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**Environmental Evaluation on Increasing Flood in
Brgy. Meyto Calumpit Bulacan: A Case Study**

A Case Study Presented to the PAGASA- PRRFWC
DOST-Region 3 Compound, Barangay Maimpis, San Fernando, Pampanga

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INTRODUCTION

Background of the Study

Floods are considered as the most common and dangerous natural disasters in the Philippines. It can take place naturally, or environmental factors that destroy the water flow. There are many regions in the country that face this natural disaster because of the overflowing of rivers. Moreover, it also happens because of the tropical cyclones with prolonged rains. The Municipality of Calumpit in the province of Bulacan has over 229 hectares of river system, comprised of the Angat, Pampanga, Bagbag, Labangan, and Calumpit/Hagonoy Rivers.

Calumpit, Bulacan has the total of 29 barangays which is divided between agricultural, residential, industrial, commercial, and institutional. The barangay of Meyto is just one of the barangays that is prone to flood. It is an agricultural area and main sources of livelihood are farming and fishing. Its assessment to flood susceptibility was classified from Low to High rating by Mines and Geosciences Bureau of Region III in 2013. The barangays classified with moderate to high susceptibility to flooding are located in identified low portions of the barangay, in topographically low-lying areas and/or near a major river system. These barangays were presented with the Geohazard Threat Advisory informing their susceptibility to flooding and the corresponding recommendations particular to the barangay. This study aims to seek to investigate different environmental factors, degradations or changes other than generally located in a topographically low area.



Figure 1: Regional Map, Calumpit, Bulacan



Figure 2: Barangay Meyto, Calumpit Map

Statement of the problem

This study primarily aims to assess “How does Environmental Changes increase the induced flood in Meyto Calumpit Bulacan”?

- a. Climate change,
- b. Human alteration on agricultural lands and waters,
- c. Human wastes on the streams,
- d. Catch basin and in addition no drainage system

Hypothesis

Environmental Changes over time are more likely to increase the frequency and height of floods in Meyto Calumpit Bulacan.

- a. The persistence of Global Warming is highly indicative of the resulting flood.
- b. The persistence of Human Alteration on agricultural lands and waters are highly indicative of resulting floods.
- c. The persistence of Human Waste thrown out on streams is highly indicative of resulting floods.
- d. The persistence of urbanization without proper a drainage system is highly indicative of the resulting flood.

Importance of the Study

The following were believed to benefit from this study:

Local Government Unit (LGU) – With the data collected, the local government unit has to assess for the implementation of desirable flood control and drainage projects in river systems in the barangay Meyto, Calumpit. It will pursue the provision of adequate structural schemes

especially flooding for the barangay and its other adjacent barangays. This can be used as reference to their plan for renovation of the road and drainage plan for the barangay.

Community - With the data collected, the community will be aware of the different effects of pollutants and environmental degradation due to anthropogenic activities and human-driven elements which can lead to flood and its adverse effect on the residents.

Future Researchers - This study will be beneficial to the future researchers due to the fact that this study was developed through analyzing studies from experts. The ideas presented may be used as reference data in conducting new researches.

Teachers – this study will benefit those teachers who are in need of materials for teaching their students in Environmental Science and Disaster Risk and Reduction Management.

Scope and Limitations of the Study

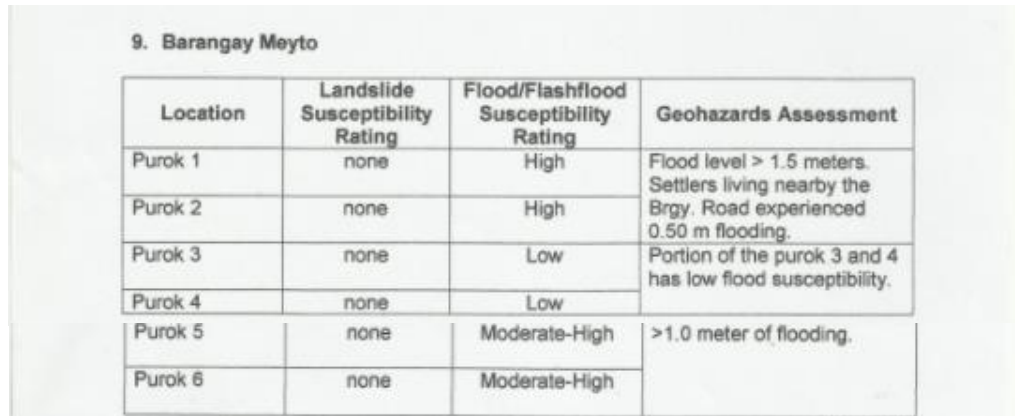
The researchers will only focus in the barangay Meyto, Calumpit, Bulacan which is now a flood-prone area. The researchers have to assess the environmental changes that indicate the cause of the present-day flooding experienced by the residents of the barangay, whether it is weather events and human-driven elements which will be gathered through inquiring in the locals. And as for limitations, the researchers were not allowed to go on an ocular visit to maintain individual's safety in accordance with health protocol provided by the university. The data which the researchers will obtain may be limited for it will be based on the data and knowledge of the locals.

PART II: BODY

Presentation of the Data Gathered

The following are the observed environmental changes or the factors which could possibly increase the induced flood in barangay Meyto, Calumpit, Bulacan.

The flood susceptibility of the barangay Meyto in the municipality of Calumpit was assessed by Mines and Geosciences Bureau of Region III in 2013. Some of the zones were classified with moderate to high susceptibility to flooding are located in identified low portions of the barangay, in topographically low-lying areas and/or near a major river system while some zones were classified Low susceptibility but now are also experiencing moderate to high flood with compare to the past years, which could possibly resulted due to human-driven elements and environmental changes.



9. Barangay Meyto

Location	Landslide Susceptibility Rating	Flood/Flashflood Susceptibility Rating	Geohazards Assessment
Purok 1	none	High	Flood level > 1.5 meters. Settlers living nearby the Brgy. Road experienced 0.50 m flooding.
Purok 2	none	High	
Purok 3	none	Low	Portion of the purok 3 and 4 has low flood susceptibility.
Purok 4	none	Low	
Purok 5	none	Moderate-High	>1.0 meter of flooding.
Purok 6	none	Moderate-High	

Figure 3: barangay Meyto flood susceptibility assessment

According to the barangay Meyto Secretary, Ever Lyn Reyes, the population for the past 11 years increased from 3,051 in 2010 to 4,272 in 2021. The increase in population have resulted and generated waste in the barangay's waterway. The river and water waste is also the reason for flooding. There is no maintenance of the excavation of the rivers and water, making it filled with different wastes that resulted to slow absorption of water. With that, the water carrying capacity

of the river is reduced. This will lead to floods when there is heavy rainfall. In addition, the adjacent barangays such as San Jose and Panducot could also be wastes contributor.



Photo 1: Waste disposed in the river system

Photo retrieved from Brgy. Meyto Secretary Ever Lyn Reyes

The barangay Meyto lies along the river bank that is connected to one of the major river basins in Central Luzon which is the Pampanga River and considered as cause of flood. This happens when there is a heavy and prolonged rainfall the water level in the river rises as a result of which the capacity of the river bed to hold excess water decreases. This relates due to the waste disposed in the river system making it shallow. Moreover, there is no dike built along the river bank so that when there is an increase in water level there is nothing to hold back the water.



Photo 2: barangay Meyto along the river bank

Photo was taken year 2016 from Brgy. Meyto Secretary

The main sources of livelihood in barangay Meyto are farming and fishing which have deep interconnections with land and water. However, some of the land was turned into ponds for agricultural area. According to Mr. Gerardo Belen, of Municipal disaster risk reduction and management office, land conversion into agricultural area causes flood due to the fact that ponds and farming areas are more likely to receive an abundance amount of water from tropical cyclones and even in a heavy rainfall causing water to be stagnant and stay for a timely period. The land alterations we make to land always have the possibilities of having positive and negative outcome. This may be for the livelihood of the people but on the other hand, the water overflows causing flood on the nearby areas/houses for it is located on low elevated zone.



Photo 3: Alteration made to land into agricultural

Photo retrieved from Brgy. Meyto Secretary Ever Lyn Reyes

Meyto, Calumpit is known as catch basin of the floodwaters coming from high places. With the past weather disturbances, it took two weeks and more for the flood waters to subside. Having a good drainage system is necessary in minimizing flooding by preventing water to accumulate and it drains the excess water on the roads. The lack of a drainage system has an adverse impact on the community. The barangay has been no road rehabilitation, water remains on the street and in certain lower areas of the land for an extended period, even after the typhoon

or low-pressure region has passed. The road has been as it is for a very long time and if carefully managed, it can help to prepare and adjust to the challenges. In today, building of dike alongside is ongoing; this is in line with the changes in our climate.



Photo 4: No drainage/canal systems

Photo retrieved from Brgy. Meyto Secretary

At the top of those factors the researchers have found, the most challenging environmental change we are facing is the climate change. With higher temperatures, we have more energy in the Earth's system. Higher ocean water and air temperatures increase the possibility for evaporation and therefore cloud formation. At higher temperatures, the air can hold more moisture content. This led to an increase in precipitation intensity, duration and/or frequency. As it increases the likelihood for more extreme weather events to occur, risks will expand beyond the high-risk areas known today.

PART III: CONCLUSION

Conclusion about the data

Flood is the most frequent type of disaster in the Philippines. Barangay Meyto is considered to be as flood prone area with moderate to high chances of flooding in low-lying areas near the river system. Global warming is one of the reasons why the Philippines experience extreme weather from typhoon and Southeast Monsoon that brought heavy rains that floods the community. Aside from weather, alteration of agricultural lands decreases the area that can withhold floodwaters and affect the households. Improper waste management and lack of drainage system to the increasing population and impending urbanization to the area are the contributors of the increasing flood water through the years. In conclusion, the local government of Barangay Meyto should implement charges regarding to the improper waste disposal as well as community cleanup in the riverbanks. Proper planning and installation of drainage system in the area will benefit the community to minimize flood water going through households.

Recommendation

One of the actions that can be taken to reduced floods is organizing a community drive about flood risk awareness. As environmental science students, encourage your family or neighborhood to segregate their trashes and not dispose it on the rivers or estuaries that can clog or block the drainage system. It is one the possible reason of slow subsidence of flood. Moreover, the river and water wastes should be excavated for a quicker absorption of flood water. By these possible solutions, the barangay and its community hopes that these can help prevent the flood in the barangay Meyto, Calumpit. Although there is no guarantee of total avoidance of it, there might be a chance to lessen the high and dangerous level of flood in the zones.

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