

## **Flood Forecasting and Early Warning Disaster Management in the Philippines**

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For disaster–prone countries like the Philippines, preparedness and mitigation have become matters of extreme urgency. Being situated in the Pacific Ring of Fire renders us susceptible to volcanic eruptions and earthquakes.

A number of earthquakes occur within the Philippine archipelago every now and then mainly because the country is situated along two major tectonic plates: the Pacific Plates and the Eurasian Plates. We have 220 volcanoes, 22 of which are potentially active. The most powerful and devastating eruptions on record are the Pinatubo and Mayon incidents.

Authorities report 2.4 quakes per day or 887 quakes per year. For the period January 1990 to January 26, 2002, there were 10,708 earthquakes in the Philippines.

The wide–open ocean and the stretching of the archipelago up to 21 degrees North latitude make my country vulnerable to typhoons and tsunamis. As well lie in one of the typhoon belts of the world, we have about 19 typhoons affecting our country every year. During the first quarter, most of the typhoons affect areas in the Visayas, gradually moving upwards to Luzon in the second quarter. In the third quarter of the year, typhoon movements are concentrated in the northern most part of the Philippines and in the last quarter, typhoons pass through most part of the archipelago including some portions of Mindanao and Palawan.

The NDCC defines disasters as natural or man–made events wherein communities experience severe danger and incur loss of lives and properties causing disruption in its social structure and prevention of the fulfillment of all

or some of the affected communities' essential functions. An event is considered a disaster if any two of the following situations prevails: 1. at least 20% of the population are affected and in need of emergency assistance or those dwelling units have been destroyed; 2. a great number or at least 40% of the means of livelihood such as bancas, fishing boats, vehicles and the like are destroyed; 3. major road and bridges are destroyed and impassable for at least a week, thus disrupting the flow of transport and commerce; 4) widespread destruction of fishponds, crops poultry and livestock and other agricultural products, and 5. epidemics.

The estimated cost of damage brought about by disasters for the year 2001 was place at P9.223 billion or \$177.4 million. Faced with a formidable task of managing disasters, the government saw the need to establish a functional organization capable of dealing with emergency situations.

Presidential decree 1566 dated June 11, created the National Disaster Coordinating Council –the highest policy-making, coordinating and supervising body for disaster management at the national level. A chairman in the person of the Secretary of National Defense heads the NDCC. Its composition includes all department secretaries and other key officials of the government.

There is a disaster coordinating council at all government levels. The NDCC at the national level; the RDCC at the regional level chaired by regional directors of the Philippine National Police; the PDCC at the provincial level headed by provincial governors; the MDCC and CDCC at the municipal/city levels headed by mayors and the BDCC at the Barangay level (village) chaired by Barangay chairmen or village chiefs.

The Office of Civil Defense is the executive arm of the NDCC, with disaster risk management as its primary responsibility. The OCD also pursues programs for the protection of the population, property and the environment. The OCD has 16 regional centers nationwide. They are responsible for the coordination and implementation of civil defense and disaster management programs at the regional level.

Civil defense operates during a disaster involving a sizable number of persons, during time of war and other national emergencies of equally character. In emergency situations, one of the Office of Civil Defense is to process warning information received from warning agencies and other sources and disseminate alert notices to implementing agencies, civil defense regional offices and the general public.

Warning of probable emergencies is possible in some situations such as floods, typhoons, tsunamis and volcanic eruptions. For typhoons, the PAGASA advises the public on the latest weather bulletins and announcements.

NDCC operations rely on the specialization of each member–agencies. Thus, the Philippine Institute of Volcanology and Seismology provides warning to the public on geophysical activities; the AFP takes care of matters relating to terrorist threats; DOH for epidemics; the PNP for civil disturbance; DA for infestation; the Philippine Nuclear Research Institute for radiological emergencies and PAGASA for hydro–meteorological phenomena.

For monitoring, we have three operational network systems covering meteorological, seismological and volcanological hazards. The meteorological network of PAGASA is composed of 55 synoptic stations spread at key places in the Philippines. This network is capable of monitoring weather variations, amount and rate of precipitation, percent cloudiness and typhoon tracks.

PAGASA's responsibilities as defined in the calamities and disaster preparedness plan are to: 1) keep a continuing watch over the environmental conditions within the country, through its network of surface and upper air synoptic stations; agromet and radar station; 2) prepare daily weather forecasts, typhoon warnings, and flood outlook; 3) disseminate weather information to OCD and other concerned agencies and the general public; 4) give marine meteorological service to the maritime sector in the form of checking ship barometers and briefings of officers of moored vessels at ports and harbors; maintain a visual storm signal for international shipping; 5) give aeronautical meteorological service for the safety and efficiency of air travel, both domestic

and international, through the provision of flight documentation, take-off and landing information: 6) conduct research and training in relation to natural disaster preparedness and mitigation; 7) provide assistance and advice to the hydrological sector through dam monitoring; 8) make available climatological data for use of the agricultural, industrial, public works, and energy utilization sector.

PAGASA advises the public on the latest weather bulletins and announcements for public storm signals as follows: A) storm signal number 1 when winds of 30–60 kph may be expected within 36 hours, B) storm signal number 2 when winds greater than 60 to 100 kph may be expected within 24 hours, C) storm signal number 3 when winds 100–185 kph would be expected within 18 hours and D) storm signal number 4 when winds greater than 185 kph may be expected within 12 hours.

As a conclusion, we should focus our attention towards the enhancement of our mitigation measures. We also need strong and effective disaster preparedness–response systems if we want to avoid losses to disasters. An effective early warning network is a critical component of our disaster management system. The moment of initiation of a given natural event should be detected early enough so that the population to be affected can be identified and forewarned and the designed loss reduction plans can be implemented.