

Elaine S. Mangulabnan

Natural Disasters and its Outcome in the Philippines

George Mason University

Introduction

The Philippines is considered one of the most hazard-prone countries in the world. A country made up of over 7,000 islands located between two major tectonic plates; Pacific and Eurasian, in the Pacific Ocean, in an area called the "Ring of Fire", the Philippines is no stranger to natural disasters. According to Benson (1997), "the country experiences an average of five earthquakes per day, in turn resulting in potential ground shaking, ground rupture, liquefaction and lateral spreading, landslides and tsunamis" (p. 20). Besides earthquakes, the Philippines has gone through volcanic eruptions, floods, and of course, typhoons. Briones and Israel (2013) stated that "from 2001 to 2010, the country had a total of 171 typhoons; an average of 17 typhoons per year" (p. 14). Along with the high occurrence of natural disasters, the cost of repair for damages and number of casualties are also prevalent. Typhoon Haiyan alone had an estimated cost of \$2,051,711,000 for damages. Below is a chart that shows damage and number of deaths from natural disasters between the years 1970 to 1994.

Table 1.1: Estimated damage and number of deaths resulting from natural disasters, 1970-94 (million Peso at real 1994 prices)

| | Typhoons | | Floods | | Earthquakes | | Volcanic eruptions & lands | | Droughts | | Total | |
|---------------------------|--------------------------------|-----------------------|--------------------------------|-----------------------|--------------------------------|-----------------------|--------------------------------|-----------------------|--------------------------------|-----------------------|--------------------------------|-----------------------|
| | Estimated damage (b) (m. Peso) | No. of deaths (units) | Estimated damage (b) (m. Peso) | No. of deaths (units) | Estimated damage (b) (m. Peso) | No. of deaths (units) | Estimated damage (b) (m. Peso) | No. of deaths (units) | Estimated damage (b) (m. Peso) | No. of deaths (units) | Estimated damage (b) (m. Peso) | No. of deaths (units) |
| 1970 | 17,648 | 1,585 | 20 | 3 | 99 | 17 | | | | | 17.8 | 1,605 |
| 1971 | 878 | 103 | 418 | 43 | 1 | 0 | | | | | 1.3 | 146 |
| 1972 | 14,613 | 1,016 | 210 | 28 | | | | | | | 14.6 | 1,044 |
| 1973 | 3,060 | 114 | 524 | 51 | 75 | 15 | | | | | 3.7 | 180 |
| 1974 | 4,060 | 330 | 40 | 41 | 43 | 2 | | | | | 4.1 | 373 |
| 1975 | 540 | 231 | 80 | 17 | | | | | | | 0.6 | 248 |
| 1976 | 2,863 | 360 | 913 | 40 | 5,315 | 3,782 | | | | | 9.1 | 4,202 |
| 1977 | 2,751 | 113 | 128 | 14 | 40 | 1 | | | | | 2.9 | 128 |
| 1978 | 11,469 | 863 | (0) | 2 | | | | | 0 | | 11.5 | 865 |
| 1979 | 2,587 | 66 | 32 | 1 | | | | | | | 2.6 | 67 |
| 1980 | 7,906 | 143 | 1,966 | 336 | 13 | 51 | | | | | 8.9 | 530 |
| 1981 | 6,164 | 484 | 20 | 125 | | | | | | | 6.2 | 608 |
| 1982 | 7,426 | 337 | 515 | 27 | | | | | | | 7.9 | 364 |
| 1983 | 2,043 | 136 | (0) | 41 | 58 | 19 | | | 2,985 | | 9.1 | 186 |
| 1984 | 10,036 | 1,079 | 5 | 41 | | | 185 | | | | 13.2 | 1,879 |
| 1985 | 5,926 | 211 | 16 | 59 | | | | | | | 5.9 | 264 |
| 1986 | 3,743 | 171 | 19 | 4 | | | | | | | 3.9 | 175 |
| 1987 | 7,889 | 1,020 | (0) | | | | | | 1,383 | | 9.4 | 1,020 |
| 1988 | 15,987 | 429 | (0) | | 1,552 | | | | | | 17.1 | 429 |
| 1989 | 7,002 | 362 | 612 | 101 | | | | | | | 7.6 | 463 |
| 1990 | 18,571 | 870 | 565 | 36 | 18,024 | 1,293 | | | 4,953 | | 42.1 | 1,989 |
| 1991 (a) | 5,781 | 5,197 | (0) | | | | 13,771 | 896 | 2,057 | | 21.6 | 6,093 |
| 1992 | 5,941 | 118 | 955 | 39 | 213 | 1 | 648 | 6 | 4,797 | | 12.6 | 164 |
| 1993 | 23,006 | 796 | 1,212 | 32 | | | 80 | 80 | | | 24.8 | 698 |
| 1994 | 1,773 | 243 | 297 | 24 | 4 | 4 | | | | | 2.1 | 291 |
| Five-year averages | | | | | | | | | | | | |
| 1970-4 | 8,052 | 830 | 242 | 33 | 43 | 7 | - | - | - | - | 8.3 | 670 |
| 1975-9 | 4,048 | 291 | 231 | 15 | 1,071 | 757 | - | - | - | - | 5.3 | 1,062 |
| 1980-4 | 7,719 | 614 | 502 | 106 | 14 | 14 | 33 | - | 597 | - | 8.9 | 734 |
| 1985-9 | 6,047 | 443 | 130 | 33 | 310 | 3 | - | - | 277 | - | 8.8 | 478 |
| 1990-4 | 11,115 | 1,403 | 610 | 26 | 3,648 | 260 | 2,901 | 194 | 2,366 | - | 20.6 | 1,863 |

Source: Philippine NDCC

(a) Figures on estimated damage refer only to direct physical destruction.

(b) The high death toll occurring as a consequence of typhoons was primarily due to the Ormoc flash flood, which was triggered by heavy rainfall associated with a typhoon.

Table 1(Benson 1997)

In times of natural disasters, the Philippines has somewhat of a dependency on outside countries to aid in the damage recovery process. Natural disasters also have an impact on the economy, which is expected, especially if it affects a large part of the country. No matter what the Filipino people are faced with, they continue to stay resilient. Benson (1997) states that the “principal way in which many communities have learnt of the strong links between environmental degradation and increased natural hazards has been through direct experience... made them more environmentally conscious” (pg. 25).



Figure 1- Leyte, Philippines (Chillymanjaro 2013)



Figure 2-Leyte, Philippines (Chillymanjaro

2013)

Research

The Philippines is a country that has proved to withstand multiple natural disasters. The Philippine Atmospheric, Geophysical and Astronomical Services Administration defines a disaster as “a serious disruption of the functioning of a community or 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” (as cited in Briones & Israel, 2013). A country home to about 105 million people, it has survived through typhoons,

earthquakes, volcanic eruptions, floods, and other natural disasters. Below is a chart showing a summary of the ranking of natural disasters.

Table 1. Ranking of Disaster-related 20th century Philippine Fatalities

| Hazard event | Number Killed | Damage (USD millions) |
|--------------|---------------|-----------------------|
| Typhoon | 28812 | 5653 |
| Earthquake | 9572 | 517 |
| Volcano | 6331 | 228 |
| Flood | 2545 | 431 |

Source: CRED, 1998

Table 2 (World Bank, n.d.)

Of the 220 volcanoes, “22 are classified as active” (World Bank, n.d.). The most well-known volcanoes are Mount Pinatubo, Mount Mayon, and the Taal volcano. There were about 700 deaths during the Mount Pinatubo volcanic eruption in June 1991. Volcanic eruptions include the “release of magma, explosive effects, expulsion of large projectiles, pyroclastic flows, ashfall” (World Bank, n.d.) and more. According to de la Cruz (2014), the Mount Pinatubo eruption is ranked number five in terms of cost of damage, estimating a total of \$443,000,000. Even until today, the 200,000 people who evacuated the area for the volcanic eruption are still facing its impact and aftermath. Lahars, which describe a hot or cold mixture of water and rock fragments flowing down volcanic slopes, have buried numbers of communities and have kept rice paddies and sugar cane fields from being used by farmers. These fields will be useless for farming for years, which also means that some farmers will have less land to work with. Compared to other historical volcanic eruptions around the world, Mount Pinatubo still makes *Time*'s “Top 10 Famous Volcanoes”. Out of about 1500 active volcanoes around the world, Mount Pinatubo is considered to be one of the most dangerous eruptions over the years.

As the Philippines is located in between two major tectonic plates, it's not a surprise that the country faces an average of five earthquakes per day. The World Bank (n.d.) states that the "US Geological Survey lists 168 significant damaging events in the Philippines since 1599, equivalent to a damaging event every 2.5 years on average." The two major events that caused the most damage are the 1976 Mindanao event and the 1990 Central Luzon event. Both events combined killed a total of about 7,000 people and had an estimated damage cost of \$800 million. Earthquakes are the starting trigger for a lot of other natural disasters such as liquefaction, landslides, tsunami, and fires. Due to the frequent earthquakes, "the Philippine structural engineering code is taken literally from the California code, and was observed to be followed in better quality buildings in Manila" (World Bank, n.d.). Before copying the code used by California, which is an area that also experiences many earthquakes throughout the year, buildings have been vulnerable to damage in past earthquakes. By learning from the outcome of past earthquakes, the Philippines learned to adjust the design of their buildings to avoid any more damage.



Figure 3- Mount Pinatubo (Sanburn, 2010)

Out of all the natural disasters, typhoons have proven to be the most deadly in the Philippines. Every year, an average of 20 typhoons hit the Philippines. Tinonga and Colson

(2013) wrote that “as the rate of global warming-induced climate change has increased, so have the number and strength of the storms.” According to Rice (2013), “the Philippines has been hit by more tropical cyclones than any other country on earth except China.” Typhoons have killed about 29,000 people in the country in the 20th century alone. Areas in the Philippines that are more susceptible to risk due to typhoons are Luzon, Samar, Leyte, eastern Quezon province, and Bataan Islands. Briones & Israel (2013) state that “typhoons... have the potential to reduce farm productivity; damage farm inputs, facilities and/or infrastructure, and limit farm planting options” (p. 3). The chart below shows the impact that natural disasters have on agriculture, food scarcity, natural resources, and environment.

Figure 1: Framework of Analysis on the Impacts of Natural Disasters on Agriculture, Food Security, and the Natural Resources and Environment (NRE)

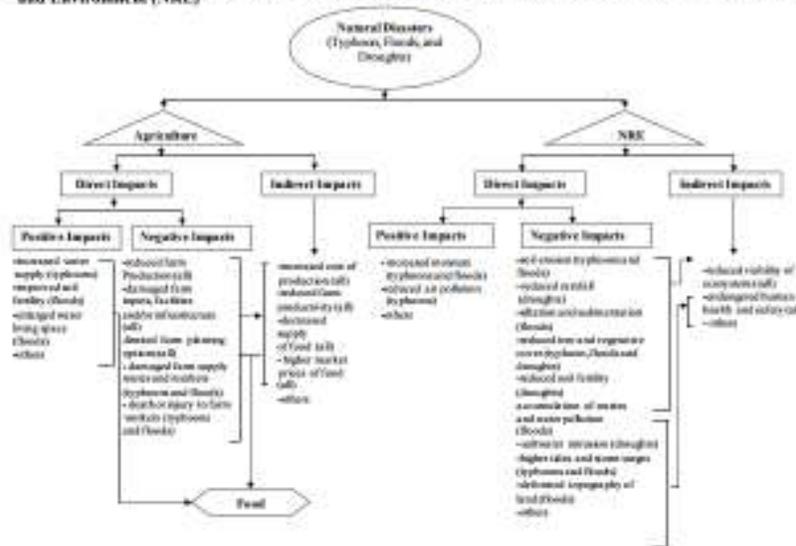


Chart 1 (Briones & Israel, 2013)

Although this chart shows that there are also positive impacts from natural disasters such as improved soil fertility and reduced air pollution, the negatives outweigh the positives. The Philippines is a country that is heavily dependent on agriculture, and farmlands are one of the areas that are hit by natural disasters the most. When a natural disaster hits, it causes a domino

effect. The land is too damaged to continue any farming, which leads to a decrease of production, which keeps farmers and markets from staying in business, which then leads to a food shortage for the community.

Case Studies

Probably the most well-known natural disaster to have ever occurred in the Philippines is Typhoon Haiyan. In de la Cruz's (2014) list of "Worst natural disasters in the Philippines", Typhoon Haiyan ranked number one for number of casualties, cost of damage, and number of people affected. On November 8, 2013, Typhoon Haiyan, a Category 5 hurricane, swept through six provinces in the central Philippines, causing more than \$2 billion in damages. As stated by Lum and Margesson (2014), "14.1 million people had been affected, with more than 4.1 million displaced" (pg. 2). Relief and recovery efforts were almost immediate. Philippine President Benigno Aquino III declared a state of national emergency and "mobilized the army to bring relief to storm survivors and organize rescue efforts" (Colson and Tinonga, 2013). The Philippine government launched an \$8.2 billion, four-year plan called the Reconstruction Assistance in Yolanda (RAY) "which focuses on rebuilding areas affected by the typhoon and developing resilience to natural disasters" (Lum and Margesson, 2014). In addition to RAY, the U.S. Humanitarian Country Team also created a "Strategic Response Plan (SRP) to support the Philippines government's activities in meeting immediate humanitarian needs and reconstruction goals" (Lum and Margesson, 2014). Immediate relief efforts have been made by a combination of governmental, Red Cross, NGOs, and private sectors. According to Lum and Margesson (2014), "international donors have contributed a total of \$662.9 million to the relief efforts. U.S. assistance has included approximately \$87 million in disaster aid and \$59 million in private sector contributions." The figure below summarizes the assistance the U.S. has provided.

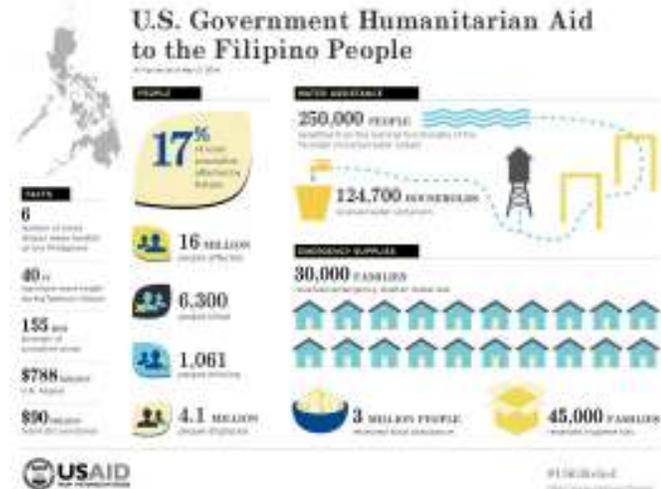


Figure 4 (USAID, 2014)

Because the Philippines is primarily an agriculturally-based economy and a lot of the land used for farming was damaged, “Philippine government has sought temporary trade arrangements with export markets... that would allow duty-free access for a limited number of products coming from affected areas” (Lum and Margesson, 2014). Even with relief effort plans and international help, efforts have been delayed due to the lack of transportation, limited communication systems, damaged infrastructure, and the occurrence of other natural disasters. One positive outcome from Typhoon Haiyan is that it strengthened the relationship of the United States and the Philippines. As stated by Lum and Margesson (2014), some “argue that the U.S. military response to the disaster has strengthened the case for an enhanced U.S. military presence in the country” (pg. 4).

One of the most deadly earthquakes ever to happen in the Philippines is the 1990 Luzon earthquake. San Jose City, Nueva Province, Luzon suffered a 7.7 earthquake, killing about 1,300 people. It affected nearly 100,000 km² and led to liquefaction, flooding, and even renewed activities of Mount Pinatubo and Mount Taal. The impact of this earthquake led to widespread

disruption throughout the country. Short term effects included decrease in transportation, communication networks, and supply of water for agricultural purposes. According to Benson (1997), the “livestock population also declined rapidly as animals were killed... post-harvest and storage facilities were damaged” (pg. 40). The earthquake also resulted in financial losses and 8,000 job losses in 1990. In an effort to repair damages, construction increased by 17.7% that year. Baguio, one of the areas that were affected the most from the earthquake, had re-emerged as a popular tourist site by 1993; suggesting a lot of construction activity.

A recent major volcanic eruption was that of Mount Taal in 1965. The eruption opened a new crater 1.5 km long and 0.3 km wide in Lake Taal. It affected an area of about 60 square kilometers, killing approximately 200 people. Since 1572, Mount Taal has erupted at least 34 times.



Figure 5- Aftermath of Mount Taal eruption in 1965 (Oregon State, n.d.)

The 1965 eruption of Mount Taal does not compare to the Mount Pinatubo eruption in 1991, but it still had a big impact in the Philippines. According to the World Bank (n.d.), “physical damage due to volcanic eruptions is perhaps 50% of those due to flooding” (pg. 19). The biggest outcome from the eruption of Lake Taal is the realization that the number of deaths can be avoided if

monitoring equipment were updated. The two key government bodies involved in provision of disaster warnings in the Philippines are Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) and Philippine Institute of Volcanology and Seismology (PHIVOLCS). PHIVOLCS regularly monitors the country’s six most active volcanoes- Taal, Mayon, Bulusan, Hibok-Hibok, Canlaon, and Mount Pinatubo, but “much of PAGASA’s monitoring equipment is out of date, whilst the organization also faces perennial funding constraints” (Benson, 1997, pg. 107). According to Benson (1997), “human and economic costs of natural disasters could perhaps be reduced by improved warning equipment” (pg. 107).

Analysis

As the Philippines is accustomed to the number of natural disasters that occur each year, the country has adjusted in order to accommodate for the cost of damages. Benson (1997) wrote that the Department of Social Welfare and Development administers “P 25,000 per annum which can be drawn upon to provide immediate emergency relief and rehabilitation assistance” (pg. 81). Below is a chart that shows the current institutional arrangements for disaster management.

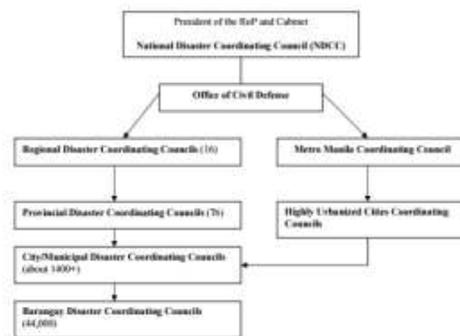


Chart 2 (World Bank, n.d.)

Although there are institutional arrangements that are supposed to be the ones organizing disaster relief plans, there is a lot of dependency on outside help. Government agencies are currently supported by a wide network of NGOs and private sector corporations. It is unlikely that any more money will be allocated to disaster relief efforts because of the fact that there are multiple natural disasters every single year, and it is inevitable that there will be damage.

Some improvements that can be made in order to ensure successful post-natural disaster management are to have a national strategy. If there is one uniform strategy for the entire country, than it makes it easier for everyone to be on the same page as far as expectations and goals. Another improvement would be to have better equipment that monitors earthquakes, volcanic eruptions, typhoons, etc. to make sure that there is enough time to plan ahead and have any emergency evacuations if necessary. Since nothing can be done to prevent a natural disaster from occurring, the best thing that the Philippines, and any other country, can do is to be prepared. Being prepared entails knowing what to expect once it hits and knowing what to do afterwards.

Conclusion

The Philippines is a country that is used to facing all sorts of natural disasters. This country has experience dealing with typhoons, floods, earthquakes, and volcanic eruptions. It is no stranger to the damage it causes and its aftermath. Executive Order 137 mandates the Philippines to commemorate “Natural Disaster Consciousness Month” every July in order to look back at the past year and see how problems can be avoided. In the end, no matter how many people are affected or how much damage is inflicted, the Filipino people find a way to survive through it all.

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