

Community Participation of Villages in Urban Flooding

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ABSTRACT

Urban flooding is a significant and growing development concern for East Asian countries, including the Philippines, highlighting the critical necessity to incorporate flood risk management into regular city and town development. Communities affected by urbanization typically have weak infrastructure and services, making them more vulnerable to flooding. The marginalized sector, particularly women and children, is the most badly affected. This study is a descriptive, quantitative research design that was conducted to determine the engagement of the community members in the flooding situation in the Villages, specifically before, during, and after the flood. This study was conducted in the two Villages of Mandaue City, Cebu, Philippines. This study had one hundred thirty-four (134) respondents representing the two villages. Thus, this study utilized a self-made instrument and was divided into two parts. The first part is to determine the extent of participation of the community members, while the second part is to assess the level of participation of the identified stakeholders through ranking. Weighted mean was used to determine the extent of participation of the community members, while ranking was used to assess the identified stakeholders' participation level. The study reveals that the extent of participation of the residents in the two villages before, during, and after the flood is moderate participation. This means that the residents are not fully engaged in the flooding preparation, responses, and recovery situation.

Keywords: Urban Flooding, Community Participation, Flood, Mandaue City, Cebu, Philippines

INTRODUCTION

The Southeast Asian nation of the Philippines is an archipelago that forms part of the Pacific Ring of Fire. Large bodies of water facing the Pacific Ocean surround the country. Due to its proximity to the equator, the nation is vulnerable to typhoons, earthquakes, flooding, and other natural catastrophes. The Philippines also has an abundance of natural resources and wildlife. According to the United Nations International Strategy for Disaster Reduction's mortality risk assessment, the nation was ranked 12th out of 200 in 2009 among those most at risk of natural disasters (Pulhin et al., 2010).

According to Chen et al. (2015), metropolitan areas are particularly vulnerable to flooding. At almost all levels of governance, improving urban flood risk management has taken

the top spot (Fang, 2016). Floods in urban environments show more varied and complex flow patterns because the water travels through many different regions, including crosswalks, sewers, courtyards, and parks, as well as around and inside buildings and other urban fixtures (Paquier et al., 2015; Falconer et al., 2017).

Urbanization invariably raises the risk of flooding due to increased susceptibility brought on by population, wealth, and infrastructure concentration in smaller regions. Flood risk is also increased by changes in hydrology and hydroclimatology brought on by changes in land use and microclimate brought on by urbanization. Numerous sociocultural practices have encouraged floods in multiple metropolitan settings. A high level of illiteracy, a lack of community awareness, poor environmental education, ineffective town planning laws, and poor environmental management are characteristics of these activities. They are also characterized by increased paved surfaces and inadequate solid waste disposal techniques, stream or river channel encroachment and abuse, stream or river channel abuse, and poor solid waste disposal. Through a mix of global climate change and human modifications of the urban area, the causes of floods become progressively more complex (Huong & Pathirana, 2013; Oriola, 1994; Padawangi & Douglass, 2015).

Urban flooding is a severe and growing development challenge for East Asian nations, including the Philippines, emphasizing the urgent need to include flood risk management in regular city and town planning. Communities affected by urbanization usually have poor infrastructure and services, which makes them more vulnerable to flooding. The marginalized sector is the ones who are most negatively affected, especially women and children. Fast urbanization necessitates doing things correctly the first time, Sheng (2011) claims, enabling cities and towns to support sustainable expansion while sparing lives and money.

Every year, infections, infrastructure damage, and fatalities are caused by floods and flood-related issues worldwide (Singh et al., 2018). More wetlands, open spaces, water bodies, and naturally vegetated surfaces have been developed in urban and suburban regions due to the speeding up of urbanization. Flooding occurs more frequently because of poor infiltration and decreased flow resistance caused by increased impermeable surfaces brought on by urbanization (Huong & Pathirana, 2013).

Stormwater drainage issues are a concern in South Asian cities due to urban sprawl and structural, hydrological, socioeconomic, and climatic variables. Climate change is predicted to increase the frequency of brief, intense downpours. Urban flooding and waterlogging are predicted to get worse since drainage systems in South Asian cities are not as capable as they once were. Unplanned urban growth reduces permeable areas and worsens the issue by filling up low-lying areas for infrastructure construction. Solid waste also clogs urban drainage systems and exacerbates urban flooding and waterlogging when dumped in canals and open areas (Pervin et al., 2020).

In the Philippines, resilience involves connecting urban flood risk management to initiatives geared toward reducing poverty and adapting to climate change as well as to specific problems with urban planning and management, such as housing provision, land tenure, delivery of urban infrastructure, service provision, and means of subsistence (Jha et al., 2012). In this case, a sustainability measure is also necessary to ensure the community's social viability, economic stability, and environmental quality.

Floods brought on by heavy rains and frequent typhoons are expected to increase in a nation like the Philippines, which is vulnerable to climate change. Men and women have developed adaptation techniques that make them adaptable to catastrophic weather occurrences in a nation that frequently experiences climate-related calamities (Tatlonghari & Paris, 2013).

At the moment, drainage systems cannot handle the increased volume of water produced by heavy rains, which finally leads to flooding (Nair, 2009; Avinash, 2016). According to Hankin et al. (2012), Messner and Volker (2006), and Kleinosky et al. (2007), flooding over

highways has the potential to result in several serious problems, including the loss of life, damage to vehicles, damage to the road infrastructure, and related economic losses.

Furthermore, a study on flooding conducted in Lapu Lapu City, Cebu, Philippines, revealed that the common cause of flooding in both Villages is the undisciplined members of the community's disposal of solid and human wastes despite government efforts to implement proper waste disposal employing segregation of biodegradable, non-biodegradable and hazardous waste from the surrounding community. It is still evident that people in the community continue to disregard the long-term effect of improper garbage disposal. In most areas of the chosen locale, wastes are thrown in rivers and other waterways, and it has been a usual scenario that these waterways are clogged up by garbage (Montebon, Negro & Patindol, 2023).

METHODOLOGY

Research Design

This study is a descriptive, quantitative research design that was conducted to determine the engagement of the community members in the flooding situation in the Villages, specifically before, during, and after the flood.

Research Locale and Respondents

This study was conducted in Village Paknaan and Village Looc, Mandaue City, Cebu, Philippines. Village Paknaan is next to the Butuanon River Watershed, while Village Looc is a coastal village. This study had one hundred thirty-four (134) respondents representing the two villages.

Instrumentation

This study utilized a self-made instrument and was divided into two parts. The first part is to determine the extent of participation of the community members before, during, and after the flood, while the second part is to assess the level of participation of the identified stakeholders through ranking. A team of experts validated the instrument, and it underwent pilot testing to determine the reliability of the research instrument.

Treatment of Data

Weighted mean was used to determine the extent of participation of the community members before, during, and after the flood situation. In contrast, ranking was used to assess the identified stakeholders' participation level.

RESULTS AND DISCUSSIONS

This part presents the results of the accumulated database on the survey results. The underlying section presents the respondent's extent of participation of the community members before, during, and after the flood and the level of participation of the identified stakeholders in responding to the flood situation.

Table 1. Extent of participation before the flood

Indicators	Mean	Interpretation
A. Before the flood		
• Monitor radio, television and social media accounts for flood news updates.	3.25	Moderately Participation
• Plan with authorities in preparation for flood.	3.22	Moderately Participation

• Secure the structure of the home and business prior to flood situations.	3.22	Moderately Participation
• Transfer essential documents and appliances to the elevated area of the house.	3.21	Moderately Participation
• Prepare emergency kits with food, water, candles, rechargeable lamps, flashlights and first aid kit for possible power interruptions.	3.17	Moderately Participation
• Prepare a list of emergency hotlines.	2.91	Moderately Participation
Aggregate Mean	3.16	Moderately Participation

Legend: High Participation: 3.26-4.00, Moderately Participation: 2.51-3.25, Less Participation: 1.76-2.50, No Participation: 1.00-1.75

Table 1 presents the extent of participation before the flood situation. It is observed that the indicator on monitoring radio, television, and social media accounts for flood news updates got the highest mean of 3.25, interpreted as moderate participation. This indicates that the residents consider listening and watching the news to keep them updated as to the status of the flood and in order for them to prepare for a potential flood before it occurs.

Conversely, indicators preparing a list of emergency hotlines got the lowest mean of 2.91 and were still interpreted as moderate participation. It implies that residents need to give more importance to preparing the list of emergency hotlines; thus, this is more of a passive activity and does not necessarily require immediate action.

Technologies offer avenues to ideas regarding mitigation measures, potential hazard identification, connectivity amongst response groups of all kinds, public warning messages, and the dissemination of crucial disaster information. The study of Bhuvana & Aram (2019) emphasizes that our digital world has transformed how we communicate, network, seek help, access information, and gain knowledge, shaping every aspect of our lives. Natural disasters necessitate immediate communication to know the wellbeing of the people concerned and to seek rescue and relief measures. Conventional media, such as radio and television, are typically developed for one-to-many information dissemination, while social media allow both one-to-many and many-to-many information dissemination and message exchange (Bassett et al., 2012; Houston et al., 2015).

Table 2. Extent of participation during the flood

Indicators	Mean	Interpretation
B. During the Flood		
• Monitor the physical conditions of home, livelihood and business structures.	3.38	High Participation
• Turn off electrical equipment and other electrical hazards.	3.34	High Participation
• Participation of women in the community in information dissemination to residents regarding the flood situation.	3.19	Moderately Participation
• Participation of men in assisting the evacuation procedures and initiating repairs of the drainage if deemed necessary.	3.17	Moderately Participation
• Gather the family members in one place, listen to the news for flood information updates and prepare for possible evacuation.	3.13	Moderately Participation
• Evacuate the area if instructed to do so.	3.12	Moderately Participation

• Participation of the LGBTQ in providing supportive roles to the men and women in the community.	2.78	Moderately Participation
Aggregate Mean	3.16	Moderately Participation

Legend: High Participation: 3.26-4.00, Moderately Participation: 2.51-3.25, Less Participation: 1.76-2.50, No Participation: 1.00-1.75

Table 2 shows the extent of participation during the flood situation. As observed in the table, the indicators of monitoring the physical conditions of home, livelihood, and business structures got the highest mean of 3.38, interpreted as high participation. It signifies that the residents prioritize monitoring their property to help them protect and ensure their structure and livelihood are safe during the flood.

On the other hand, the LGBTQ community's participation in providing supportive roles to men and women in the community got the lowest mean of 2.78, which is interpreted as moderate participation. This means that the presence of LGBTQ members during the flood is not totally noticed. Though their identity is not immediately required, it would be a great help to the community to keep them engaged and supported in case of emergency situations like floods.

Flooding has disproportionately destroyed building structures and further worsened economic status, particularly among people who live in lower areas and informal settlements (Kikwasi & Mbuya, 2019). Flood warnings from various information sources are essential for individuals to make evacuation decisions during a flood event (Du et al., 2017). Despite the limited knowledge or understanding of the physical and social challenges faced by those who shelter at home or work during rapid flooding, shelter-in-place is increasingly considered a viable emergency management strategy in some local government areas in Australia (Schwecke et al., 2015).

Table 3. Extent of participation after the flood

Indicators	Mean	Interpretation
C. After the Flood		
• Return home only when it is safe as advised by authorities.	3.43	High Participation
• Help clean the mud, flood waters and the debris brought about by the flood.	3.42	High Participation
• Communicate to immediate family member, relatives and friends about your condition.	3.37	High Participation
• Initiate the repair of the damages in the household in the community.	3.14	Moderately Participation
• Inspect the areas where floodwaters are still high and those that have receded.	2.98	Moderately Participation
• Participate in the local government and school activities on flood recovery.	2.73	Moderately Participation
Aggregate Mean	3.18	Moderately Participation

Legend: High Participation: 3.26-4.00, Moderately Participation: 2.51-3.25, Less Participation: 1.76-2.50, No Participation: 1.00-1.75

Table 3 displays the extent of participation after the flood situation. As depicted, as advised by authorities, the indicator returning home only when it is safe got the highest mean

of 3.43, interpreted as high participation. This implies that residents depend on the authorities' advice on when they are allowed to return to their respective homes.

On the other hand, indicator participation in the local government and school activities on flood recovery is observed to be the lowest, with a mean of 2.73, interpreted as moderate participation. This indicates that the residents are not involved in the participation of different stakeholders in the flood recovery programs; hence, they are focused first on recovering their property and livelihood before extending a hand to others.

Local government and residents may play a role in dealing with urban floods (Fatti & Patel, 2013). Flood management roles of delivery systems were the methods to be used holistically for giving information and assistance to everyone. Collaboration between the government, the private sector, non-governmental organizations (NGOs), and the community, in general, is the most essential factor in achieving the flood delivery system. The success of disaster management depends on its implementation in the local areas and can reduce the impact of disaster on the affected communities. However, the communities themselves, based on education about and awareness of disaster risk management, could also lead to a reduction of the impact of disaster (Khalid & Shafiai, 2015).

Table 4. Summary on the extent of participation before, during and after the flood

Variables	Mean	Interpretation
A. Before the flood	3.16	Moderately Participation
B. During the Flood	3.16	Moderately Participation
C. After the Flood	3.18	Moderately Participation
Overall Aggregate Mean	3.17	Moderately Participation

The table reveal that the extent of participation of the residents in the two villages before, during and after the flood are moderately participation. This mean that the residents are not fully engage on the flooding preparation, responses and recovery situation.

Table 5. Level of Participation on the identified stakeholders

Indicators	Mean	Rank
• Local Government Units (<i>Mga Yunit sa Lokal nga Panggamhanan</i>)	1.71	1
• Schools (<i>Mga eskwelahan</i>)	2.26	2
• Church (<i>Simbahan</i>)	2.82	3
• Non-Government Organizations (<i>Non-Government Organizations</i>)	3.64	4
• Private Companies (<i>Private nga mga Kompanya</i>)	4.61	5

Rank legend: (1 is the highest and 5 is the lowest)

As observed in Table 5, Local Government Units (LGU) rank first (1) as the number one institution that has participated in various activities before, during, and after flood situations, while private companies rank lowest. This means that the LGU is involved in the preparedness to response phase, whether there are no emergencies or disasters.

During an emergency or disaster, the local government will act quickly and appropriately to identify, direct, mobilize, and coordinate reconsider officials to take preventive, precautionary, or protective measures to reduce loss of life and minimize damage. The City Administration takes the initiative to establish and equip an Emergency Operations Center (EOC) in the Municipal Corporation Offices, where all emergency activities will be managed. The EOC will communicate with other city and district administrations to ensure close cooperation in emergencies and disasters (Raghavendra et al., 2014).

RECOMMENDATIONS

- Before a flood, residents should participate in community preparedness activities such as attending information sessions and workshops, creating emergency plans, and identifying evacuation routes that is facilitated by the local government unit or other identity.
- During a flood, residents may actively participate in evacuation efforts, assist in rescuing those in need, and provide valuable information to emergency responders.
- After a flood, residents may participate in the clean-up recovery efforts, assist in assessing damages, and provide feedback on the effectiveness of disaster management efforts.

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