

HANDA PILIPINAS

DEPARTMENT OF SCIENCE AND TECHNOLOGY



RED

REFERENCE FOR EMERGENCY AND DISASTER



2nd Edition

RED

Reference for Emergency and Disaster

2nd edition

by NOAH Strategic Communication Intervention (NOAH StratComm) Project
& Science and Technology Information Institute (STII)

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The National Library of the Philippines CIP Data

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2. Reference Guide for Disaster Preparedness and Mitigation

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Message from the Secretary

In the face of disasters, we have often found ourselves on the path of development, only to be pushed several steps back. Our goal is clear: we aim to forge a nation where every Filipino enjoys a secure and resilient community.



The Philippines, with its complex geography and susceptibility to a wide range of natural hazards, is no stranger to typhoons, earthquakes, volcanic eruptions, and other geological and hydrometeorological challenges. We have garnered international attention on numerous occasions, shedding light on the dire consequences of natural hazards and exposing the vulnerabilities within our systems. But, as we harness the capabilities of science and technology and foster collaboration among various stakeholders and institutions, we have the power to change our course.

We recognize that disasters are the foremost disruptors of development, capable of wiping out years of progress and crushing the aspirations of our people for a better life—a life marked by good health, access to nourishing food, clean water, adequate shelter, and quality education.

Disasters unfold when we—both as a government and a community—fall short in forecasting, averting, alleviating, and preparing for natural threats. They occur when we disregard the available, credible scientific data to inform our planning, decisions, and actions, and when we fail to cooperate in responding to their aftermath.

The Reference for Emergency and Disaster (RED) book, a science communication project of the Department of Science and Technology (DOST), is an investment in our future, as we continue to affirm our commitment to a redefined and reimagined Filipino resilience. By shifting the narrative from disaster victims to victors, we not only safeguard our people and resources but also lay the groundwork for sustainable development.

I thank the DOST - Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), DOST - Philippine Institute of Volcanology and Seismology (PHIVOLCS), DOST - Science and Technology Information Institute (STII), all researchers, innovators, and DOST partners for the successful launch of the latest edition of RED. I trust that this book will empower us to be proactive and better prepared when adversity strikes, enabling us to turn our vision of a safer, adaptive, climate and disaster-resilient Filipino community into a reality.

Dr. Renato U. Solidum, Jr.

Secretary, Department of Science and Technology (DOST)

Message from the Undersecretary



Investments in research and development (R&D) are crucial to develop effective, efficient, and data-driven policies for disaster risk reduction and management. As we consider key areas in disaster prevention, preparedness, response and recovery, our commitment to innovation and knowledge empowers us to effectively confront the ever-evolving challenges posed by natural hazards.

The Reference for Emergency and Disaster (RED) is not just a publication but also serves as a profound call to action, driven by the urgent need to intensify our efforts in reducing disaster risk. Understanding that knowledge is one of our most valuable assets provides us with another opportunity to deepen our comprehension of disaster risks and craft innovative solutions to save lives and protect communities. Research not only enhances our understanding of the issues at hand but also empowers us to devise appropriate risk-mitigation strategies.

Within the pages of this book, we delve into the multifaceted landscape of disaster preparedness, with a particular focus on the instrumental role played by DOST scientific and warning agencies, and the Filipino scientists. The book provides an understanding to the science of natural hazards and the ways we can prevent hazards from turning into a disaster. We hope that through this book, we build trust between communities, governments, and stakeholders.

For decades, the Filipino scientific community has risen to the challenge of disaster resilience. This publication, which pays tribute to their commitment and dedication, vividly illustrates how our scientists have collaborated with government agencies, local communities, and international partners to strengthen our disaster preparedness. Through collaborative research endeavors, we have embraced the principle of “Build Forward Better,” ensuring that each disaster becomes an opportunity for us to learn and transform.

I extend my heartfelt appreciation to all DOST agencies, researchers, innovators, communicators, and stakeholders who dedicated their time and expertise to bring the latest edition of RED to fruition. Let us persistently collaborate, fortified by our relentless determination, to ensure a brighter and safer future for our nation.

Dr. Leah J. Buendia

DOST Undersecretary for Research and Development

Message from the Undersecretary



As natural hazards become increasingly frequent and impactful, the Reference for Emergency and Disaster (RED) book becomes an essential tool for redefining our approach to resilience, focusing particularly on our nation's regions, especially those most susceptible to various hazards.

The Philippines, with its natural beauty and diverse landscape, faces environmental challenges that disproportionately affect our regions and their economies. Some regions are more susceptible to natural hazards and environmental risks. The sustained economic growth of these areas is closely tied to effective emergency preparedness and response.

In disaster-prone regions, the most vulnerable communities often suffer the most. Improved emergency preparedness enhances the quality of life for these populations, ensuring their basic needs are met even in times of adversity. It's not only about protecting the environment but also safeguarding the socio-economic fabric of our regions, creating a more sustainable and resilient foundation for growth and development.

The RED book is more than a static knowledge source; it's a dynamic force that connects communities across the country. It acts as a bridge, linking the islands into a network of awareness and preparedness. I hope that it will fulfill its purpose as a capacity-building tool, empowering local government units, non-governmental organizations, and community leaders to take charge and lead their regions in times of crisis by establishing a decentralized and effective emergency preparedness, response, and recovery system.

Engr. Sancho A. Mabborang

DOST Undersecretary for Regional Operations



Message from the Undersecretary

In this latest edition of the Reference for Emergency and Disaster (RED) book, we explore the remarkable advancements in science and technology (S&T) that have contributed to our efforts to create a safer and more resilient Philippines.

One critical area within S&T services for disaster management is the early warning systems. Advanced sensors, satellite imagery, and real-time data analysis enable us to predict severe weather events with heightened accuracy. This capability helps ensure that communities are adequately prepared to protect themselves and their properties.

Technology enhances the efficiency and effectiveness of disaster response operations. Drones and remote sensing technologies, along with Geographic Information Systems or GIS for mapping and spatial analysis, provide invaluable insights that guide informed decision-making and facilitate the allocation of resources where they are most needed.

S&T services also extend to post-disaster recovery and rehabilitation. Advanced modeling and simulation techniques allow us to design resilient infrastructure capable of withstanding future disasters. The adoption of innovative materials and construction methods contributes to the reconstruction process of our communities.

As we embrace these advancements, it is important that we prioritize inclusivity and ensure that services are accessible to all segments of society. Bridging the digital divide and enhancing the capacity of local communities to stay informed and harness these technologies should be at the forefront of our efforts. By fostering collaboration and partnerships among various institutions, we can develop S&T services that cater to the diverse needs of our population.

Maridon O. Sahagun

DOST Undersecretary for Scientific and Technical Services

01

Backgrounder on Hazards in the Philippines



Background on Hazards in the Philippines

The Philippines, being a locus of typhoons, tsunamis, earthquakes and volcanic eruptions, is a hotbed of disasters. Natural hazards inflict loss of lives and costly damage to properties. Over the last years, the devastating impacts of some of the strongest Tropical Cyclones that hit the country like Typhoons Pedring (2011), Pablo (2012), Odette (2021), and Yolanda (2013) resulted in a high number of fatalities with economic losses amounting to billions of pesos.

Extreme weather is the common factor in these latest catastrophes. Situated in the humid tropics, the Philippines will inevitably suffer from climate-related calamities similar to those experienced recently. With continued development in the lowlands, and growing populations, it is expected that damage to

infrastructure and human losses would persist and even rise unless appropriate measures are immediately implemented by government.

According to the World Risk Report in 2023 that examines the interrelationship between disasters, marginalized groups, and diverse structure of societies, the Philippines ranked as the most vulnerable country to disaster risks in the world.

The report also focuses on vulnerability of the population such as susceptibility, capacity to cope and adapt to future natural hazard events.

Rank	Country	World Risk Index (%)	Exposure (%)	Vulnerability (%)	Susceptibility (%)	Lack of coping capacities (%)	Lack of adaptive capacities (%)
1	PHILIPPINES	48.86	39.99	54.92	51.21	58.84	54.98
2	Indonesia	43.50	39.89	47.43	45.46	50.59	46.38
4	India	41.52	35.99	47.89	37.79	55.86	52.04
4	Mexico	38.17	50.08	29.09	44.78	12.28	44.76
5	Colombia	37.64	31.54	44.93	39.65	50.01	45.75
6	Myanmar	36.16	22.43	58.28	52.14	58.83	64.54
7	Mozambique	34.61	18.10	66.17	65.78	64.15	68.65
8	Russian Federation	28.20	28.35	28.05	14.97	39.00	37.81
9	Bangladesh	27.29	16.57	44.93	35.30	57.88	44.39
10	China	27.10	64.59	11.37	14.75	11.54	8.63



Rising water levels submerging a house as heavy monsoon rains cause major floods in Baco, Oriental Mindoro, Philippines on July 23, 2021. (by Cheryl Ramalho)

Why Do Disasters Happen?: Debunking common misconceptions

We often hear the term “natural disasters” — referring to how a natural phenomenon causes a disaster. But this commonly used phrase is a fallacy, a misconceived notion that presumes disasters as naturally occurring.

Contrary to that perception, it is time to recognize that there is no such thing as a “natural disaster”, there’s only natural hazards. This is a long-time campaign and advocacy of the United Nations for Disaster Risk Reduction (UNDRR). The UNDRR emphasizes how anthropogenic causes, unplanned urbanization, unchecked poverty, destruction of the environment, and the lack of international cooperation are among the drivers of the increasing intensity and frequency of disaster events.

A dilemma of language

However, the term “natural disaster” is still widely used among politicians, media organizations, civil society groups, and international organizations — and, more surprisingly, among scientists and disaster risk reduction (DRR) practitioners.

In a study, Chmutina and Von Medding (2019) systematically analyzed the use of this expression and saw how the term disconnected from the reality of the most vulnerable by

putting the blame on “nature,” putting the responsibility for failures of development on natural phenomena or “acts of God.” The study said the term was initially used in the 1990s as a way to leverage popularity — with no communication agenda — to trigger particular associations and behaviors among the public. However, this resulted in negative impacts and misconceptions about disasters.

Disasters and hazards

At present, a disaster is defined as 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 (Philippine DRRM Act of 2010). To put it simply, disasters happen when: (1) there’s a hazard — either natural or human-induced; (2) there are losses and damages associated to the levels of exposure and aspects of vulnerability; and (3) the lack of capacity to deal with the impacts of the hazards.

So are all hazards a disaster? The answer is NO. Disasters are no longer viewed as the function of physical hazards. A hazard is a dangerous phenomenon or a threat — slow onset or onset — which can only become

a disaster if there are losses and damages, and if the community can no longer deal with its impact.

Imagine a community living in a coastal area with risks of storm surge, but that was able to preemptively evacuate to safe areas and secure its members’ livelihoods. Imagine the community being informed on what to do before, during, and after a tropical cyclone. Imagine the community and the local government leading family preparedness planning and implementing the preparedness measures in times of a tropical cyclone. Imagine infrastructure built to mitigate impacts of flooding and storm surges. These are only a few factors that can reduce the risks of a disaster and, most importantly, prevent loss of life.

Disasters are not a by-product of a single factor. They are usually the result of an interaction between systems within systems. Disasters are not only about the physical science; what is interesting about them is that there is a social component to them, and an interplay of various systems.

Given the risk profile of the Philippines, our main goal is to build disaster resilience, and the pathway to resilience is reducing disaster risks. Hence, it is critical to grasp that the root causes of disasters are not only natural, and that there is a difference between disasters and hazards.

By setting the parameters on why disasters happen, we help shape the public perception of risks associated with natural hazards. Consequently, we can encourage the public to turn disaster science into action. (*Rachelle Anne Miranda, DOST-DRRCC*)

DISASTER IMAGINATION

Disaster Imagination is the pioneering concept developed by Dr. Renato U. Solidum Jr. to help Filipinos internalize hazards, and its impacts in preparing and anticipating risks. Secretary Solidum emphasizes that the “right disaster imagination” will prompt “appropriate disaster preparedness actions”.

He further explains that “Disaster Imagination” must not only be based on past experiences but also on the best available science. If Filipinos internalize the impacts of disasters on their families and livelihoods, they can be more convinced to prepare appropriately and efficiently.

Key considerations in your Disaster Imagination:

- (1) Identify all the hazards in the place of interest,
- (2) Depending on the scale of the hazards, determine the areas that can be affected, and
- (3) Assess not only the hazard but also the impact.

Disaster Risk Reduction and Building Community Resilience

The Philippines faces an average of twenty (20) tropical cyclones a year along with floods and storm surges, as well as earthquakes, among others. Recent events and global reports have shown that there is an increasing trend in the intensity and frequency of disasters.

The Philippine communities face massive destruction from calamities as what Typhoon Yolanda did. While we cannot stop the occurrence of natural hazards, we can definitely mitigate disaster risk in our communities.

The Department of Science and Technology (DOST) believes that science can be used to better understand and improve disaster planning and preparations at the national and local levels.

Applying science, scenario-based strategies and protocols can be drawn in dealing with calamities: from emphasizing **early warning and early action** to achieve minimum loss and enable quick recovery.

In 2005, the United Nation (UN) General Assembly endorsed the Hyogo Framework for Action (HFA) which aims to substantially reduce disaster losses by 2015 by “building the resilience of nations and communities to disasters. It was developed and agreed on with many partners needed to reduce disaster risk – governments, international agencies, disaster experts and many others – bringing them into a common system of coordination.”

Moreover, the Sendai Framework for Disaster Risk Reduction 2015-2030 “was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015. It is the outcome of stakeholder consultations initiated in March 2012 and inter-governmental negotiations from July 2014 to March 2015, supported by the United Nations Office for Disaster Risk Reduction at the request of the UN General Assembly,” as stated by Margareta Wahlström, United Nations Special Representative of the Secretary-General for



Disaster Risk Reduction.

She continues that the “Sendai Framework is built on elements which ensure continuity with the work done by States and other stakeholders under the HFA and introduces a number of innovations as called for during the consultations and negotiations.” Prior to the framing of the Sendai Framework, a significant shift has been introduced emphasizing “disaster risk management as against disaster management, the definition of seven global targets, the reduction of disaster risk as an expected outcome, a goal focused on preventing new risk, reducing existing risk and

strengthening resilience, as well as a set of guiding principles, including primary responsibility of states to prevent and reduce disaster risk, all-of-society and all-of-State institutions engagement.”

Although in the Framework, the scope of disaster risk reduction has been broadened significantly to focus on both natural and man-made hazards and related environmental, technological, and biological hazards and risks and health resilience is strongly promoted throughout. However, the content of the Reference for Emergency and Disaster Book centers on natural hazards. ■

The first step in disaster preparedness is knowing the hazards present in the community. Aside from being familiar with the hazards in the area, it is also important to know the negative impact that can affect the lives of people.

02

Know and Monitor the Local Hazards



Geological

A

Earthquake/Lindol

Definition

An EARTHQUAKE is a weak shaking to violent trembling of the ground produced by the sudden displacement of rocks or rock materials below the earth's surface. On average, there are around 20 earthquakes recorded in the Philippines every day.

Types

Tectonic

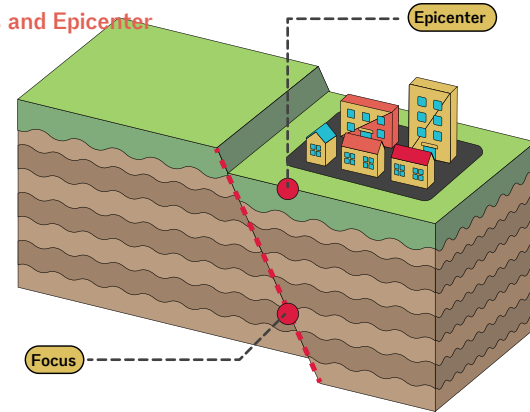
Sudden displacements along faults in the solid and rigid layer of the earth.

Volcanic

Earthquakes induced by rising magma beneath active volcanoes.



Focus and Epicenter



Source: DOST-Philippine Institute of Volcanology and Seismology

Focus

Actual location beneath the surface where the earthquake begins. The ground ruptures at this spot, then seismic waves radiate outward in all directions.

Epicenter

Point on the Earth's surface located directly above the focus of an earthquake.

Magnitude & Intensity

Magnitude

The energy released at the source of the earthquake. Magnitude is determined from measurements on seismographs.

Intensity

The strength of shaking produced by the earthquake at a certain location. Intensity is determined from effects on people, human structures, and the natural environment. In the Philippines, the PHIVOLCS Earthquake Intensity Scale (PEIS) is used to determine the intensity of an earthquake in a specific place.

Aftershocks

Usually weaker earthquakes that follow the main shock (the strongest shock) of an earthquake sequence.

Earthquake-Related Hazards

Ground Shaking

Because of severe ground shaking, low and tall buildings, towers, and posts may tilt, split, topple or collapse; foundation of roads, railroad tracks, and bridges may break; water pipes and other utility installations may get dislocated, dams and similar structures may break and cause flooding and other forms of mass movement may be generated.

Ground Rupture

A deformation on the ground that marks the intersection of the fault plane with the earth's surface. The most common manifestation is a long fissure extending from a few kilometers to tens of kilometers. Houses and buildings on top of an active fault can be damaged by ground rupture.

Liquefaction

A process where particles of loosely consolidated and water-saturated sediments are re-arranged in more compact state. It commonly occurs in low-lying areas, reclaimed sites, along river channels, and coastlines

If not properly designed and constructed, houses and buildings may subside or tilt.

Earthquake-Induced Landslide

The downslope movement of rocks, soils, and other debris triggered by the earthquake's ground shaking. It may result to rapid burial of foot slope or low-lying areas. Landslide materials may block roads causing isolation of places and transportation cutoff. In some cases, these materials dam river channels and eventually lead to flashfloods.

Tsunami

A series of waves commonly generated by earthquakes under the sea. Tsunamis occur when the earthquake is shallow-seated and strong enough (magnitude 6.5 or greater) to vertically displace parts of the seabed and disturb the mass of water over it. Tsunamis can flood low lying coastal areas and drown people.



Ground Shaking



Liquefaction



Tsunami



Ground Rupture



Earthquake-Induced Landslide

Source: DOST-Philippine Institute of Volcanology and Seismology

HAVE YOU FELT AN EARTHQUAKE?!

REPORTING AN EARTHQUAKE INTENSITY

1 Notice how you feel and what you have observed during the earthquake.

2 Find the intensity of the earthquake using PHIVOLCS Earthquake Intensity Scale (PEIS). *Refer to page 88*

3 Report the identified intensity to DOST-PHIVOLCS.

4 SEND NECESSARY DETAILS TO DOST-PHIVOLCS FACEBOOK PAGE (via direct message) or text 0947 404 7797 or call (632) 8426 1468 local 307 or 308

SEND THE FOLLOWING DETAILS

Name

Date and time of earthquake

Location at the time of earthquake

(All personal information will be kept private and secured.)

5 The reported data will be included to the Earthquake Information report.

Source: DOST-Philippine Institute of Volcanology and Seismology

Earthquake Information

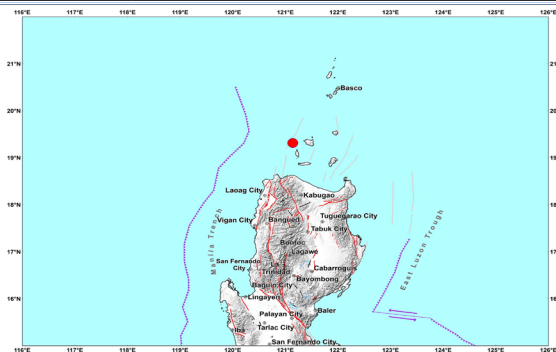
DEPARTMENT OF SCIENCE AND TECHNOLOGY

PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY

EARTHQUAKE INFORMATION NO. : 3

PHIVOLCS Building, C.P. Garcia Avenue, U.P.-Diliman, Quezon City, PHILIPPINES
Tel.: 8426-1468 Fax: 8927-1087

Date/Time	: 17 Jun 2023 - 06:15:18 PM
Location	: 19.31°N, 121.14°E - 024 km N 18°W of Dalupiri Island (Calayan) (Cagayan)
Depth of Focus (Km):	003
Origin	: TECTONIC
Magnitude:	Mw 5.5



Reported Intensities : Intensity V-C alayan, CAGAYAN
Intensity IV -B angui, Burgos, P agudpud, a nd Pasuquin, ILOCOSNORTE; Pamplona nd Santa Ana, CAGAYAN
Intensity III-B acarra, C urrimao, City of Laoag, and Sarrat, ILOCOSNORTE; Aparri, C laveria, P lat, Sanchez-Mira, a nd Santa Praxedes, CAGAYAN
Intensity II-F lora, L una, Pudtol, a nd SantaM arcela, A PAYAO; Adams, Badoc, C ity of Batac, Dumlague, Paoy, Pinili, a nd SanN icolas, I LOCOSNORTE; Cabugao, SanJ uan, and Sinalit, ILOCOS SUR; Abulug, A lcala, Alacapan, Bagbao, Ballesteros, Camalaniugan, Gattaran, Lasam, Peñablanca, Rizal, SantaT eresita, SantoN iño, Solana, and Tuao, CAGAYAN
Intensity I-K abugao, A PAYAO; Carasi, I LOCOSNORTE; Magsingal, and C ity of Vigan, ILOCOS SUR; Buguey, E nrile, Gonzaga, Igui, a nd Lal-Lo, CAGAYAN; Cabagan, a nd Delfin Albano, ISABELA

Expecting Damage	: YES
Expecting Aftershocks	: YES
Issued On	: 19 June 2023 - 03:27 PM
Prepared by	: CNDA/JSO/KRV

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>).



WHAT TO DO? BEFORE



The key to effective disaster prevention is planning:

- Know the earthquake hazards in your area.
- Follow structural design and engineering practices when constructing a house or building.
- Evaluate the structural soundness of the buildings and houses; strengthen or retrofit if necessary.

Prepare your homes, workplace or schools:

- Strap or bolt heavy furniture/cabinets to the walls.
- Check stability of hanging objects like ceiling fans and chandeliers.
- Breakable items, harmful chemicals, and flammable materials should be stored properly in the lowermost secured shelves.
- Always turn off the gas tanks when not in use.

Familiarize yourself with the exit routes and places where fire extinguishers, first aid kits, alarms, and communication facilities are located. Learn how to use them beforehand.

Identify an evacuation route for children, senior citizens, and persons with disabilities (PWDs) during the planning stage for earthquake preparedness.

Prepare a handy emergency supply kit with first aid kit, canned food and can opener, water, clothing, blanket, battery-operated radio, flashlights, and extra batteries.

Conduct and participate in regular earthquake drills.

WHAT TO DO? DURING



STAY CALM. When you are INSIDE a structurally sound building or home, STAY THERE! Do the “DUCK, COVER and HOLD”.

- Duck under a sturdy desk or table, and hold on to it, or protect your head with your arms.
- Stay away from glass windows, shelves, cabinets, and other heavy objects.
- Beware of falling objects. Be alert and keep your eyes open.

If you're OUTSIDE, move to an open area!

- Stay away from trees, powerlines, posts, and concrete structures.
- Move away from steep slopes which may be affected by landslides.
- If you're near the shore and feel an earthquake, especially if it's too strong, move quickly to higher grounds. Tsunamis might follow.

If you're in a moving vehicle, STOP and get out! Do not attempt to cross bridges, overpasses, or flyovers that may have been damaged.

WHAT TO DO? AFTER



Be prepared for aftershocks. Once the shaking stops, take the fastest and safest way out of the building.

DON'T

- use elevators
- enter damaged buildings
- use telephone unless necessary
- PANIC

CHECK

- yourself and others for injuries
- water and electrical lines for damages
- for spills of chemical, toxic and flammable materials
- and control fires which may spread

If you need to evacuate your residence, leave a message stating when you left and where you can be located and bring your emergency supply kit.

Keep updated on disaster prevention instructions from battery-operated radios.



11 March 2011: A powerful wave crashes onto a street in Miyako in Iwate prefecture, sweeping all before it (Photo: MAINICHI SHIMBUN/REUTERS)

C

Tsunami

Definition

One of the most dangerous hazards is TSUNAMI, or the series of sea waves commonly generated by under-the-sea earthquakes and whose heights could be greater than five (5) meters.

Locally-generated tsunamis can occur within very short time, with the first waves reaching the nearest shoreline from the epicenter in 2 to 5 minutes after the main earthquake, before any official warning can be transmitted from the national level to the community level. Hence, it is important for people to remember the natural signs of a local tsunami. If any of these is felt, observed, or heard, people should evacuate to high grounds or away from the shoreline.

Natural Signs Of An Approaching Local Tsunami



Shake

A strong earthquake where it is difficult to stand or move.



Drop

Unusual sea level change, sudden sea water retreat or rise. Exposure of corals, underwater rocks and marine life.






Roar


Rumbling sound of approaching waves.

Tsunami

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.

TSUNAMI INFORMATION	THREAT TO THE PHILIPPINES	RECOMMENDED ACTION FOR AFFECTED PLACES
		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.

Source: DOST-Philippine Institute of Volcanology and Seismology



WHAT TO DO? BEFORE



Familiarize with natural signs of an approaching local tsunami. Remember "Shake, Drop and Roar".

Identify high ground or farther inland as evacuation area. Map out the safest and fastest route to get there.



Put up signages. Identify safe and unsafe areas, and develop evacuation procedure.



Conduct community-level awareness about earthquakes and tsunami. Focus on natural signs of an approaching local tsunami, tsunami information (advisory/warning), and evacuation.

WHAT TO DO? DURING

Do not stay in low-lying coastal areas. Tsunami can hit people in coastal areas within minutes after a strong earthquake.



Move to higher ground or farther inland immediately. Go to a designated evacuation area immediately after a strong earthquake.

Never go down the shore to watch the tsunami. You will be exposed to waves that may be too high, very strong, and fast.



WHAT TO DO? AFTER



Stay away from the shore unless the authorities declare it is safe.

Do not leave the evacuation area until the tsunami warning is lifted. Follow the instructions of the authorities.



Check for injuries. Examine yourself and others for injuries and provide assistance if necessary

Stay updated. Monitor the situation from radio, social media, and other platforms.



D

Volcanic Hazards

Volcano

The term VOLCANO signifies a vent, hill or mountain from which molten or hot rocks with gaseous materials are ejected. The term also applies to craters, hills or mountains formed by removal of pre-existing materials or by accumulation of ejected materials.

The Philippine Archipelago has approximately more than 300 volcanoes. Of these 24 are considered active and several have erupted in recent times. DOST-PHIVOLCS have volcano observatories for Mayon, Taal, Pinatubo, Bulusan, Kanlao, Hibok-Hibok, Matutum and Parker.

Classification of Volcanoes

Active

Volcanoes that erupted within historical times (within the last 600 years) or has written or oral accounts of eruption or has erupted within the past 10,000 years based on radiometric dating from volcanic products (e.g. Mayon Volcano).

Potentially Active

Morphologically young-looking volcanoes but with no historical records of eruption (e.g. Mt. Apo).

Inactive

Volcanoes with no record of eruptions and the physical form is being changed by agents of weathering and erosion via formation of deep and long gullies (e.g. Mt. Makiling).

Hazards Directly Associated with Eruption

Pyroclastic Density Currents or Pyroclastic Flow

Refer to the turbulent mass of ejected fragmented volcanic materials (rocks and ash) with hot gases that flow downslope at very high speed.

Lava Flow

Molten rock (lava) cascading downslope from an erupting vent. Areas with lava flow will become unusable for a certain number of years.



Tephra / Ash Fall

Tephra refers to the fragmented volcanic materials of any size. Fine-sized particles less than 2mm are called ash, which can be erupted at high altitude. Ash can be suspended on air and dispersed to the direction of the prevailing wind. At some point, ashes start to settle and fall, affecting areas even far from the erupting volcano.

Volcanic Gases

One of the basic components of a magma or lava. The most common volcanic gases are water vapor, carbon dioxide, and sulfur dioxide. High volume of emitted gases may pollute the atmosphere, destroy vegetation, and cause fish kills in volcanic lakes.

Hazards Indirectly Associated with Eruption

Lahar

Sometimes called mudflows or volcanic debris flows, are flowing mixtures of volcanic debris and water. It is triggered by rainfall or lake breakout, and can occur even years after a volcanic eruption. It can lead

to widespread burial, long-term siltation, and recurring flooding.

Debris Avalanche or Sector Collapse

Fast downhill movement of soil and rock caused by slope failure on the edifice of a volcano.

Ground Subsidence and Fissuring

A fissure is an elongated fracture or crack at the surface from which lava erupts. Subsidence is the lowering or sinking of the ground resulting from the downward adjustment of surface materials to the voids caused by volcanic activity.

Secondary Explosions

Produced by the contact of water in still hot volcanic deposits such as those of pyroclastic density currents (PDC) and lava flow. These can cause remobilization of volcanic material to generate small-scale PDCs and minor ashfall.




Precursor of An Impending Volcanic Eruption

The following are commonly observed signs that a volcano is about to erupt. These precursors may vary from volcano to volcano:

- Increase in the frequency of volcanic quakes with rumbling sounds;
- Occurrence of volcanic tremors;
- Increased streaming activity; change in color of steam emission from white to gray due to entrained ash;
- Crater glow due to presence of magma at or near the crater;
- Ground swells (or inflation), ground tilt and ground fissuring due to magma intrusion;
- Localized landslides, rockfalls and landslides from the summit area not attributable to heavy rains;
- Noticeable increase in the extent of drying up of vegetation around the volcano's upper slopes;
- Increase in the temperature of hot springs, wells (e.g. Bulusan and Kanlaon) and crater lake (e.g. Taal) near the volcano;
- Noticeable variation in the chemical content of springs, crater lakes within the vicinity of the volcano;
- Drying up of springs/wells around the volcano;
- Development of new thermal areas and/or reactivation of old ones; appearance of solfataras (volcanic vent that yields hot vapors and sulfurous gases).

Volcano Bulletin




BULKANG BULUSAN

Buod ng 24 oras na pagmamanman
(simula 12AM kahapon hanggang 12AM ngayong araw)


Petsa: 07 Enero 2024
(Bahagyang aktibidad)

ANTAS NG ALERTO 1


MGA PARAMETRO




Seismicity **6 volcanic earthquakes**




Sulfur Dioxide Flux **102 tonelada / araw (01 Disyembre 2023)**



Natatakpan ng ulap ang bulkan




Pamamaga ng bulkan



Lokasyon ng Lindot: ● Nakalipas na 24 oras ● Nakalipas na dalawang linggo
Bilang ng volcanic earthquake: 6 May sapat na record para ma-locate: 6

REKOMENDASYON / DAGDAG NA KOMENTO

- Pagpasok sa apat na kilometrong (4 km) radius Permanent Danger Zone o PDZ at pagpasok nang walang pag-ingat sa 2-km Extended Danger Zone o EDZ sa gawing timog-silangan
- Paglipad ng anumang aircraft malapit sa tuktok ng bulkan




Paalala Maaaring maganap ang mga sumusunod:

- biglaang pagputok ng steam o phreatic explosions

Lokasyon ng Bulkang Bulusan: Lalawigan ng Sorsogon

Department of Science and Technology
Philippine Institute of Volcanology and Seismology
C.P. Garcia Avenue, U.P. Campus Diliman
Quezon City 1101 Philippines

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@phivolcs_dost



View other Volcano
Bulletins here:



Source: DOST-Philippine Institute of Volcanology and Seismology

Volcano Alert Level Scheme

BULUSAN VOLCANO ALERT LEVELS

ALERT	CRITERIA	INTERPRETATION
0 Quiet or No Alert	All monitored parameters within background levels. Unremarkable level of volcanic earthquakes occurring within the volcano area. Generally weak steam emission.	Quiescence; no magmatic eruption is foreseen. However, there are hazards (explosions, rockfalls and landslides) that may suddenly occur within the four-kilometer radius Permanent Danger Zone (PDZ).
1 Low Level of Volcanic Unrest	Slight increase in volcanic earthquake and steam/gas activity. Sporadic explosions from existing or new vents. Notable increase in the temperature of hot springs. Slight inflation or swelling of the edifice.	Hydrothermal, magmatic, or tectonic disturbances. The source of activity is shallow, near crater or in the vicinity of Irosin Caldera. Entry into the PDZ must be prohibited.
2 Moderate Level of Volcanic Unrest	Elevated levels of any of the following: volcanic earthquake, steam/gas emission, ground deformation and hot spring temperature. Intermittent steam/ash explosion and above baseline Sulfur Dioxide (SO ₂) emission rates. Increased swelling of volcanic edifice.	Probable intrusion of magma at depth, which can lead to magmatic eruption. Entry within PDZ must be prohibited. Other areas within five (5) kilometers of the active vent may be included in the danger zone.
3 High Level of Volcanic Unrest	Sustained increases in the levels of volcanic earthquakes, some may be perceptible. Occurrence of low-frequency earthquakes, volcanic tremor, rumbling sounds.	Magma is near or at the surface, and activity could lead to hazardous eruption in weeks. Danger zones may be expanded up to eight (8) kilometers from the active crater.
4 Hazardous Eruption Imminent	Intensifying unrest characterized by earthquake swarms and volcanic tremor, many perceptible. Frequent strong ash explosions. Sustained increase, or sudden drop, of SO ₂ emission. Increasing rates of ground deformation and swelling of the edifice. Lava dome growth and/or lava flow increases, with increased frequency and volume of rockfall.	Magmatic processes or effusive eruption underway, which can progress into highly hazardous eruption. Danger Zone may be extended up to nine (9) kilometers or more from the active crater.
5 Hazardous Eruption in Progress	Magmatic eruption characterized by explosive production of tall ash-laden eruption columns, or by massive collapses of summit lava dome. Generation of deadly pyroclastic flows, surges and/or lateral blasts and widespread ashfall.	Life-threatening eruption producing volcanic hazards that endanger communities. Additional danger areas may be declared as eruption progresses.

Revised 25 September 2014

Ashfall

WHAT TO DO? DURING



Listen to the radio for updates/developments regarding the volcanic eruption.



Keep your pets in their shelter or inside the house to help them avoid inhaling ash.



Close all windows and doors of the house and your car.



If you are outside, look for a shelter and wear glasses to protect your eyes. Avoid using contact lenses.



Cover nose and mouth using a mask or a damp cloth.



If you are driving a vehicle, pull to the side of the road and stop if there is a heavy ashfall.



Cover water containers and food to avoid contamination with ash.



Wash fruits and vegetables thoroughly before cooking or eating them.

WHAT TO DO? AFTER



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



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



Shake loose ash from plants before watering them.



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



Use powder detergent in washing clothes contaminated with ash.



Use vacuum cleaner or shake loose the ash from furniture before dusting them. Cover your nose and mouth while cleaning.



To remove ash from glass windows and doors, use water hose before washing them with soap and lukewarm water.

IMPORTANT REMINDERS



If you are living near an erupting volcano, evacuate as soon as possible.



Avoid passing through a creek or river where lava, pyroclastic flows or lahars may flow.



If the erupting volcano is under/near the sea or a lake, evacuate immediately because there is high chance of big waves.



2018 Itogon, Benguet landslides (Rappler)

E

Landslides

Definition

LANDSLIDES are downward movement of slope materials either slowly or quickly. It occurs when the bond that holds the slope materials together is loosened or lost, making it easier for gravity to pull the materials downward. Hilly and mountainous areas, escarpments, and steep river banks, sea cliffs, and other steep slopes are prone to landsliding.

Kinds of Landslides

- Creep – imperceptibly slow, steady, downward movement of slope- forming soil or rock.
- Slump – a mass of rock and soil suddenly slips down a slope.
- Rock/debris slide
- Rockfall
- Debris flow
- Mudflow

Combination of two or more factors causes landslides:

- Steep slopes
- Lack of plants and trees in mountains
- Rocks weakened due to weathering
- Breaking of rocks
- Slopes that are too heavy

When Landslides Happen

- When there is heavy and continuous rain (rain-induced landslide)
- When there is ground-shaking due to earthquakes (earthquake-induced landslide)

Signs of An Impending Landslide

- Cracks on the ground, highways or concrete floors
- Utility posts, trees, gates and walls of buildings tilt
- Bulging ground appears
- Utility lines underground breaks
- Groundwater seeps to the surface
- Water in creeks or rivers becomes murky

Landslide



WHAT TO DO? BEFORE



Know your landslide situation by coordinating with local authorities on MGB landslide hazard maps, evacuation protocols, and early warning system.



Observe for signs if impending landslide in your area (i.e. seepage, tension cracks, tilting of trees).



Avoid building structures in areas with steep slope and with a history of previous landslides (i.e. slump, debris avalanche/flow, rock fall).



Always have a "Go Bag" prepared as well as family communication and evacuation plans.



If you suspect an imminent landslide, contact your local officials (M/BDRMMC) and your MGB-Regional Office



8-667-6700

WHAT TO DO? DURING



Stay vigilant for signs of imminent threat of landslide (i.e. rumbling sounds, sudden change in turbidity and level of water in channels, etc.)



If caught outdoors on foot, stay away from the path of a landslide and run towards a higher ground.



If caught outdoors in a vehicle, watch out for falling debris and do not cross bridges.



If caught outdoors in a vehicle, move to safe ground and turn on hazard lights to alert other motorists.



If caught inside a structure and escape is not possible, protect yourself by staying inside or under a sturdy table/bed and curl into a tight ball while covering your head.

WHAT TO DO? AFTER



Stay away from the landslide area as it is prone to secondary landslides and flooding. Wait for authorities' go signal to return.



Have your home inspected for damaged foundation by structural engineers before reoccupation.



Immediately report damaged structures and missing/injured individuals to the authorities to initiate rescue.



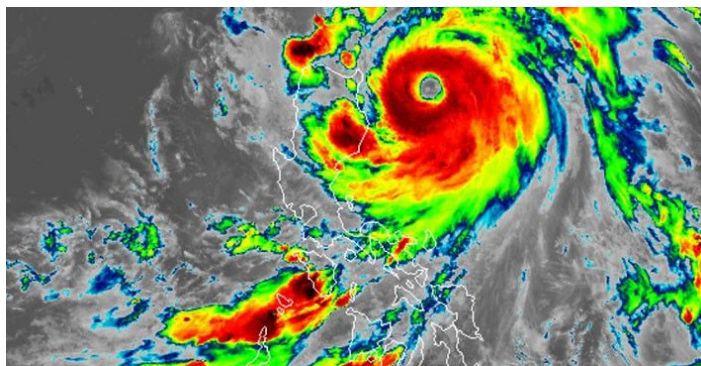
Keep informed on the latest emergency information from the M/BDRMMC, TV, radio, and official government and media social networking sites.



Consult your MGB Regional Office or geotechnical experts for additional information to reduce landslide risks.



Hydrometeorological



A Tropical Cyclone

Definition

A TROPICAL CYCLONE is a weather disturbance characterized by rotating clouds. It originates over warm tropical waters and brings strong winds, heavy rain, and other hazards which can be life-threatening and damaging or destructive to properties and livelihood.

DOST-PAGASA assigns local names whenever a tropical cyclone enters the Philippine Area of Responsibility (PAR). Around 20 tropical cyclone enters or develops within PAR every year.

Classification of Tropical Cyclones

Tropical Cyclones are classified according to the strength and speed of the maximum sustained winds near the center.



Tropical Depression (TD)
Less than 62 kph



Tropical Storm (TS)
62-88 kph



Severe Tropical Storm (STS)
89-117 kph



Typhoon (TY)
118-184 kph



Super Typhoon (STY)
Exceeding 185 kph

Hazards and Impacts Associated with Tropical Cyclones



River floods from heavy or prolonged rains



Storm surges or the rising of seawater above normal levels, causing floods in coastal areas



Rain-induced landslides, with soil and rocks rushing down mountainous slopes



High waves and rough seas, which are risky for sea travel



Mudflow as a result of rain mixing with sediments in the ground



Strong winds can blow away roofs and knock down trees and posts.

Weather Advisory

A weather advisory will be issued whenever a weather system such as monsoons or Low Pressure Area (LPA) is about to bring significant rains within the next 3 days. The initial advisory may be issued anytime within the day, with succeeding advisories to be issued at 11 AM and 11 PM.

WEATHER ADVISORY NO. 16

FOR: SOUTHWEST MONSOON
ISSUED AT: 11:00 AM, 01 SEPTEMBER 2023

THE SOUTHWEST MONSOON ENHANCED BY SUPER TYPHOON [SAOLA] (FORMERLY "GORING"), SEVERE TROPICAL STORM "HANNA" (HAIKUI), AND SEVERE TROPICAL STORM [KIROGI] MAY BRING SIGNIFICANT AMOUNT OF RAINS IN THE NEXT THREE DAYS.

FORECAST PERIOD	HEAVY RAINFALL OUTLOOK		
	50-100 MM	100-200 MM	GREATER THAN 200 MM
TODAY (SEPTEMBER 1)	ILOCOS REGION, ABRA, BENGUET, TARLAC, NUEVA ECIA, PAMPANGA, BULACAN, RIZAL, CAVITE, AND BATANGAS	METRO MANILA, ZAMBALES, BATAAN, AND OCCIDENTAL MINDORO	-
TOMORROW (SEPTEMBER 2)	ABRA, BENGUET, TARLAC, NUEVA ECIA, PAMPANGA, BULACAN, RIZAL, CAVITE, AND BATANGAS	METRO MANILA, ILOCOS REGION, ZAMBALES, BATAAN, AND OCCIDENTAL MINDORO	-
SUNDAY (SEPTEMBER 3)	ABRA, BENGUET, TARLAC, NUEVA ECIA, PAMPANGA, BULACAN, RIZAL, CAVITE, BATANGAS, NOTHERN PAWALAN INCLUDING CUYO AND CALAMIAN ISLANDS, AND ANTIQUE	METRO MANILA, ILOCOS REGION, ZAMBALES, BATAAN, AND OCCIDENTAL MINDORO	-

UNDER THESE CONDITIONS, **FLOODING AND RAIN-INDUCED LANDSLIDES ARE EXPECTED**, ESPECIALLY IN AREAS THAT ARE HIGHLY OR VERY HIGHLY SUSCEPTIBLE TO THESE HAZARDS AS IDENTIFIED IN HAZARD MAPS.


Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

Gale Warning


A gale warning is issued if the wind is expected to strengthen to gale force within 12 hours. Such strength is equivalent to at least 52 km/h.

DOST-PAGASA issues gale warning for sea travelers as gale-force winds can produce very rough seas (52 km/h is equivalent to 3.4-meter waves or as high as one-storey building).

Most areas with TCWS will be issued a gale warning, but not vice-versa.



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)
Weather Division



Management System
ISO 9001:2015
www.dost.gov.ph
2023-08-2023

GALE WARNING NR. 2
For: Strong to Gale-Force winds associated with NORTHEAST MONSOON
Issued at 05:00 AM Today, 11 January 2024
Valid for broadcast until the next warning at 05:00 PM today.

Strong to Gale-Force winds are prevailing or expected to affect the following areas:

Seaboards	Weather	Winds (km/h / kt)	Sea Condition	Wave Height
THE SEABOARDS OF NORTHERN LUZON (Batanes, Cagayan including Babuyan Islands, Isabela, and Ilocos Norte)	MOSTLY CLOUDY SKIES WITH LIGHT RAINS	(45 - 63) / (24 - 34)	rough to very rough	2.8 - 4.5

Warnings are for sea areas within 30 nautical miles from the coast.

Sea travel is risky for small seacrafts (including all motor bancas of any type or tonnage). Mariners of these vessels are advised to remain in port or seek safe harbor. For larger vessels, operating in these conditions required experience and properly equipped vessels.

Vessel masters, boat captains, ship owners / operators, and Coast Guard units concerned are advised to take appropriate measures to ensure safety of life at sea. Unless there is an intermediate issuance, the next warning will be issued at 05:00 PM today.

Prepared by: *BjNE*

Checked by: *RBB*

Sample of a Gale Warning, which indicates the specific seaboards that have or will have rough to very rough sea conditions and their equivalent winds and wave heights.

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

Tropical Cyclone Bulletin

A Tropical Cyclone Bulletin (TCB) shall be issued when a tropical cyclone enters the PAR or an LPA develops into a tropical cyclone while inside the PAR.

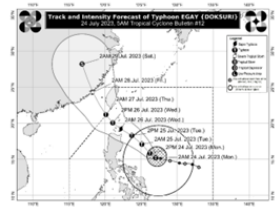
Information on the tropical cyclone and its track can be found on the first part of the TCB. A Tropical Cyclone Wind Signal (TCWS) will also be in place if the winds from the tropical cyclone will directly affect an area in 36 hours or less, depending on the TCWS.

TROPICAL CYCLONE BULLETIN NO. 12

Typhoon EGAY (DOKSURI)

Issued at 5:00 AM, 24 July 2023

Valid for broadcast until the next bulletin at 11:00 AM today.

TYPHOON EGAY UNDERGOES RAPID INTENSIFICATION AS IT MOVES OVER THE PHILIPPINE SEA.						
Location of Center (4:00 AM)						
The center of the eye of Typhoon EGAY was estimated based on all available data at 565 km East of Balor, Aurora (15.3°N, 126.9°E)						
Intensity						
Maximum sustained winds of 140 km/h near the center, gustiness of up to 170 km/h , and central pressure of 965 hPa						
Present Movement						
Westward at 15 km/h						
Extent of Tropical Cyclone Winds						
Strong to typhoon-force winds extend outwards up to 600 km from the center						
TRACK AND INTENSITY FORECAST						
Date and Time	Center Position		Location	Intensity		Movement dir. and speed (km/h)
	Lat. (°N)	Lon. (°E)		MSW (km/h)	Cat.	
12-Hour Forecast 2:00 PM 24 July 2023	15.9	126.2	435 km East of Casiguran, Aurora	155	TY	NW 10
24-Hour Forecast 2:00 AM 25 July 2023	17.1	125.1	330 km East Northeast of Casiguran, Aurora	165	TY	NW 15
36-Hour Forecast 2:00 PM 25 July 2023	18.3	123.7	220 km East of Aparri, Cagayan	175	TY	NW 15
48-Hour Forecast 2:00 AM 26 July 2023	19.2	122.2	Over the coastal waters Calayan, Cagayan	185	STY	WNW 15
60-Hour Forecast 2:00 PM 26 July 2023	20.1	121.1	100 km West Southwest of Basco, Batanes	175	TY	NW 15
72-Hour Forecast 2:00 AM 27 July 2023	21.2	120.1	185 km West Northwest of Itbayat, Batanes	165	TY	NW 15
96-Hour Forecast 2:00 AM 28 July 2023	24.3	118.3	535 km Northwest of Itbayat, Batanes (OUTSIDE PAR)	110	STS	NNW 15
120-Hour Forecast 2:00 AM 29 July 2023	28.2	116.8	970 km North Northwest of Extreme Northern Luzon or in the vicinity of Jiangxi, China (OUTSIDE PAR)	65	TS	NNW 20

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

Tropical Cyclone Bulletin

TROPICAL CYCLONE WIND SIGNALS (TCWS) IN EFFECT			
TCWS No.	Luzon	Visayas	Mindanao
2 Wind threat: Gale-force winds	The southeastern portion of Isabela (Palanan, Dinapigue) and northeastern portion of Catanduanes (Pandán, Bagamanao, Pangasinan, Viga, Gigmoto) Warning lead time: 24 hours Range of wind speeds: 62 to 88 km/h (Beaufort 8 to 9) Potential impacts of winds: Minor to moderate threat to life and property		
1 Wind threat: Strong winds	Batanes, Cagayan including Babuyan Islands, the rest of Isabela, Quirino, Nueva Vizcaya, Apayao, Kalinga, Abra, Mountain Province, Ilocos Norte, Ilocos Sur, La Union, the northern portion of Pangasinan (Natividad, San Nicolas, San Quintin, Sison, Pozorubio, San Manuel, San Fabian, Anda, Bolinao, San Jacinto, Manaoag, Laoac, Binalonan, Asingan, Tayug, Santa Maria, Umingan, Dagupan City, Mangaldan), Aurora, the northern and eastern portions of Nueva Ecija (Carrangian, Bongabon, Gabaldon, Pantabangan, Lupao, San Jose City), the northern and southeastern portions of Quezon (Pitogo, San Andres, Buenavista, San Francisco, Calauag, Infanta, Lopez, Catanauan, Mulanay, Guinayangan, Unisan, General Luna, Plaridel, Quezon, Alabat, Padre Burgos, Macalelon, Mauban, General Nakar, Perez, Agdangan, Gumaca, Atimonan, Real, San Narciso, Tagkawayan) including Polillo Islands, Camarines Norte, Camarines Sur, the rest of Catanduanes, Albay, Sorsogon, and Masbate Warning lead time: 36 hours Range of wind speeds: 39 to 61 km/h (Beaufort 6 to 7) Potential impacts of winds: Minimal to minor threat to life and property		

HAZARDS AFFECTING LAND AREAS

Heavy Rainfall Outlook

Forecast accumulated rainfall today

- **50-100 mm:** Catanduanes, the northeastern portion of Camarines Sur, and the northern portion of Camarines Norte

Forecast accumulated rainfall tomorrow

- **Above 200 mm:** The northeastern portion of mainland Cagayan
- **100-200 mm:** The rest of Cagayan including Babuyan Islands, Ilocos Norte, Ilocos Sur, the western portion of Abra and the northern portion of Apayao
- **50-100 mm:** Batanes, the northern and eastern portions of Isabela, the rest of Apayao, the rest of Abra, Kalinga, the western portion of Mountain Province, Benguet, La Union, and the western portion of Pangasinan

Forecast accumulated rainfall on Wednesday

- **Above 200 mm:** Batanes, Babuyan Islands, and Ilocos Norte
- **100-200 mm:** The northern portion of mainland Cagayan, Apayao, Abra, and Ilocos Sur,
- **50-100 mm:** The rest of mainland Cagayan, Kalinga, the western portion of Mountain Province, Benguet, La Union, and Pangasinan.

Severe Winds

Minor to moderate impacts from gale-force winds are possible within any of the areas where Wind Signal No. 2 are in effect. Minimal to minor impacts from strong winds are also possible within any of the areas where Wind Signal No. 1 is hoisted. **Current forecast scenario shows that the highest wind signal that may be hoisted will be Wind Signal No. 4 or 5 (e.g., typhoon-force wind threat).**

EGAY and the enhanced Southwest Monsoon may also bring gusty conditions over the following areas not under any Wind Signal, especially in coastal and upland/mountainous areas exposed to winds:

- **Today:** CALABARZON, MIMAROPA, Visayas, and the northern portions of Zamboanga Peninsula, Northern Mindanao, and Caraga.
- **Tomorrow:** Luzon, Visayas, Zamboanga Peninsula, Basilan, Sulu, Tawi-Tawi, and the northern portion of Northern Mindanao and Dinagat Islands.
- **Wednesday:** Luzon and Visayas.

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

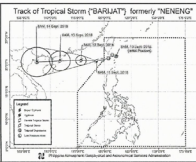
Tropical Cyclone Advisory



Republic of the Philippines
Department of Science and Technology
Philippine Atmospheric, Geophysical and
Astronomical Services Administration (PAGASA)
Weather Division
ISO 9001:2009 Certified
Registry No. 01 100 1334709

WFS-25
Rev.1/03-25-2018

TROPICAL CYCLONE ADVISORY # 1 FOR: Tropical Storm "BARIJAT"

Issued at 11:00 AM, 11 September 2018 Valid broadcast until the next advisory to be issued at 11 AM Tomorrow	
TD "NENENG" HAS INTENSIFIED INTO A TROPICAL STORM (INTERNATIONAL NAME "BARIJAT") WHILE MOVING WESTWARD TOWARDS SOUTHERN CHINA.	
Location of Center (8:00 AM today)	The center of Tropical Storm "BARIJAT" was estimated on all available data at 350 km West of extreme Northern Luzon (OUTSIDE PAR) (20.7°N, 118.6°E)
Maximum Sustained Winds	65 km/h near the center.
Gustiness	Up to 80 km/h
Movement	West at 20 km/h
	
Forecast Positions and Intensities Tomorrow morning 12 September 2018 855 km West of extreme Northern Luzon (OUTSIDE PAR) (20.8°N, 115.7°E) Tropical Storm Thursday morning 13 September 2018 1,060 km West of extreme Northern Luzon (OUTSIDE PAR) (20.7°N, 111.8°E) Tropical Storm Friday morning 14 September 2018 1,510 km West of extreme Northern Luzon (OUTSIDE PAR) (20.5°N, 107.5°E) Tropical Depression • TS "BARIJAT" gradually decreasing its effect in Northern Luzon.	
The public and the disaster risk reduction and management council concerned are advised to monitor for the next update on this weather disturbance to be incorporated in the Public Weather Forecast at 4 PM today and 4 AM tomorrow and in the next advisory at 11 AM Tomorrow.	

Prepared by: SMRR




Checked by: JSC

"Tracing the sky...helping the country"
WTCB 100 km Visual Observed City

tel: 091-8639291547











Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

Thunderstorm Activity

Icon	Description
	<ul style="list-style-type: none"> This will be issued when there is an indication that a thunderstorm is threatening a specific area(s) within the next 2 hours. Updates will be issued as frequent as necessary. This will be disseminated via SMS, Social Media, and website.
	<ul style="list-style-type: none"> This will inform the public that TSTM formation is likely within the next twelve (12) hours. This is more general than a warning. This will be disseminated thru Social Media, and website.
	<ul style="list-style-type: none"> Issued when TSTM is less likely within the next twelve (12) hours. This will be disseminated thru Twitter, Facebook, and website.

Rainfall Advisory and Heavy Rainfall Warning

RAINFALL ADVISORIES, CLASSIFICATION, AND MEASUREMENT

COLOR-CODED RAINFALL ADVISORIES AND CLASSIFICATION	RAIN MEASUREMENT	FLOOD POSSIBILITY	RESPONSE
RED  TORRENTIAL	MORE THAN 30mm RAIN observed in 1 hour and expected to continue in the next 2 hours 	8 gallons per square meter/hour Serious Flooding expected in low lying areas	EVACUATION
ORANGE  INTENSE	15-30mm RAIN observed in 1 hour and expected to continue in the next 2 hours 	4 to 8 gallons per square meter/hour Flooding is threatening	ALERT for possible evacuation
YELLOW  HEAVY	7.5-15mm RAIN observed in 1 hour and expected to continue in the next 2 hours 	2 gallons per square meter/hour Flooding is possible	MONITOR the weather condition
 MODERATE	2.5 - 7.5mm RAIN observed in 1 hour and expected to continue in the next 2 hours 	2.5 liters per square meter/hour to 7.5 liters per square meter/hour (Flooding still possible in certain areas)	
 LIGHT	LESS THAN 2.5 mm RAIN observed in 1 hour and expected to continue in the next 2 hours 	2.5 liters per square meter/hour (Flooding still possible in certain areas)	

PAGASA.GOV.PH @ DOST_PAGASA

PCDSDPO@GOV.PH

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

Tropical Cyclone Wind Signal



WHAT TO DO? BEFORE



Listen to news updates and monitor the weather conditions provided by DOST-PAGASA.



Learn about the community's plan regarding issuing warnings and evacuation procedures.



Inspect the house and repair any weak or damaged parts.



Move pets and livestock to a safe location.



Prepare the GO BAG containing the essentials of the family.



When instructed by authorities, quickly proceed to the designated evacuation center.

DURING



Turn off the main electrical switch and water valve.



Stay calm. Remain inside the house or evacuation center and listen to the latest news and weather updates.



Use a flashlight or emergency lamp. Be cautious when using candles or gas lamps.



Avoid windows or glass surfaces.



Exercise caution in mending damaged parts of the house and other properties.

AFTER



Ensure that outlets or electrical appliances are dry and not submerged in water before restoring power.



If evacuated, wait for instructions from authorities on when it is safe to return home.



As much as possible, stay at home to avoid disrupting emergency services.



If going out, avoid fallen trees, damaged buildings, and power lines.



Dispose of collected water in cans, pots, and tires to prevent mosquito breeding.



B

Storm Surge/Daluyong ng Bagyo

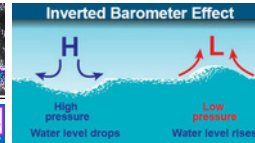
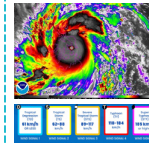
Definition

STORM SURGE is the abnormal rise of sea water due to low pressure and strong winds brought by tropical cyclones resulting in sea water moving towards the coastline causing flood in low-lying areas.

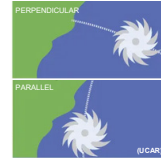
Causes of Storm Surge

- Strong winds brought by tropical cyclone and the low atmospheric pressure.
- The actual height of the storm surge wave is increased when the storm surge coincides with the occurrence of high tide
- Shallow coastline causes higher surge height while deeper slope causes lower surge height

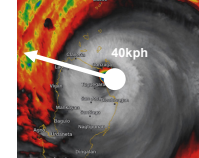
Tropical Cyclone Characteristics



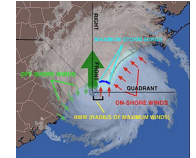
Larger TC, more areas to be affected by storm surge
...
Stronger winds, higher storm surge
...
Lower pressure, higher storm surge



Perpendicular approach produce higher storm surge



Faster storms on open coasts yield higher storm surges, while slower ones in bays and estuaries can also result in elevated surges.



Right front quadrant produces the highest storm surge

Continental Shelf and Shape of the Coastline

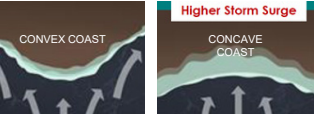


GENTLE SLOPE



STEEP SLOPE

Gentle sloping continental shelves produce higher storm surge



Higher storm surge is found in concave coast

Local Features



Rivers adjacent to the coast may contribute to more inland flooding depending on its characteristics



Natural or man-made barriers help lessen the impact on storm surge to the coastal communities

Storm Surge



WHAT TO DO DURING A STORM SURGE?

FOR INDIVIDUALS



Monitor public weather forecasts, bulletins and warnings issued by DOST.



Turn off utilities, main electrical switches and gas valves.



Make plans for evacuation to higher grounds for evacuation centers.



If you need to evacuate, bring your survival kit with essential items like canned food, drinking water, flashlight, clothes, transistor radio, etc.



Secure your home. Move essential items to the upper floors.

FOR COMMUNITIES



Community leaders should prepare evacuation plans by identifying evacuation centers that are on higher grounds. Create a communication system easily understood by all residents.



Make sure that all valuables and important documents are secured.



Make sure that there is a back up plan composed of the following: reliable transport system, efficient search and rescue operation, medical assistance, clearing equipment, sanitation and relief and rehabilitation activities.



Conduct regular drills and exercises to familiarize every community member with actual storm surge situations.



Evacuate people as soon as possible to higher grounds when there is a strong typhoon that will hit coastal communities.

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration



A man pulls his bike while traversing the flooded Araneta Avenue in Barangay Talayan (Philippine News Agency)

C Flood

Flooding occurs when heavy or sudden rain exceeds the capacity of rivers, creeks, and other waterways, causing excess water to overflow into areas that are not typically flooded. Floods often happen when channels become congested and obstructed, which hinders the water's quick flow away.

Causes of Flood

Natural Causes

- Intense and prolonged rainfall
- Storm Surge (due to strong winds brought by a storm)
- High Tides (gravitational effect of the moon)

Human Activities

- Increased urbanization and coastal development
- Rapid clogging & siltation of drainage laterals and waterways
Indiscriminate dumping of garbage in waterways, canals and drainage system.
- Encroachment at open waterways
Informal settlers constructing illegal structures along and on top of waterways
- Lack of an integrated land use plan
- Inadequate flood control structures and limited capacity of existing drainage systems

- Failure of levees and dikes
- Deforestation and environmental degradation

Types of Flood

Location

1. Riverine flooding - occurs when rivers overflow their banks, and water flows into nearby areas.
2. Coastal flooding - caused by high tides, storm surges, and strong waves.
3. Urban flooding - happens in densely populated areas when rainfall overwhelms the capacity of drainage systems.

Duration

1. Rapid-onset/flash floods - occur within 6 hours, usually after heavy rainfall from thunderstorms or a dam break.
2. Slow-onset floods - develop slowly over days and weeks when water bodies flood their banks.

Flood Bulletin

During flood watch, the Flood Forecasting and Warning Centers (FFWCs) issue flood advisories or bulletins twice daily for major river basins nationwide. The water level is monitored using three assessment levels: ALERT (when the river reaches 40% of its capacity), ALARM (when it reaches 60% of its capacity), and CRITICAL (when it reaches 80% of its capacity).



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and Astronomical Services
Administration (PAGASA)

PAMPANGA RIVER BASIN FLOOD FORECASTING & WARNING CENTER (PRFFWC)
DMGC, Bgy. Maitim, City of San Fernando, Pampanga 2000, T+63 (45) 550-5175; CP: 0999 336 6416
websites: bagong.pagasa.dost.gov.ph / prffwc.synthasite.com

FLOOD BULLETIN NO. 6		
PAMPANGA RIVER BASIN & ALLIED RIVERS ISSUED AT 5:30 AM, 29 JULY 2023 (VALID UNTIL THE NEXT BULLETIN AT 5:30 PM TODAY)		
Average Basin Rainfall as of 5:00 AM today	Past 24-hr observed 98 millimeters	Forecast 24-hr basin rainfall Between 20 to 40 millimeters
BASIN'S LIKELY RESPONSE / RELATED IMPACTS		
WATER LEVEL STATION	RIVER / SWAMP WATER LEVEL (WL) TREND AT STATION	POSSIBLE FLOOD SITUATION MESSAGE (POSSIBLE IMPACTS) & AREAS LIKELY TO BE AFFECTED
Rio Chico River at Zaragoza station (Nueva Ecija)	Estimated still to be above the 4.00 m Alarm WL; to remain above alarm until this afternoon	Pluvial floods to persist (ponding of rainwater causing several inches of floodwater along roadways & croplands); Fluvial flood (river overflowing) is possible - La Paz, Concepcion, Tarlac City, Bamban, Zaragoza, San Antonio, Alajala, Licab
Pampanga River at San Isidro station (Nueva Ecija)	Now at 5.34 m, has breached above the 5.00 m Alert WL last night; slow rise to continue and may likely reach 6.00 m Alarm WL tonight / tomorrow	Pluvial flooding (partly submerged roads, croplands) persists; Fluvial flood (river overflowing) is possible - Jaen, San Isidro, Cabaio, Gapan
Pampanga River at Arayat Station (Pampanga)	Now at 6.07 m, above 6.00 m Alarm WL; slow rise to continue & likely to reach 6.50 m Critical WL this afternoon / tonight	Pluvial floods (partly submerged roads, croplands) to persist; Fluvial flood (river overflowing & possible riverbank erosion) is threatening & likely to occur - riverside areas of Arayat, San Simon, San Luis
Candaba Swamp Area at Candaba station (Pampanga)	Now at 6.07 m, above 5.00 m Critical WL; Slow filling-up of swamp WL above its Critical to continue further; more spread of floodwaters over swamp area until tomorrow	Pluvial floods (submerged roads, croplands) / Fluvial floods (possible riverbank erosion) to persist within the swamp area; flooding has occurred & is to persist in the low-lying areas within the swamp area at San Miguel, San Mateo, San Rafael, Candaba, Apalit
Pampanga River at Sulipan Station; Pampanga Delta areas (Pasac, Guagua Sub-Basin)	Now at 3.36 m, above 3.20 m Alarm WL; very slow fluctuating rise to continue until this afternoon (tide-influenced)	Pluvial floods (partly submerged roads, croplands) to persist in Plaridel, Pullan, Belluag, Lubao, Sasmuan, Guagua, Sta. Rita, Malinal, Sto. Tomas, City of San Fernando, Mexico, Bacolor and adjacent areas; Pluvial & Fluvial floods along the lower sections of Main Pampanga River at riverside areas of Apalit, Macabebe, Masantol, Calumpit, Paombong and Hagonoy
The public and the Local Disaster Risk Reduction & Management Councils (LDRRMOs) within the Pampanga River Basin (PRB) are advised to maintain their preparedness & continue their response activities to mitigate the impacts of the hazards associated with the SW Monsoon, which is to prominently persist for at least 1 to 2 more days over the western portions of PRB; to keep monitoring for heavy rainfall warnings, other severe weather information, & other related products issued by PAGASA.		

Prepared by: JRD / JCL / RFD

Checked by: HTH

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Metro Manila, Philippines 1100

Tel. No.: (02) 8284-08-20
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Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

General Flood Advisory

A General Flood Advisory is issued for areas outside the telemetered major river basins when there is significant rainfall based on objective criteria such as past and current rainfall observations and rainfall forecasts from numerical weather prediction models, satellite-based information, and radar estimates. This advisory is issued to the public nationwide through NDRRMC twice daily, at 6:00 AM and 6:00 PM.



Republic of the Philippines
Department of Science and Technology
PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND
ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)
PAGASA Science Garden, Agham Road, Diliman, Quezon City 1100

GENERAL FLOOD ADVISORY #4

For Region 3 (Central Luzon)

Issued at 6:00 pm, 26 August 2023

(Valid until the next issuance at 6:00 am tomorrow)

PRESENT WEATHER :

AT 3:00 PM TODAY, THE CENTER OF THE EYE TYPHOON "GORING" (SAOLA) WAS ESTIMATED BASED ON ALL AVAILABLE DATA AT 160 KM EAST SOUTHEAST OF APARRI, CAGAYAN OR 145 KM EAST NORTHEAST OF TUGUEGARAO CITY, CAGAYAN (18.07N, 123.11E) WITH MAXIMUM SUSTAINED WINDS OF 155 KMH NEAR THE CENTER AND GUSTINESS OF UP TO 190 KMH. IT IS MOVING SOUTHWARD AT 10 KMH. SOUTHWEST MONSOON AFFECTING CENTRAL AND SOUTHERN LUZON, VISAYAS, AND MINDANAO.

FORECAST 12-HR RAINFALL :

MODERATE TO OCCASIONALLY HEAVY RAINS

WATERCOURSES LIKELY TO BE AFFECTED :

- **BATAAN** - RIVERS AND ITS TRIBUTARIES PARTICULARLY BALANGA AND MORONG.
- **AURORA** - RIVERS AND ITS TRIBUTARIES PARTICULARLY CASIGURAN, AGUANG AND LOWER UMRAY.
- **ZAMBALES** - RIVERS AND ITS TRIBUTARIES PARTICULARLY PAMATAWAN, STO. TOMAS, BUCAO, BANCAL AND LAWIS.

PEOPLE LIVING NEAR THE MOUNTAINS SLOPES AND IN THE LOW LYING AREAS OF THE ABOVE MENTIONED RIVER SYSTEMS AND THE LOCAL DISASTER RISK REDUCTION AND MANAGEMENT COUNCILS CONCERNED ARE ADVISED TO BE ALERT FOR POSSIBLE FLASHFLOODS

Prepared by :

(SGD)

JWB / ARA

Duty Hydrologists

Main Operation Center-Flood Forecasting and Warning Section (MOC-FFWS)

Hydrometeorology Division, PAGASA

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

Flooding



WHAT TO DO?

BEFORE

Stay informed on weather conditions by monitoring radio and TV news from PAGASA.



Visit the PAGASA website for real-time updates on tropical cyclone tracks, water level sensor readings, and historical flood maps.



Familiarize yourself with the flood warning system in your community, and know where the nearest evacuation center is located.



Prepare your survival kit.



Move essential household appliances and belongings to the upper level of the house.



Turn off electric switches and gas valves when it is time to evacuate.



DURING

Stay informed about weather conditions and monitor radio and TV news for updates from PAGASA.



Visit the PAGASA website for real-time updates on tropical cyclone tracks, water level sensor readings, and historical flood maps.



Stay indoors unless there is an emergency.



Never cross rivers or streams where the water level is already knee-deep.



Be cautious of flooded roads and bridges, and watch out for open maintenance holes and drainages.



Avoid turning on switches or using electrical appliances until a competent electrician has checked all electrical outlets and switches.



Do not swim or play in rivers, streams, or canals.



Report broken electric lines to appropriate agencies like MERALCO.



Beware of contaminated food and water, especially those submerged in flood waters.



Avoid consuming any food or water that the floodwaters may have contaminated.



Be prepared to evacuate with your survival kit if the flood waters continue to rise.



If needed, boil water before drinking it and only eat cooked food.



AFTER

Be careful of broken electric wires, flammable items and dangerous animals like snakes and rats.



Consult a doctor immediately if you experience any symptoms like fever or cough.



Avoid staying in disaster areas and refrain from sightseeing to avoid further danger.





Rain-induced landslide, Panaon Island, Southern Leyte, December 2003

D

Rain-induced Landslide

Definition

LANDSLIDE caused by heavy rain due to thunderstorms, tropical cyclones, monsoons, and other weather systems is the sliding down of soil, rocks or mud from an elevated place like a mountain or cliff resulting in houses or structures, properties, and even people being buried.



Rain-induced debris flow, Brgy. Mayana, Barili, Cebu, December 2014
Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration



WHAT TO DO?

BEFORE



Study the condition in your area and watch out for signs of possible landslide like cracking of the soil or sudden gush of water from the soil.



Prepare your survival kit with provisions like food, drinking water, flashlight, transistor, radio, etc. Refer to page ____

DURING



Monitor possibility of landslides through weather reports and landslide hazard maps.



If you are inside the house or building and evacuation is no longer possible, stay inside and get under a table.



Know where the fastest and safest way to the nearest evacuation center



If you are outside, avoid areas that may be affected by landslide and if possible go to an elevated and safe place.



Evacuate immediately in cases of non-stop rainfall and when there are signs of landslide.



If landslide can no longer be avoided, lie down in a fetal position and protect your head.



If you are driving, don't try to cross bridges and roads that are about to collapse and avoid falling rocks and soil.

AFTER



Avoid going to places affected by landslide as the hazard might recur.



Watch out for possible flashfloods if the landslide blocked the water flow.



Check for missing persons and report it to authorities so that rescue operations can start immediately.



Monitor the latest advisories and warnings from the radio and TV or visit the PAGASA website.



Report damaged power and water lines, telephone installations and other utility facilities.



Check for damaged foundation and other parts of the house or building. Immediately have repairs done once there is no longer a landslide threat.



E

El Niño

What is ENSO?

The EL NIÑO SOUTHERN OSCILLATION (ENSO) is a naturally occurring phenomenon of the climate system resulting from the interaction between the ocean and atmosphere in the Central and Eastern Equatorial Pacific (CEEP).

El Niño is the warm phase of ENSO. It lasts 8 to 12 months and occurs every 2 to 7 years.

Drought Warning System



**Dry
Condition**

Below Normal Rainfall
Conditions for 2
Consecutive Months



**Dry
Spell**





Below Normal Rainfall
Conditions for 3
Consecutive Months



Drought

Below Normal Rainfall
Conditions for 5
Consecutive Months

ENSO Alert and Warning System (El Niño)

WARNING TYPE	WATCH <i>BE AWARE and PREPARED!</i> 	ALERT <i>EARLY ACTION!</i> 
FORECASTS	If the conditions are favorable with 55% chance of El Niño development within the next six months	If the conditions are favorable with 70% chance of El Niño development within the next two months
FORM OF ISSUANCE	<ul style="list-style-type: none"> Monthly Climate Assessment and Outlook Press Statement 	<ul style="list-style-type: none"> Monthly Climate Assessment and Outlook Press Statement Dry Spell and Drought Assessment and Outlook
WARNING TYPE	ADVISORY <i>TAKE ACTION!</i> 	FINAL ADVISORY <i>ASSESS AND ACT WHENEVER NECESSARY!</i> 
FORECASTS	El Niño is ongoing and expected to continue.	El Niño has ended.
FORM OF ISSUANCE	<ul style="list-style-type: none"> El Niño Advisories Press Statement and Press Briefing Dry Spell and Drought Assessment and Outlook 	<ul style="list-style-type: none"> Final Advisory Press Statement Dry Spell and Drought Assessment and Outlook

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

El Niño Watch



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and Astronomical
Services Administration (PAGASA)

CLIMPS-02 Rev. 0/06-01-22

Monthly Climate Assessment and Outlook *El Niño Watch*

ENSO-neutral conditions are present in the tropical Pacific and may prevail until the June-July-August (JJA) 2023 season. However, a transition to El Niño in the July-August-September (JAS) 2023 season is likely and may persist until 2024.

El Niño increases the likelihood of below-normal rainfall conditions, which could negatively affect some areas of the country (such as dry spells and droughts). However, over the western part of the country, above-normal rainfall conditions during the Southwest monsoon season (Habagat) may also be expected.

Assessment in March 2023

The Northeast (NE) monsoon, easterlies, isolated thunderstorms, ridge of high-pressure area (HPA), low-pressure areas (LPAs), and shear lines were the weather systems that prevailed in the country during March. Moreover, on March 21 the agency declared the termination of the NE monsoon, indicating the start of the warm and dry season. There is no tropical cyclone (TC) developed during the month, despite several LPAs formed inside the Philippine Area of Responsibility (PAR), which brought heavy rains in some areas in Mindanao.

Based on actual rainfall for the month, most parts of the country received way below to below normal rainfall (33 provinces with way below normal and 28 provinces with below normal rainfall). However, most parts of Mindanao and Samar provinces experienced near to above-normal rainfall conditions.

Generally, near to below-average mean surface temperatures were observed in most parts of Luzon and Visayas. Furthermore, near to slightly above-average mean surface temperatures were observed over Mindanao. The actual temperature ranges were as follows: mountainous areas of Luzon: 10.9°C – 28.4°C; rest of Luzon: 15.5°C – 37.0°C; Visayas: 20.0°C – 35.0°C; mountainous areas of Mindanao: 16.5°C – 33.8°C; rest of Mindanao: 21.2°C – 35.9°C and 19.5°C – 36.0°C in Metro Manila.

Outlook for April 2023

The warm and dry climate conditions will continue in April. Weather systems likely to affect the country are the following: Easterlies, Ridge of HPA, LPAs, Localized thunderstorms, Intertropical convergence zone (ITCZ), and zero (0) or one (1) TC occurrence for April.

The rainfall forecast for April shows that most parts of Luzon will likely experience below-normal conditions except for the provinces of Ilocos Norte, Bataan, and Cavite which may receive way below-normal rainfall. However, most parts of Visayas and Mindanao will likely experience near-normal rainfall. The probabilistic forecast of below normal in most parts of Luzon also depicts high confidence while near to above-normal rainfall conditions in Visayas and Mindanao.

Meanwhile, near-average to below-average mean surface air temperatures are forecasted in most parts of the country, except for Iba, Clark, Port Area, Alabat, Puerto Prinsesa, Dumaguete City, Dipolog City, Cotabato City, and Davao City which may experience slightly above to above average temperatures. The ranges of forecast temperature are as follows: 12.2°C to 29.0°C in the mountainous areas of Luzon, 15.8°C to 39.4°C over the rest of Luzon, 21.2°C to 36.8°C in Visayas, 15.0°C to 35.0°C in the mountainous areas of Mindanao, 20.4°C to 38.3°C over rest of Mindanao and 20.4°C to 37.8°C for Metro Manila.

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1 of 2

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

El Niño Watch



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and Astronomical
Services Administration (PAGASA)

CLIMPS-02 Rev. 0/06-01-22

PAGASA will continue to monitor closely the development of El Niño and its influence on the country's climate conditions. Therefore, all government agencies and the public are encouraged to take precautionary measures to mitigate its adverse impacts. For more information, please call the Climatology and Agrometeorology Division (CAD) at 8284-0800, extension 4920.

Original Signed:

VICENTE B. MALANO, Ph.D.
Administrator

Date Issued: 05 April 2023

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2 of 2

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

El Niño Advisory



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and
Astronomical Services Administration (PAGASA)



CLIMPS-01 rev.0/15-08-2023

ENSO ADVISORY

El Niño Advisory No. 7

Strong El Niño is ongoing and is expected to continue through January-February 2024. Majority of global climate models suggest that El Niño will likely persist until the March-April-May 2024 season with a transition to ENSO-neutral in the April-May-June 2024 season.

El Niño increases the likelihood of below-normal rainfall conditions, which could bring negative impacts (such as dry spells and droughts) in some areas of the country which will likely be manifested in the first quarter of the year. This may adversely affect the different climate-sensitive sectors such as water resources, agriculture, energy, health, public safety, and other key sectors of the country.

Assessment in December 2023

The weather systems that affected the country during the month were the Northeast (NE) Monsoon, localized thunderstorm, shear line, easterlies, low-pressure areas (LPAs) and the passage of Tropical Storm (TS) "KABAYAN" with international name, "JELAWAT". TS "KABAYAN" entered the Philippine Area of Responsibility (PAR) and made landfall in Manay, Davao Oriental on 18 December before dissipating into an LPA. Moreover, "KABAYAN" brought occasional rains over the eastern portions of Visayas and Mindanao but no significant damages to agriculture and infrastructures were monitored.

Rainfall assessment for the month showed that way below to below normal rainfall conditions were experienced in most parts of the country except Bulacan, Quezon, Bohol, Siquijor, Southern Leyte, Zamboanga Peninsula, Northern Mindanao, Davao Region, Caraga, and were near normal rainfall were observed. Consequently, above normal rainfall conditions were observed over Batanes and Agusan del Norte.

Over the past five (5) months of rainfall deficits, Cavite has experienced meteorological drought; twenty-four (24) provinces mostly in Luzon area have experienced dry spell; while three (3) provinces have experienced dry conditions. For a complete list of these provinces, please refer to the [Drought/Dry Spell Assessment Maps and Tables](#).

Generally, mean surface air temperatures observed across the country were slightly warmer to warmer than average. The recorded temperature ranges were as follows: 22.9°C to 34.6°C in Metro Manila; 15.2°C to 26.7°C in the mountainous areas of Luzon; 15.0°C to 36.6°C for the rest of Luzon; 22.0°C to 35.0°C in Visayas; 16.8°C to 33.5°C in the mountainous areas of Mindanao; and 21.3°C to 36.4°C over the rest of Mindanao.

In addition, four PAGASA stations recorded new maximum temperature extremes for the month of December, namely: Clark, Pampanga station on 06 December 2023 (34.2°C), NAIA, Pasay City station on 10 December 2023 (34.6°C), San Jose, Occidental Mindoro station on 28 December 2023 (36.6°C) and Zamboanga City station on 29 December 2023 (36.4°C).

Outlook for January 2024

The weather systems that will likely affect the country in January 2024 are the NE Monsoon, localized thunderstorm, shear line, frontal system, ITCZ, easterlies, LPAs, and zero (0) or one (1) TC inside the PAR, along with the possible influence of intra-seasonal and inter-annual climate modes like the Madden-Julian Oscillation (MJO), El Niño, and among others.

Science Garden Compound, Senator Miriam Defensor-Santiago Ave.,
Brgy. Central, Quezon City, Metro Manila, Philippines 1100

Tel. No. (02) 8284-08-00 loc. 4921 or 4920
Website: <http://bagong.pagasa.dost.gov.ph>

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

El Niño Advisory



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and
Astronomical Services Administration (PAGASA)



CLIMPS-01 rev.0/15-08-2023

Rainfall forecast for the month shows that way below to below normal rainfall conditions are likely over most parts of Luzon and Visayas, Northern Mindanao, Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) and Zamboanga Peninsula while near normal rainfall conditions are likely over the rest of the country. In addition, forecast shows a 45% probability of having below normal rainfall conditions in most parts of the country.

Moreover, by end of January, fifteen (15) provinces in Luzon are potential for meteorological drought condition; twelve (12) provinces are potential for dry spell, while, twenty-four (24) provinces are potential for dry condition. For a complete list of these provinces, please refer to the [Drought/Dry Spell Outlook](#).

Generally, near average to warmer than average air temperatures are forecasted over the country, except in Romblon and Coron, Palawan, where cooler than average is expected. Moreover, surges of cold temperatures may also be expected to occur during the month. The forecast temperature ranges are as follows: 19.0°C to 35.0°C over Metro Manila; 10.0°C to 28.0°C in the mountainous areas of Luzon; 13.0°C to 35.5°C for the rest of Luzon; 20.0°C to 35.0°C in the Visayas; 14.0°C to 34.0°C over the mountainous areas of Mindanao and 19.0°C to 37.0°C over the rest of Mindanao.

PAGASA will continue to closely monitor the monsoon activity and the ongoing El Niño phenomenon. Areas potential for meteorological dry spells and drought will be updated and will be disseminated accordingly. Meanwhile, all government agencies and the general public are encouraged to take precautionary measures to mitigate the adverse impacts of the said climate phenomenon. For more information, please call the Climatology and Agrometeorology Division (CAD) at 8284-0800, extension 4920 or 4921.

Original Signed:

NATHANIEL T. SERVANDO, Ph.D.
Administrator

Date Issued: 05 January 2024

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Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration



Flooding of school in Mindanao due to La Niña rains. (Photo courtesy of DepEd)

F

La Niña

Definition

LA NIÑA is characterized by unusually cool ocean surface temperatures in the central and eastern equatorial Pacific (CEEP).

La Niña is the cool phase of ENSO. It lasts 1 to 3 years and occurs every 3 to 4 years.

Effects of La Niña



Early rainy season



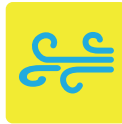
Short dry season



More tropical cyclones enter the Philippine Area of Responsibility







Above normal rainfall



Enhanced Northeast (NE) Monsoon activity

ENSO Alert and Warning System (La Niña)

WARNING TYPE	WATCH <i>BE AWARE and PREPARED!</i> 	ALERT <i>EARLY ACTION!</i> 
	If the conditions are favorable with 55% chance of La Niña development within the next six months	If the conditions are favorable with 70% chance of La Niña development within the next two months
FORECASTS		
ISSUANCE	<ul style="list-style-type: none"> Monthly Climate Assessment and Outlook Press Statement 	<ul style="list-style-type: none"> Monthly Climate Assessment and Outlook Press Statement
WARNING TYPE	ADVISORY <i>TAKE ACTION!</i> 	FINAL ADVISORY <i>ASSESS AND ACT WHENEVER NECESSARY!</i> 
	La Niña is ongoing and expected to continue.	La Niña has ended.
FORECASTS		
ISSUANCE	<ul style="list-style-type: none"> La Niña Advisories Press Statement Press Briefing 	<ul style="list-style-type: none"> Final Advisory Press Statement

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

La Niña Watch



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and Astronomical Services
Administration (PAGASA)

Monthly Climate Assessment and Outlook ENSO-neutral conditions persist La Niña Watch

El Niño Southern Oscillation (ENSO) - neutral conditions are still present across the tropical Pacific Ocean. Majority of the climate models suggest ENSO-neutral conditions are likely to prevail during the August-September-October 2021 season. However, La Niña is likely to re-emerge (55% chance) during the September-October-November 2021 season and may persist until the first quarter of 2022. With this, PAGASA ENSO Alert and Warning System status is *La Niña Watch*.

Assessment in July 2021

The weather systems that affected the country during the month were the localized thunderstorms, low pressure areas (LPAs), inter-tropical convergence zone (ITCZ), southwest (SW) monsoon, and the occurrence of two (2) tropical cyclones (TCs) that entered the Philippine Area of Responsibility (PAR), namely: Tropical Depression (TD) "Erong", July 4-6 and Typhoon (TY) "Fabian" (International name: In-Fa), July 16-23. Both TC tracks were over extreme Northern Luzon. Meanwhile, TY "Fabian" developed from a tropical depression and moved slowly until it intensified into a typhoon while inside the PAR and enhanced the southwest (SW) monsoon. This brought heavy and continuous rains which resulted to widespread flooding and rain-induced landslides, and consequently affected several areas in Luzon and Visayas. According to NDRRMC Situational Report for Southwest Monsoon Enhanced by TC Fabian (2021), a total of 432 areas in Region 1, Region 3, CALABARZON, MIMAROPA, Region 6, CAR and NCR experienced flashflood / flooding and 487 other related incidents, that resulted to damage to infrastructure and agriculture. Two (2) cities/municipalities in MIMAROPA have declared under State of Calamity.

Rainfall assessment showed that most areas in Luzon received near to above normal rainfall conditions except for Cagayan, Isabela, and Sorsogon where below normal rainfall condition were observed. However, in Visayas and Mindanao, generally below to near normal rainfall were observed except for above normal conditions experienced in Antique, Davao de Oro, Davao Oriental, Surigao del Norte, Surigao del Sur, Sulu and Tawi-tawi.

Surface temperatures were near to slightly warmer than average, except for Davao, Romblon and General Santos where temperatures were slightly cooler than average. Mean temperature ranges were as follows: mountainous areas of Luzon, 19.0°C – 22.8°C; rest of Luzon, 20.0°C – 35.1°C; Visayas, 24.7°C – 33.8°C; mountainous areas of Mindanao, 19.0°C – 30.6°C; rest of Mindanao, 22.3°C – 34.6°C and Metro Manila: 25.1°C – 31.8°C.

Furthermore, seven (7) stations have surpassed their historical extreme maximum temperatures for July namely Clark, Pampanga (35.4°C/July 2), Cotabato City (36.8°C/July 26), El Salvador, Misamis Or. (36.6°C/July 25), Malaybalay, Bukidnon (33.4°C/July 12), Davao City (36.0°C/July 25), Hinatuan (37.9°C/July 24 and 25) and Zamboanga City (36.2°C/July 24) while San Jose, Occ. Mindoro (19.5°C/July 29) and Surigao City (18.0°C/July 15 and 19) have also surpassed their minimum temperatures for the month. Mindanao PAGASA Regional Services Division issued several advisories on the occurrence of these extreme temperatures.

Outlook for August 2021

The weather systems that will likely affect the country during the month are the localized thunderstorms, ITCZ, LPAs, SW monsoon, and two (2) or three (3) tropical cyclones that may enter/develop inside the PAR.

Rainfall forecast for the month shows that near normal rainfall conditions are expected in most parts of the country except for the western section of Luzon that may receive below normal rainfall. However, above normal rainfall conditions are expected in some areas over the Bicol Region, Eastern Visayas and CARAGA.

Generally, slightly below average to above average air temperatures are predicted in the country. The forecast ranges are as follows: 15.0°C to 28.0°C over the mountainous areas of Luzon, 17.0°C to 37.5°C for the rest of Luzon, 20.0°C to 36.0°C in the Visayas, 15.5°C to 33.5°C over the mountainous areas of Mindanao, 18.0°C to 36.5°C over the rest of Mindanao and 22.0°C to 35.0°C in Metro Manila.

Despite the on-going community quarantine due to the COVID-19 pandemic, PAGASA will continue to closely monitor the climate conditions and updates shall be issued as appropriate. For further information, please contact the Climatology and Agrometeorology Division (CAD) at telephone number 8284-0800, local 906.

VICENTE B. MALANO, Ph.D.
Administrator

Date Issued: 04 August 2021
Our URL: <http://bagong.pagasa.dost.gov.ph/>

"Tracking the sky...helping the country"
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Metro Manila, Philippines 1100

Trunkline: (02) 8284-0800 local 906
Website: <http://bagong.pagasa.dost.gov.ph>

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

La Niña Advisory



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and Astronomical
Services Administration (PAGASA)

CLIMPS-01 Rev.006-01-22

ENSO ADVISORY La Niña Advisory No. 16

Equatorial sea surface temperatures (SSTs) remain below average across most of the Pacific Ocean and the atmospheric condition is consistent with La Niña level. Most of the climate models suggest that La Niña is weakening and is expected to persist until Dec- Jan-Feb (DJF) 2023, then transition to ENSO-neutral afterwards.

La Niña increases the likelihood of having above-normal rainfall conditions that could lead to potential adverse impacts (such as heavy rainfall, floods, flash floods, and rain-induced landslides) over highly vulnerable areas.

Assessment in December 2022

The weather systems that affected the country during the month were the Northeast (NE) monsoon, localized thunderstorms, low pressure areas (LPAs), easterlies, intertropical convergence zone (ITCZ), shearline, and the occurrence of Tropical Storm (TS) Rosal with international name "PAKHAR" (Dec 10-12). TS Rosal did not cross the country but brought heavy rains which caused flooding in some areas in Region V & CARAGA as contained in the National Disaster Risk Reduction and Management Council (NDRRMC) Situational Report (SitRep 2) dated 13 December 2022.

Flooding and landslide incidents were also recorded in Regions IV-B, V, VI, VII, VIII, IX, X, XI and BARMM due to the effect of shearline. Other hazards associated with shearline such as strong winds and heavy rains also resulted to loss of lives and damage to agriculture and infrastructures. Thousand of families were evacuated and twenty two (22) cities and municipalities were declared under State of Calamity (NDRRMC SitRep dated 04 January 2023).

Rainfall assessment for the month showed that most parts of Luzon received way below to below normal rainfall except for Bicol Region and the provinces of Apayao, Batanes, Cagayan, Quezon, Marinduque, Romblon and Palawan where near to above normal rainfall was observed. Meanwhile, most areas in Visayas and Mindanao experienced near to above normal rainfall conditions.

Generally, near average surface air temperatures were felt in most parts of the country except for slightly cooler than average surface temperatures that were observed in Tayabas, Daei, Coron, Romblon and General Santos City. The temperature ranges were as follows: mountainous areas of Luzon: 12.0°C – 25.4°C; rest of Luzon: 13.2°C – 35.3°C; Visayas: 21.3°C – 35.0°C; mountainous areas of Mindanao: 17.3°C – 32.5°C; rest of Mindanao: 20.5°C – 35.3°C and 20.5°C – 33.6°C in Metro Manila. Surges of cold temperatures were also felt over most parts of Luzon.

Meanwhile, two (2) stations have surpassed their historical extreme maximum temperatures for the month, namely: Masbate (34.5°C on 17 December) and Catbalogan (35.0°C on 15 December).

Outlook for January 2023

The weather systems that will likely affect the country in January are the NE monsoon, localized thunderstorms, shearlines, LPAs, ITCZ, easterlies and zero (0) or one (1) tropical cyclone that may enter/develop in the PAR. The NE Monsoon may still be enhanced by other prevailing weather systems that could trigger floods, flashfloods and rain-induced landslides over susceptible areas. Moreover, surges of cold temperatures will still be likely.

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Website: <http://bagong.pagasa.dost.gov.ph>

Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

La Niña Advisory

ENSO ADVISORY La Niña Advisory No. 16

Rainfall forecast for the month shows that most parts of country will likely experience near to above normal rainfall conditions except in Abra, Region I, and most parts of Central Luzon that may receive below normal rainfall. However, the probability for above normal rainfall conditions are still high.

Generally, near average to warmer than average air temperatures are forecasted in most parts of the country, except Batanes, Romblon, Masbate, Cuyo, Palawan, Bohol and Leyte where slightly cooler to cooler than average surface air temperatures are expected. The forecast temperature ranges are as follows: 9.4°C to 27.9°C in the mountainous areas of Luzon, 13.0°C to 35.5°C over rest of Luzon, 19.9°C to 34.50°C in Visayas, 13.4°C to 33.3°C in the mountainous areas of Mindanao, 18.6°C to 36.5°C over rest of Mindanao and 18.2°C to 34.2°C for Metro Manila.

PAGASA will continue to closely monitor the climate conditions that may affect the country. Meanwhile, all concerned government agencies and the general public are advised to take precautionary measures, especially on the ongoing La Niña and updates shall be issued as appropriate. For further information, please contact the Climatology and Agrometeorology Division (CAD) at telephone number 8284-0800 local 906.

Original Signed:

VICENTE B. MALANO, Ph.D.
Administrator

Date Issued: 05 January 2023

2 of 2

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Source: DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration

03

Protocols, Warning & Communication Protocols

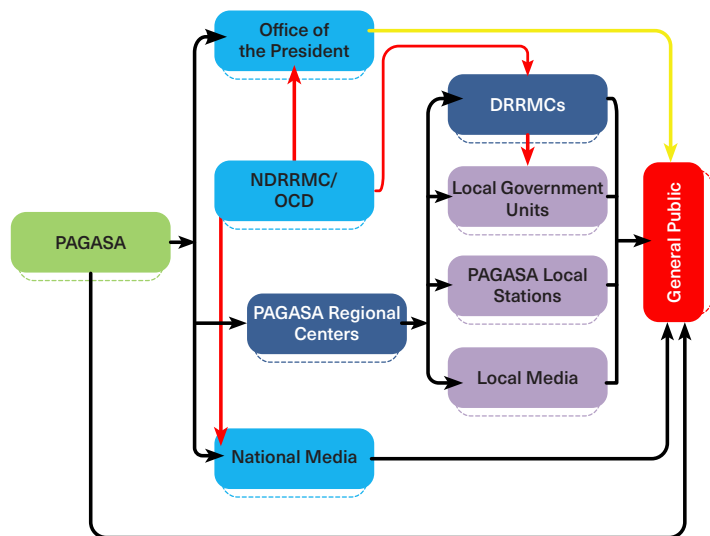


Protocols, Warning & Communication Protocols

After knowing and identifying the different kinds of hazards, it is equally important to know how these information and warnings are communicated to elicit appropriate response.

Warning agencies like PAGASA follow a certain communication protocol to ensure that the weather information they generate are effectively relayed to the public.

Information Dissemination Flow (External)



"The Republic Act Number 10639 otherwise known as the FREE MOBILE DISASTER ACT was signed into law on 20 June 2014. It mandates mobile phone service providers to send out alerts from NDRRMC and other early warning agencies to mobile phone subscribers that are at risk of being affected by incoming hazards. Under the act, in the event of an impending tropical cyclone, tsunami, earthquake or other calamities, mobile phone service providers are mandated to disseminate emergency alert and warning messages in a regular interval as required by the NDRRMC, and other relevant agencies. The alert, regulated by NTC and the NDRRMC, shall come at no cost, whether direct or indirect, to the consumers; and shall be included as part of the service provider's auxiliary services. The emergency alert and warning messages shall be sent to all cellphone subscribers in the affected areas at any time whenever necessary."

Civil Defense PH Facebook Page

Legend:
█ National █ Regional █ Local
→ PAGASA → NDRRMC → OP

Warning agencies use different platforms – television, radio, newspaper, SMS and online media – for real-time dissemination of information and warnings.

Social Media Accounts



Philippine Atmospheric,
Geophysical and Astronomical
Services Administration



Science Garden Compound, Senator
Miriam P. Defensor-Santiago Avenue,
Barangay Central, Quezon City, Metro
Manila, Philippines



Trunk Line Number: (02) 8284-0800
Weather Forecasting (24/7) (02) 8927-2877 / (02) 8926-4258
Public Information (02) 8927-9308 (02) 8434-2696
Aviation Weather (02) 8832-3023

Social Media Accounts



Philippine Institute of
Volcanology and Seismology



C.P. Garcia Avenue, UP Campus,
Diliman, Quezon City



Trunk Line Number
(02) 8426-1468 up to 79



Appendix

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 buildings 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 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 is noticeable.

VI: VERY STRONG

- Many people are frightened; many run outdoors. Some people lose 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 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 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 surfaces, 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 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 ground rupture may be observed. Trees are violently shaken. Water splashes or flows 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 flows 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 lakes occur. Many trees are toppled, broken or uprooted.

SCAN ME



HOW SAFE IS MY HOUSE?

Self-check for Earthquake Safety
of Concrete Hollow Block (CHB) Houses
in the Philippines



The integrity and safety of a house depends on how it was made.



Ver. 1.0
February 2014

SCAN ME



Brochure

HOW SAFE IS MY HOUSE?

Self-check for Earthquake Safety
of Concrete Hollow Block (CHB) Houses
in the Philippines



The integrity and safety of a house depends
on how it was made.



Ver. 1.0
February 2014

Tap anywhere to continue

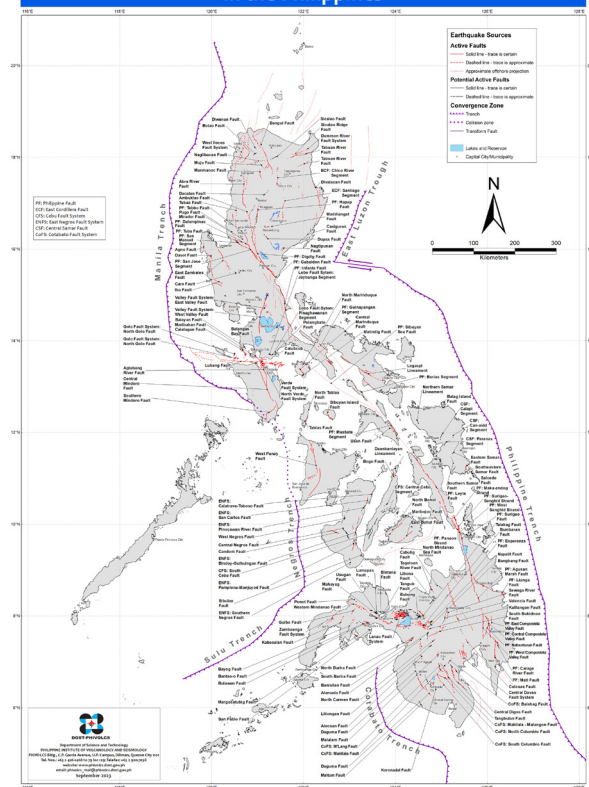
SCAN ME



Website

ACTIVE FAULTS IN THE PHILIPPINES MAP

Distribution of Active Faults and Trenches in the Philippines



web version

FAULT FINDER



TSUNAMI PREPAREDNESS GUIDELINES

How does a community go about preparedness and planning for tsunami?

The following is an initial checklist that a community can answer to gauge the level of preparedness on tsunami.

GENERAL CHECKLIST

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

From the initial checklist, a community can move further following the suggested step-by-step procedure on tsunami preparedness. Some activities may be applicable. Some activities can be adjusted depending on the needs of a particular community.

1. Increase awareness on basic tsunami information

Introduce key concepts and basic information, such as natural signs of an impending tsunami, to a capable team or core group of people in the community who will be the prime advocates of tsunami preparedness.

2. Tsunami hazard and risk mapping

A tsunami hazard map shows areas that can be affected by a tsunami. Most often, this kind of map is generated by experts and specialists after careful study of the area.

3. Tsunami evacuation planning

A tsunami evacuation map shows areas identified as safe and areas that are within the hazard zones. This kind of map provides information on how to evacuate to the identified safe areas.

4. Educating the community

After preparing the tsunami evacuation map, another series of information dissemination about the tsunami evacuation plan should be conducted

The three main activities under this are: (1) community information campaigns, (2) putting up of tsunami signages and (3) conduct of tsunami drill.

5. Establishing tsunami warning system

- Identify key offices and officials that will be part of the communication flow for information and warning.
- Identify existing equipment (2-way radio, sirens, bell, megaphones, etc.) available in each identified various points to reach the community.
- Identify appropriate warning system scheme and establish final warning system procedure for community (church bell, siren, etc).
- Install additional equipment for warning system.
- Establish final flowchart of information test warning and communication system.

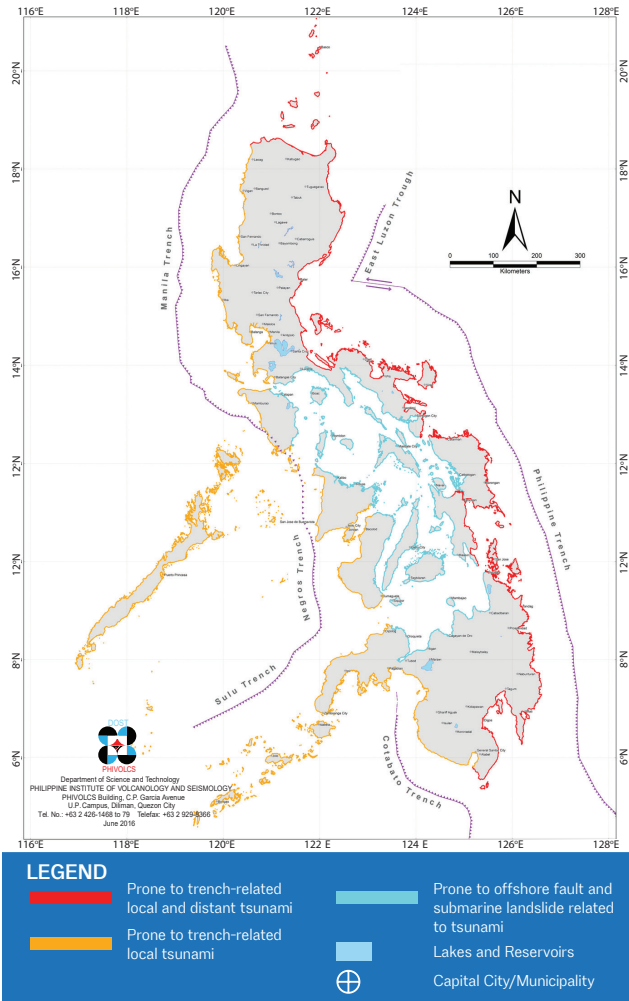
6. Identify tsunami mitigation measures

Choice of which mitigation measures to use depends on the community and capability to adapt whichever type of mitigation measure.

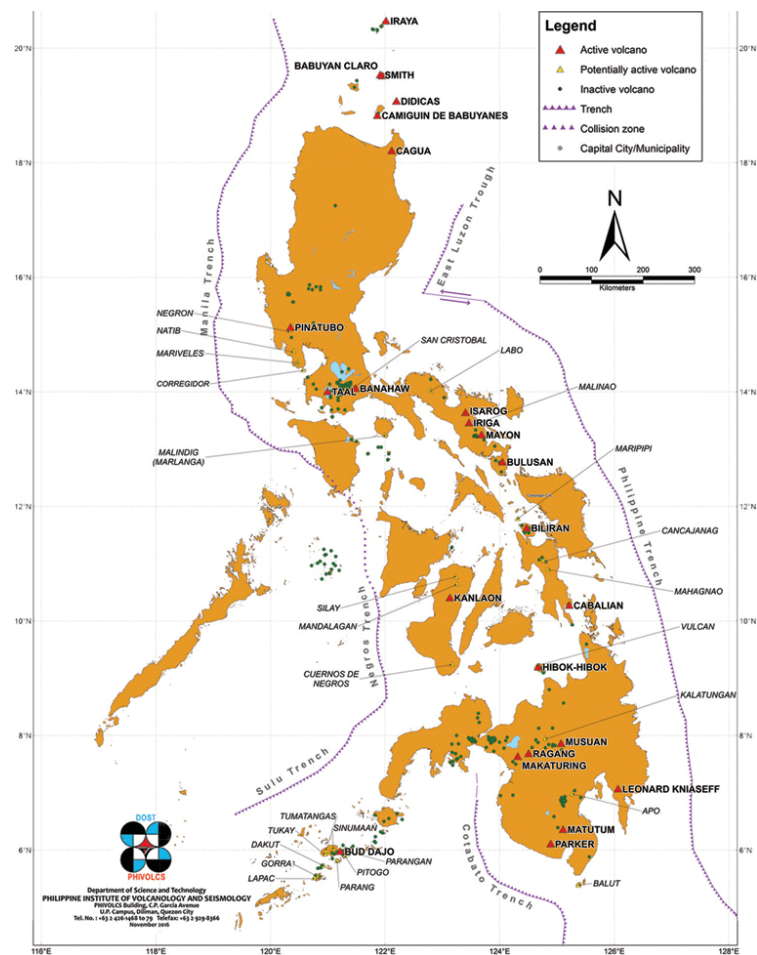
List of Tsunami Mitigation Measures

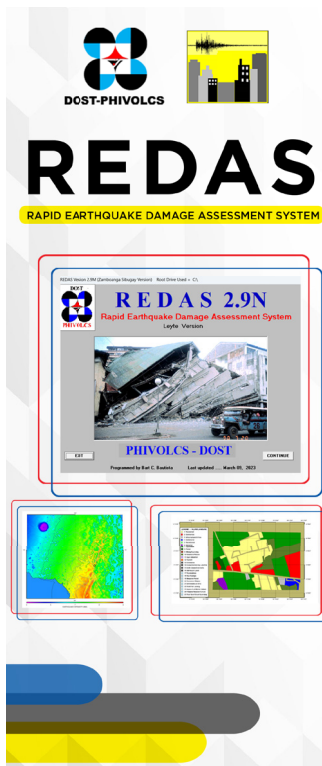
Non-structural	Structural
<ul style="list-style-type: none"> • Information campaign in schools and in communities • Tsunami hazard maps • Tsunami evacuation maps • Tsunami warning and information signage • Tsunami marker • Land use planning • Preservation of mangrove area • Coastal zoning 	<ul style="list-style-type: none"> • Construction of sea walls, breakers, tsunami platforms and towers • Construction of additional alternate/access roads from the coastal community; (development of roads perpendicular to the coast for faster evacuation)

Tsunami Prone Areas in the Philippines



VOLCANOES OF THE PHILIPPINES





WHAT ARE THE BENEFITS?

The participants are expected to have learned the following:

- Generate science-based seismic hazard maps
- Develop database useful for impact assessment and other uses
- Learn to use earthquake and rainfall monitoring tools useful for operation centers
- Calculate impacts from earthquake, flood, severe wind, tsunami, and lahars
- Calculate impacts to agricultural damages from severe wind and floods
- Generate and visualize multi-hazard maps
- Mainstream hazard assessment into land use planning and development, emergency preparedness, and contingency planning



WHAT ARE THE REQUIREMENTS?

Windows-based laptop/PC (for software installation) and signed Memorandum of Agreement (MOA) between DOST-PHIVOLCS and requesting party

MODE OF DISTRIBUTION

Modular Trainings customized according to user's needs and requirements

MEDIUM OF INSTRUCTION

Filipino and English languages

ASSESSMENT & CERTIFICATION

Certificate of Completion, Certificate of Participation or Certificate of Attendance.

RESOURCE PERSONS

Experts from PHIVOLCS, PAGASA and MGB

TRAINING MODULES

MODULE 1

Basic REDAS and Seismic Hazard Assessment

MODULE 2

Developing Relational Database in REDAS

Prerequisites: Module 1 and 2

MODULE 4

REDAS Multi-Hazard Impact Assessment (SHake, FloAT, SWIFT)

MODULE 5

TsuSim

MODULE 6

CropDAT

Stand alone modules

MODULE 3

REDAS Exposure Database Development

MODULE 7

ETAM and SRM

ADVANCED REDAS MODULES

- Session on Mainstreaming DRR (8h)
- Earthquake Impact Calculation using Survey Data
- Data Processing using Survey Data
- More under development (e.g. Lahar and Ashfall Impact Assessment)

REDAS IMPACT ASSESSMENT MODULES

SHake



Earthquake Impact Assessment Module computes for earthquake impacts

SWIFT



Severe Wind Impact Forecasting Tool computes impacts from severe wind hazard in partnership with PAGASA

FloAT



Flood Loss Assessment Tool computes impact from floods, in partnership with the Mines and Geosciences Bureau

TsuSim



Tsunami Simulation and Impact Module simulates tsunami hazard, computes for its impacts, and plots tsunami evacuation map

QLIST



Quick Lahar Impact Simulation Tool computes impacts due to lahars

CropDAT



Agriculture/ Crop Damage Assessment Tool estimates agricultural damages due to severe wind and flood hazards

REDAS (Rapid Earthquake Damage Assessment System) is a software developed by PHIVOLCS in 2002 under a DOST GIA Project. The software can simulate earthquake hazards such as ground shaking, liquefaction, landslides and tsunami. The software can also compute earthquake impacts in terms of physical damage, casualties and economic loss. Although REDAS was originally conceived for use in earthquake hazard and impact assessment, other multi-hazard maps including hydrometeorological hazards such as floods, storm surge and rain-induced landslides are already incorporated into the software and can likewise be displayed by users.

Contact Information



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leyobautista@yahoo.com



GEORISKPH is a government-led multi-agency initiative led by the Philippine Institute of Volcanology and Seismology (PHIVOLCS), that serves as the central resource of information on natural hazards and risk assessment. It aims to support the country's resilience against natural hazards and risks through enhancing the Philippines' disaster risk reduction and management efforts by providing geospatial information and tools for better decision-making.

OUR PLATFORMS



Quickly generate initial hazard assessments in your selected location for seismic, volcanic, and hydrometeorological hazards.

HazardHunterPH™
GEORISKPH

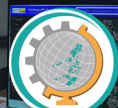
CHANGING THE GAME IN HAZARDS ASSESSMENT AND MONITORING



Generate summaries of hazards and risk assessment and perform analysis and visualization of exposure and elements at risk to natural hazards.

GeoAnalyticsPH™
GEORISKPH

From Data Collection to Analysis: (Generating Summary Hazard Assessments and Analytics Using GeoAnalyticsPH)



Collect hazard and exposure information from the office or field to ensure accurate and efficient updates in the database system.

GeoMapperPH™
MAP ANYWHERE, ANYTIME

Empowering LGUs & NGAs in Data Collection (Exposure, Vulnerability, Coping Capacity etc.)



An automated planning tool web application envisioned to revolutionize the Disaster Risk Reduction and Management (DRRM) planning processes in the country by helping the government efficiently plan to combat disasters, work smarter, and rebuild faster.

PlanSmart™
Ready to Rebuild

A catalyst to efficient and effective planning



<https://georisk.gov.ph/>

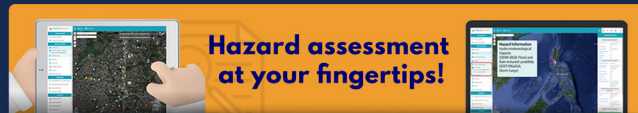
Contact us: (02) 8426-1468 to 79 | phivolcs_mail@phivolcs.dost.gov.ph | www.phivolcs.dost.gov.ph | [f #PHIVOLCS](#) | [@phivolcs_dost](#) | [DOST-PHIVOLCS](#)



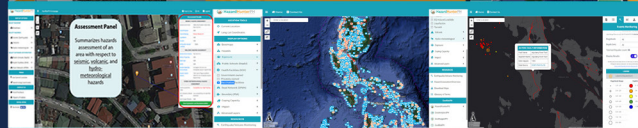
HazardHunterPH™
HAZARD ASSESSMENT AT YOUR FINGERTIPS

CHANGING THE GAME IN HAZARDS ASSESSMENT AND MONITORING

Quickly generate initial hazard assessments in your selected location for seismic, volcanic, and hydrometeorological hazards.



Hazard assessment at your fingertips!



- 1 Multi-hazard assessment for geological and hydro-meteorological hazards
- 2 Hazards and exposure information map layers
- 3 Near-real time earthquake monitoring
- 4 Summary hazard assessment on active volcanoes
- 5 Download hazard maps

What's in store for HazardHunterPH?



- Creation of official reports for bank loans, building permits, etc.
- Expansion of near real-time monitoring to cover more hazards
- Incorporation of typhoon tracks from DOST-PAGASA in the Map Display
- Addition of Impact Assessment Module (from REDAS)
- Development of Mobile Application for iOS and Android
- Integration of functionalities from other GeoRiskPH platforms and technologies for more efficient policy- and decision-making



Visit our website



Contact us: (02) 8426-1468 to 79 | phivolcs_mail@phivolcs.dost.gov.ph | www.phivolcs.dost.gov.ph | [f #PHIVOLCS](#) | [@phivolcs_dost](#) | [DOST-PHIVOLCS](#)

PlanSmart Ready to Rebuild Automated Planning Tool for Disaster Rehabilitation and Recovery

PlanSmart Ready to Rebuild Web Application

The PlanSmart Ready to Rebuild web application is an automated planning tool for disaster rehabilitation and recovery developed by the Department of Science and Technology-Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS) in collaboration with the National Disaster Risk Reduction and Management Council (NDRRMC), Office of Civil Defense (OCD), and the World Bank.

A catalyst to effective and efficient planning.

The app is envisioned to revolutionize the Disaster Risk Reduction and Management (DRRM) planning processes in the country by helping the government to efficiently plan for disasters, to work smarter, and to rebuild faster.

In 2022, PlanSmart Ready to Rebuild was developed.

It leverages the GeoRiskPH Integrated Platform and the Ready to Rebuild Program.

PlanSmart Ready to Rebuild is first of a series of PlanSmart tools that will be developed.

It can systematically generate a Rehabilitation and Recovery Plan using science-based data, GeoRiskPH calculation tools, and putting results in a pre-forma planning document template.

Objectives

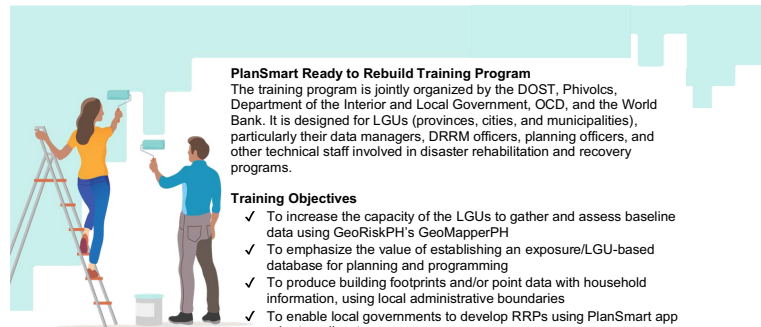
The PlanSmart Ready to Rebuild planning tool aims to support Local Government Units (LGUs) in formulating a comprehensive Rehabilitation and Recovery Plan (RRP) faster, which will help them improve decision-making and planning for pre- and post-disaster events.

Target Users and Beneficiaries

The app is designed for national and local governments, including decision-makers and technical staff, planners, DRRM officers, data managers, and budget officers. Ultimately, the local communities and residents will benefit from this initiative, especially the poor and the most vulnerable to disaster risks and impacts.

Launch

The PlanSmart Ready to Rebuild app will be launched on September 14, 2022.



PlanSmart Ready to Rebuild Training Program

The training program is jointly organized by the DOST, PHIVOLCS, Department of the Interior and Local Government, OCD, and the World Bank. It is designed for LGUs (provinces, cities, and municipalities), particularly their data managers, DRRM officers, planning officers, and other technical staff involved in disaster rehabilitation and recovery programs.




Training Objectives

- ✓ To increase the capacity of the LGUs to gather and assess baseline data using GeoRiskPH's GeoMapperPH
- ✓ To emphasize the value of establishing an exposure/LGU-based database for planning and programming
- ✓ To produce building footprints and/or point data with household information, using local administrative boundaries
- ✓ To enable local governments to develop RRP's using PlanSmart app prior to a disaster

Target Participants

For its pilot run, the program will train a total of 137 LGUs and more than 400 individual participants from the following regions:

- ☒ National Capital Region (NCR)
- ☒ CALABARZON (Region IV-A)
- ☒ Bicol Region (Region V)
- ☒ Central Visayas (Region VII) and
- ☒ CARAGA (Region XIII)

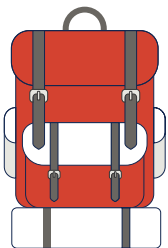
Training Methodology	Training Content and Agenda	Training Outputs
 Interactive Lecture	<ul style="list-style-type: none"> Module 1: Introduction to Disaster Rehabilitation and Recovery 	<ul style="list-style-type: none"> ✓ Pre-Orientation Output: Submission of Pre-Disaster Baseline Data
 Training Videos	<ul style="list-style-type: none"> Module 2: Baseline Data Collection and Management 	<ul style="list-style-type: none"> ✓ Training Output 1: Hazards Assessment of LGU-Owned Administrative Boundaries
 Group Work	<ul style="list-style-type: none"> Module 3: Formulation of Disaster Rehabilitation and Recovery Program using PlanSmart 	<ul style="list-style-type: none"> ✓ Training Output 2: Rehabilitation and Recovery Plan (RRP) Generated Using PlanSmart

World Bank Support

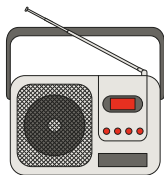
This initiative is part of the World Bank's technical assistance under the Fourth Disaster Risk Management Development Policy Loan with a Catastrophe Deferred Drawdown Option (CATDDO4). CATDDO4 is a \$500 million standby credit line that provides immediate liquidity following a declaration of national calamity. This initiative is also supported by the Global Facility for Disaster Reduction and Recovery Trust Fund.



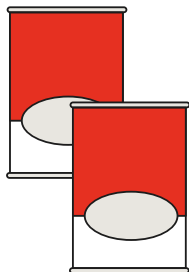
SURVIVAL KIT



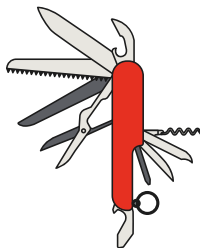
waterproof bag



transistor radio



canned food



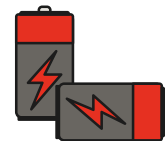
utility knife



flashlight



powerbank



batteries



rope



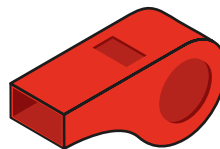
water



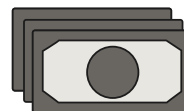
cellphone



matches



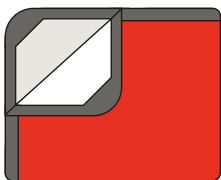
whistle



money



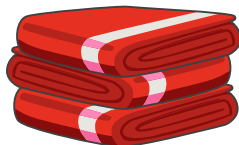
first aid kit



important documents



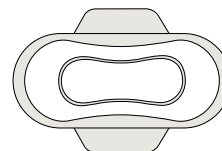
extra clothes



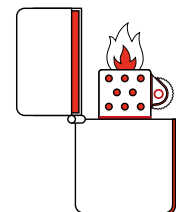
blankets



watch



sanitary napkin



lighter

Source: DOST-Philippine Institute of Volcanology and Seismology

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Philippine National Police: 117

Bureau of Fire Protection: 117

Department of Public Works and Highways: 165-02

Philippine Red Cross: 143

Metro Manila Development Authority: 136

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DENR-MGB

B

- **Beach Escarpment**
Ridges on the sand caused by the strong impact of the waves.

C

- **Coastal Engineering Structures**
Structures built or installed to serve as protection against the strong impact of waves. Examples of these include seawalls and groins.
- **Coastal Erosion**
The gradual loss of land, sand, or rocks along the coastline caused by: the strong impact of waves; rising sea levels in a specific area (local sea level rise); flooding due to storm surges, tsunamis, or tidal events; illegal sand mining or mining along the coastline or underwater; and the placement of coastal engineering structures such as seawalls and groins,

which may interfere with the natural flow and deposition of sands along the seashore.

N

- **No-Build Zone**
A section of the coastline where the construction of any infrastructure or permanent residence is prohibited due to the threat of various coastal hazards such as storm surges, sea level rise, and coastal erosion.
- **Notch o Sea Notch**
A vertical groove or indentation in a rock caused by the impact of waves and tides.

S

- **Sea Level Rise**
The increase in the level of seawater, which is an effect of a worsening climate change.

DOST-PAGASA

A

- **Amihan**
(northeast monsoon winds)
Hanging humihihip na nagmumula sa kalupaan ng Siberia tuwing Nobyembre hanggang Pebrero sanhi ng pamumuo ng ulap at pag-ulan sa silangang bahagi ng bansa.

B

- **Buhawi (tornado)**
Hugis embudong hangin na marahas na umiikot mula sa lupa papunta sa ulap at tumatagal lamang sa loob ng 10 minuto.
- **Buhawing dagat (waterspout)**
Hugis embudong hanging umiikot mula sa dagat o iba pang tubigan papunta sa ulap.

F

- **Flashflood**
Biglaang pagtaas ng tubig sa mga ilog, batis, o lawa na kadalasang resulta ng malakas pag-ulan.

H

- **Habagat (Southwest Monsoon)**
Ito ay ang mainit at mamasa masang hangin galing sa West Philippine Sea at Indian Ocean na umiiral mula Hunyo hanggang Setyembre. Nagdudulot ang habagat ng malakas na pag-ulan at hangin lalo na sa kanlurang bahagi ng bansa at nagtatagal ng ilang araw hanggang higit sa isang linggo.

I

- **Intertropical Convergence Zone (ITCZ)**
Ito ay nabubuo dahil sa pagsasalubong ng hangin (northeast at southeast trade winds) mula sa hilaga at timog na hemispera. Kaakibat nito ang kaulapan na animo'y nakalinya sa loob ng tropical na rehiyon. Nagdudulot ito ng kalat-kalat na pag-ulan sa Southern Luzon, Visayas, o Mindanao depende sa buwan. Posible ring mabuo sa loob ng ITCZ ang Low Pressure Area o bagyo.

- **Isolated rain shower**
Pulo-pulong pag-ulan

K

- **Kidlat (lightning)**
Nakikitang kislap ng elektrisidad sa atmospera tuwing may unos na agad na sinusundan ng kulog.

M

- **Monsoon**
Pana-panahong hangin.
- **Monsoon rain**
Ulan na dala ng pana-panahong hangin.

P

- **Pulo-pulong pag-ulan (isolated rain showers)**
Magkakahiwalay na pag-ulan sa isang pook.

R

- **Rain shower**
Dagling pag-ulan

S

- **Subasko (Squall)**
Pabugso-bugsong lakas ng hangin na umaabot nang lampas 30 kilometro kada oras at tumatagal nang

dalawang minute sa bawat bugso; malimit na dulot ng unos na makidlat.

T

- **Thunderstorm**
Panandaliang sama ng panahon na makidlat at makulog, may mas malaks na ulan, at pabugsu-bugsong hangin.
- **Turbulence**
Marahas ng paggalaw ng hangin o tubig
- **Torrential rain**
Matinding ulan na umaabot sa mahigit 30 milimetro kada oras; katumbas ng PULANG babala ng PAGASA sa pag-ulan (COLOR CODED HEAVY RAINFALL ADVISORY/WARNING), nangangailangan ito ng pag-iingat o agad sa paghahanda para sa paglikas sa ligtas na lugar.

DOST-PHIVOLCS

E

- **Epicenter**
The point on the Earth's surface directly above a hypocenter or focus, the point where an earthquake or an underground explosion originates.

F

- **Focus**
The actual point of origin of an earthquake beneath the Earth's surface.

G

- **Ground Rupture**
A commonly long crack in the ground caused by the movement of a fault. Structures directly above the fault may sustain damage.
- **Ground Shaking**
Destructive vertical and horizontal movements occur during an earthquake. Intense shaking can lead to the collapse of structures.

I

- **Intensity**
Determined by the severity of the shaking and its effects of shaking on people, objects, structures, and the environment. The intensity of an area can be assessed using the PHIVOLCS PEIS. It is often higher near the epicenter.

L

- **Lahar or Volcanic Mudflow**
The rapid flow of densely packed and muddy volcanic materials combined with water. This often occurs on the sides of a river during heavy rainfall.
- **Liquefaction**
A phenomenon in which the strength and stiffness of soil are reduced by earthquake shaking or other rapid loading.

M

- **Magnitude**
The energy released by an earthquake from its focus. It is measured using data collected from a seismograph.

P

- **PEIS**
PHIVOLCS Earthquake Intensity Scale
- **PDC**
Pyroclastic Density Current
- **PDZ**
Permanent Danger Zone
- **PHIVOLCS-LAVA**
PHIVOLCS Local Active Volcanoes Archive
- **PHIVOLCS**
Philippine Institute of Volcanology and Seismology

S

- **Seiche Waves**
Created by the shaking of the ground in a closed or partially enclosed body of water such as a lake or reservoir.

V

- **Volcanic Tsunami**
Waves or a series of waves caused by the upward movement of water during a volcanic eruption. This can also occur if the volcanic eruption is underwater or if there is a debris avalanche.

Acknowledgements



Dr. RENATO U. SOLIDUM, JR.
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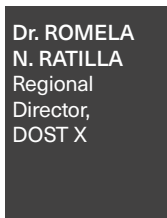
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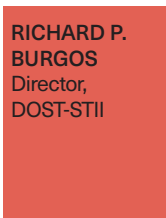
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