# UNDERSTANDING NATURAL HAZARDS: RISKS FACING THE PHILIPPINES

DECEMBER 2024

## KEY HIGHLIGHTS

The Philippines faces numerous natural hazard risks including cyclones, floods, earthquakes, tsunamis, volcanoes and landslides. Its cyclone and flood risk are high due to its location in the northwest Pacific typhoon belt (as shown in Figures to the right and below). The country also faces significant earthquake and volcanic activity due to its location within the Pacific Ring of Fire. Many of the hazards are projected to increase and intensify.

- The climate is tropical, with a rainy season, which ranges from June to November; and a dry season, which lasts from December to May1
- The peak of the typhoon season is July through October, when nearly 70% develop.[2]
- The country has prepared for the possibility of another super typhoon or powerful earthquake, often referred to as the "big one"[3]

### Vulnerability Factors

- The Global Risks Report 2024 puts extreme weather events as the top risk.[4] From 1970 – 2020, the country has primarily faced the following hazards: storm (55%), flood (25%), earthquake (5%), landslide (5%), and volcano (4%).[5]
- The Philippines location and geography also contributes to its susceptibility to tsunami, sea level rise, storm surges, drought, and wildfires[67]

### Impact on Communities

- Estimates place 60% of the land and 74% of the population as exposed to numerous hazards. Since 1990, the country has faced 565 natural disasters, which left 70,000 dead and US$23 billion in damages[8]
- In 2020-2021, the Philippines was one of the top ten countries in the world to experience the greatest number of disasters, with 25 recorded; and also within the top ten with the most people affected[9]

## OVERVIEW OF NATURAL HAZARDS

### Tropical Cyclones (TC)

The Philippines is the country most exposed to tropical storms worldwide. It sits in the Pacific typhoon belt where nearly one-third of the world's TCs form. Northern Luzon and eastern Visayas are the areas most affected.[14]

The Philippines sees an average of 20 TCs annually, with 8 or 9 making landfall.[1516] An average of five per year are considered destructive.[17] The strongest recorded typhoon happened in November 2013, when Super Typhoon Haiyan (Yolanda) affected 5.13 million people[18], left 6,000 people dead, damaged 1.1 million homes and caused US$802 million in damages.[19]

## FAST FACTS

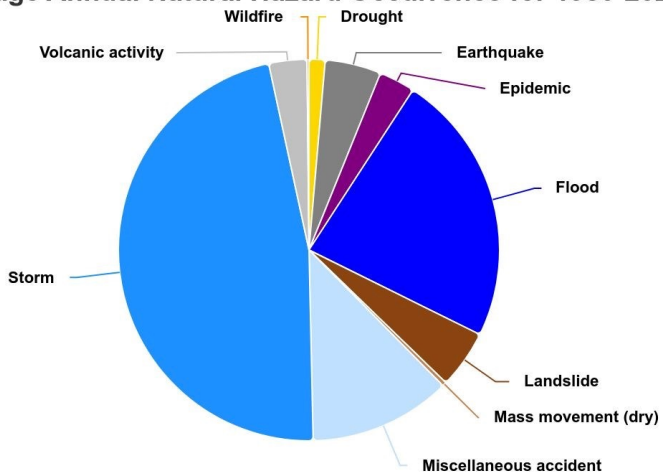
**Geography:**
The Philippines is the world's second largest archipelago, comprised of 7,107 islands stretching 1,810 km (1,125 miles) across and with 36,289 km (22,549 miles) of coastline. It is comprised of three main island groups – Luzon, Visayas and Mindanao. Total land area is 300,000 sq. km (115,831 sq. mi)[10]

**Population:**
109.04 million (Census 2020)[11]

**Population of Metro Manila (National Capital Region):** 13,484,462[12]

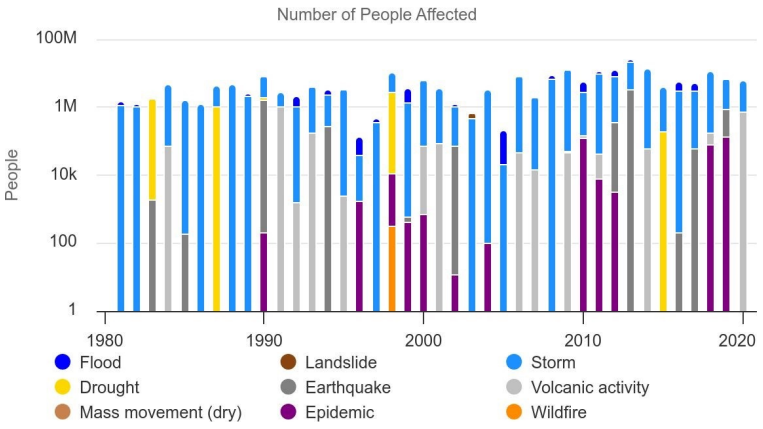
**Administration:**
Divided into 17 Regions, 82 Provinces, 149 cities, 1,485 municipalities, and 42,001 barangays[13]

**Average Annual Natural Hazard Occurrence for 1980-2020**




**Source: World Bank. Philippines: Natural Hazard Statistics.** https://climateknowledgeportal.worldbank.org/country/philippines/vulnerability

**Key Natural Hazard Statistics for 1980-2020**




**Source: World Bank. Philippines: Natural Hazard Statistics.**
https://climateknowledgeportal.worldbank.org/country/philippines/vulnerability

## NATURAL HAZARDS (CONT.)

**Other destructive cyclones:**

- 2012: Typhoon Bopha (Pablo) affected 973,000 people and left 1,268 dead
- 2011: Typhoon Washi (Sendong) affected 698,00 and left 1,901 dead
- 2008: Typhoon Fengshen (Frank) affected 4.78 million people and left 1,501 dead
- 2006: Typhoon Durian (Reming) affected 343,000 and left 1,399 dead[20]

The country has faced multiple storms in succession. For example, in a span of a month starting in October 2024, six tropical cyclones affected the Philippines ranging from a Severe Tropical Storm to Super Typhoons. As of 19 November 2024, the total number of people affected by the storms was at more than 10 million across 17 out of 18 regions with at least 617,000 displaced.[21]

### Floods

Tropical cyclones, monsoon rains or a combination of both, pose a significant risk, especially during the typhoon or rainy season. In July 2024, combined effects of the southwest monsoon and TC Gaemi (Carina) affected 4.8 million and left 39 dead.[22] Repeated flooding during rainy seasons is a perennial problem for Metro Manila due to its location in a river delta next to the ocean. Sea-level rise along the country's coastline contributes to the risk.[23] The El Niño Southern Oscillation (ENSO) increases the chance of below normal rainfall in some areas, however, over western parts, above normal rainfall during the Southwest monsoon (Habagat) may occur. During a La Nina period, the Philippines may experience a higher chance of above normal rainfall.[24]

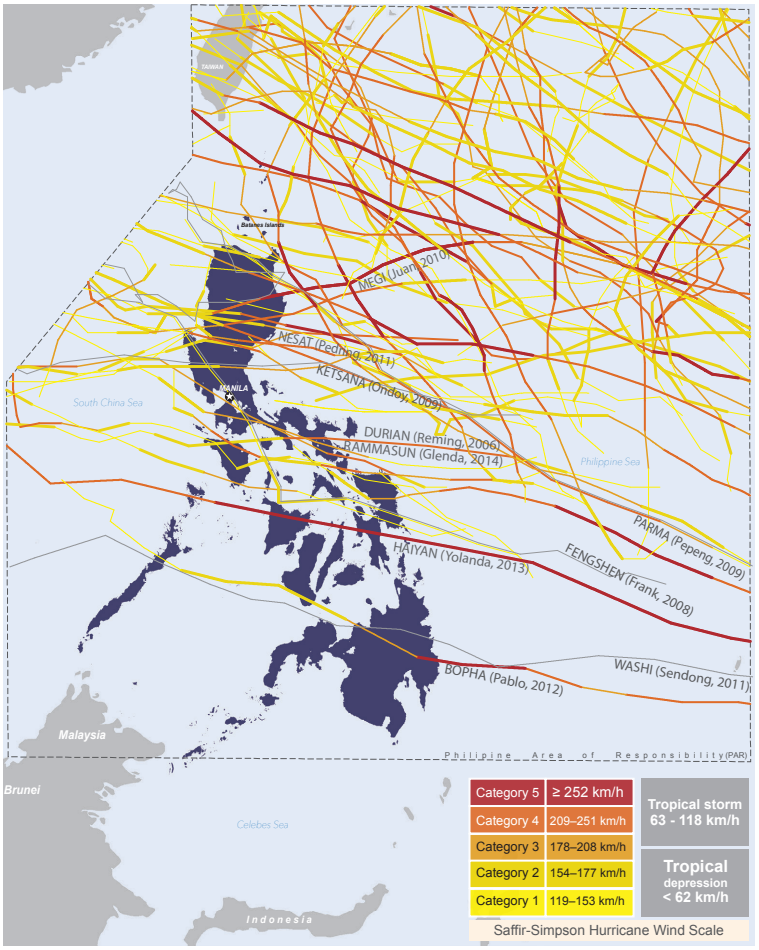
### Tsunami

Triggered by large earthquakes, tsunami is relatively rare but could be devastating. The vulnerability is due to offshore faults and the Manila Trench, Negros Trench, Sulu Trench, Cotabato Trench, Philippine Trench, and East Luzon Trough may produce a tsunami-generating earthquake. The country is also at risk of tsunami generated elsewhere in the region.[25]

**Major tsunamis include:**

- November 15, 1994: At least 38 were killed by a tsunami triggered by a M7.1 quake in Mindoro
- August 1976: An M8.1 quake produced waves as high as 9 meters, leaving over 8,000 dead[26]

**Philippines: Destructive Tropical Cyclones from 2006 to 2016**




**Source: OCHA.** https://reliefweb.int/map/philippines/philippines-destructive-tropical-cyclones-2006-2016

**Residents of Tacloban, Philippines, gather around a U.S. Navy SH-60B Seahawk helicopter for food and supplies Nov. 20, 2013. Source: DVIDS. Photo by Petty Officer 1st Class Peter D. Blair.** https://reliefweb.int/map/philippines/philippines-destructive-tropical-cyclones-2006-2016

## NATURAL HAZARDS (CONT.)

### Earthquakes

Earthquake prone regions include eastern Mindanao, Leyte, and Samara, which experience an average of 16 felt earthquakes annually.[27] On average, the Department of Science and Technology (DOST)-Philippine Institute of Volcanology and Seismology (PHIVOLCS) records at least 20 earthquakes daily. A destructive earthquake is a major concern for officials, and this is reflected in plans for the "big one." The Metro Manila Earthquake Impact Reduction Study (MMEIRS) has released reports beginning in 2004 analyzing a scenario for a magnitude (M) 7.2 quake. The MMEIRS Risk Analysis Project in 2013 estimates that such a quake will result in 31,000 deaths and losses of P2.269 trillion.[28]

Sources of large earthquakes include the Valley Fault System, and for Metro Manila the Manila Trench could generate an M8.2 quake resulting in a tsunami. Every region could experience a large magnitude temblor from different active faults and trenches.[29]

**Major earthquakes include:**

- 2013: A M7.2 quake hit Bohol, leaving 93 dead
- 2012: M6.7 quake in Negros province left more than 50 dead
- 1990: A M7.9 quake in Luzon left over 1,600 deaths and P10 billion in damages[30]

### Volcanoes

Volcanic activity in the archipelago is common, with 24 active volcanoes.[31] Direct hazards include ashfall, lava flow, explosions, lahar flows, landslides, and volcanic gas.[32] These volcanic hazards may result in immediate dangers to life and limb, public health risks due to volcanic emissions, and forced evacuations.

Mount Pinatubo, Mt. Mayon and Taal volcano, all located on Luzon, are the most well-known and most damaging in terms of lives lost. Mount Pinatubo is probably the most famous due to its eruption in June 1991, which left 840 dead and affected more than 942,000.[33] Recent significant activity includes the eruption of Mayon in June 2023, which affected over 38,000 people and displaced over 17,600.[34] An eruption at Taal in January 2020 left at least 39 dead.[35]

**Major volcanic eruptions include:**

- 2018: Mt. Mayon forced the evacuation of 90,000 people[36]
- 2006: Mt. Mayon eruption left 1,266 dead[37]
- 1993: An eruption at Pinatubo claimed the lives of 14[38]
- 1993: Mt. Mayon eruption left 79 dead[39]

### Landslides

Landslides are generally triggered by other hazards, such as TCs, earthquakes, volcanic eruptions and rains. Landslides are most common in steep, hilly, mountainous and inland regions of the country.[40]

One of the worst disasters to occur happened in February 2006, when rains triggered a massive landslide from Mt. Canabag which hit the village of Guinsaugon in Southern Leyte, leaving at least 1,126 people dead, displaced 19,000 others, and caused US$25 million in damages.[41]

### Extreme Weather Events

The Philippines is vulnerable to extreme weather events. The country is number five on the list of regional countries with the highest multi-hazard risk. The country is considered to have high risk due to its geography, exposure to hazards, and socioeconomic vulnerability.[42] Between 2000 - 2019, the Philippines experienced 317 extreme weather events.[43]

### DISASTER MANAGEMENT STRUCTURE

- National Disaster Risk Reduction and Management Council (NDRRMC) is the lead agency for disaster response, and coordinates preparedness, prevention, mitigation, rehabilitation and recovery. It is under the Department of National Defense (DND)
- NDRRMC has subordinate regional, provincial, district and city Disaster Risk Reduction and Management Councils (DRRMCs)
- Department of Social Welfare and Development (DSWD) is the lead agency under NDRRMC for disaster response, ongoing monitoring, planning, and coordination
- The Office of Civil Defense (OCD) is the NDRRMC Secretariat
- The Secretary of National Defense is the chair of NDRRMC, and DND thru OCD assists the lead agencies
- Armed Forces of the Philippines (AFP) Chief of Staff sits on the NDRRMC
- DND through AFP takes the lead in Search, Rescue, and Retrieval (SRR), and supports civilian agencies in relief operations, prevention, mitigation, preparedness, rehabilitation and recovery
- Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) observes and forecasts weather, flooding, and other climactic conditions and publishes severe weather alerts
- PHIVOLCS mitigates disasters that arise from volcanic eruptions, earthquakes, and tsunami. It provides warnings, disaster preparedness, and mitigation information[44]

## PLANS

The Philippines has developed several hazard-specific plans. The National Disaster Response Plan (NDRP) is a multi-hazard response plan that addresses different hazards such as:

- NDRP for Hydro-Meteorological Hazards (Version 2, 2017) focuses on typhoons, tropical storms and flooding, and addresses the response plan at all government levels
- NDRP for Earthquake and Tsunami (2017) outlines key players and mechanisms for national, regional, and local response

Additional earthquake plans developed by the government:

- Metro Manila Earthquake Contingency Plan: Oplan Metro Yakal Plus, 2015
- Harmonized National Contingency Plan for the Magnitude 7.2 Earthquake, 2019[45]

## MAJOR ACTORS IN A DISASTER RESPONSE

**National:**

- NDRRMC, regional and local DRRMCs
- NDRRMC Operations Center
- Local Government Units (LGUs)
- DSWD
- OCD
- AFP and Philippine National Police (PNP)
- Philippine Red Cross (PRC), Philippine NGOs
- Humanitarian Country Team (HCT)
- PHIVOLCS
- PAGASA

**International:**

- IOs: United Nations, International Federation of Red Cross & Red Crescent Societies (IFRC)
- International NGOs: CARE, World Vision, Save the Children, etc.
- Bilateral donors: USA, UK, EU
- Association of Southeast Asian Nations (ASEAN). Members are also likely to respond bilaterally[46]
- Philippine International Humanitarian Assistance Cluster (PIHAC) coordinates international assistance
- Philippines International Humanitarian Assistance Reception Center (PIHARC), processes entry of international teams, equipment, and donations[47]

## USINDOPACOM DISASTER RESPONSE

USINDOPACOM has supported at least 15 natural disaster response efforts in the Philippines since June 1991, after the eruption of Mt. Pinatubo.[48] The DoD has conducted multiple operations in support of U.S. response efforts, including a major landslide and numerous destructive storms and typhoons, including Super Typhoon Haiyan (Yolanda). U.S. military efforts for that operation included more than 13,400 military troops, 66 aircraft, and 12 naval ships.[49]

## RESOURCES

- **Fact Sheet Earthquake Risk to Manila:** https://www.cfe-dmha.org/LinkClick.aspx?fileticket=-n9HX_Z2kys%3d&portalid=0
- **Philippines Disaster Management Reference Handbook, November 2021. CFE-DM.** https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h76R6jCvL24%3d&portalid=0
- **Volcanoes of the Philippines. PHIVOLCS.** https://www.phivolcs.dost.gov.ph/index.php/volcano-hazard/volcanoes-of-the-philippines

## Sources


1 ADRC. Information on Disaster Risk Reduction of the Member Countries: Philippines.
2 PAGASA. https://www.pagasa.dost.gov.ph/climate/tropical-cyclone-information
3 UN News. 11 October 2024. Waiting for the 'big one' – natural hazards in the Philippines: A UN Resident Coordinator blog. https://news.un.org/en/story/2024/10/1155516
4 WEF. The Global Risks Report 2024. https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2024.pdf
5 CFE-DM. Philippines Disaster Management Reference Handbook, https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h76R6jCvL24%3d&portalid=0
6 ADRC. Information on Disaster Risk Reduction of the Member Countries: Philippines. https://www.adrc.asia/nationinformation.php?NationCode=608&Lang=en
7 CFE-DM. Philippines DM Reference Handbook.
8 World Bank. World Bank Climate Change Knowledge Portal – Philippines, https://climateknowledgeportal.worldbank.org/country/philippines/vulnerability
9 IFRC. World Disasters Report 2022. https://www.ifrc.org/sites/default/files/2023-03/2022_IFRC-WDR_EN.0.pdf.pdf
10 CFE-DM. Philippines DM Reference Handbook.
11 OCHA. Philippines Provincial Profiles. 2020 Edition.
12 Republic of the Philippines, Philippine Statistics Authority, https://psa.gov.ph/content/highlights-national-capital-region-ncr-population-2020-census-population-and-housing-2020
13 OCHA. Philippines Provincial Profiles. 2020 Edition.
14 Habitat for Humanity. Response to Typhoons in the Philippines: Background. https://www.habitatforhumanity.org.uk/what-we-do/disaster-response/response-totyphoons-philippines/
15 PAGASA. Tropical Cyclone Information. https://www.pagasa.dost.gov.ph/climate/tropical-cyclone-information
16 World Bank. World Bank Climate Change Knowledge Portal – Philippines.
17 ADRC. Information on Disaster Risk Reduction of the Member Countries: Philippines. https://www.adrc.asia/nationinformation.php?NationCode=608&Lang=en
18 OCHA. Philippines: Destructive Tropical Cyclones from 2006 to 2016. https://reliefweb.int/map/philippines/philippines-destructive-tropical-cyclones-2006-2016
19 World Bank. Climate Change Knowledge Portal Philippines.
20 OCHA. Philippines: Destructive TCs from 2006 to 2016.
21 OCHA. Philippines: Multiple Tropical Cyclones - Flash Update No.5. https://reliefweb.int/report/philippines/philippines-multiple-tropical-cyclones-flash-update-no5-19-november-2024
22 OCHA. Philippines: Floods and Landslides - Jan 2024. https://reliefweb.int/disaster/ls-2024-000003-phl#maps-infographics
23 CFE-DM. Philippines DM Reference Handbook.
24 DOST-PAGASA. La Nina Alert 12 July 2024. https://www.pagasa.dost.gov.ph/press-release/161
25 PHIVOLCS. "Prepare for tsunami," urges USEC. Solidum. https://www.phivolcs.dost.gov.ph/index.php/news/7643-prepare-for-tsunami-urges-usec-solidum
26 Ibid.
27 ASEAN Earthquake Information Center. http://aeic.bmkg.go.id/aeic/philippines.html
28 Ibid.
29 Ibid.
30 Ibid.
31 PHIVOLCS. Volcanoes of the Philippines. https://www.phivolcs.dost.gov.ph/index.php/volcano-hazard/volcanoes-of-the-philippines
32 PHIVOLCS. Introduction to Volcanoes. https://www.phivolcs.dost.gov.ph/index.php/volcano-hazard/introduction-to-volcanoes
33 CFE-DMHA. USINDOPACOM Foreign Disaster Response in the Indo-Pacific. April 1991 – January 2024. https://www.cfe-dmha.org/LinkClick.aspx?fileticket=MNZLDbxZaic%3d&portalid=0
34 OCHA. Philippines: Mayon Volcano - Jun 2023. https://reliefweb.int/disaster/vo-2023-000099-phl
35 NASA. An Ash-Damaged Island in the Philippines. https://earthobservatory.nasa.gov/images/146444/an-ash-damaged-island-in-the-philippines
36 World Bank. Climate Change Knowledge Portal Philippines.
37 WorldData.info. Volcanoes in the Philippines. https://www.worlddata.info/asia/philippines/volcanoes.php
38 Ibid.
39 Encyclopedia Brittanica. Mayon Volcano. https://www.britannica.com/place/Mayon-Volcano
40 CFE-DM. Philippines DM Reference Handbook.
41 CFE-DMHA. USINDOPACOM Foreign Disaster Response in the Indo-Pacific. April 1991 – January 2024.
42 PDC Global and CFE-DM. Indo-Pacific: 2025 Climate Change Impact Analysis. https://www.cfe-dmha.org/LinkClick.aspx?fileticket=-PYj1b0z9vQ%3d&portalid=0
43 GermanWatch. Global Climate Risk Index 2021. https://www.germanwatch.org/en/cri
44CFE-DM. Philippines Disaster Management Reference Handbook, https://www.cfe-dmha.org/LinkClick.aspx?fileticket=h76R6jCvL24%3d&portalid=0
45 NDRRMC website. https://ndrrmc.gov.ph/
46 Fact Sheet: Earthquake Risk to Manila. https://www.cfe-dmha.org/LinkClick.aspx?fileticket=-n9HX_Z2kys%3d&portalid=0
47 CFE-DM. Philippines DM Reference Handbook.
48 CFE-DMHA. USINDOPACOM Foreign Disaster Response in the Indo-Pacific. April 1991 – January 2024.
49 Ibid.