Planning, Monitoring and Evaluation
Human Resources Management and Development
Accounting
Budget
Collection and Disbursement
Procurement and Property Management
General Services
Management Information System

MODULE 1. UNDERSTANDING GEOLOGIC HAZARDS AND ITS IMPACTS

This module focuses on awareness and increasing the knowledge of users on basic information on volcanoes, earthquakes and tsunamis and their hazards and impacts.

Module 1.1 Earthquake

Module objective:

At the end of this module, you will be able to

1. explain where and how earthquakes occur;
2. explain why earthquakes occur in the Philippines;
3. differentiate focus and epicenter;
4. differentiate magnitude and intensity;
5. identify on the map the earthquake generators in the Philippines.

Learning resources:

1. Earthquake and Earthquake Hazards AVP
2. Magnitude vs Intensity flyer
3. Earthquake and its Hazards flyer
4. PHIVOLCS Earthquake Intensity Scale (PEIS)
5. Distribution of active faults and trenches in the Philippines

Discussion:

1. Watch the AVP (PHIVOLCS Earthquake AVP)

PHIVOLCS Earthquake AVP_Final (HD720p)
https://www.youtube.com/DOSTPHIVOLCSOfficial

Earthquake - is a weak to violent shaking of the ground produced by sudden movement of rock materials below the earth's surface.

Types of earthquake:

Tectonic – are those generated by the sudden displacement along faults in the solid and rigid layer of the earth.

Volcanic – are those induced by magma beneath active volcanoes or by rising magma as it moves towards the surface.

Where and how earthquakes occur?

Earthquakes occur along tectonic plate boundaries and active faults.

The earth has an outermost shell, about 80 km thick, which is solid and rigid. This shell is called the **lithosphere**. The lithosphere is subdivided into small and large pieces with some pieces large enough to contain continents. These pieces of the lithosphere are called **TECTONIC PLATES** or, simply, **PLATES**. Immediately beneath the lithosphere is another thin shell called the **asthenosphere**, which can be made to flow slowly like liquid but behaves essentially as solid. The lithosphere and its tectonic plates float on the asthenosphere. Because the asthenosphere is being induced to flow by convection cells produced by rising hot materials from the earth's interior and by the sinking of these materials back into the earth's interior as they experience cooling during their upward journey, the floating tectonic plates are being jostled about and displaced relative to one another. This jostling of plates and the relative displacements of plates along their margins generate tectonic earthquakes.

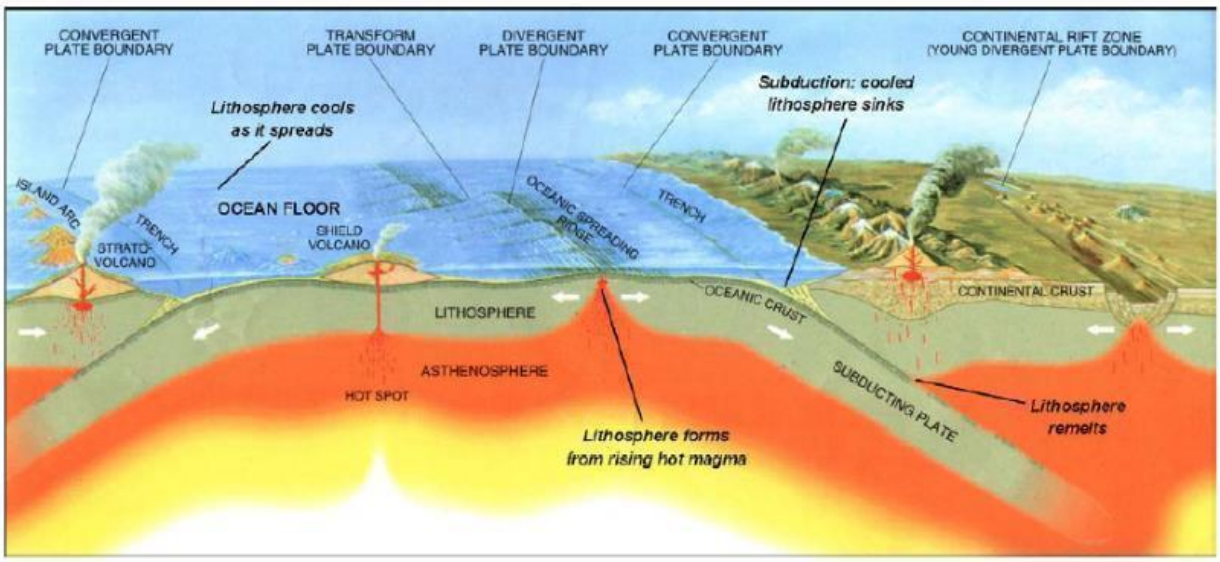


Diagram showing the lithosphere, asthenosphere, trench, subduction zones and mid-oceanic ridge. The processes resulting from the movement of plates are indicated in italized letters (From Simkin, et.al., 1994)

Plate Boundary along which relative movements of neighboring plates can occur and trigger the occurrence of earthquakes.

3 Types of Plate Boundary

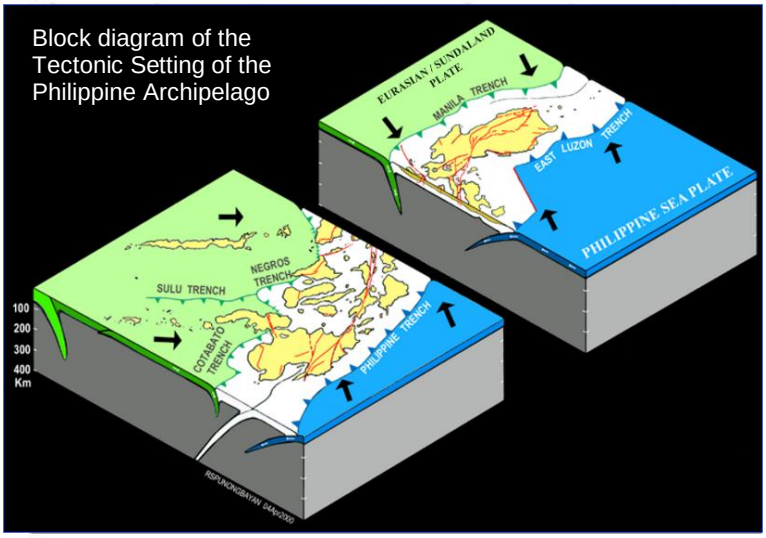
- **Divergent Plate Boundary** where two (2) neighboring plates move away from each other or are pulled apart. The pulling apart of plates and the insertion of lava along divergent plate margins are accompanied by shallow-seated earthquakes. Divergent plate margins coincide with the axes of mid-oceanic ridges which lie on the seafloor under 3 to 4 km of water.

- **Convergent Plate Boundary** where two (2) neighboring plates move towards and push against each other. An active convergent plate margin is marked either by a deep-sea trench like the Philippine Trench or by a long mountain chain like the Himalayas. A deep-sea trench defines the points of entry of one of the plates as it descends into the earth's interior beneath the other plate. Earthquakes associated with convergent plate margins have depths ranging from shallow (0 to 70km deep) to very deep (down to about 700km deep).

- **Transform Plate Boundary** is a vertical surface that cuts and breaks the continuity of divergent and convergent plate margins. When it transects the mid-oceanic ridges, the only active part of the fault where adjacent plates slide past each other is bounded by the axes of the disconnected ridge segment. Earthquakes generated along transform faults are shallow-seated (from 0 to 70km deep). The famous San Andreas Fault in California is an example of a transform fault.

Why do earthquakes occur in the Philippines?

The Philippine archipelago is situated in a tectonically-active region called "Pacific Ring of Fire," where numerous earthquakes and volcanic eruptions occur. The archipelago is surrounded by two subducting tectonic plates (the Philippine Sea Plate in the east and the Eurasian Plate in the west) as manifested by offshore earthquakes along trenches (Philippine Trench, East Luzon Trough, Manila Trench, Negros Trench, Sulu Trench, and Cotabato Trench). Most of the inland earthquakes are caused by the movement along the Philippine Fault, a 1,300km-long fault that traverses from Ilocos Region in the north to eastern Mindanao in the south. Movements along other active faults are also responsible for the present-day high seismicity of the Philippines.

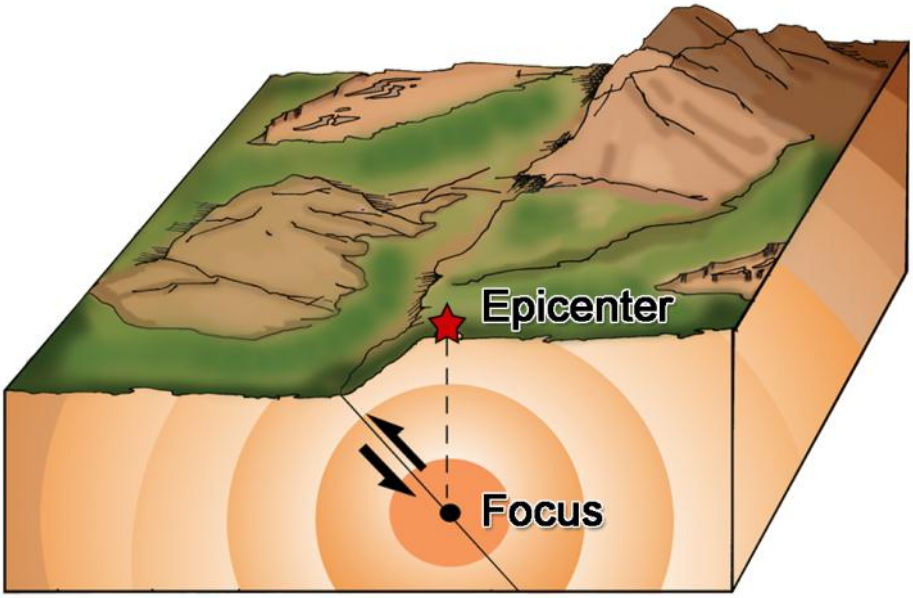


Block diagram of the Tectonic Setting of the Philippine Archipelago

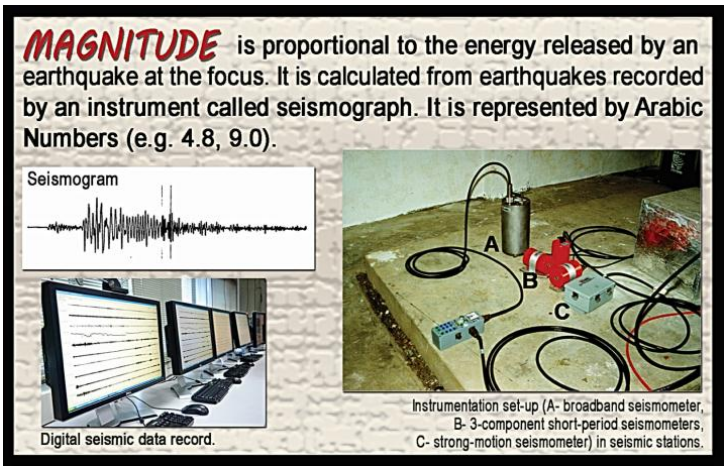

Seismicity Map of the Philippines
1907 to September 2020
Magnitude 5.0 and above

Focus - point within the earth which is the center of energy release during an earthquake.

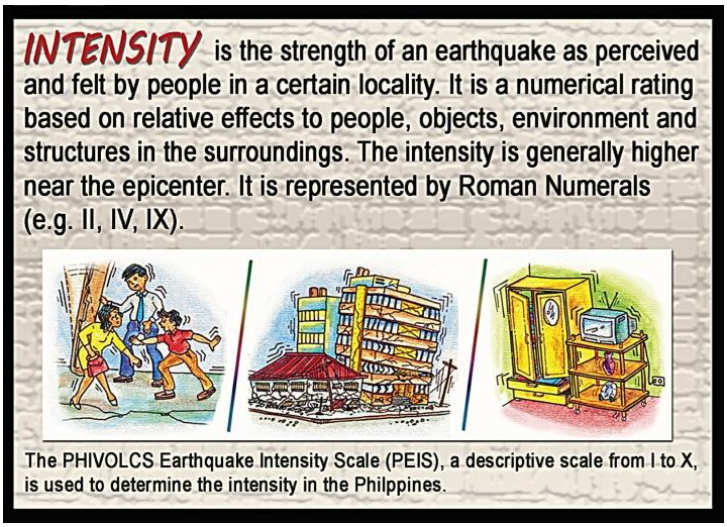
Epicenter - point on the surface directly above the focus.



Magnitude – a measure of the energy release at the source of the earthquake.



Intensity – a measure of how weak or strong the shaking produced by the earthquake is based on effects on people and their surroundings at a certain location.



PHIVOLCS Earthquake Intensity Scale (PEIS)

The PHIVOLCS Earthquake Intensity Scale or PEIS is a 10-point scale being used in the Philippines. This is used to assess the Intensity at a specific location. The common factors to observe are the following:

- People (how did they feel the earthquake?)

- Objects (static objects and moving objects, whether indoor objects or outdoor)

- Water

- Structures

- Trees

- Vehicles

- Occurrence of other hazards like liquefaction and/or landslides

Different situations are also considered in order to assess the intensity observed:

- is it daytime or nighttime?

- is the observer sleeping or awake?

- is the observer indoors or outdoors?

- is the observer at rest or moving?

People are encouraged to report an Intensity after a felt earthquake using the PEIS. They may call or text DOST-PHIVOLCS through the following numbers:

Landline: 02- 8426-1468 local 307 or 308
02- 8929-9254

Cellphone: 0947-4047797

Callers/intensity reporters are expected to provide the following information-

Name of caller/Date and time of earthquake/Location at the time of earthquake/Intensity rating.

PHIVOLCS EARTHQUAKE INTENSITY SCALE (PEIS)

I. SCARCELY PERCEPTIBLE

- Perceptible to people only under favorable circumstances.
- Delicately balanced objects are disturbed slightly.
- Still water in containers oscillates slightly.

II. SLIGHTLY FELT

- Felt by few individuals at rest indoors.
- Hanging objects swing slightly.
- Still water in containers oscillates noticeably.

III. WEAK

- Felt by many people indoors specially in upper floors of buildings. Vibration is felt like the passing of a light truck. Dizziness and nausea are experienced by some people.
- Hanging objects swing moderately.
- Still water in containers oscillates moderately.

IV. MODERATELY STRONG

- Felt generally by people indoors and some people outdoors. Light sleepers are awakened. Vibration is felt like the passing of a heavy truck.
- Hanging objects swing considerably. Dinner plates, glasses, windows and doors rattle. Floors and walls of wood framed building creak. Standing motor cars may rock slightly.
- Water in containers oscillates strongly.
- Rumbling sounds may sometimes be heard.

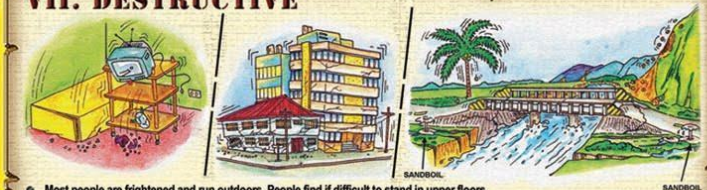
V. STRONG

- Generally felt by most people indoors and outdoors. Many sleeping people awakened. Some are frightened; some run outdoors. Strong shaking and rocking are felt throughout building.
- Hanging objects swing violently. Dining utensils clatter and clink; some are broken. Small, light and unstable objects may fall or overturn. Liquids spill from filled open containers. Standing vehicles rock noticeably.
- Shaking of leaves and twigs of trees is noticeable.

VI. VERY STRONG

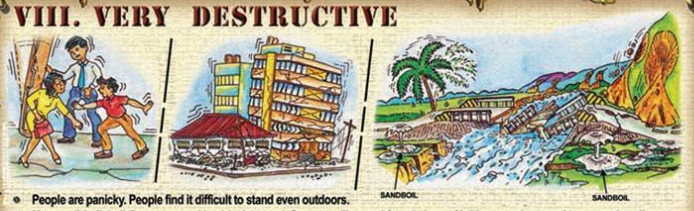
- Many people are frightened; many run outdoors. Some people loose their balance. Motorists feel like driving with flat tires.
- Heavy objects and furniture move or may be shifted. Small church bells may ring. Wall plaster may crack. Very old or poorly built houses and man-made structures are slightly damaged though well-built structures are not affected.
- Limited rockfalls and rolling boulders occur in hilly to mountainous areas and escarpments. Trees are noticeably shaken.

VII. DESTRUCTIVE



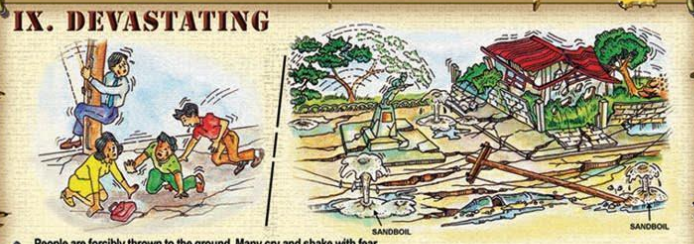
- Most people are frightened and run outdoors. People find if difficult to stand in upper floors.
- Heavy objects and furniture overturn or topple. Big church bells may ring. Old or poorly built structures suffer considerable damage. Some well-built structures are slightly damaged. Some cracks may appear on dikes, fish ponds, road surface, or concrete hollow block walls.
- Limited liquefaction, lateral spreading and landslides are observed. Trees are shaken strongly. *(Liquefaction is a process by which loose saturated sand loses strength during an earthquake and behaves like liquid.)*

VIII. VERY DESTRUCTIVE



- People are panicky. People find it difficult to stand even outdoors.
- Many well-built buildings are considerably damaged. Concrete dikes and foundations of bridges are destroyed by ground settling or toppling. Railway tracks are bent or broken.
- Tombstones may be displaced, twisted or overturned. Utility posts, towers and monuments may tilt or topple. Water and sewer pipes may be bent, twisted or broken.
- Liquefaction and lateral spreading cause man-made structures to sink, tilt or topple. Numerous landslides and rockfalls occur in mountainous and hilly areas. Boulders are thrown out from their positions particularly near epicenter. Fissures and fault rupture may be observed. Trees are violently shaken. Water splashes or slops over dikes or banks of rivers.

IX. DEVASTATING



- People are forcibly thrown to the ground. Many cry and shake with fear.
- Most buildings are totally damaged. Bridges and elevated concrete structures are toppled or destroyed.
- Numerous utility posts, towers and monuments are tilted, toppled or broken. Water and sewer pipes are bent, twisted or broken.
- Landslides and liquefaction with lateral spreading and sandboils are widespread. The ground is distorted into undulations. Trees are shaken very violently with some toppled or broken. Boulders are commonly thrown out. River water splashes violently or slops over dikes and banks.

X. COMPLETELY DEVASTATING

- Practically all man-made structures are destroyed.
- Massive landslides and liquefaction, large scale subsidence and uplifting of landforms and many ground fissures are observed. Changes in river courses and destructive seiches in lakes occur. Many trees are toppled, broken or uprooted.

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PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY
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U.P. Campus, Diliman, Quezon, City
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PHIVOLCS Website: www.phivolcs.dost.gov.ph

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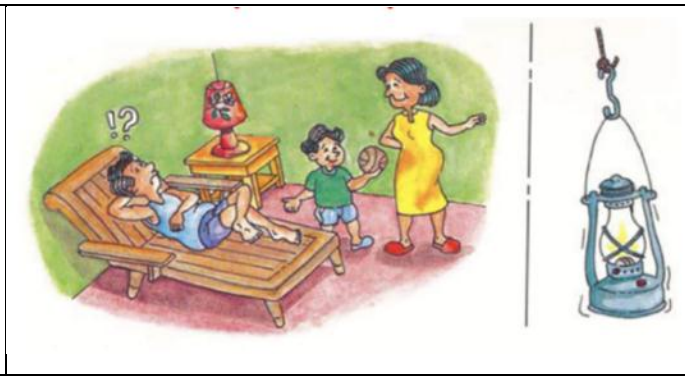
REPORT AN EARTHQUAKE

Text only 0918-9248354
Text/Call 0905-3134077
or call (02) 426-1468 to 79 local 124/125; (02) 929-9254

For text, send: NAME / DATE AND TIME OF EARTHQUAKE / LOCATION AT THE TIME OF EARTHQUAKE / INTENSITY RATING

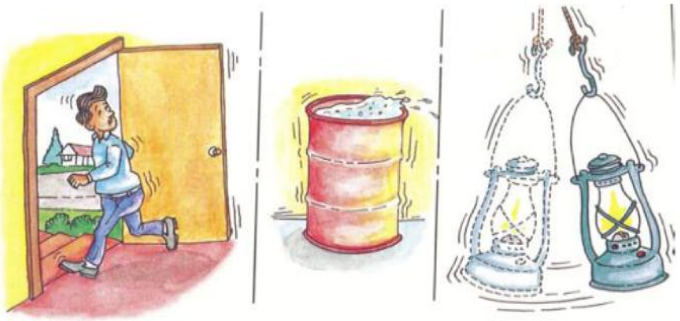
Each Intensity is described below in detail:

I. SCARCELY PERCEPTIBLE	
• Perceptible to people under favorable circumstances. • Delicately balanced objects are disturbed slightly. • Still water in containers oscillates slowly.	

II. SLIGHTLY FELT	
• Felt by a few individuals at rest indoors. • Hanging objects swing slightly. • Still water in containers oscillates noticeably.	

III. WEAK	
• Felt by many people indoors especially on upper floors of buildings. • Vibration is felt like the passing of a light truck. • Dizziness and nausea are experienced by some people. • Hanging objects swing moderately. • Still water in containers oscillates moderately.	

IV. MODERATELY STRONG	
• Felt generally by people indoors and by some people outdoors. • Light sleepers are awakened. • Vibration is felt like a passing of a heavy truck. • Hanging objects swing considerably. • Dinner, plates, glasses, windows and doors rattle. • Floors and walls of wood framed buildings creak. • Standing motor cars may rock slightly. • Liquids in containers are slightly disturbed. • Water in containers oscillates strongly. • A rumbling sound may sometimes be heard.	

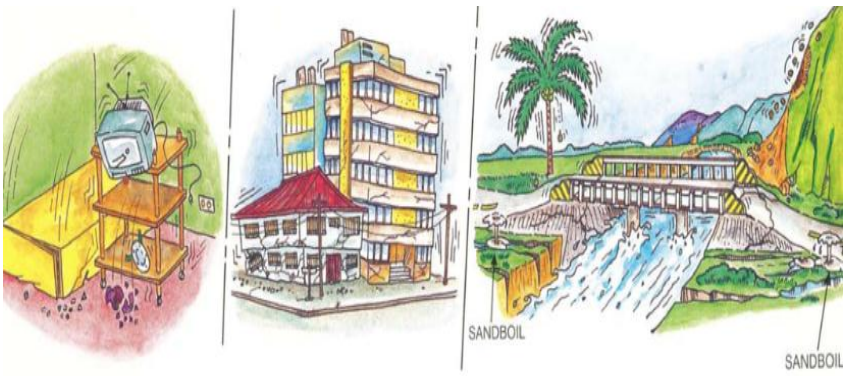
V. STRONG	
• Generally felt by most people indoors and outdoors. • Many sleeping people are awakened. • Some are frightened, some run outdoors. • Strong shaking and rocking felt throughout the building. • Hanging objects swing violently. • Dining utensils clatter and clink; some are broken. • Small, light and unstable objects may fall or overturn. • Liquids spill from filled open containers. • Standing vehicles rock noticeably. • Shaking of leaves and twigs of trees are noticeable.	

VI. VERY STRONG

- Many people are frightened; many run outdoors. Some people lose their balance.
- Motorists feel like driving in flat tires.
- Heavy objects or furniture move or may be shifted.
- Small church bells may ring.
- Wall plaster may crack.
- Very old or poorly built houses and human-made structures are slightly damaged though well-built structures are not affected.
- Limited rockfalls and rolling boulders occur in hilly to mountainous areas and escarpments.
- Trees are noticeably shaken.

VII. DESTRUCTIVE

- Most people are frightened and run outdoors.
- People find it difficult to stand on the upper floors.
- Heavy objects and furniture overturn or topple.
- Big church bells may ring.
- Old or poorly-built structures suffer considerable damage.
- Some well-built structures are slightly damaged.
- Some cracks may appear on dikes, fish ponds, road surface, or concrete hollow block walls.
- Limited liquefaction, lateral spreading and landslides are observed.
- Trees are shaken strongly.
  (Liquefaction is a process by which loose saturated sand loses strength during an earthquake and behaves like liquid).

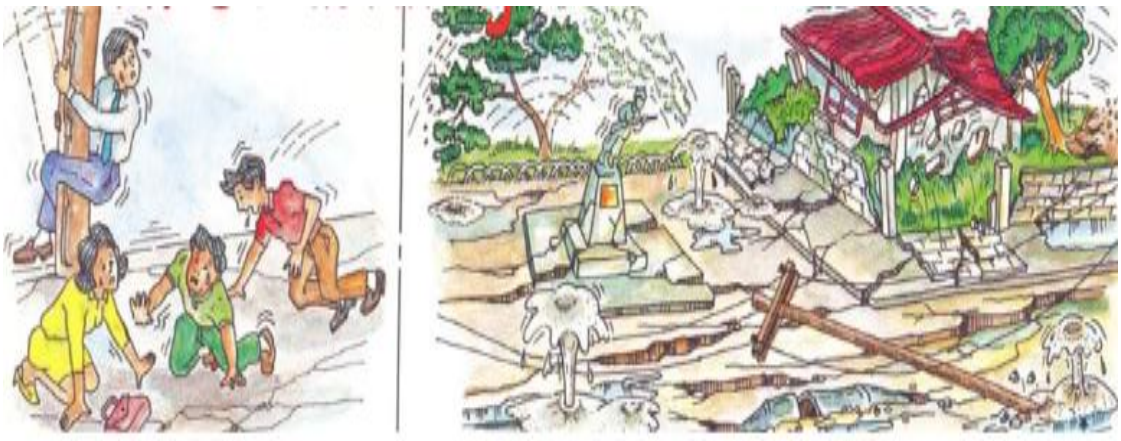


VIII. VERY DESTRUCTIVE

- People are panicky. People find it difficult to stand even outdoors.
- Many well-built buildings are considerably damaged.
- Concrete dikes and foundation of bridges are destroyed by ground settling or toppling.
- Railway tracks are bent or broken.
- Tombstones may be displaced, twisted or overturned.
- Utility posts, towers and monuments may tilt or topple.
- Water and sewer pipes may be bent, twisted or broken.
- Liquefaction and lateral spreading cause human- made structures to sink, tilt or topple. Numerous landslides and rockfalls occur in mountainous and hilly areas. Boulders are thrown out from their positions particularly near the epicenter.
- Fissures and fault ruptures may be observed.
- Trees are violently shaken.
- Water splashes or slops over dikes or banks of rivers.

IX. DEVASTATING

- People are forcibly thrown to the ground. Many cry and shake with fear.
- Most buildings are totally damaged.
- Bridges and elevated concrete structures are toppled or destroyed.
- Numerous utility posts, towers and monuments are tilted, toppled or broken.
- Water sewer pipes are bent, twisted or broken.
- Landslides and liquefaction with lateral spreading and sand boils are widespread.
- The ground is distorted into undulations.
- Trees are shaken very violently with some toppled or broken.
- Boulders are commonly thrown out.
- River water splashes violently or slops over dikes and banks.



X. COMPLETELY DEVASTATING

- Practically all human-made structures are destroyed.
- Massive landslides and liquefaction, large scale subsidence and uplifting of landforms and many ground fissures are observed.
- Changes in river courses and destructive seiches in large lakes occur.
- Many trees are toppled, broken and uprooted.

For ease of use, the Intensities described above are laid down in table form:

People									
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Perceptible only under favorable circumstances.	Felt by few at rest indoors.	Felt by many indoors especially on upper floors.	Felt generally by people indoors and some people outdoors.	Generally felt by most people indoors and outdoors.	Some lose balance.	People find it difficult to stand on upper floors.	People find it difficult to stand even outdoors.	People are forcibly thrown to the ground.	
				Some run outdoors.	Many run outdoors.	Most run outdoors.			
		Dizziness and nausea are experienced by some.	Light sleepers are awakened.	Many sleeping people awakened. Some are frightened.	Many people are frightened.	Most are frightened.	People are panicky.	Many cry and shake with fear.	
		Vibration is felt like the passing of a light truck.	Vibration is felt like the passing of a heavy truck.	Strong shaking and rocking are felt throughout the building.	Motorists feel like driving with flat tires.				

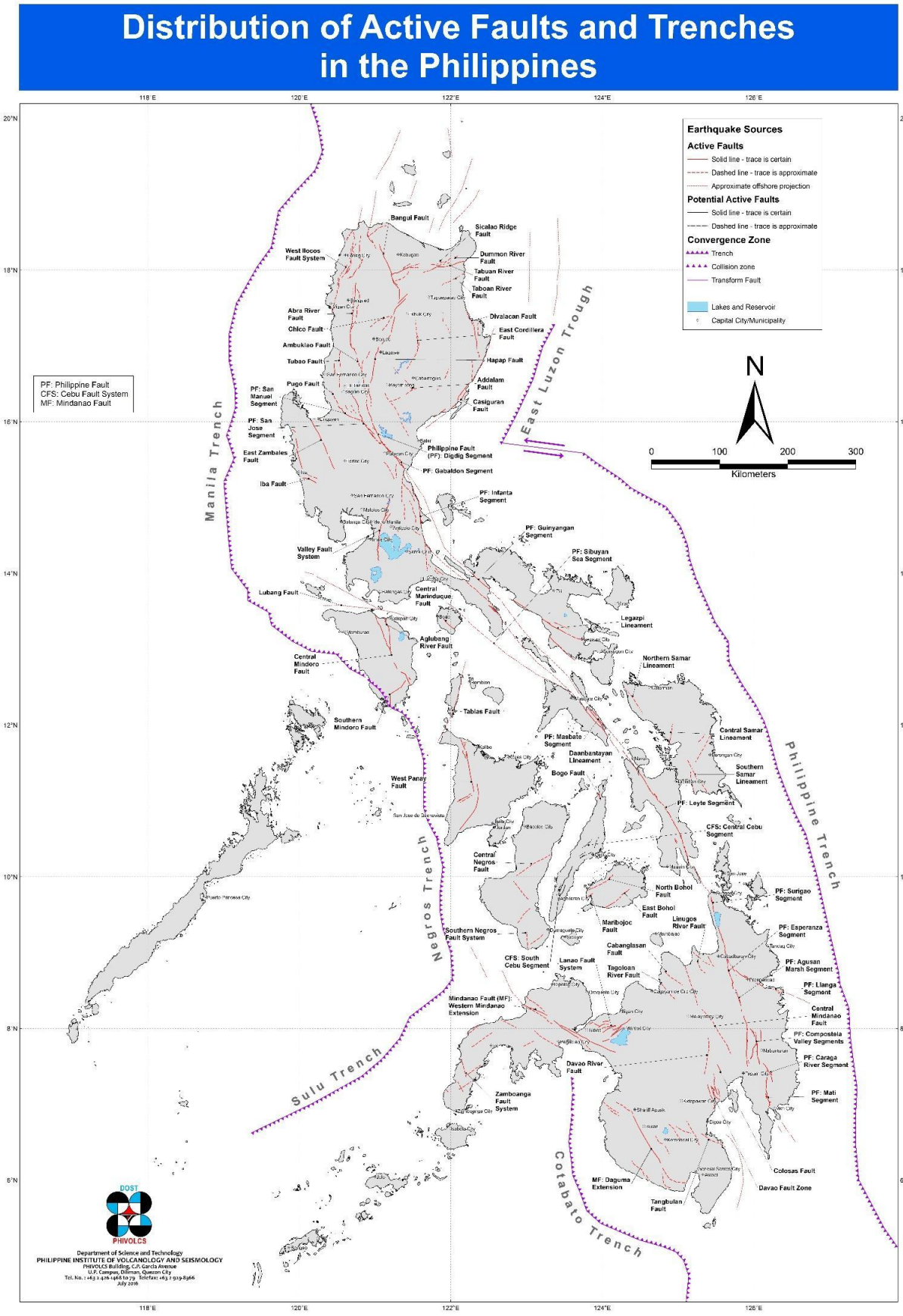
Objects									
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Delicately-balanced objects are disturbed slightly.	Hanging objects swing slightly.	Hanging objects swing moderately.	Hanging objects swing considerably.	Hanging objects swing violently.	Small church bells may ring.	Big church bells may ring.			
			Dinner plates, glasses, windows and doors rattle.	Dining utensils clatter and clink; some are broken.					
				Light and unstable objects may fall or overturn.	Heavy objects and furniture move or may be shifted.	Heavy objects and furniture overturn or topple.			

Structures									
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
			Floors and walls of wood-framed buildings creak.		Wall plaster may crack.			Most buildings are totally damaged.	Practically all human-made structures are destroyed.
					Very old or poorly built houses and human-made structures are slightly damaged.	Old or poorly-built structures suffer considerable damage.	Many well-built buildings are considerably damaged. Liquefaction and lateral spreading cause human-made structures to sink or topple.		
					Well-built structures are not affected.	Some well-built structures are slightly damaged.			
						Some cracks may appear on dikes, fish ponds, road surfaces, or concrete hollow block walls.	Concrete dikes and foundations of bridges are destroyed by ground settling or toppling.	Bridges and elevated concrete structures are toppled or destroyed.	
							Utility posts, towers, and monuments may tilt or topple. Water and sewer pipes may be bent, twisted or broken. Railway tracks are bent or broken. Tombstones may be displaced, twisted, or overturned.	Numerous utility posts, towers and monuments are tilted, toppled, or broken. Water and sewer pipes are bent, twisted, or broken.	

Water or bodies of water									
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Still water in containers oscillates slightly.	Still water in containers oscillates noticeably.	Still water in containers oscillates moderately.		Liquids spill from filled open containers.			Water splashes or slops over dikes or banks of rivers.	River water splashes violently or slops over dikes and banks.	Changes in river courses and destructive seiches in lakes occur.

Trees									
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
				Shaking of leaves and twigs of trees is noticeable.	Trees are noticeably shaken.	Trees are shaken strongly.	Trees are violently shaken.	Trees are shaken very violently with some toppled or broke.	Many trees are toppled, broken or uprooted.

Distribution of active faults and trenches in the Philippines



What is a fault?

It is a break, fracture, fissure or zone of weakness where movement or displacement has occurred or may occur again. It may extend hundreds of kilometers across the earth's surface and tens of kilometers downward.

What is an active fault?

An active fault is defined as a fault that moved within the last 10,000 years or in the Holocene Period. It shows evidence or has a documented history of its recent movement.

Uses of Active Fault Maps

- Zone of Avoidance (buffer zone) against ground rupture hazard (at least 5 meters zone of avoidance from both sides of the active fault or from the edge of the deformation zone)
- Land-use zoning
- Compliance with environmental laws (EGGAR & ECC)
- Input to National Building Code
- Input to disaster preparedness plans

Module 1.2 Earthquake Hazards and its Impacts

Module objective:

At the end of this module you will be able to

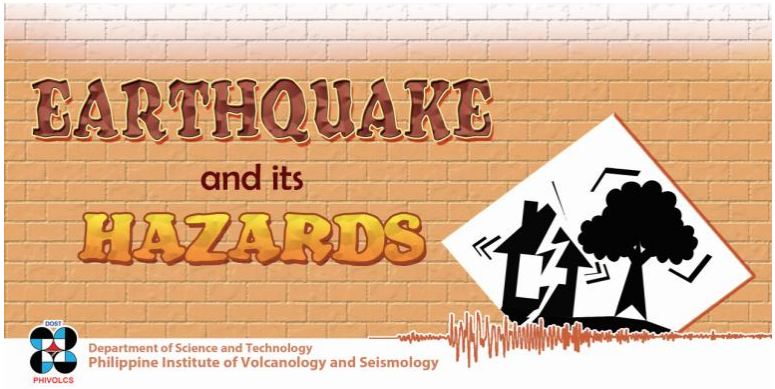
- identify and explain the earthquake-related hazards that affected or can affect a particular province/municipality.

Learning resources:

1. Earthquake and its Hazards AVP
2. Tsunami 101 AVP
3. Impacts of Past Earthquake and Tsunami (videos and photos)
4. Earthquake and its hazards flyer

Discussion:

1. Watch the AVP (PHIVOLCS Earthquake AVP and PHIVOLCS Tsunami AVP)
2. Watch videos of past damaging earthquakes (Surigao, Zambales, Leyte)



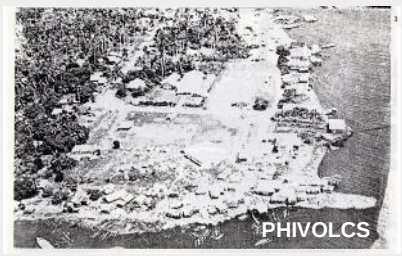
PHIVOLCS Earthquake AVP_FINAL (HD720p)

PHIVOLCS TSUNAMI AVP-Final High Res 720p

https://www.youtube.com/DOSTPHIVOLCSOfficial

Earthquake Hazards

-these are earthquake-related phenomena/processes which may occur that pose a potential threat or may produce negative impacts to humans, properties and to the environment if a very strong earthquake occurs.

Earthquake Hazards	Photos	Impacts/Disaster Losses
Ground rupture -creation of new or the renewed movements of old fractures, oftentimes with the two blocks on both sides moving in opposite directions		Fissuring, horizontal and/or vertical displacements of the ground due to movement of the fault. Damage to structure/s on top of a ground rupture.
Ground shaking -Disruptive up, down and sideways vibration of the ground during an earthquake.		Structural and non-structural damages (e.g. broken glasses, toppled objects, fire); or collapse of buildings. May consequently cause hazards such as liquefaction, landslide, seiche.
Liquefaction -Phenomenon wherein sediments behave like a liquid similar to quicksand; commonly occurs in low-lying areas, reclaimed sites, and along and near bodies of water.		Sinking and/or tilting of structures above the area where liquefaction occurs; rising of buoyant buried structures such as water pipes and fuel tanks; sandboil; lateral spreading; fissuring
Earthquake-induced landslide -Downslope movement of rocks, soil, and other debris commonly triggered by strong ground shaking.		Blockage of roads resulting in the isolation of places; transportation cutoff; damming of river channels
Tsunami -Series of waves generated by various geological processes generally by an earthquake under the sea.		Flooding; coastal erosion; drowning of people; damage to properties; murky seawater; contamination of groundwater due to the seawater penetration.

Learning Activity: Please check if your Province/City/Municipality had experienced the following earthquake hazards and indicate its impact on your area.

Earthquake hazard	**Please check if your Province/City/Municipality had experienced the following earthquake hazards**	**Impacts/Disaster losses**
DATE/YEAR OF THE EARTHQUAKE EXPERIENCED:		
Ground rupture		
Ground shaking		
Liquefaction		
Earthquake-induced landslide		
Tsunami		

Module 1.3 Volcanoes

Module objectives:

At the end of this module, you will be able to

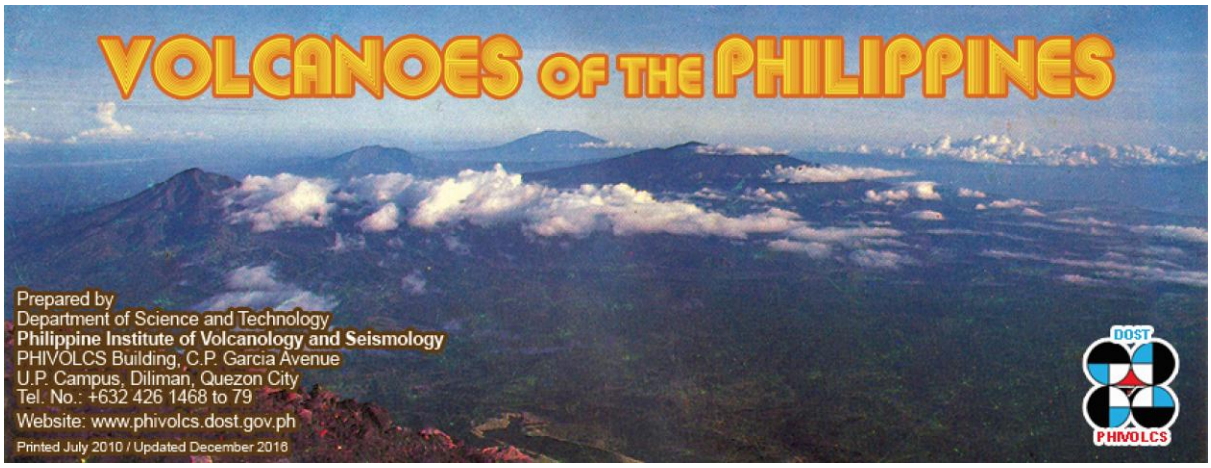
- identify the 3 classifications of volcanoes;
- identify active and potentially-active volcanoes in your area.

Learning resources:

1. Volcanoes of the Philippines flyer
2. Videos
3. Map of Volcanoes in the Philippines

Discussion:

1. Watch videos
2. Read Volcanoes of the Philippines flyer



Volcano:

A volcano is a hill, mountain or fissure from which molten or hot rocks with gaseous materials are ejected. The term also applies to a crater formed by the removal of pre-existing materials, or a hill or mountain formed by the accumulation of ejected materials.

Volcanic eruption:

- is a process wherein molten rock materials are emitted or ejected in the form of flowing masses of lava or fragmental particles called *pyroclastics* with gas from a crater, vent or fissure.

PHIVOLCS Classification of Volcanoes

- **Active volcanoes**
  - had eruptions in historic times which are supported by numerous historical accounts
  - associated with oral folkloric history which suggests an eruption that is remembered by our ancestors
  - have shown indications of seismic activity
  - have volcanic deposits less than 10,000 years as determined by radiometric dating

- **Potentially active volcanoes**
  - are geologically young-looking, which suggests that they possibly erupted in the last 10,000 years; however, no historic record of their eruptions can be found.
  - A volcano is said to be geomorphologically young as suggested by:
    - low degree of erosion and dissection
    - presence of young vent features
    - lack of or have very little vegetation cover

- **Inactive volcanoes**
  - have no record of eruptions and their forms have been changed by agents of weathering and erosion as evidenced by the presence of deep gullies

Volcano Facts in the Philippines:

around 300 named and unnamed volcanoes all over the archipelago

24 active volcanoes

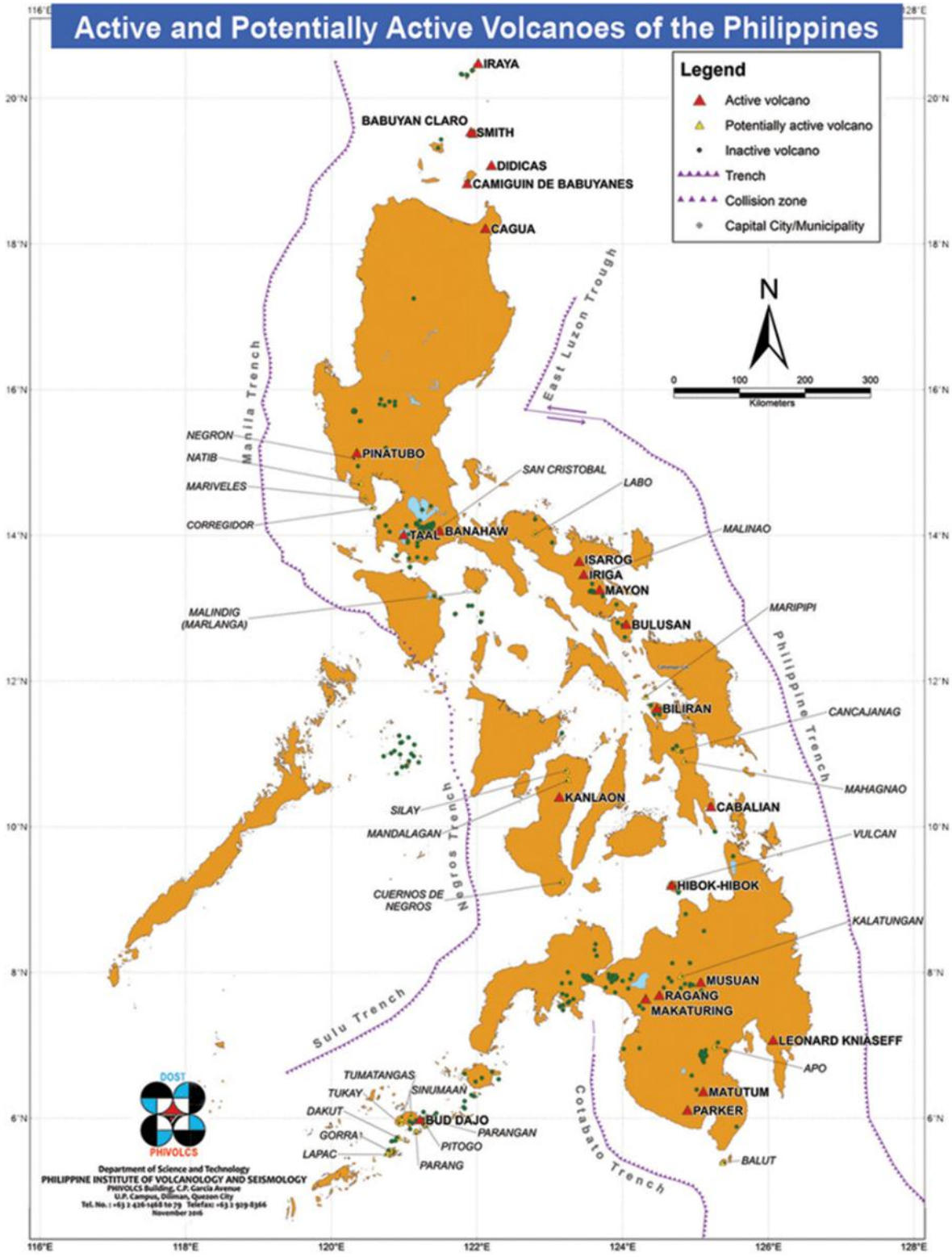
27 potentially active volcanoes

Active Volcanoes of the Philippines

Name of Volcano	Lat (N)	Long (E)	Locality
Babuyan Claro	19.525	121.950	Cagayan (Babuyan Is.)
Banahaw Volcano Complex	14.067	121.483	Laguna, Quezon
Biliran (Suiro)	11.650	121.467	Biliran Province
Bud Dajo	5.983	121.217	Sulu
Bulusan	12.770	124.050	Sorsogon
Cabalian	10.281	125.214	Southern Leyte
Cagua	18.222	122.123	Cagayan
Camiguin De Babuyanes	18.833	121.860	Cagayan (Babuyan Is.)
Didicas	19.077	122.202	Cagayan (Babuyan Is.)
Hibok-hibok	9.203	124.675	Camiguin
Iraya	20.483	122.017	Batanes
Iriga	13.457	123.457	Camarines Sur
Isarog	13.658	123.375	Camarines Sur
Kanlaon	10.412	123.132	Negros Oriental/ Occidental
Leonard Kniaseff	7.382	126.047	Compostela Valley
Makaturing	7.642	124.342	Lanao Del Sur
Matutum	6.367	125.367	Cotabato
Mayon	13.257	123.685	Albay
Musuan	7.867	125.073	Bukidnon
Parker	6.113	124.892	Cotabato
Pinatubo	15.133	120.350	Boundaries of Pampanga, Tarlac and Zambales
Ragang	7.692	124.505	Cotabato
Smith	19.540	121.917	Cagayan (Babuyan Is.)
Taal	14.017	120.985	Batangas

Potentially Active Volcanoes of the Philippines

Name of Volcano	Lat (N)	Long (E)	Locality
Apo	6.989	125.269	Davao Del Sur and North Cotabato
Balut	5.392	125.375	Davao Del Sur
Cancajanag	11.067	124.778	Leyte
Corregidor	14.400	120.567	Bataan
Cuernos De Negros (Magasu, Magaso)	9.250	123.167	Negros Oriental
Dakut	5.733	120.933	Sulu
Gorra	5.557	120.817	Sulu
Kalatungan	7.953	124.802	Bukidnon
Labo	14.017	122.792	Camarines Sur
Lapac (Lapak)	5.517	120.760	Sulu
Mahagnao	10.896	124.867	Leyte
Malinao (Buhi, Takit)	13.417	123.608	Albay
Malindig (Marlanga)	13.250	122.000	Marinduque
Mandalagan	10.650	123.250	Negros Occidental
Maripipi	11.800	124.333	Biliran
Mariveles	14.517	120.467	Bataan
Natib	14.717	120.400	Bataan
Negron	15.083	120.333	Zambales
Parang	5.817	121.167	Sulu
Parangan	5.975	121.400	Sulu
Pitogo	5.905	121.300	Sulu
San Cristobal	14.067	121.433	Laguna, Quezon and San Pablo City
Silay	10.775	123.233	Negros Occidental
Sinumaan	6.033	121.100	Sulu
Tukay	5.933	120.950	Sulu
Tumatangas	5.998	120.967	Sulu
Vulcan (Camiguin)	9.215	124.647	Camiguin



Map of Active and Potentially-Active Volcanoes in the Philippines

Module 1.4 Volcanic Hazards and its Impacts

Module objective:

At the end of this module, you will be able to

- identify and explain the volcanic hazards that affected or can affect your province/municipality.

Learning resources:

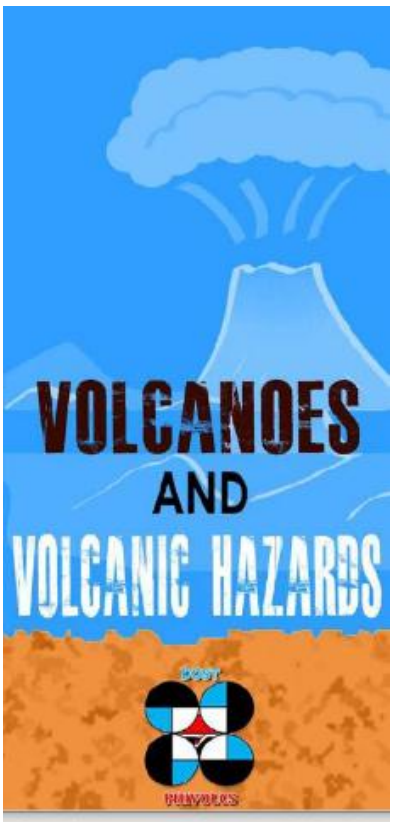
1. Volcanoes and Volcanic Hazards Flyer

2. Videos

Discussion:

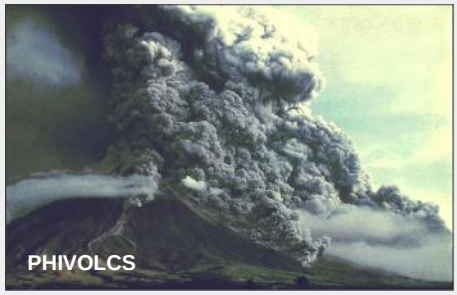
1. Watch videos

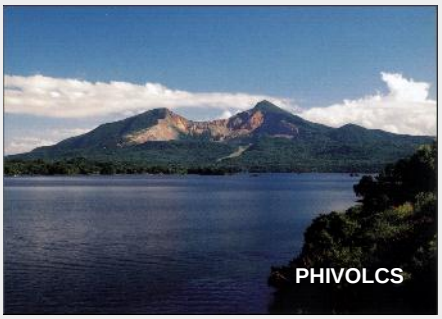
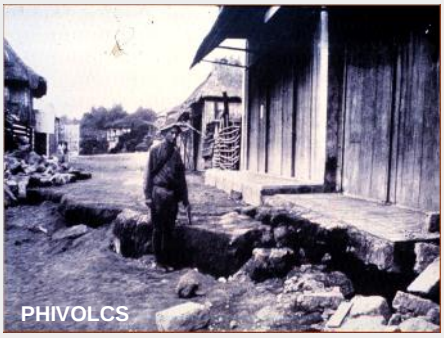
2. Read Volcanoes and Volcanic Hazards flyer



Volcanic hazards

- these are volcano-related phenomena/processes that pose a potential threat or may produce negative impacts to humans, properties and to the environment in a given period of time.

Volcanic Hazards	Photos	Impacts/Disaster Losses
Pyroclastic density current -fast turbulent mass of fragmental volcanic material (ash and rocks) mixed with hot gases that flows downslope at very high speed (>60kph)		The high temperature of a pyroclastic flow can burn everything along its path; deposits of pyroclastic flows can bury areas within river valleys and plains
Lava flow -stream-like flow of incandescent, molten rock material erupted from a volcano		Areas buried by lava flows will not be usable for a long time because lava solidifies into a massive rock.
Ashfall or tephra fall -Shower of fine-to-coarse-grained volcanic materials and other airborne products of a volcanic eruption. Ashfall distribution or dispersal is dependent on the prevailing wind direction.		The fine ash particles when inhaled can cause respiratory problems; thick heavy ash accumulations can cause roofs to collapse; ashfall is hazardous to aircraft because it can cause jet engine failure
Lahar -Rapidly flowing thick mixture of volcanic materials and water, usually generated along river channels by extreme rainfall.		Lahar deposits can bury large areas under volcanic debris several meters thick.
Volcanic gases -Gases released to the atmosphere in the form of water vapor, hydrogen sulfide, sulfur dioxide, carbon monoxide, hydrogen chloride, and hydrogen fluoride.		Toxic gases emitted by volcanoes can be harmful to health.

Volcanic Hazards	Photos	Impacts/Disaster Losses
Debris avalanche or volcanic landslide -A massive collapse of a huge portion of a volcano, usually triggered by an earthquake or volcanic eruption.		Hundreds of square kilometers of areas at the slopes and foot of the volcano may be devastated.
Tsunami or seiche -Waves or wave trains that are generated by sudden displacement of water during volcanic eruptions. These could also be generated during undersea eruptions or by debris avalanche.		Seiche can be form by perturbations by eruptions, debris avalanches entering lakes, bays and swept inshore.
Ground fissuring -Due to the movement of magma beneath, the surface may have movements/adjustments along faults accompanied by earthquakes.		Properties on top of fissures may be damaged.

Learning Activity:

If there is/are active and/or potentially active volcano/es in your area, identify the volcanic hazards that affected or can affect your Province/Municipality.

Module 1 Evaluation:

Please answer:

1. It is the service institute of the Department of Science and Technology (DOST) that is principally mandated to mitigate disasters that may arise from volcanic eruptions, earthquakes, tsunami and other related geotectonic phenomena.

    a. PAGASA
    b. PHIVOLCS
    c. DOST
    d. PNRI

Match the following:

_____ 2. Measure of the energy release at the source of the earthquake.

_____ 3. Measure of how weak or strong the shaking produced by the earthquake based on effects to people and their surroundings at a certain location.

_____ 4. It is a weak to violent shaking of the ground produced by the sudden movement of rock materials below the earth's surface.

_____ 5. Point within the earth which is the center of energy release during an earthquake.

_____ 6. Point on the surface directly above the focus.

_____ 7. A 10-point Intensity scale being used in the Philippines.

A. Earthquake
B. Focus
C. Magnitude
D. PEIS (PHIVOLCS Earthquake Intensity Scale)
E. Epicenter
F. Intensity

Please answer:

Identify the 3 classifications of volcanoes

8. _____

9. _____

10. _____

11. Are there active and potentially active volcanoes in your area? If yes, what volcano/es?

MODULE 2. DOST-PHIVOLCS INFORMATION PRODUCTS, TOOLS AND INNOVATIONS, AND SERVICES

Module objective:

At the end of this module, you will be able to

- acquire competency on how to access the DOST-PHIVOLCS information products, tools and services and be familiar with their uses.

Learning resources:

1. DOST-PHIVOLCS information materials (Folder: PHIVOLCS Web-IEC-materials)
2. DOST-PHIVOLCS services
3. DOST-PHIVOLCS-developed information tools

Discussion:

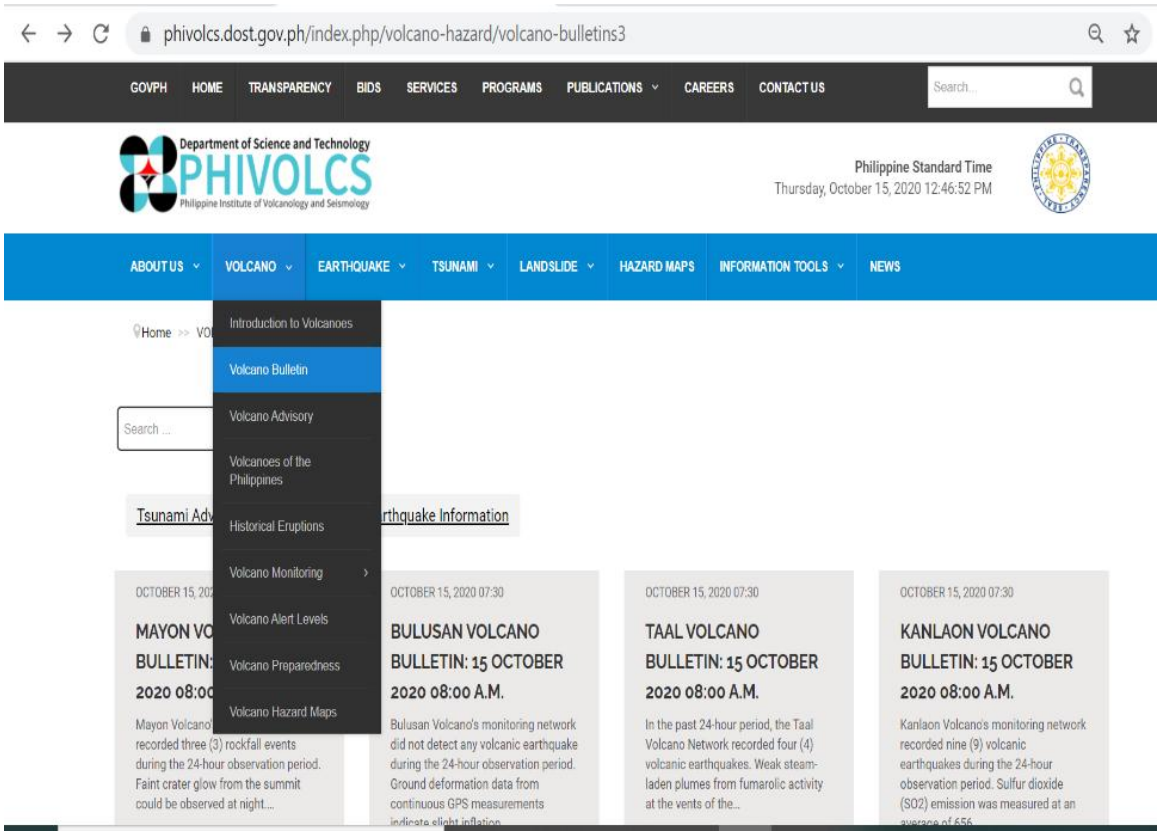
Module 2.1 DOST-PHIVOLCS Information Products

DOST-PHIVOLCS has various information products which contain information about volcanoes and active faults in the Philippines and their associated hazards. More importantly, these products provide advice on how to mitigate the impacts of these hazards. This module will highlight the DOST-PHIVOLCS information materials, tools and services and how to access them.

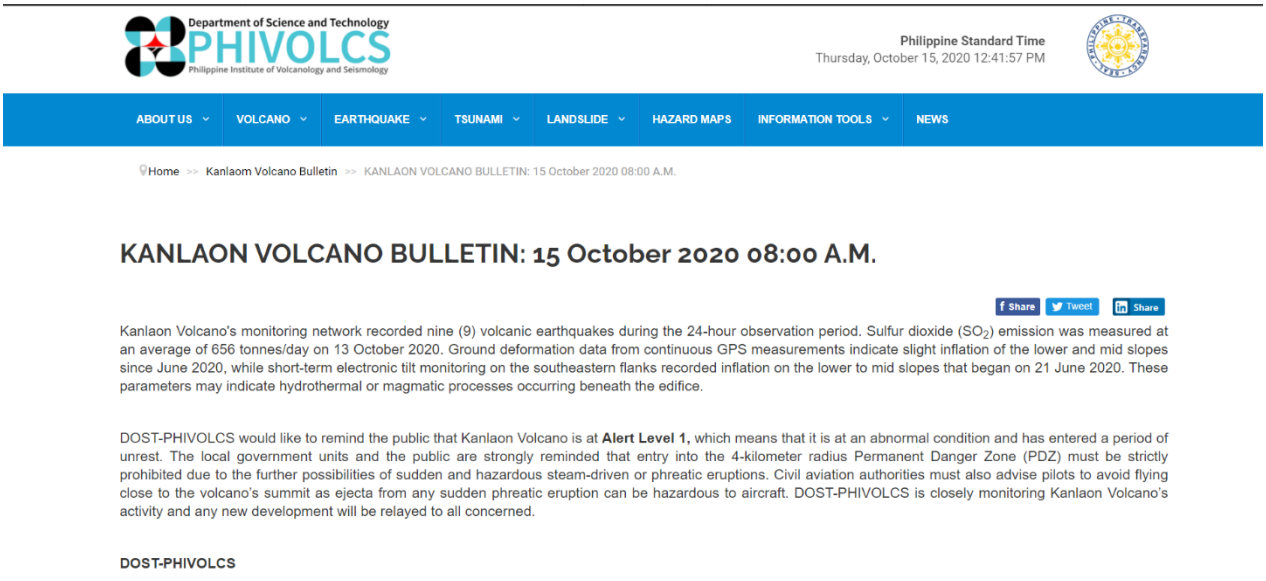
Volcano Information

Volcano Information is either in the form of Bulletin or Advisory. Advisories are issued to notify the public and concerned authorities on the current activity of a volcano. The advisories will also provide recommendations on what actions to take vis-à-vis the current situation of the volcano. Volcano Bulletins on the other hand, are issued daily for closely monitored active volcanoes. Included in a Volcano Bulletin are the current Alert Level of the volcano, its activity, the monitored parameters for the past 24 hours and the recommended actions.

- Advisories and Bulletins are posted online and can be accessed at the DOST-PHIVOLCS website https://www.phivolcs.dost.gov.ph/. Click on VOLCANO – Volcano Bulletin or Volcano Advisory.



An example of Volcano Bulletin for Kanlaon:



Earthquake Information

DOST-PHIVOLCS Earthquake Information is released if a seismic event was detected and located in the Philippines by the Philippine Seismic Network (PSN). Provided in the Earthquake Information are the event parameters (epicenter, depth of focus, time and magnitude) which are determined using the streamed data from the PSN. Intensity information are also included if the event is felt by individuals or measured by an intensity meter. There are two types of Intensity Information:

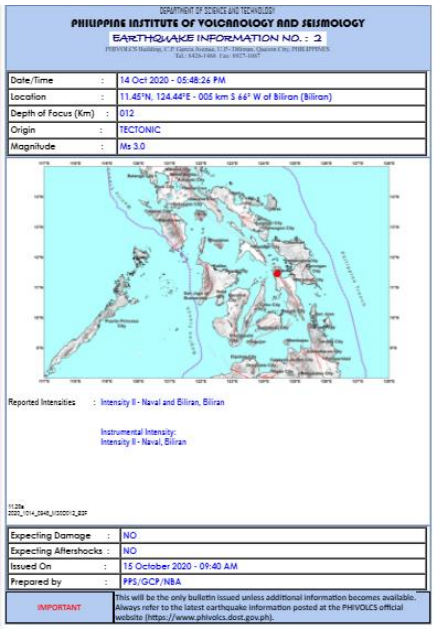
a. Reported Intensities- based on reports of people
b. Instrumental Intensities- are recorded by an instrument called intensity meter. Intensity meters are usually placed in LGU offices.

Accessing Earthquake Information:

1. Visit DOST-PHIVOLCS website: https://www.phivolcs.dost.gov.ph/.

2. Click on EARTHQUAKE – Earthquake Information, list of latest seismic events in the Philippines will be shown.

3. Click on a particular Date-Time to view details of that earthquake event.


DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY
EARTHQUAKE INFORMATION NO. : 2

Date/Time	:	14 Oct 2020 - 05:48:26 PM
Location	:	11.45°N, 124.44°E - 005 km S 66° W of Biliran (Biliran)
Depth of Focus (Km)	:	012
Origin	:	TECTONIC
Magnitude	:	Ms 3.0

Reported Intensities : Intensity II - Naval and Biliran, Biliran

Instrumental Intensity:
Intensity II - Naval, Biliran

Expecting Damage	:	NO
Expecting Aftershocks	:	NO
Issued On	:	15 October 2020 - 09:40 AM
Prepared by	:	PFS/GCP/NBA
IMPORTANT		This will be the only bulletin issued unless additional information becomes available. Always refer to the latest earthquake information posted at the PHIVOLCS official website (https://www.phivolcs.dost.gov.ph).

Earthquake Information No. – Earthquake Information is updated if additional data becomes available.

1. Earthquake Parameters:
   - -Date and time of occurrence
   - -Location of the epicenter (geographical coordinates – Latitude and Longitude) referred to a nearest known town
   - -Depth of focus (km)
   - -Origin – Tectonic or Volcanic
   - -Magnitude
2. Reported Intensities – based on assessed PEIS
3. Instrumental intensities – based on the recorded measurement of the intensity meter*
4. Expecting damage
5. Expecting aftershocks

*Intensity meter – is an instrument usually installed in LGU offices nationwide, that records ground acceleration during an earthquake. The ground acceleration readings are converted to PEIS.

Philippine Tsunami Information

The Philippine Tsunami Information (PTI) is released if an earthquake with a potential to generate a tsunami occurs. The first column of the PTI indicates either an advisory or a warning. An advisory is released when an earthquake with a potential to generate a tsunami occurs. On the other hand, a warning is issued when a life-threatening tsunami waves of heights greater than one meter is expected to arrive to Philippine coastlines. The second column of the PTI describes the degree of threat to the Philippines, and the third column provides the recommended action.

PHILIPPINE TSUNAMI INFORMATION

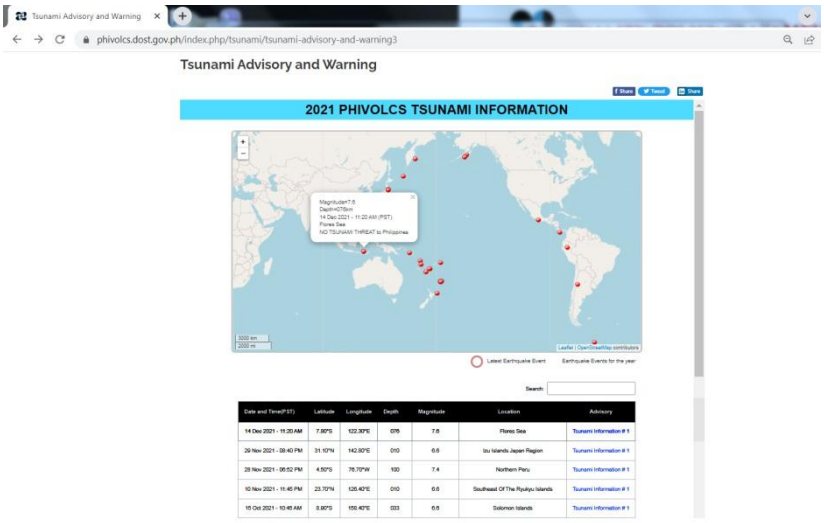
Tsunami Information	Threat to the Philippines	Recommended Action for Affected Places
Advisory **NO TSUNAMI THREAT**	A large earthquake is generated but either (1) there is no tsunami generated by this event or (2) a tsunami was generated but will not reach the Philippines.	**No evacuation needed**. The advisory is issued for information purposes only.
Advisory **SEA LEVEL CHANGE MONITORING**	**PHIVOLCS will monitor sea level changes and provide updates.**	**No evacuation order is in effect.** Public is advised to wait and listen for updates.
Advisory **MINOR SEA LEVEL DISTURBANCE**	**Minor sea level disturbance is expected** in some coastal areas with wave heights of less than one (1) meter above the expected ocean tides.	People are advised to **stay away from the beach and not to go to the coast.** People whose houses are located very near the shoreline are advised **to move farther inland**. Owners of boats in harbors, estuaries or shallow coastal waters of the affected provinces should secure their boats and move away from the waterfront. Boats already at sea are advised to stay offshore in deep waters until further notified.
TSUNAMI WARNING	**Destructive tsunami is generated with life threatening wave heights**. (A destructive tsunami is expected to arrive to Philippine coastlines with **wave heights of greater than one (1) meter** above the expected ocean tides.)	**Immediate evacuations** of coastal communities that maybe affected are strongly advised. Owners of boats in harbors, estuaries or shallow coastal waters of the affected provinces should secure their boats and move away from the waterfront. Boats already at sea are advised to stay offshore in deep waters until further notified.

The **Philippine Institute of Volcanology and Seismology (PHIVOLCS)** is the Tsunami Warning Focal Point of the Philippines.
PHIVOLCS Building, C.P. Garcia Avenue, U.P. Campus, Diliman, Quezon City 1101
Tel. Nos.: +632 4261468 to 79; +632 9299254 Fax Nos.: +632 9271087; +632 9298366
Website: www.phivolcs.dost.gov.ph

June 2013

Accessing the Tsunami Information

1. Visit DOST-PHIVOLCS website https://www.phivolcs.dost.gov.ph/.
2. Click on TSUNAMI – Tsunami Advisory and Warning, a list of the latest Tsunami Information in the Philippines will be shown.
3. Click on Tsunami Information No. to view details of that event.



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY

TSUNAMI INFORMATION NO. 1

NO TSUNAMI THREAT

No tsunami threat to the Philippines from this earthquake.

PRELIMINARY EARTHQUAKE PARAMETERS

Date and Time	:	14 Dec 2021 - 11:20:26 AM
Location	:	7.8°S,122.3°E - Flores Sea
Depth (km)	:	076
Magnitude	:	7.6

EVALUATION

Hazardous tsunami waves are possible for coasts located within 1000 km of the earthquake epicenter.

This is for information purposes only and there is no tsunami threat to the Philippines from this earthquake.

RECOMMENDED ACTION

No action required.

Issued on: 14 Dec 2021 - 11:37:20 AM
Issued by: BR/ALTDS/KVCS

IMPORTANT This will be the only tsunami information issued unless additional information becomes available. Always refer to the latest tsunami information posted at the PHIVOLCS official website (https://www.phivolcs.dost.gov.ph/).

DOST-PHIVOLCS Information Materials

DOST-PHIVOLCS Information Materials are in the forms of flyers, pamphlets, leaflets, posters, comics, brochures, and scientific papers or proceedings which are available in either print or digital format. These materials contain general information on Philippine volcanoes, earthquakes, tsunamis and other related geologic processes. They also describe the hazards posed by these processes and how to reduce or even avoid the impacts of these hazards. Most print materials are free of charge except for some special publications.

DOST-PHIVOLCS Division in-charge of these information materials: Geologic Disaster Awareness and Preparedness Division (GDAPD)

Requesting for DOST-PHIVOLCS Information Materials:

For walk-in request for printed materials:

1. View and select from the list of printed materials available from the assigned GDAPD staff.
    - In times of public-health related emergencies such as a pandemic, call DOST-PHIVOLCS prior to visit to request printed materials.
2. Fill-out the request form for print materials and submit to the GDAPD staff.
3. Claim the printed materials.
4. Fill-out a Stakeholder Satisfaction form and submit.

For multiple (50 or more) copies of printed materials:

1. Letter of Request can be hand-carried, mailed, faxed, or emailed to (02) 8927-4524 or phivolcs_mail@phivolcs.dost.gov.ph
    - If hand-carried, submit the letter of request to the GDAPD staff.
    - In times of public-health related emergencies such as a pandemic, call DOST-PHIVOLCS prior to visit to request printed materials.
    - If the request was mailed or faxed, confirm by calling if the request was received by GDAPD and inquire when the request could be accommodated.
2. Fill-out the request form prior to the release of printed materials and submit to GDAPD assigned staff.
3. Claim the printed materials.
4. Fill-out a Stakeholder Satisfaction form and submit.

For a digital copy of materials:

1. Letter of Request can be mailed, faxed, hand-carried, or emailed to (02) 8927- 4524, phivolcs_mail@phivolcs.dost.gov.ph
    - If hand-carried, GDAPD staff will receive the letter of request.
    - If a request was mailed or faxed, confirm by calling if the request was received by GDAPD and if the request could be accommodated.
    - Stakeholders must receive acknowledgment of the letter to DOST-PHIVOLCS for the processing of the request.
2. Claim the requested information materials thru email or pick-up.
3. Fill-out a Stakeholder Satisfaction form and submit.

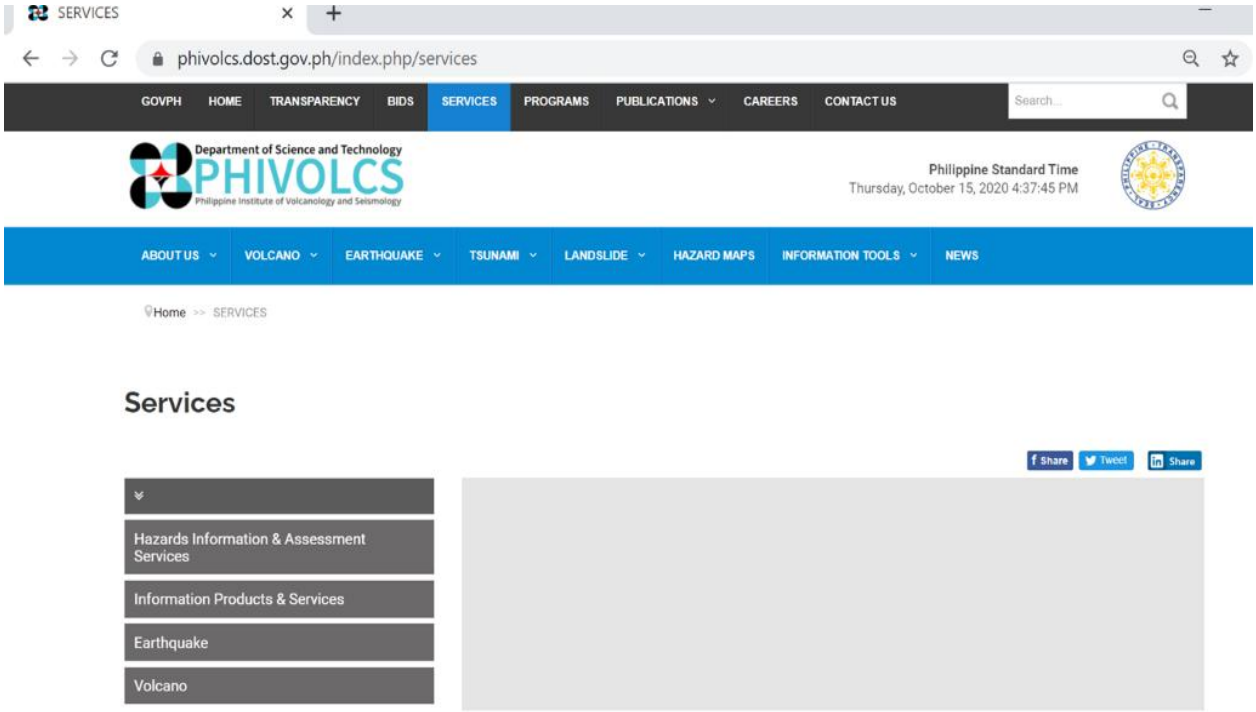
Module 2.2 DOST-PHIVOLCS Services

DOST-PHIVOLCS Services are:

- Volcano
- Earthquake
- Information Products and Services
- Hazards Information and Assessment Services

AVAILING OF DOST-PHIVOLCS SERVICES:

1. Visit DOST-PHIVOLCS website https://www.phivolcs.dost.gov.ph/.
2. Click on Services



Volcano Services

Catalogue: Volcano Information

This refers to volcanological data including processed geophysical, geodetic and geochemical data generated by the Volcano Monitoring and Eruption Prediction Division (VMEPD).

Certification: Volcano Current Status

This refers to a certification issued by DOST-PHIVOLCS upon request of any stakeholder. The certification states the current status of the volcano (Alert Level 0 or higher) and the hazards associated with it. This certification is issued upon request and is different from the VMEPD regularly-issued volcano bulletins or advisories.

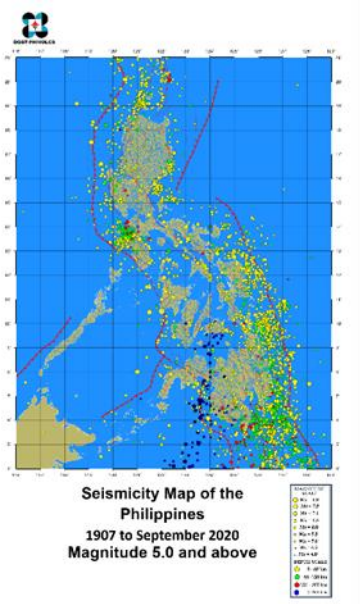
Earthquake Services

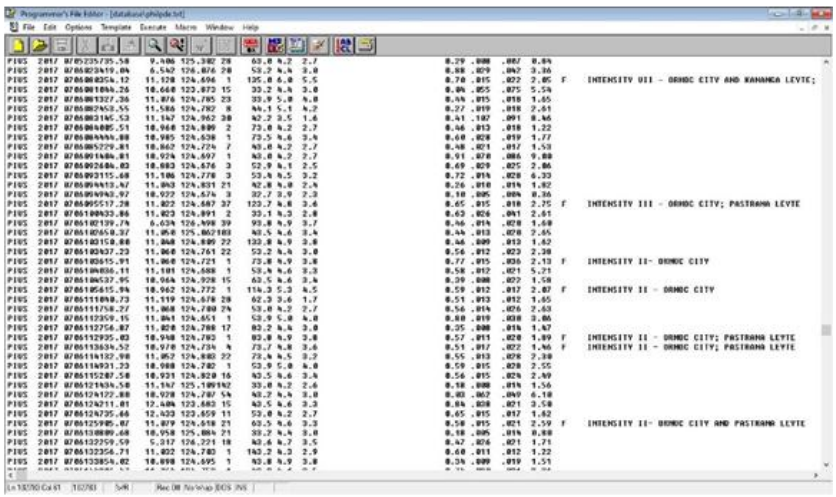
Hazard Maps (Probabilistic, deterministic and seismicity map)

Probabilistic Ground Shaking Hazard Map – depicts the associated earthquake ground motion (in units of g; g = acceleration of gravity); Applications: seismic provisions of building codes, insurance rates, risk assessment and other public policies.

Deterministic Ground Shaking Hazard Map – depicts the associated earthquake ground shaking hazard (in intensity or units of g; g = acceleration of gravity) as modeled using knowledge of the physical process of earthquake generation, level of seismic activity and wave propagation in the specified area.

Seismicity Map - plots of earthquake epicenters as circles on a map, with varying size and color indicating magnitude and depth; will only cover available data in a specified time and area in the Philippines.





Catalogue: Earthquake Data

Waveform Data – is a graphical representation of an earthquake signal as recorded by a seismograph or an accelerograph installed in any of the earthquake monitoring stations operated by DOST-PHIVOLCS. Digital data are provided unprocessed.

Earthquake Catalogue – is a list or tabulation of earthquake data, typically compiled or grouped because they share a common type, origin, means of detection, or method of discovery.

The Official DOST-PHIVOLCS Earthquake Catalogue consists of basic parameters **(date/time, latitude and longitude of the epicenter, depth, magnitude, and reported intensities, if any)** of earthquake events that have been recorded and processed by the seismic monitoring system in the Philippines.

Certification of Earthquake Occurrence

– this certification reflects earthquake information available in the records maintained by the Seismic and Tsunami Data Management Section of SOEPD; includes the date, time, location, depth, magnitude and reported intensities of an earthquake event.

Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY

13 September 2020

CERTIFICATION

To Whom It May Concern:

This is to certify the occurrence of an earthquake on 15 December 2019. Based on available data, the following are the details of the event:

Date of Occurrence:	15 December 2019
Time of Occurrence:	02:11 PM
Epicentral Location:	06.76°N, 125.13°E - 013 km N 75° W of Matanao (Davao Del Sur)
Origin:	Tectonic
Depth:	009 km
Magnitude:	Ms 6.9

Reported Intensities:

Intensity VII – Digos City; Bansalan, Hagonoy, Magsaysay, Matanao, Kiblawan, Padada, and Sta. Cruz, Davao del Sur

Intensity VI – General Santos City; Koronadal City; Kidapawan City; Malalag, and Sulop, Davao del Sur; Columbio, Sultan Kudarat; Malungon, Sarangani; Sta. Maria, Davao Occidental

Intensity V – Antipas, Arakan, Carmen, Magpet, Makilala, Matalam, M'lang, and Tulunan, Cotabato; Polomolok, Tampakan, and Tupi, South Cotabato; Davao City; Cotabato City; Alabel, Glan, and Malapatan, Sarangani; Lupon, Davao Oriental

Intensity IV – Banisilan, and Pikit, Cotabato; Isulan, Sultan Kudarat; Damulog, Don Carlos, Kadingilan, Kalilangan, Kitaotao, Pangantucan, and Talakag, Bukidnon; Lake Sebu, Norala, Surallah, and T'boli, South Cotabato; Kiamba, and Maasim, Sarangani; Governor Generoso, and San Isidro, Davao Oriental

Intensity III – Dangcagan, and Maramag, Bukidnon; Cagayan de Oro City; Gingoog City; Mati City; Tarragona, Davao Oriental

Intensity II – Aleosan, Cotabato; Impasug-ong, and Libona, Bukidnon; Tubod, Lanao del Norte; Dipolog City; Butuan City

Intensity I – Molave, Zamboanga del Norte

The reported intensities are based on the PHIVOLCS Earthquake Intensity Scale (PEIS) of I to X. At Intensity VII: Most people are frightened and run outdoors. People find it difficult to stand in upper floors. Heavy objects and furniture overturn or topple. Big church bells may ring. Old or poorly-built structures suffer considerably damage. Some well-built structures are slightly damaged. Some cracks may appear on dikes, fish ponds, road surface, or concrete hollow block walls. Limited liquefaction, lateral spreading and landslides are observed. Trees are shaken strongly. (Liquefaction is a process by which loose saturated sand lose strength during an earthquake and behave like liquid).

This certification is issued upon the request of for whatever purpose it may serve.

Other DOST-PHIVOLCS Information Products and Services

Outside Lecture Package

DOST-PHIVOLCS provides resource person(s) as lecturer, facilitator, observer or subject matter expert for interviews to requesting organizations. Standard lecture packages are basic information on volcanoes, earthquakes, tsunamis and other related geotectonic phenomena. A resource person may also provide lectures on specialized topics related to Geosciences and Disaster Risk Reduction. Facilitators or observers may also be requested to give technical inputs during volcano, earthquake or tsunami evacuation drills or exercises, subject to availability of personnel.

Requesting for Resource Persons:

1. Hand-carry, fax, or email to pivs_lectures@phivolcs.dost.gov.ph a letter of request. Letter of request must be received by DOST-PHIVOLCS at least two (2) weeks prior to the date of the activity.
    - Address all letters to DR. RENATO U. SOLIDUM, JR., OIC-PHIVOLCS.
    - Please state the following:
        - topic
        - number and type of participants
        - place, date and time of the lecture
        - contact person of requesting organization
        - contact landline/mobile number(s)
    - DOST-PHIVOLCS encourages 50% male and 50% female participation/ audience during lectures, drills and other related activities.
2. In times of public health-related emergencies such as a pandemic, call DOST-PHIVOLCS prior to the visit.
3. If the letter of request is sent by fax or email, the client must confirm with DOST-PHIVOLCS the receipt of their letter and possible schedule right after sending their communication.
4. Requesting organization should provide the following
    - Transportation of resource person from and back to DOST-PHIVOLCS Office;
    - Computer and LED/LCD projector;
    - Meals and accommodation if outside Metro Manila and requiring an overnight stay.
5. In times of public health-related emergencies such as a pandemic, lectures are conducted online.

Educational Tour Package

DOST-PHIVOLCS provides group tours (e.g., students, teachers, government employees) which include film showing and exhibit viewing. Film showing may be any of the following subjects: volcanoes, earthquakes or tsunamis. Technical personnel are available to answer questions after film showing or during exhibit viewing. Lectures for specific topics may be arranged upon request, subject to the availability of a resource speaker. In times of public health-related emergencies such as a pandemic, educational tours are conducted virtually.

Information Package: Duplication of Audio-Visual Materials and Digital Images

DOST-PHIVOLCS produces audio-visual materials and documentaries. These materials may be copied, with corresponding fees. The client may select from the list of documentaries found on DOST-PHIVOLCS website. Also available are digital photograph collections about volcanoes, earthquakes and tsunamis.

Information Package: Exhibit On-loan

Framed posters or mounted diagrams for public viewing are displayed at DOST-PHIVOLCS Main and field stations. These exhibits about volcanoes, earthquakes and tsunamis may be loaned to interested individuals or groups. A resource person to discuss the content of the exhibit may also be provided.

For exhibit loan requests from outside Metro Manila which may require a resource person, the request must be lodged 20 working days prior to the activity to give time to prepare the travel documents of the resource person.

Hazards Assessment Service: Earthquake and Volcanic Hazards Assessment Report

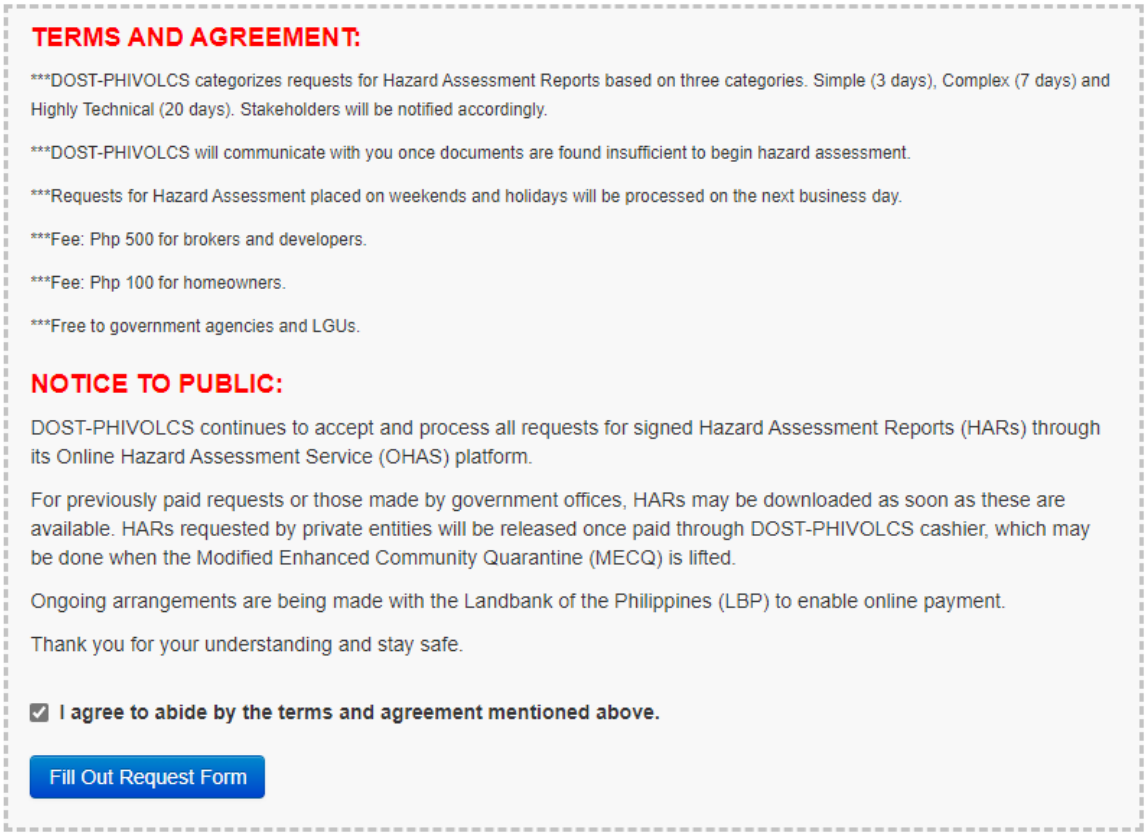
The DOST-PHIVOLCS' Hazard Assessment Service (HAS) assesses the presence of an earthquake and/or volcanic hazard in a particular parcel of land of interest to a stakeholder. The assessment is contained in a Hazard Assessment Report (HAR).

Hazard Assessment Report (HAR) – is a document that contains the hazard assessment for a particular parcel of land of interest to a stakeholder. All information in the report may be refined as new data become available.

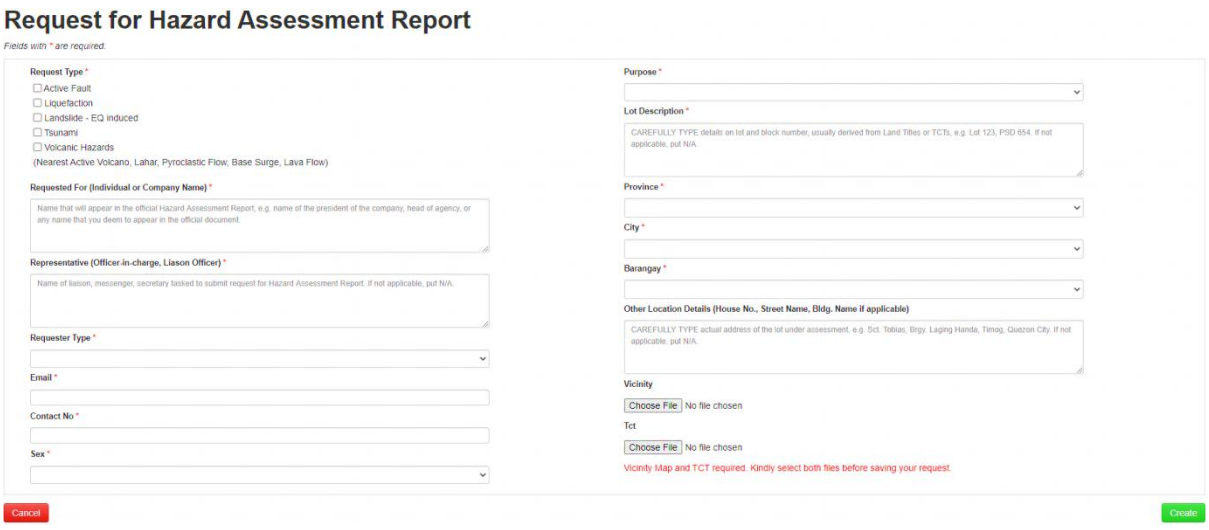
Requesting for Hazard Assessment Report

1. Access the Online Hazards Assessment Services at https://has.phivolcs.dost.gov.ph/

2. Tick 'I Agree' on the Terms and Agreement and Fill out the Request Form.



3. Answer all the required fields.



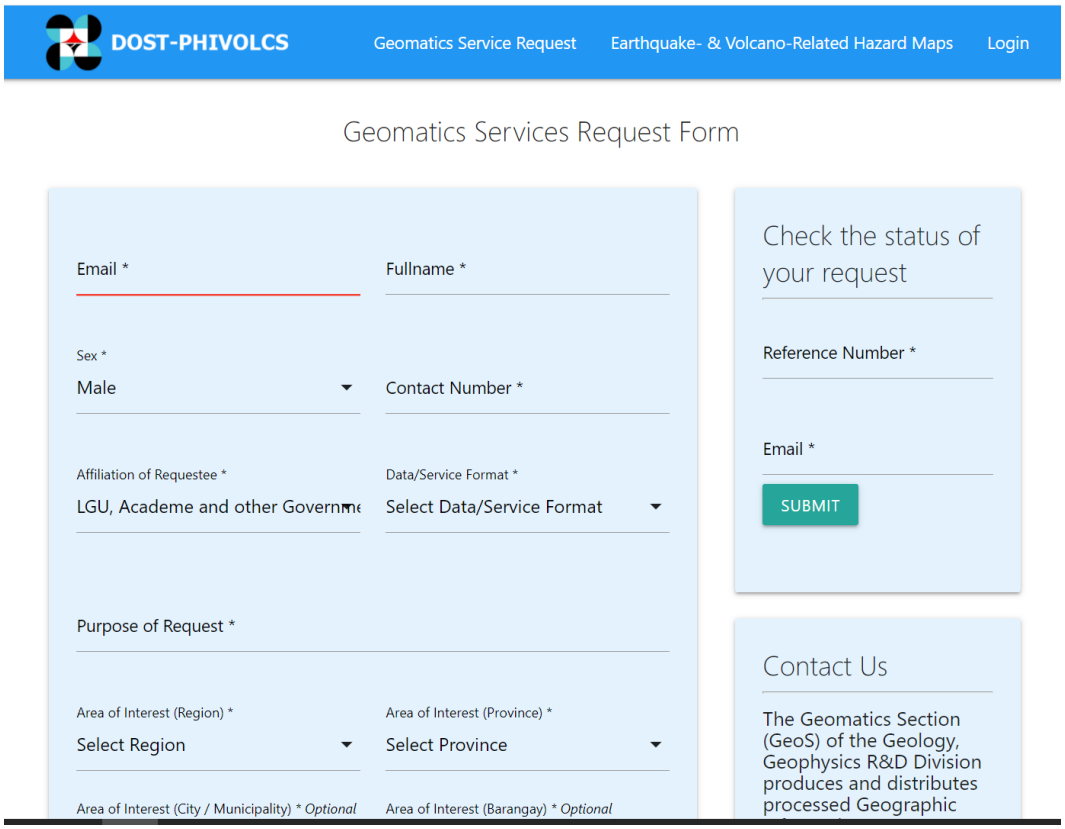
4. Finally, upload the Vicinity Map and TCT, and click 'Create'.

Geology- and Geomatics- related Information package

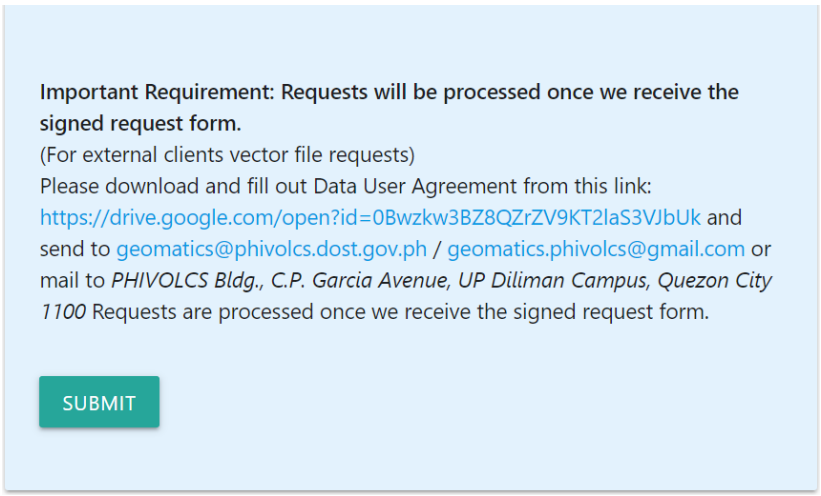
Hazard Information Package – refers to any set of information products pertaining to the earthquake- and volcano-related processes generated and produced by the Geology and Geophysics Research and Development Division (GGRDD), and which can be provided in the form of printed or digital maps, reports, or explained in letters and face-to-face consultation, among others.

Requesting for Web Map/Feature Services for reference purposes

1. Access the Geomatics GIS Web Portal at https://gisweb.phivolcs.dost.gov.ph/gisweb/geomatics-services-request



2. Fill out and submit the Geomatics Data and Services Form



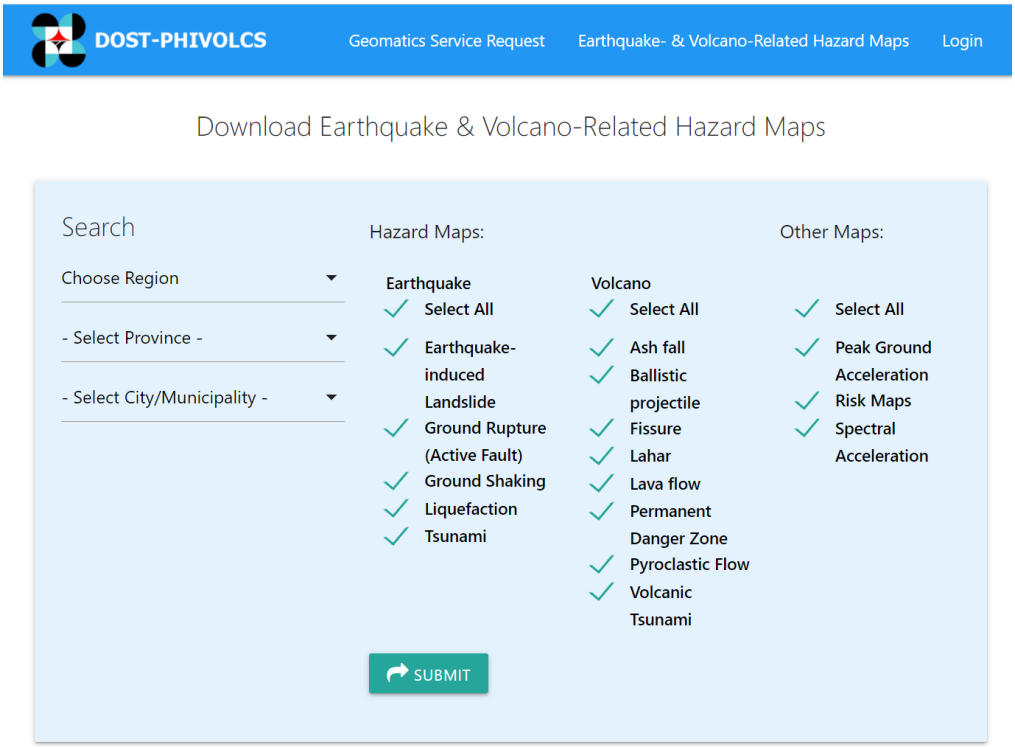
3. Fill out the Data User Agreement (DUA) [https://drive.google.com/file/d/0Bwzkw3BZ8QZrZV9KT2laS3VJbUk/view] or Memorandum of Understanding (MOU) attached in the automated reply email and send to geomatics@phivolcs.dost.gov.ph

4. Check email for Web Services link

5. Fill out and submit the Stakeholder Satisfaction Form. Click "Feedback" using this link: https://goo.gl/vUDtLR

Requesting for Earthquake and Volcanic Hazards Map Layouts

1. Access the Geomatics GIS Web Portal at https://gisweb.phivolcs.dost.gov.ph/gisweb/earthquake-volcano-related-hazard-gis-information or at https://hazardhunter.georisk.gov.ph



2. Select area to sort (from National to Municipal level)
3. Select hazard/s
4. Click Submit and wait for results to appear
5. Click thumbnails to download hazard maps

Requesting for information not available at DOST-PHIVOLCS' online hazard assessment platforms:

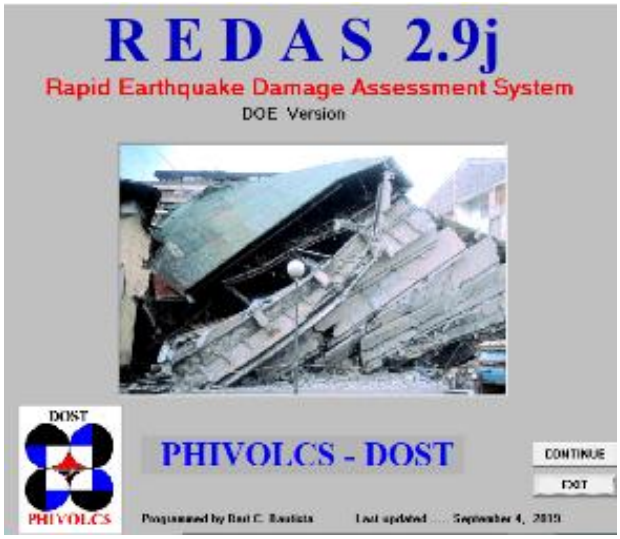
Email a letter request to od@phivolcs.dost.gov.ph or ggrdd.mail@phivolcs.dost.gov.ph. All letters of request should be addressed to DOST Undersecretary and PHIVOLCS Officer-In-Charge Renato U. Solidum, Jr.

Module 2.3 DOST-PHIVOLCS-developed Information Tools

DOST-PHIVOLCS-developed Information Tools are innovations developed by the Institute which can be used by clients for their DRRM and other-related plans.

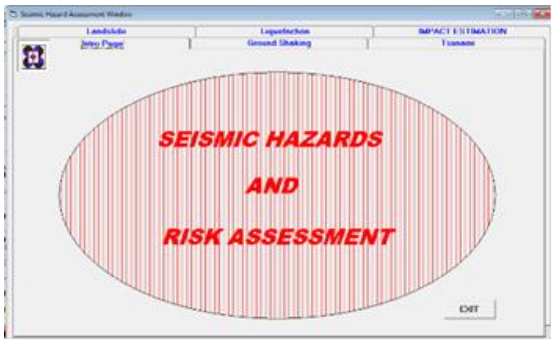
Some DOST-PHIVOLCS-developed information tools are described below, and details on accessing the tools can be found and can be accessed at DOST-PHIVOLCS website https://www.phivolcs.dost.gov.ph/.

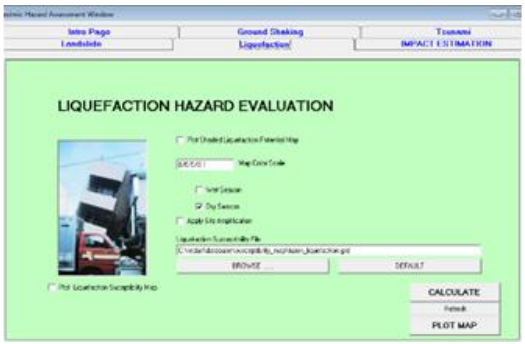
Rapid Earthquake Damage Assessment System (REDAS)

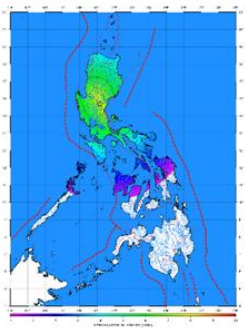


REDAS (Rapid Earthquake Damage Assessment System) is a software developed by DOST-PHIVOLCS in 2002 under a DOST-GIA Project. The software can simulate earthquake hazards such as ground shaking, liquefaction, landslides and tsunamis. The software can also compute earthquake impacts in terms of physical damage, casualties and economic losses. Although REDAS was originally conceived for use in earthquake hazard and impact assessments, other multi-hazard maps including hydrometeorological hazards such as floods, storm surges and rain-induced landslides are already incorporated into the software and can likewise be displayed by users. Participants are also taught how to develop their own exposure database using an android application. **REDAS is now being shared with local government units as a tool for emergency preparedness, contingency planning and more importantly for mainstreaming disaster risk reduction into the local development planning process.**

Succeeding images are some of the REDAS Modules and sample output of Ground Shaking hazard:







Impact assessment modules namely SWIFT and FLOAT, which PHIVOLCS co-developed with PAGASA and MGB, are built-in in REDAS.

SWIFT (Severe Wind Impact Forecasting Tool) deals with impact estimation from severe wind hazards. FLOAT (Flood Loss Assessment Tool) module deals with losses from floods.

TsuSIM (Tsunami Simulation and Impact Assessment Module) which can estimate tsunami impacts.

CropDAT (Crop Damage Assessment Tool) which can estimate agricultural damages due to severe wind and flood hazards.

REDAS also has a module on **Earthquake and Tsunami Alerting Module (ETAM)** where users can obtain earthquake information in near-real time. ETAM is especially useful for those with Operations Centers. Another android application is the **Tool for Seismic Intensity Reporting (ToSIR)** where anyone can report intensity reports to DOST-PHIVOLCS as they feel it. The data allows DOST-PHIVOLCS to verify ground shaking simulation results.

Several provinces, cities/municipalities, state universities and colleges (SUCs), private companies, non-governmental organizations and government institutions had been trained on the use of the REDAS software. The software and training are free. Interested parties need to enter into a Memorandum of Agreement with PHIVOLCS to avail of the software and training.

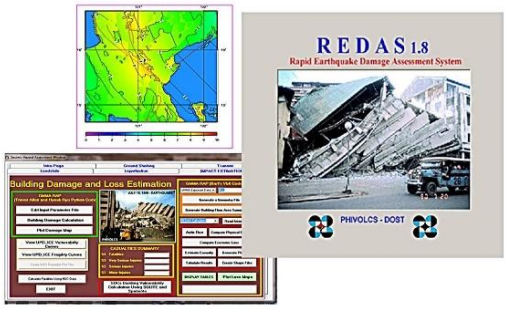
REDAS

Rapid **E**arthquake **D**amage **A**ssessment **S**ystem **Software**

REDAS (Rapid Earthquake Damage Assessment System) is a hazard and risk simulation software that aims to produce hazard and risk maps immediately after the occurrence of a strong and potentially damaging earthquake. REDAS was conceived after PHIVOLCS' and the nation's experience after the Mag7.8 earthquake.The July 1990 event caused large number of fatalities, severe damages to buildings and facilities, and loss of billions of pesos. A lesson learned from this large-magnitude earthquake is the need to establish a system that can give rapid estimate of the possible seismic hazards and the severity of the impacts to population, buildings, lifelines, road networks and other elements-at- risks.

REDAS at present has three main components:

1. PRODUCES SEISMIC HAZARD MAPS
   - Ground Shaking
   - Liquefaction
   - Earthquake-Induced Landslides
   - Tsunamis
2. BUILDS EXPOSURE DATABASE
   Population, buildings, bridges, lifelines, critical facilities, hospitals, fire stations, etc.
3. COMPUTES EARTHQUAKE RISK
   - Physical damage
   - Economic loss
   - Fatalities



OBJECTIVES:

- To provide a free software that can give rapid estimate of the possible seismic hazards and the severity of the impacts to population, buildings, lifelines, road networks and other elements-at- risks.
- To have a deeper understanding and appreciation of the earthquake hazards and risks.
- To equip local officials and planners with a tool they can easily manipulate and has important features designed for their local needs and which they can use for making prompt decisions for quick deployment of rescue and relief operations.

TRAINING PROGRAM:

DAY 1
- Registration
- Opening Ceremony
- REDAS Installation
- Installation of Exposure Database Module (EDM)
- Installation of SQLite and Quantum GIS

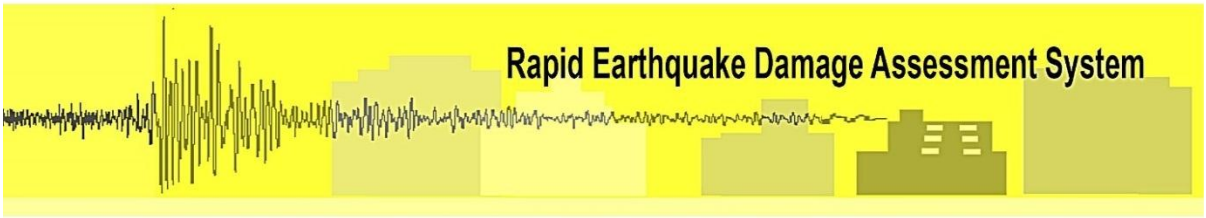
DAY 2
- Introduction to PHIVOLCS
- Learning Basic REDAS Features
- Annotating Maps using REDAS
- SQLite as Relational and Spatial Database System (Part I-III)
- Earthquake and Tsunami Alerting Tool

DAY 3
- Volcanic Hazards
- Earthquake Hazards
- Hydrometeorological Hazards
- SQLite as Relational and Spatial Database System (Part IV)
- Plotting basemaps and Administrative Boundaries
- Selecting Administrative Boundaries
- Plotting Multi-Hazard maps
- Digitizing Line and Polygons using REDAS
- Map Georeferencing and Digitizing in QGIS
- How to Prepare Downloadable Maps for Digitizing and EDM Module

DAY 4
- Introduction to GPS
- Earthquake Catalogue and Seismicity Maps
- Seismic Hazard Assessment
- Mainstreaming Hazard Assessment Into Disaster Risk Reduction
- REDAS as Risk Assessment Tool
- Introduction to Field Survey Using Geotagged Video Capture Tool
- Building Typology and Vulnerability Curves
- Exposure Database Module (EDM)
- Workshop: Template 1 (Mainstreaming Hazard Assessment Into Land Use Planning)
- Earthquake Risk Assessment Methodology

DAY 5
- Fieldwork on Exposure Database Survey
- Uploading GPS track Data to REDAS
- Building Capture Exercise
- Uploading Building Photos
- Plotting Point
- Building Risk Database

DAY 6
- Backing Up and Restoring EDM Data
- Data Management of EDM Data
- Discussion of Workshop Template 1
- Starting to use REDAS at my Office
- Closing Ceremony / Awarding of Certificates



BENEFITS

At the end of the training the participant would have accomplished the following:

- Knowledge on Hazards
- Basic features of REDAS
- Display of multi-hazard maps
- Map reading
- Seismic Hazard Assessment
- Risk database building
- How to use GPS for mapping risk elements
- How to digitize maps for risk mapping
- Mainstreaming Hazard Assessment into Land Use Planning

PARTICIPANTS

The target users of the software are Civil Defense Officials, Disaster Managers, local government officials, policy makers and planners, rescue and medical groups, and news media.

TRAINING REQUIREMENTS

REDAS is a six-day live-in training. One computer per participant (preferably dedicated for REDAS use), GPS and signed Memorandum of Agreement (MOA) between PHIVOLCS and requesting LGU.

Minimum Computer Requirements:

- at least Pentium IV
- 1.6 Ghz, 1 GB ram
- 10 GB free hard disk space
- With Administrative level
- Virus free computer

TRAINING FEE

There is no training fee for the course. Participants shoulder their own food and accommodation.

MEDIUM OF INSTRUCTION

The medium of instruction is English and Filipino.

ASSESSMENT AND CERTIFICATION

Participants will receive either Certificate of Completion or Certificate of Attendance.

RESOURCE PERSONS

Experts from PHIVOLCS will be the main resource persons and facilitators during the training. Guest speakers from PAGASA and MGB are also invited when availabe.

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

MISSION

We provide timely and quality information and services for warning, disaster preparedness and mitigation. This we do through the development and application of technologies for the monitoring and accurate prediction of and determination of areas prone to volcanic eruptions, earthquakes, tsunamis and other related hazards, and capacity enhancement for comprehensive disaster risk reduction.

Societal Outcome: Communities have achieved resilience to volcanic eruptions, earthquakes, tsunamis, and other related hazards.

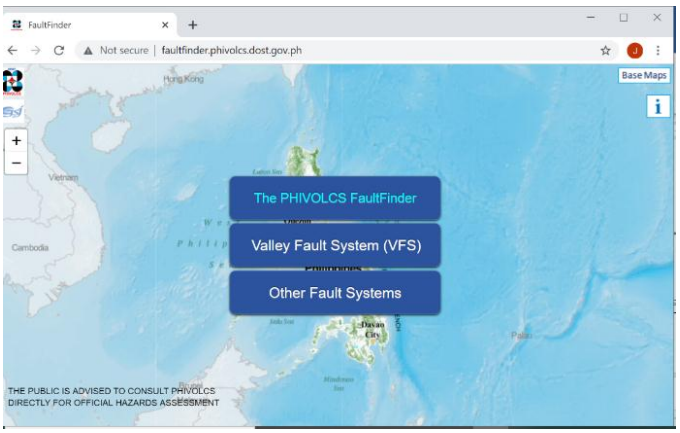
CONTACT US:

PHIVOLCS Building, C.P. Garcia Avenue
UP Campus, Diliman, Quezon City
Website: http://www.phivolcs.dost.gov.ph
/phivolcs_dost
Philippine Institute of Volcanology and Seismology(PHIVOLCS-DOST)

DOST-PHIVOLCS FaultFinder

The DOST-PHIVOLCS FaultFinder is an application capable of doing proximity-to- active faults searches. It may be used to determine the location of active faults in an area and to measure the shortest distance between an active fault and a user's current location using the gadget's tracking device. It may also be used to measure the shortest distance between an active fault and a specific site, which is identified by a user.

It is accessible through this link: https://faultfinder.phivolcs.dost.gov.ph/. It can also be downloaded in the PlayStore for Android phones.



Accessing FaultFinder

1. Visit https://faultfinder.phivolcs.dost.gov.ph

2. Click on Valley Fault System if your area is Metro Manila OR

   Click Other Fault System for other areas in the Philippines

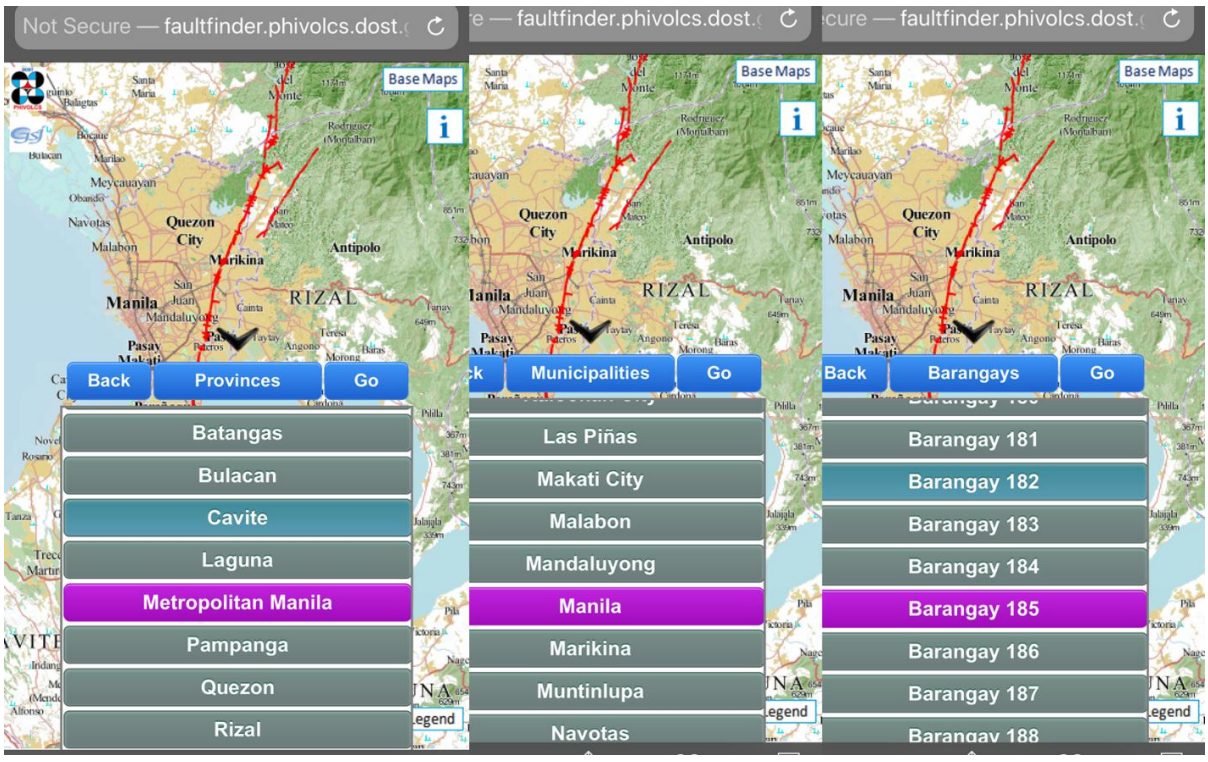
3. Read Disclaimer and Click Agree

4. A Philippine map will appear. Click Active Fault Based on Location

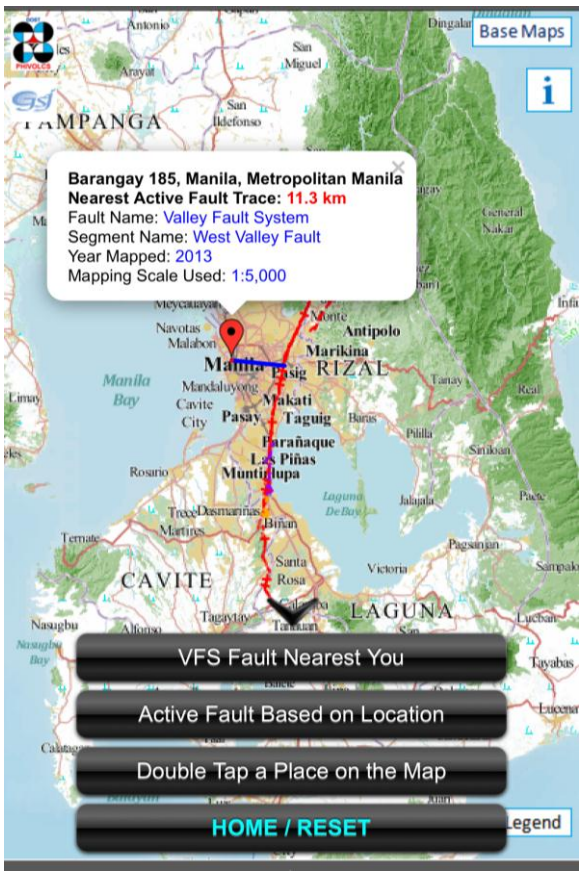
5. List of Provinces will appear – click on a Province

6. List of Cities and Municipalities of the chosen Province will appear – Click on a City or Municipality.

7. List of Barangays will appear, - Click on a Barangay.

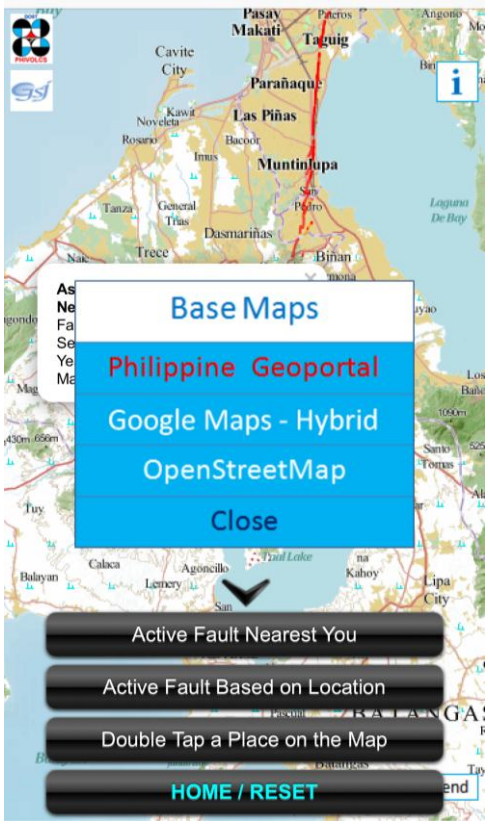


A map showing the distance of an active fault to the selected Barangay will appear.



Other features of Faultfinder:

1. Three (3) base maps are available to choose from:
   - Philippine Geoportal
   - Google maps
   - OpenStreetMap
2. You can also click on a specific area (e.g., your house) and it will also give you the distance to the nearest active fault.

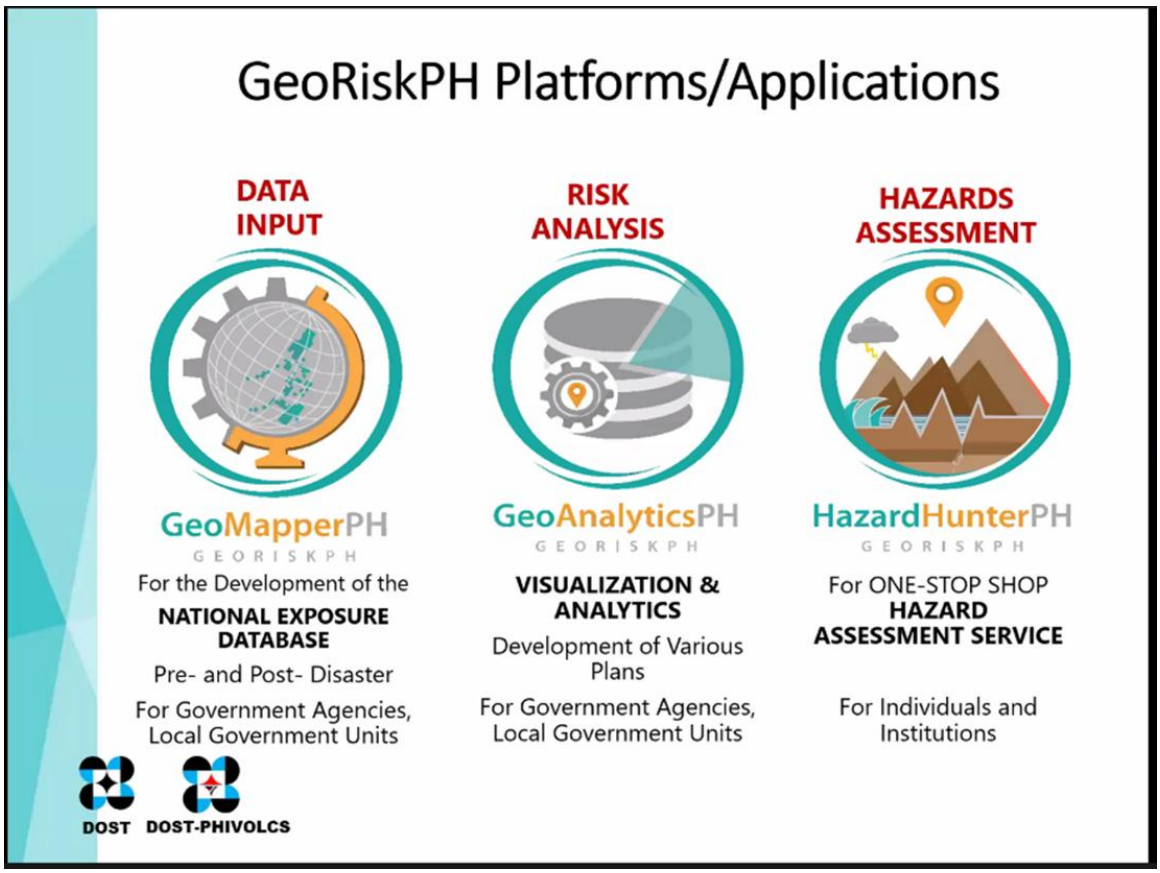


GeoRiskPH or Geospatial Information Management and Analysis Project for Hazards and Risk Assessment in the Philippines

GeoRisk Philippines is a multi-agency initiative led by the Philippine Institute of Volcanology and Seismology (PHIVOLCS), funded by the Department of Science and Technology (DOST) and monitored by the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD).

Its vision is to be the Philippines' central source of information for accurate and efficient hazards and risk assessment to help the government increase the nation's resilience to natural hazards. It aims to provide protocols and platforms to share hazards, exposure and risk information to help people, communities, local governments, and national agencies prepare and plan how to reduce the risks for natural hazards.

GeoRiskPH Platforms



GeoMapperPH is for the development of the National Exposure Database. It enables collections of hazard and exposure information. Target users are government agencies and local government units.

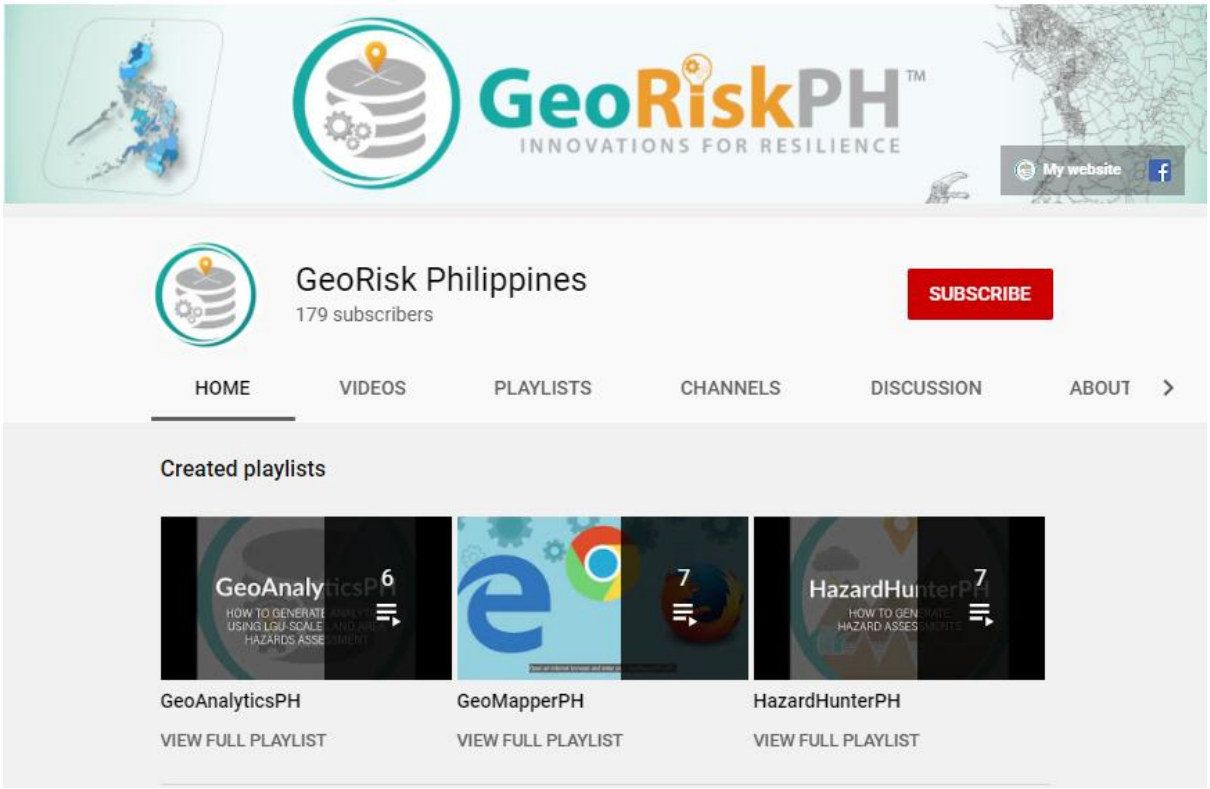
GeoAnalyticsPH is for visualization and analytics. This is useful for the development of various plans. Target users are government agencies and local government units.

HazardHunterPH is a one-stop shop Hazard Assessment Service. Target users are individuals and institutions.

GeoRiskPH Instructional Videos

For step-by-step procedures on how to use the three GeoRiskPH tools, visit the GeoRiskPH YouTube channel at https://www.youtube.com/channel/UCvI_AOVI0m4cfZesMFYCZWA.

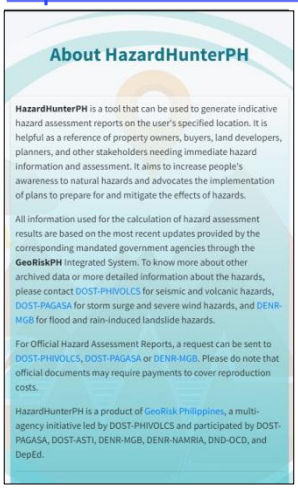
Select from any of the following playlists: GeoAnalyticsPH, GeoMapperPH, HazardHunterPH (as shown in the photo below). Click on your topic of interest and a collection of videos will be loaded showing how to use your tool of choice.



HOW TO USE HAZARDHUNTERPH

A quick tour of HazardHunterPH is shown below:

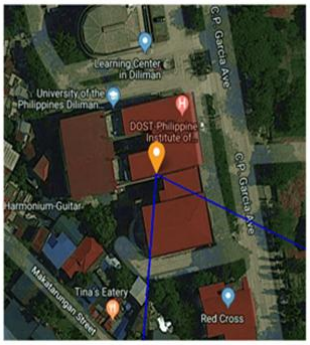
https://hazardhunter.georisk.gov.ph



- is a tool that can be used to **generate indicative hazard assessment reports** on the user's specified location.
- it is a helpful reference of stakeholders needing immediate **hazard information and assessment.**
- it aims to **increase people's awareness to natural hazards** and advocates the implementation of plans to **prepare for and mitigate the effects of hazards.**

1. Open on your browser: https://hazardhunter.georisk.gov.ph

How to use



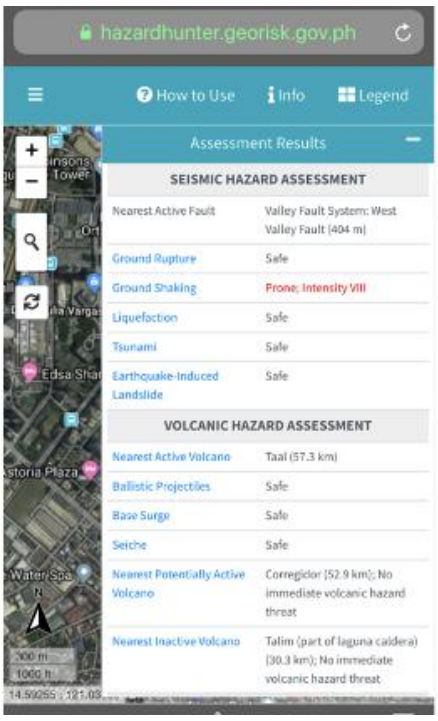
DOUBLE-CLICK/ TAP ON MAP TO CHOOSE LOCATION

INITIAL HAZARD ASSESSMENT WILL APPEAR ON THE SCREEN

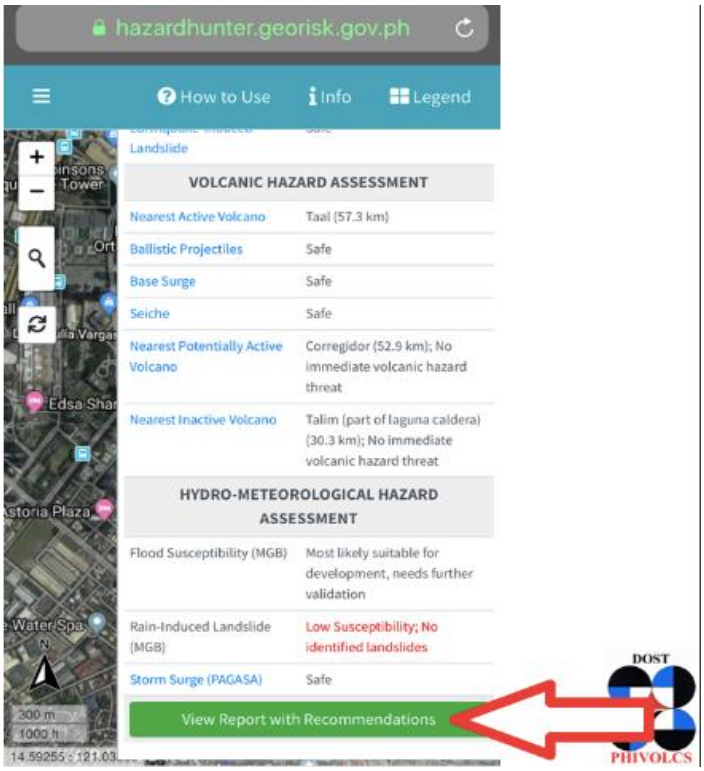
SELECT EXPLANATIONS AND RECOMMENDATIONS LINK TO SEE FULL REPORT

2. Double-click or tap on the map to choose a location.

3. Click on “See Result”, initial hazard assessment will appear on the screen. Scroll down to see initial hazard assessment.



4. Click on “View Report with Recommendations.” Explanations and Recommendations will appear on the screen.




PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY

DATE 18 July 2019
COORDINATES 14.57964 , 121.06513

SEISMIC HAZARDS ASSESSMENT

GROUND RUPTURE	LIQUEFACTION	EARTHQUAKE-INDUCED LANDSLIDE	TSUNAMI
Safe; Approximately 404 m from the Valley Fault System	Safe	Safe	Safe

EXPLANATION AND RECOMMENDATION

- ✓ All hazard assessments are based on the available susceptibility maps and the coordinates of the user's selected location.
- ✓ Ground rupture hazard assessment is the distance to the nearest known active fault in the area. The recommended buffer zone, or Zone of Avoidance, against ground rupture hazard is at least 5 meters on both sides of the active fault or from its zone of deformation.
- ✓ Fissure, with its related ground subsidence, may not be a potential source of earthquake. However, fissures and ground subsidence may develop further if the condition that generated them continued to persist, or as a response to strong ground shaking. The recommended buffer zone, or Zone of Avoidance, against fissuring is at least 5 meters on both sides of the fissure.
- ✓ All sites may be affected by ground shaking in the event of an earthquake.
- ✓ Ground shaking and liquefaction hazards can be mitigated by following the provisions of the National Building Code and the Structural Code of the Philippines.
- ✓ Avoidance is recommended for sites with earthquake-induced landslide hazard unless appropriate engineering interventions are in place.
- ✓ Tsunami threat to people's lives can be addressed by community preparedness and a tsunami evacuation plan. Advice for tsunami evacuation comes from public agencies and the local government. But more importantly, coastal communities must learn to evacuate themselves when they recognize the three natural signs of tsunami, which are 1) strong ground shaking, 2) unusual rise or fall of sea level, and 3) strong or unusual sound coming from the sea.

This report was generated through GeoRisk Philippines' HazardHunterPH app. This report is not for sale. To obtain an official document for legal purposes, or for the assessment of critical facilities and areas within ground rupture buffer zones, request for an Official Hazard Assessment Report from the Philippine Institute of Volcanology and Seismology (PHIVOLCS) by visiting https://hazhunter.phivolcs.dost.gov.ph.

DOST-PHIVOLCS Official Social Media Sites:

Facebook: /PHIVOLCS

Twitter: @phivolcs_dost

https://www.youtube.com/DOSTPHIVOLCSOfficial

Learning activity:

1. Locate your City/Municipality/Province

2. Identify if your City/Municipality/Province is prone or not prone to the following hazards

Hazard	Please check if your municipality is prone	Possible impacts or impacts experienced
Ground rupture		
Ground shaking		
Liquefaction		
Earthquake-induced landslide		
Tsunami		
Volcanic hazards		

MODULE 3. COMMUNITY AND FAMILY PREPAREDNESS

This module provides key information and actions on community and family preparedness using DOST-PHIVOLCS information materials.

Module 3.1 Community Preparedness

Module objectives:

At the end of this module, you will be able to

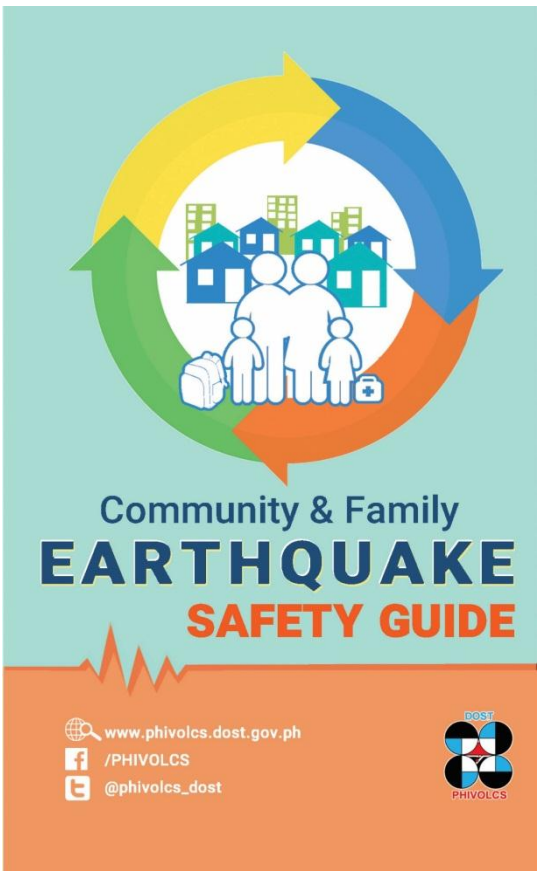
- acquire knowledge and understanding on how to prepare your community from different geologic hazards;
- describe key information/action on community preparedness;
- classify approaches on how to prepare a community from volcano, earthquake, and tsunami hazards;
- identify appropriate approach/es for the community.

Learning resources:

1. Community and Family Earthquake Safety Guide flyer
2. Volcano Alert Levels
3. Developing a Tsunami Prepared Community flyer

Discussion:

Module 3.1.1



1 PLAN

a. Form a Disaster Risk Reduction and Management Committee (DRRMC) or if already existing, or if already existing, update it

b. Conduct community data gathering such as

c. Conduct community watching exercise

- Assess the strength of the houses or buildings. For Concrete Hollow Block (CHB) Masonry Houses, use the DOST-PHIVOLCS "How Safe is my House?" tool for earthquake safety.
- Identify safe and unsafe areas within the community.

	INSIDE	OUTSIDE
Good and Safe areas	Ramp Wide corridors Visible emergency exits	Open spaces for evacuation Public alarm system Wide pathways
Unsafe areas	Glass windows and panes Shelves, machineries, appliances and furniture that may topple or fall Narrow corridors with obstructions	Powerlines, posts, concrete structures, trees, bridges, overpass or flyovers Narrow alleys Steep slopes or landslide prone and/ or tsunami prone areas

d. Conduct inventory of available resources and facilities that can be utilized during emergencies.

e. Make provisions for persons with disabilities, elderly, children, and pregnant women e.g. accessible pathways, assign marshal/s

2 DEVELOP COMMUNITY EARTHQUAKE EVACUATION PLAN

a. Identify hazards present in your area using the available hazards maps

- Establish warning system and put-up signage.

b. Evacuation area

- Assess safety of all available open spaces for evacuation sites.

For Tsunami, identify high grounds.

- Consider the number of occupants per house or building **(daytime and nighttime)**, designate a specific open space **for everyone.**

- Determine and ensure there is sufficient open space for all.

c. Formulate building and community evacuation procedures

- Identify and mark all possible emergency exits in the building and pathways going to evacuation area.

- Set a buffer zone from the house or building.
- Map the fastest and safest way out going to designated evacuation area.

- Prepare an evacuation procedure or plan, including a back-up or contingency plan.

3 CONDUCT ORIENTATION ON EARTHQUAKE PREPAREDNESS AND EARTHQUAKE DRILL

3.1 Preparations prior to the earthquake drill

a. Organize lecture about earthquake and its hazards, and how to protect one's self.

If OUTDOORS ..

- *move to an open space*
- *stay away from trees, powerlines, posts, buildings, and walls*
- *move away from steep slopes*

b. Introduce the evacuation plan and routes going to the identified evacuation areas. Post the evacuation map in visible places.

c. Regularly check available warning devices such as alarm systems and sirens.

d. Assign building marshals to be in-charge of ensuring that exit points are open during shaking.

e. Assign marshals who will manage the traffic; and assist the persons with disabilities, elderly, children and pregnant women.

f. Announce the drill schedule and ensure maximum community participation.

g. Assign observers and evaluators who will give comments/suggestions during post-drill evaluation.

3.2 Conduct of Earthquake Drill	
1 EARTHQUAKE	1-minute alarm indicates earthquake or shaking.
2 RESPONSE	While the alarm is ongoing - **"DUCK, COVER and HOLD".** Remain in this position until the shaking stops.
3 EVACUATION	As soon as the shaking stops, immediately evacuate and proceed to identified evacuation areas using the pre-determined routes. If inside a building, take the safest and fastest way out. Be prepared for aftershocks. If you need to leave, post a message stating when you left and where you can be located.
4 ASSEMBLY	At the designated evacuation area, residents must be grouped per household.
5 HEAD COUNT	Leaders/head of the family should check and make sure that all members are accounted for.
6 ASSESS AND ADDRESS EFFECTS	Leaders/head of the family should: ■ check others for injuries ■ check gas, electrical, and water lines for damage ■ check spills of chemical, toxic and flammable materials ■ put out small fires which may spread ■ check the house or building for cracks and damage
7 EVALUATION OF DRILL	Over-all coordinator will announce the termination of drill or "All clear". (Must be applied to offices and community)

How to Prepare Your FAMILY for Earthquake?

1. **Check the location of your house** if along or near an active fault, prone to landslide, liquefaction and tsunami.

2. **Assess your house using the "How Safe is my House?"** - tool for self-check for earthquake safety

3. **Orient family members** about earthquake and its hazards.

4. **Teach each member** on what to do before, during and after an earthquake

   e.g during earthquake **"DUCK (DROP), COVER, and HOLD"**

5. **Conduct observation on safe and unsafe spots in your house.** Have your family member identify each.

6. **Prepare family emergency supply kit.**

7. **Prepare family evacuation procedure.**

8. **Participate in community-wide earthquake preparedness planning and drills.** Regularly practice the evacuation procedure with your family members.

9. **Teach your family** basic **first aid**, how to use the **fire extinguisher**, and switching off **waterlines**, **gas tanks**, and **circuit breaker.**

10. **Agree on how to reunite with family members and plan to communicate.**

- ✔ Be aware of location of family members and places they frequent.
- ✔ Agree on a safe meeting place and how to get there.

- ✔ Designate a relative or friend outside your area as your contact person.
- ✔ If you have children, inquire with the school administrators about their policies or guidelines during earthquakes.

- ✔ Know where the school-designated evacuation area is.

Module 3.1.2 Volcano Alert Levels:

The Volcano Alert Levels which range from zero (0) to five (5), are used to guide the public and other stakeholders on the current status of each monitored volcano. As each monitored volcano has its own characteristics, recommended action plans are also different for each community located in the proximity of each active volcano.

Users of this Guidebook are advised to also check the DOST-PHIVOLCS official website for the updated or newer version of Volcano Alert Levels.

Example of Volcano Alert Level

Pinatubo Volcano Alert Levels (Source: DOST-PHIVOLCS)

Alert Level	Monitoring Criteria	Interpretation	Recommendations
0 NORMAL	Background parameters: VT earthquake typically <5/day; Crater lake CO2 flux <1000 tonnes/day	Quiescence; no eruption in foreseeable future	Continued vigilance and community preparedness.
1 LOW-LEVEL UNREST	Abnormal parameters: VT earthquake clusters along regional faults or lineaments or within the hydrothermal system; changes in the fumarolic activity in the crater; increased crater lake CO2 flux and CO2/H2S ratio changes.	Local tectonic or hydrothermal activity; no eruption imminent.	Extreme caution when venturing into the Pinatubo Crater recommended.
2 INCREASING UNREST	Increasing changes in parameters: increased and shallowing VT earthquake clusters, shallow sporadic low-level tremor with long-period (LP) or low frequency (LF) events, DLPs (deep long period) events at sub-crustal depths; continued increases in crater lake CO2 flux and CO2/H2S ratios, significant SO2 emission may be detected; increased fumarolic activity with discrete weak phreatic eruptions; ground deformation detected by satellite systems.	Probable deep-seated magmatic intrusion and/or increased hydrothermal activity; could eventually lead to an eruption.	No entry into Pinatubo Crater; Preparation of communities in case of escalation of unrest.
3 INTENSIFIED UNREST	Intensifying changes in parameters: VT/high frequency earthquake clusters or swarms within shallow depths of the edifice, increase in the intensity and duration of LP/LF events, DLP clusters at lower crustal depths; sustained or increasing SO2 emission, increased phreatic activity with explosion-type earthquakes or tremor episodes; accelerating ground deformation with possible emplacement of a summit dome.	Certain magmatic intrusion into the shallow magma system or summit region with increased likelihood of an eruption. Precursory eruptive activity as hydrothermal system is disrupted. Lava dome extrusion may occur.	Evacuation of upland communities up to 10 kilometers from the crater
4 HAZARDOUS ERUPTION IMMINENT	Accelerating changes or abrupt decline in parameters: strong VT / high-frequency earthquakes within a few kilometers-depth of the edifice with felt intensities, episodic swarms of hybrid or LP earthquakes, episodic tremor with continuous ash emission, sustained and intensifying volcanic tremor, episodic explosion earthquakes with explosive activity; increasing RSAM, increasing incidence and sizes of volcanic earthquakes; successive explosions with pronounced eruption columns and small-volume pyroclastic density currents (PDCs); intense ground deformation or bulging of the summit region; abrupt increase or drop in SO2/volcanic gas flux.	Phreatomagmatic or preclimactic Magmatic eruption; If magma ascent rates increase, highly explosive eruption probable within hours to a few days; if magma ascent rates decrease, prolonged lava dome extrusion may occur.	Evacuation of communities within pre-determined hazard zones for PDCs, heavy ashfall and syn-eruption lahars.
5 HAZARDOUS ERUPTION ONGOING	Highly explosive magmatic eruption in progress; explosion-type earthquakes or large-amplitude volcanic tremor; successive or sustained explosions with eruption column and pronounced umbrella cloud that could exceed 20 kilometer-heights above the crater; extensive PDCs emplaced around the edifice; widespread ashfall; syn-eruption lahars.	Climactic Subplinian to Plinian eruption; Volcanic hazards within a 30- kilometer radius of the crater and ashfall hazards downwind of the eruption plume.	Evacuation of additional communities, downwind of the eruption plume, along major river systems and in buffer extensions of hazard zones.

STAND-DOWN PROCEDURES

Alert levels will be maintained for the following periods AFTER activity decreases to the next lower level:

From Level 5 to Level 4: **Wait 12 hours after level 5 activity stops**
From Level 4 to Level 3 or 2: **Wait 2 weeks after activity drops below level 4**
From Level 3 to Level 2: **Wait 2 weeks after activity drops below level 3**

Revised: 21 June 2021

Note: Users of this guidebook are advised to also check the DOST-PHIVOLCS official website for the updated or newer version of Volcano Alert Level Scheme.

Initial checklist that a community can answer to gauge its level of tsunami preparedness:

1. Do members of your community know the basic information about earthquakes and tsunamis?	
2. Does your community have organized efforts based on: 2.1 community needs? 2.2 resources immediately available to help?	
3. Does your community have hazard maps to guide in your preparedness efforts?	
4. Does your community have evacuation maps and plan to guide in preparedness efforts?	
5. Are the members of the community involved in tsunami preparedness in order to: 5.1 educate everyone about the evacuation scheme? 5.2 inform everyone with things they can do to increase community safety?	
6. Does your community conduct tsunami drills?	
7. Is there an established community-based tsunami warning system?	
8. Is there a long-term development plan wherein tsunami risk reduction measures are incorporated?	
9. Is there a plan on how to sustain the efforts in the long-term?	

How to develop a tsunami-prepared community?

1. Increase awareness of basic tsunami information.

2. Tsunami hazard and risk mapping (you may also use the hazards maps provided in HazardHunterPH and GeoAnalyticsPH).

    2.1 Acquire a tsunami hazard map and know the worst-case scenario in your area.
    2.2 Identify areas to be affected.
    2.3 Identify elements at risk to tsunami hazard.

3. Tsunami evacuation planning

    3.1 Tsunami evacuation map – shows areas identified as safe and areas that are within the hazard zone. The following are essential information provided in the map:

- Areas threatened by tsunami inundation;
- Location of designated safe areas where people should gather in case of tsunami;
- Recommended routes to the safe area for people to follow which are normally indicated as arrows;
- Other significant information such as landmarks for people to identify location.

3.2 Designing a tsunami evacuation map

Step 1: Acquire a tsunami hazard map

Acquire detailed community map
- update the community map (road systems, elements-at-risk)
- determine the population to evacuate

Step 2: Identify safe evacuation areas

- site is outside identified tsunami hazard zone
- site can be reached by foot within the shortest possible time
- total area of the site can hold the community to be evacuated
- site can be easily identified

Step 3: Recommend evacuation routes

- safest, shortest/fastest
- wide streets
- if possible, no bridges
- away from other hazards
- limited overhead power lines and similar hazards
- “walk along routes” to check ground condition

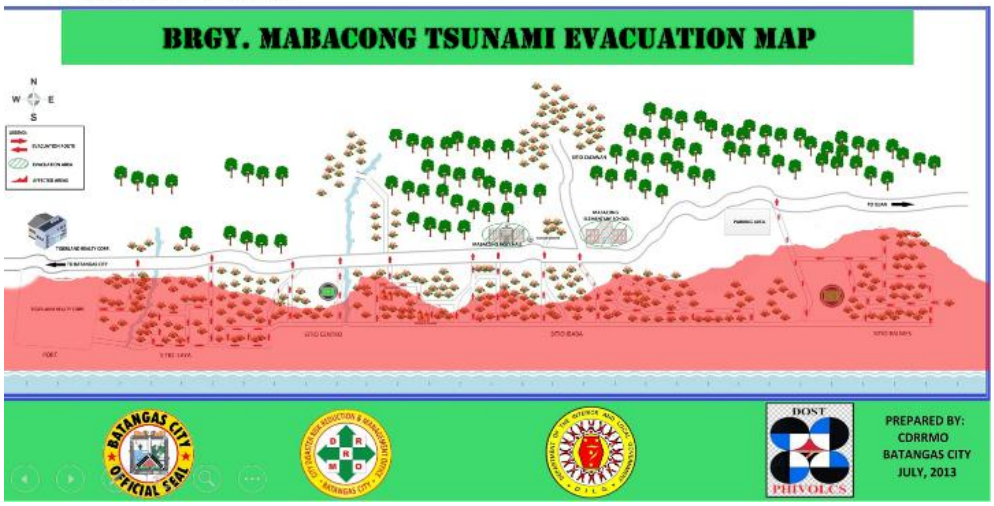
Step 4: Hold small workshop for community leaders to finalize maps

- create working map with the tsunami inundation zone, identified evacuation areas and routes

Step 5: Develop complete version of the map

- finalize map out of inputs from the group workshop
- should be simple and easy to read
- tsunami hazard zone is shown on the map
- safe evacuation areas are identified
- recommended evacuation routes are identified
- local landmarks are shown

Tsunami evacuation map – shows areas identified as safe and areas that are within the hazard zone



4. Community education about tsunami

4.1 Community information campaign

Topics may include:

- Which areas have high risks for being flooded in a tsunami?
- List of natural tsunami warning signs
- Basic information on tsunami evacuation plan
- Causes of tsunami
- How tsunamis affect communities
- Ways to reduce tsunami damage

4.2 Putting up tsunami signages

Tsunami Prone

Directional signage

Evacuation area

4.3 Conduct of tsunami drill

- Table top exercise
- Simple walk-through exercise
- Full-scale tsunami drill

Phases of a tsunami drill

1) Alarm phase
2) Reaction
3) Evacuation phase
4) Assembly phase
5) Headcount phase
6) Drill termination
7) Post-drill evaluation

5. Establishing a tsunami warning system:

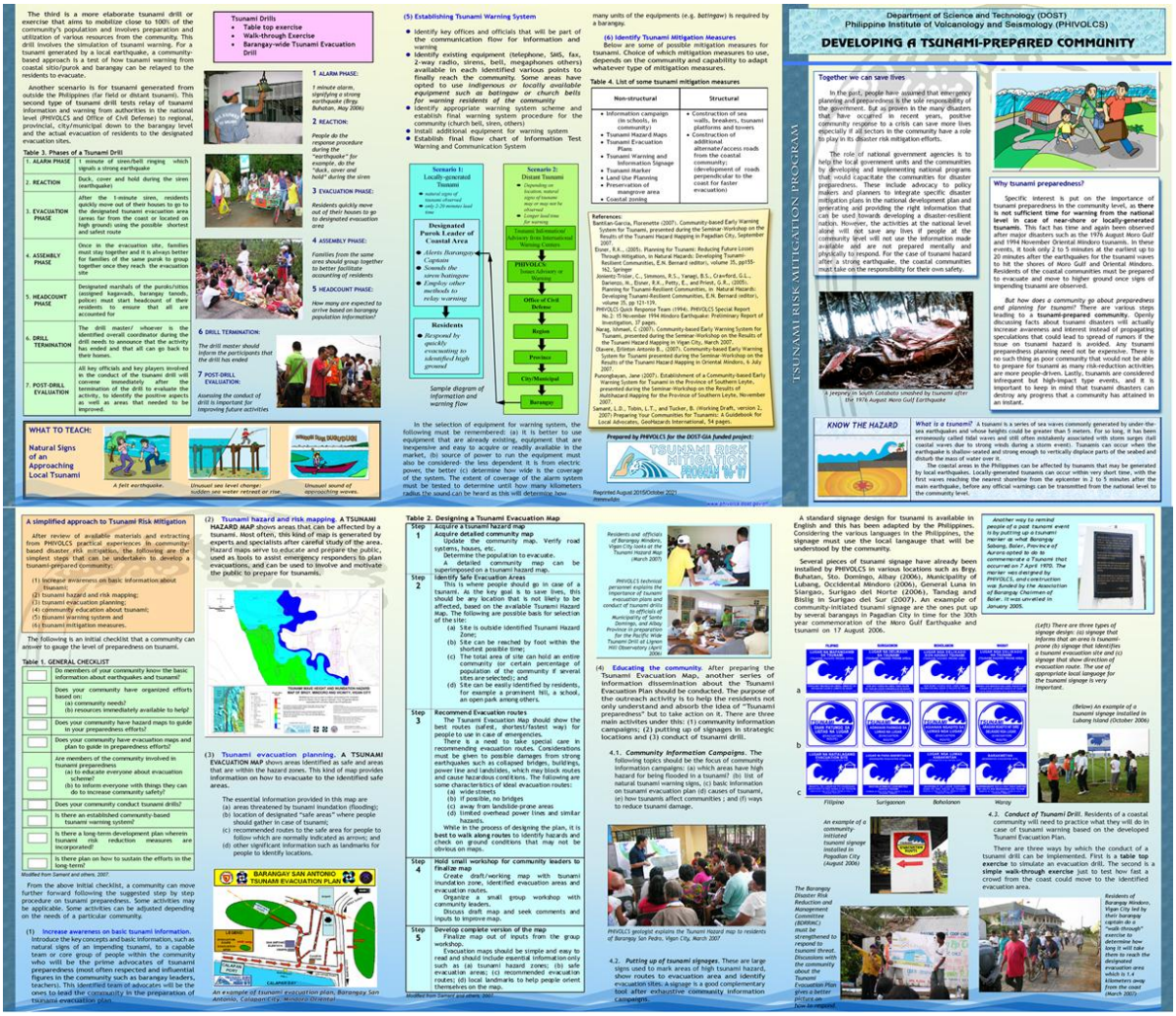
- Identify key offices and officials that will be part of the communication flow for information and warning
- Identify existing equipment (telephone, SMS, fax, 2-way radio, sirens, bells, megaphones, indigenous or locally available equipment such as batingaw or church bells)
- Identify appropriate warning system scheme and establish final warning system procedure for the community
- Install additional equipment for warning system, if necessary
- Establish final flow chart of information test warning and communication system

6. Tsunami mitigation measures

Tsunami mitigation measures are actions taken in advance aimed at minimizing the negative impacts of tsunami. These measures can be non-structural or structural. The choice of which mitigation measures to use depends on the community and its capability to adapt. Examples of non-structural and structural measures:

Non-Structural	Structural
▪ Information campaign ▪ Tsunami hazard maps ▪ Tsunami evacuation plans ▪ Tsunami warning and information signage ▪ Tsunami marker ▪ Land use planning ▪ Preservation of mangrove areas ▪ Coastal zoning	▪ Construction of seawalls, breakers, tsunami platforms, towers ▪ Construction of additional alternate access roads (development of roads perpendicular to the coast for faster evacuation)

A copy of this flyer is included in your learning resources. This flyer details steps in developing a tsunami-prepared community.



- Dynaslope Project (formerly DEWS-L - Development of Early Warning System for Landslide)

  - is a research program implemented by the DOST-PHIVOLCS in 50 sites around the country. It aims to develop an early warning system for deep-seated and catastrophic landslides, through landslide sensor technology in partnership with local communities. Deep-seated landslides are those that have sliding surfaces of more than 3 meters. These landslides are being monitored using underground motion sensors. This monitoring is being complemented with real-time observations by host communities.

What is a landslide?

A landslide is the mass movement of rock, soil, and debris down a slope due to gravity. It occurs when the driving force is greater than the resisting force. It is a natural process that occurs in steep slopes. The movement may range from very slow to rapid. It can affect areas both near and far from the source. Movement can occur in many ways. It can be a fall, topple, slide, spread, or flow.

Landslide materials may include:

- Soil
- Debris
- Rock
- Garbage

Landslide triggers

- Natural triggers example
  - Intense rainfall
  - Weathering of rocks
  - Ground vibrations created during earthquakes
  - Volcanic activity

- Human-made triggers
  - Construction of roads and structures on unstable slope
  - Deforestation
  - Unsafe mining practices

Landslide triggering conditions

- Steep Slopes
- Weakening of slope material
- Weathering of rocks
- Overloading on the slope

Landslide Preparedness

The Philippines is prone to various natural hazards, i.e., typhoons and earthquakes, thus, occurrence of landslides is inevitable. Awareness and preparedness are the most effective prevention and mitigation measures against possible threats of landslides in the community.

What can be done to minimize landslide risks?

- Hazard mapping
- Public information
- Engineering intervention measures or slope protection measures
  - Benching
  - Retaining wall
  - Riprap
  - Gabion walls
  - Shotcrete
  - Drainage
  - Erosion-control, coconet bio-engineering or vetiver grass

- Early Warning System (EWS) are monitoring systems designed to predict events that precede landslides in order to issue a hazard warning. It mitigates risk by reducing the consequences. The figure on the left shows the 50 Dynaslope sites in the Philippines.

Module 3.2 Family Preparedness: How Safe is My House and Ashfall Preparedness Guide (What to Do Before, During, and After)

Module objectives:

At the end of this module, you will be able to

- have knowledge on basic standards when building your houses;
- describe the steps in ashfall preparedness (before, during and after).

Learning resources:

1. How Safe is My House flyer
2. Ashfall Preparedness Guide (What to Do Before, During and After)

Discussion:

How Safe is My House?

How Safe is My House is a paper-and-pen questionnaire consisting of 12 basic questions. Its title is "How Safe is My House? Self-check for Earthquake Safety of CHB Houses in the Philippines." Each question is described below:

Question	Description
1: *Who built or designed my house?*	refers to engineered house
2: *How old is my house?*	is on compliance to recent earthquake-resistant standards
3: *Has my house been damaged by past earthquakes or other disasters?*	estimates weakened or strengthened houses
4: *What is the shape of my house?*	suggests that regular-shaped houses behave better
5: *Has my house been extended or expanded?*	recommends that additional portion of the house must be engineered
6: *Are the external walls of my house made of 6-inch thick CHB?*	recommends the use of correct size of CHB especially for exterior walls
7: *Are steel bars of standard size and spacing used in walls?*	suggests standard size and spacing of reinforcements
8: *Are there unsupported walls more than 3 meters wide?*	discouraged very wide CHB walls
9: *What is the gable wall of my house made of?*	recommends light materials for gable wall
10: *What is the foundation of my house?*	implies that reinforced concrete footing/foundation resist shaking
11: *What is the soil condition under my house?*	stiff or stabilized ground provide better support
12: *What is the overall condition of my house?*	is on the awareness to the current status of the house

Target users for this tool are the owners of houses with CHB (concrete hollow block) including those residences with small shops, offices, garages, and the likes with one to two floors. The questionnaire was developed in a simple manner in order to (1) encourage house owners to answer the questions on their own and (2) promote a practical way of evaluating residential houses for earthquake safety.

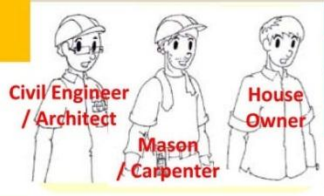
Each question has three (3) possible answers. The answers are given an equivalent score of either “1” or “0”. Scores will then be summed up.

How the total scores are interpreted:

Total score	Evaluation and Recommendations
11-12 points	*Though this seems safe for now, please consult experts for confirmation*
8-10 points	*This requires strengthening, please consult experts*
0-7 points	*This is disturbing! Please consult experts soon*

The National Building Code/National Structural Code and the Shaking Table Test for CHB Houses emphasize adherence to design standards and proper construction implementation for CHB type of structures in the Philippines. The walls of CHB houses play a vital function as the main support of the structure. The code prescribes the use of at least 6” (150mm) thick CHB and reinforced with a minimum diameter of 10mm for vertical and horizontal steel bars spaced at 40 cm and 60 cm on centers respectively. It is also highly recommended that all CHB cells and joints are filled with mortar using correct mixture of 1 part of cement to 4 parts of washed river sand (1:4).

QUESTION 1 — Who built or designed my house?



Items		point
A: Built or designed by a licensed civil engineer/architect.	-	1
B: Not built by a licensed civil engineer/architect.	-	0
C: It is not clear or unknown.	-	0

This question refers to the person who supervised the building of the house.

QUESTION 2 — How old is my house?

Items		point
A: Built in or after 1992.	-	1
B: Built before 1992.	-	0
C: It is not clear or unknown.	-	0

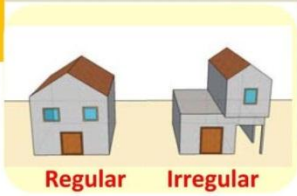
This checks if your house was built under more recent earthquake-resistant building standards.

QUESTION 3 — Has my house been damaged by past earthquakes or other disasters ?

Items		point
A: NO or YES but repaired.	-	1
B: YES but not yet repaired.	-	0
C: It is not clear or unknown.	-	0

This checks if the house sustained structural damage and had undergone repair works.

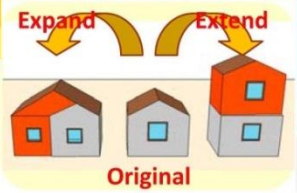
QUESTION 4 — What is the shape of my house?



Items		point
A: Regular (symmetrical, rectangular, box-type, simple)	-	1
B: Irregular/Complicated.	-	0
C: It is not clear or unknown.	-	0

This checks the shape of your house which influences behavior during strong ground shaking. .

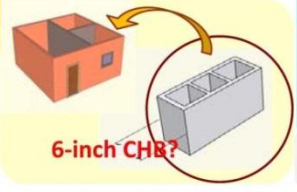
QUESTION 5 — Has my house been extended or expanded?



Items		point
A: NO or YES but supervised by a civil engineer/architect.	-	1
B: YES, but not supervised by a civil engineer/architect.	-	0
C: It is not clear or unknown.	-	0

This checks if additional construction was properly executed and correctly attached to the original structure.

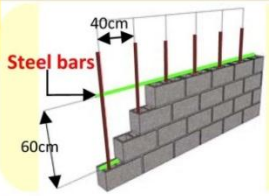
QUESTION 6 — Are the external walls of my house 6-inch (150mm) thick CHB?



Items		point
A: YES, it is 6-inch	-	1
B: NO, it is thinner than 6-inch.	-	0
C: It is not clear or unknown.	-	0

This checks if the standard size of at least 6" thick CHB was used.

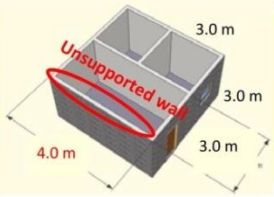
QUESTION 7 — Are steel bars of standard size and spacing used in walls ?



Items		point
A: YES (10mm diameter, tied and spaced correctly) .	-	1
B: NO, fewer and smaller than 10mm.	-	0
C: None or Unknown.	-	0

This checks if standard size and spacing of steel bars were used as reinforcement.

QUESTION 8 — Are there unsupported walls more than 3 meters wide?



Items		point
A: NONE, all unsupported walls are less than 3m wide.	-	1
B: YES, at least one unsupported wall is more than 3m wide.	-	0
C: It is not clear or Unknown.	-	0

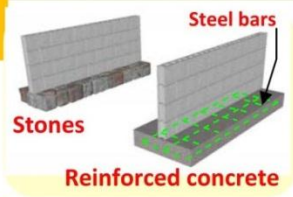
This checks if the wall is properly supported from falling down.

QUESTION 9 — What is the gable wall of my house made of ?

Items		point
A: Light materials, properly anchored CHBs, no gable wall.	-	1
B: Not properly anchored CHBs, Bricks, Stone.	-	0
C: It is not clear or Unknown.	-	0

This checks if the gable wall is properly supported by sufficient steel bars or by a lintel beam.

QUESTION 10 — What is the foundation of my house?



Items		point
A: Reinforced concrete.	-	1
B: Stones or unreinforced concrete.	-	0
C: It is not clear or Unknown.	-	0

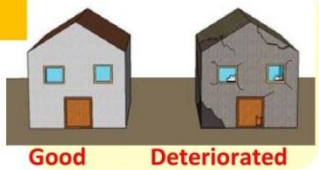
This checks if the foundation is properly constructed to support the walls.

QUESTION 11 — What is the soil condition under my house?

Items		point
A: Hard (rock or stiff soil).	-	1
B: Soft (muddy or reclaimed) .	-	0
C: It is not clear or Unknown.	-	0

This checks if the house was built over a stable or stabilized ground.

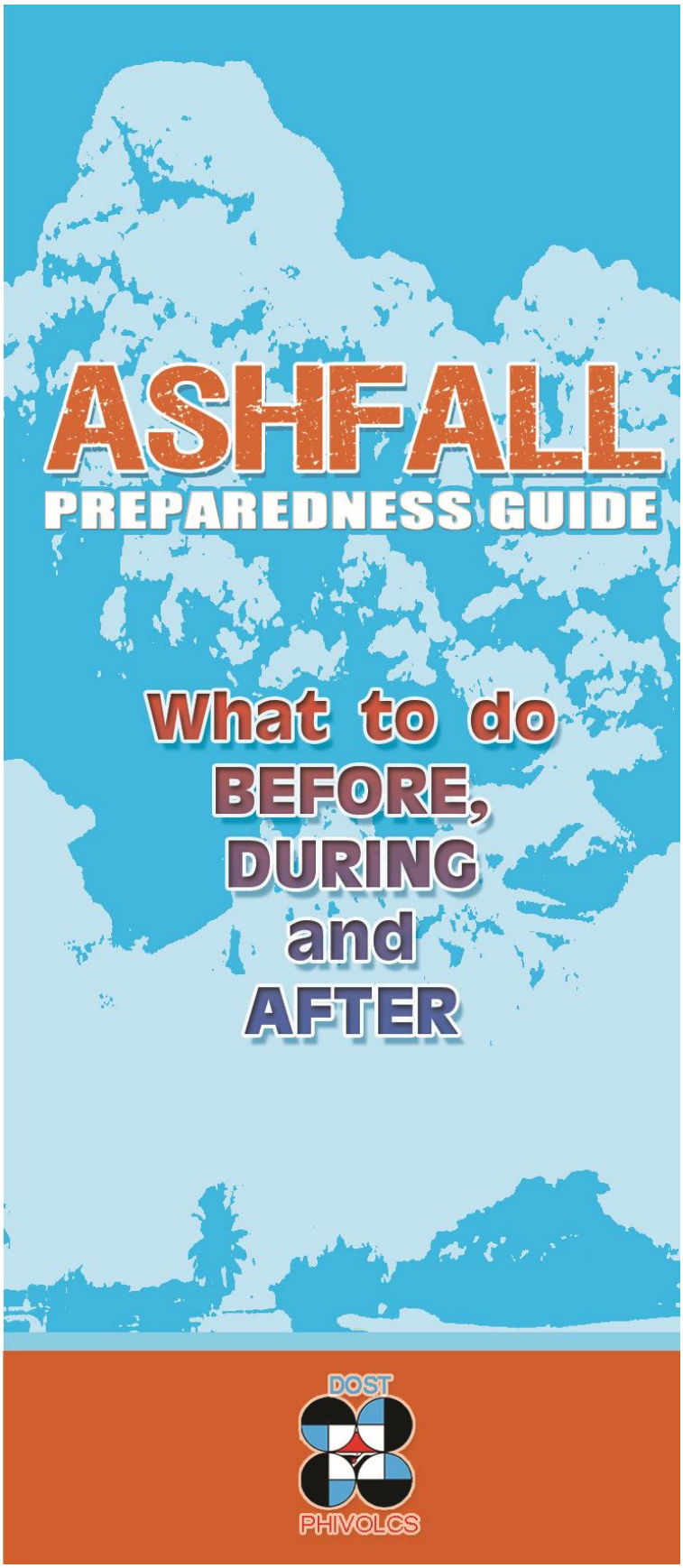
QUESTION 12 — What is the overall condition of my house?



Items		point
A: Good condition.	-	1
B: Poor condition.	-	0
C: It is not clear or Unknown.	-	0

This describes the overall physical state of the house and checks defect or any deterioration.

Ashfall Preparedness Guide (What to Do Before, During, and After)



ASHFALL PREPAREDNESS GUIDE

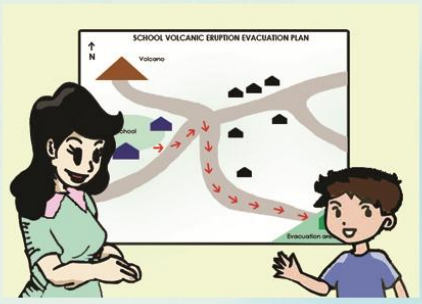
BEFORE

- Listen to the radio for updates from authority when there is an impending eruption that may cause ashfall.
- Prepare emergency supply kit and place in an accessible area.

Basic items inside an emergency supply kit:

1. First aid kit and medications
   (alcohol, bandages, absorbent cotton, gauze, masks, adhesive plasters, medicine, tweezers)
2. Food
3. Bottled water
4. Flashlights and batteries
5. Radio (battery operated)
6. Lighters and matches
7. Whistle
8. Dust mask
9. Goggles
10. Knife
11. Blankets and spare clothes
12. Rope - at least 7 meters long
13. Plastic wrap (to keep ash out of electronics)
14. Toiletries
15. Pen and paper
16. Emergency contact numbers
17. Cash

- Prepare dust masks or clean cloth for covering the nose and goggles for eye protection.
- Prepare cleaning supplies such as broom, vacuum cleaner with spare bags and filters, and a shovel.
- Consider that you could be stuck in your vehicle, store emergency supplies in your vehicle.
- Have food and water provision for pets, poultry, and livestocks.
- Know the location of evacuation area.
- If you have children, know the school's emergency plan.



- Have indoor games and activities ready for children.

ASHFALL PREPAREDNESS GUIDE

DURING

DURING

- Stay calm. Stay indoors. Cover your nose and mouth with damp, clean cloth or dust mask.
- Close all windows and doors of your house and your car.
- Place damp towels or cloth at door openings and other open sources.

- Listen to the radio for updates/ developments regarding the volcanic eruption.
- Keep your pet/s in their shelter or inside the house to avoid inhaling ash.
- If you are DRIVING a vehicle, pull to the side of the road and STOP if there is heavy ashfall which causes poor/low visibility.
- If OUTSIDE, look for a shelter and wear glasses to protect your eyes. Avoid using contact lenses.
- Wash all fruits and vegetables thoroughly before eating.

- Cover water containers and food to avoid contamination from ash.

ASHFALL PREPAREDNESS GUIDE

AFTER

AFTER

As soon as the ashfall diminishes, scrape off the ash that has accumulated on the rooftops to prevent collapse.

Wash grass before feeding the animals or livestocks.

Boil water before drinking.

After removing the ash, clean the roof and gutter with water to preven corrosion.

Remove ash fron windows and doors of the house and car. Use water before washing them with soap and lukewarm water.

Use powder detergent in washing clothes covered in ash.

Collect the ashes and put them in an area far from water drainage to avoid clogging.

Use a vacuum cleaner or shake the furniture to loosen and clean the ash. Cover your nose and mouth while cleaning.

Action Planning

Impacts of past earthquake/s in your area, if none, write possible impacts that can affect your area if a damaging earthquake occurs in your area. Guidance: Impacts to lives, properties, livelihood	**Earthquake risk reduction and resilience initiatives**		
	What have you done? (YYYY-YYYY)	What are your plans? (YYYY-YYYY)	**Best practices** (what can you highlight as best practice/s you have done before the earthquake and after the earthquake in relation to your risk reduction and resilience activities?)
			Needs improvement/ strengthening?

Based on your plans for _____, which action plan can DOST-PHIVOLCS assist you? You may send us a detailed Action Plan on this.

VISION

A leading global science and technology institution of empowered men and women helping develop communities safe from and resilient to volcanic eruptions, earthquakes, tsunamis and other related hazards.

MISSION

We provide timely, quality, and socially-inclusive information and services for warning, disaster preparedness and mitigation. This we do through the development and application of technologies for the monitoring and accurate prediction of and determination of areas prone to volcanic eruptions, earthquakes, tsunamis and other related hazards, and gender-responsive capacity enhancement for comprehensive disaster risk reduction.

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