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Research Article

An Assessment of Socio-Economic Impacts of Rainstorm Disaster on the Livelihood of the Residents of Ikole Local Government Area in Ekiti State, Nigeria

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Abstract

This study assessed the socio-economic impacts of the rainstorm disaster which occurred on 3rd March, 2023 on the livelihood of the residents of Ikole LGA in Ekiti State, Nigeria. The study area is prone to recurring rainstorms, a natural and metrological disaster that has ravaged the livelihoods of the residents of Ekiti State. The weather (sunshine hours, temperature, relative humidity, cloud cover, visibility, wind direction, wind speed and rainfall) information of Ikole LGA on 3rd March 2023 was obtained from the Nigerian Meteorological Agency, Oshodi, Lagos, and the incidence/profile of rainstorm in Ikole LGA on the same day was obtained from the Ekiti State Emergency Management Agency. A well–designed and structured questionnaire was administered to respondents to obtain information on the kind of losses encountered by the victims of rainstorm disasters in the locations and the coping strategies they adopted in mitigating the effects of the disaster. The data collected from the victims were analyzed with an SPSS package, presented in tables and followed with discussion. The results showed that the rainstorm brought about socio-economic hardship on the victims in the study area. It was discovered that some of the relief measures on the ground were short-term measures which provided no lasting solution to the menace. Some general measures suggested among others to mitigate the effects of rainstorms include proper construction of a storm-water drainage system in the study area and the Planting of low-height vegetation that can serve as wind-break.

Keywords

Disaster, rainstorm, rainstorm disaster, relief measures, livelihood.

1. Introduction

A disaster is a catastrophic and calamitous event that can be originated from both man-made and natural origin. It could also be geological (landslide, earthquake, soil creep), chemical and technological (Chornobyl disaster, oil spills, accidents), metrological (erosion, flooding, rainstorm) and biological (outbreak of epidemics such as pandemics like Ebola, covid-19) Sharif, (2020), (Ibidun

2010). Disaster occurs when a hazard impacts or strikes a vulnerable community with low capacity resulting in damages, loss and serious disruption of community functioning. The widespread human, material and environmental losses exceed the community's ability to cope using its resources Raheem et al (2024). Rainstorm disaster continues to wreak havoc on lives and properties in both high and low-income countries across the globe. The disaster nature of the climatic phenomenon appears to have constituted a grave concern for the global populace particularly with the onslaught of global warming and climatic fluctuation being experienced across the global environment. A rainstorm is a severe weather event characterized by heavy rain, reduced visibility, and maybe thunder and lightning Ohshimo et al (2018). Oluwayemisi et al (2019), define a Disaster as "an emergency event that involves the destruction of economic resources, depletion of environment and loss of lives which is caused by natural hazards or human-induced actions resulting in a significant change in circumstances over a relatively short period. Typical examples are death, displacement, disease, and loss of crops, damage to physical and service infrastructure, depletion of natural and social capital, institutional weakening.

It is good to note here that even though rainstorm disaster is a worldwide natural phenomenon, there is every tendency to believe that low-income countries are more at the receiving end and more prone to the impacts of the disaster. This could be attributed to a lack of or inadequate planning and preparation on the part of the government of the low-income countries. The occurrence of rainstorms as a natural and metrological disaster is exacerbated by global warming and extreme weather which has been causing the most fatalities per 100,000 inhabitants across the globe International Strategy for Disaster Reduction (2008). Ecosystems and natural occurrences are being impacted by the subtle shifts in atmospheric conditions that follow global warming. As a consequence, it puts more of the globe at risk from natural disasters. For example, in 2022, the U.S. experienced 18 separate weather and climate disasters costing at least 1 billion dollars, including floods, storms, very high temperatures, heat waves, tornados, cyclones droughts etc.

Federal Ministry of Economic Corporation and Development (FMECD, 2015) remarked that everyone should be very worried about the frequency of rainstorms since they increase the likelihood of natural disasters including landslides, landslips, and floods. The risk of natural hazards such as rainstorms often happens as a result of the link between natural and human factors Nura et al (2022). As a result, land use planners need to pay close attention to the rising frequency of rainstorms and the potential damage they pose to the ecosystem.

A rainstorm is a weather disaster which has been causing great effects on the residents and their livelihoods. In recent times, it has contributed to the public outcry concerning the damages caused to both individuals and the government. Several people in many parts of the world have been rendered homeless and properties worth millions of naira destroyed due to this menace of rainstorms (Eric, 2021). Rainstorm disaster has a great influence on the connectivity of roads and cause serious damage to the transportation system Zhenzhen (2024). It submerged or collapsed houses, damaged roads, and caused traffic congestion or paralysis Guo et al (2024). Government at different levels has spent more in providing temporary succour and relief for the victims. In many of those locations where it had occurred, particularly in low-income countries like ours, many of the buildings destroyed remained abandoned due to the poverty-stricken state of their victims. Rainstorms are one of the most comprehensive disasters in the world, which happen frequently and always bring great harm. The danger of rainstorms due to storms is a serious obstacle to the international sustainable development agenda (Saini et al, 2006). The world's largest, wealthiest and most vulnerable economies bear the brunt of the yearly average worldwide losses. Many poor and middle-income nations especially tiny island developing states have the largest concentration of risk according to the United States Department of Disaster Reduction concerning yearly capital investment or social spending, especially regarding Sudden Infant Death Syndromes (SIDS) (UN International Strategy for Disaster Reduction, 2015).

Communities in Ekiti State have been affected by rainstorm's menace in terms of destruction to the means of livelihoods. Rainstorms are very prevalent and are one of the most serious natural catastrophes like flooding. Its main characteristics are severe widespread flooding and have been widely reported due to the terrain, and regular features of the weather system. It comes without

warning and causes widespread devastation like economic damage, interrupting both traffic and telecommunication, loss of clean water supply, and loss of thousands of properties and human lives. According to the National Emergency Management Agency NEMA (2018), in the first two months of the year, over 200 homes were allegedly damaged by rainstorms in Ekiti state, resulting in physical harm to people, destruction of houses and buildings and trees, psychological trauma, economic losses, unplanned or unbudgeted spending on the part of the government and individuals and public and financial disgrace to the victims. The disaster affected more than five Local Government Areas of the state namely: Ado, Ise-Orun, Ekiti West, Agbado, Aisegba in Gbonyin Local Government Area and Ikole where the estimated damage ran into hundreds of millions of naira. Again, in March 2019, according to a report given by the National Emergency Management Agency and State Emergency Management Agency, a rainstorm disaster caused havoc across some towns in Ekiti State including; Ado- Ekiti metropolis, Afao, Are, Ilawe, Igbemo, Isan and Iludun etc.

Causative factors such as poverty, urbanization, weak building structure as well as poor landscape design of the environment are responsible for the devastating effects of this phenomenon. Loss of property, displacement of affected people and unplanned expenses which have been on the increase over the years can be found in the regions with low economic status Akintude et al (2019). It was reported that more than 80 houses including shops, and schools were blown off in Ado-Ekiti, and several electricity poles and trees in seven communities were thrown down causing traffic congestion. This disaster caused extensive socioeconomic dislocation with catastrophic consequences ranging from the destruction of human habitation, and resources, and human health affected and many communities were in blackout for several weeks National Emergency Management Agency and State Emergency Management Agency (2019). The communities in the study area have suffered from rainstorms for close to three decades and have a limited capacity to control these meteorological events.

The records of rainstorms in the study area are very rampant. The News Agency of Nigeria (NAN) reported that, the first rain of the year 2018 which lasted for only 40 minutes ravaged farmlands and destroyed crops, schools, church buildings and other economic trees in Ikole Local Government Area. It was reported that no fewer than 100 residential buildings were destroyed in Temidire, Oke Ijebu, Ayedun, Odo-oro and Oke Agbe (NAN 2018). The one available for 3rd March 2023 shows a very catastrophic experience. It is in the light of this that this research has become important. This research aims to assess the socio-economic impacts of the rainstorm disaster which occurred on the 3rd March, 2023 on the livelihood of the residents of Ikole- Ekiti Local Government Area of Ekiti State. The research is intended to ascertain the incidence and profile of rainstorm disasters in the study area, examine the economic implications of the hazard and assessment of the relief measures provided by the disaster managers to the victims.

Figure 1. Some of the buildings were affected by the rainstorm of 3rd March 2023 in the study area.

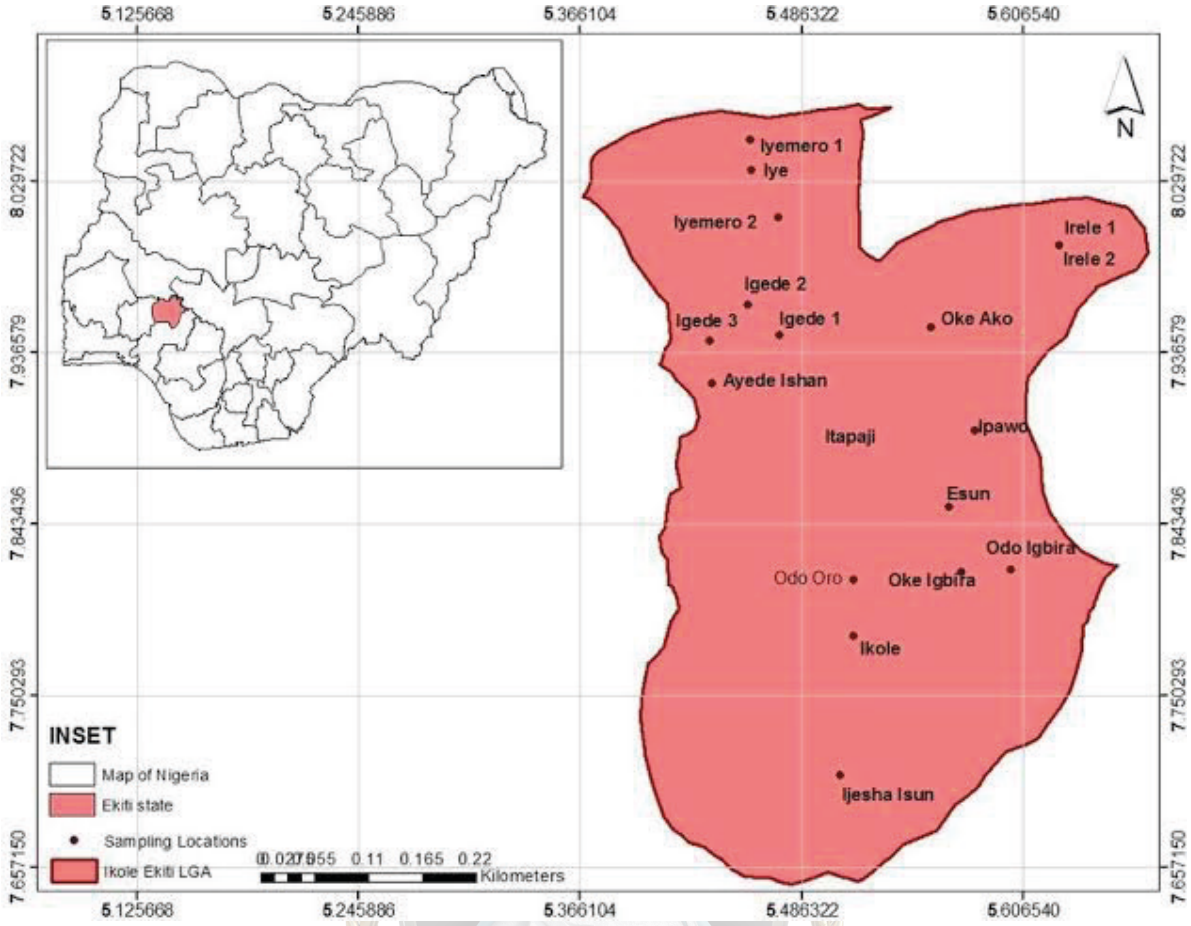

Figure 2. Map of Nigeria and Ikole Local Government showing the study area.

2. Materials and Method

Survey research was employed as a method in the choice of location for sampling. This was done by careful and purposeful selection based on the literature of districts in Ikole Local Government such as Oke-Ako, Ijesa-Isu and Ikole.

The research was made up of both qualitative and quantitative data with data sourced from both primary and secondary sources. The primary data were collected using copies of 400 questionnaires from which 389 were recovered in addition to an on-the-spot assessment of the victims' houses and the environment to determine their level of vulnerability. A well-designed and structured questionnaire was used for the collection of the primary data from the respondents, who experienced the incidence of rainstorm disaster and got their personal or rented apartments affected on 3rd March 2023 from the study area.

The secondary data comprised of data obtained from already existing information on the rainstorm of 3rd March 2023 in Ikole Local Government in Ekiti State from the Nigerian Meteorological Agency, Oshodi, Lagos and state agencies that are in charge of managing disasters. This record was collected from the Ekiti State Emergency Management Agency. The data used included the weather (sunshine hours, temperature, evaporation, relative humidity, cloud cover, visibility, wind direction, wind speed and rainfall) of Ikole on 3rd March 2023 obtained from the Nigerian Meteorological Agency, Oshodi, Lagos. Records to show the incidence and profile of rainstorms in the study area were also obtained from the Ekiti State Emergency Management Agency. The data obtained from the respondents were processed and analyzed using the Statistical Package for Social Sciences (SPSS) 25.0 version.

3. Results and Discussion

Table 1 provides a detailed summary of the recorded weather variables observed in Ikole Local Government Area (LGA) on the 3rd of March, 2023, offering critical insights into the climatic conditions during this specific period.

Table 1. The weather variables of Ikole LGA on 3rd March 2023**.**

S/N	**Weather variable**	**Value/Description**
1	Sunshine hours	12.1
2	Temperature	36.8°C
3	Wind direction	North-East
4	Wind speed	8km/h
5	Rainfall	36mm
6	Visibility	10km
7	Relative humidity	63%
8	Cloud cover	30%

Source: Nigeria Metrological Agency, Oshodi, Lagos, Nigeria (2023)

The sunrise hours in the study area on the 3rd of March 2023 are enough to increase the temperature to 36.8 °C for that particular day. High temperatures will give rise to high evaporation from the Earth's land and ocean surfaces. The outcome will give rise to high relative humidity. The relative humidity of (63% in the study area indicates saturation which leads to high cloud cover and usually results in condensation. The two important components here are relative humidity and cloud cover which eventually resulted in the precipitation (rainfall) of 36mm. The wind direction is the North-Eastern trade wind which prevails in the northern hemisphere at approximately 30 degrees latitude. It becomes **humid** and **warmer** as moisture accumulates along the way (Patil 2023). Wind speed of 8km/h with 4-6 knoth. Wind having 4-6 knoth is responsible enough to damage roof and pull down electricity poles. Meanwhile, the amount of rainfall recorded (36mm) in the study area is enough to destroy the livelihoods of the inhabitants of the study area. With these findings, it shows extreme weather events and climatic anomalies have serious effects on the socioeconomic status of the inhabitants of the study area. By implication, climate change adaptation strategies need to be put in place.

The incidence and profile of rainstorm disasters in the study area

Both primary and secondary data were obtained for this objective which sought to find out the profile/incidence of rainstorm disaster in the study area. The primary data was sourced from the victims of the rainstorm disaster of the 3rd March 2023. The secondary data was sourced from the Ekiti State Emergency Management Agency. Table 2 presents the incidence of rainstorm experience on 3rd March 2023.

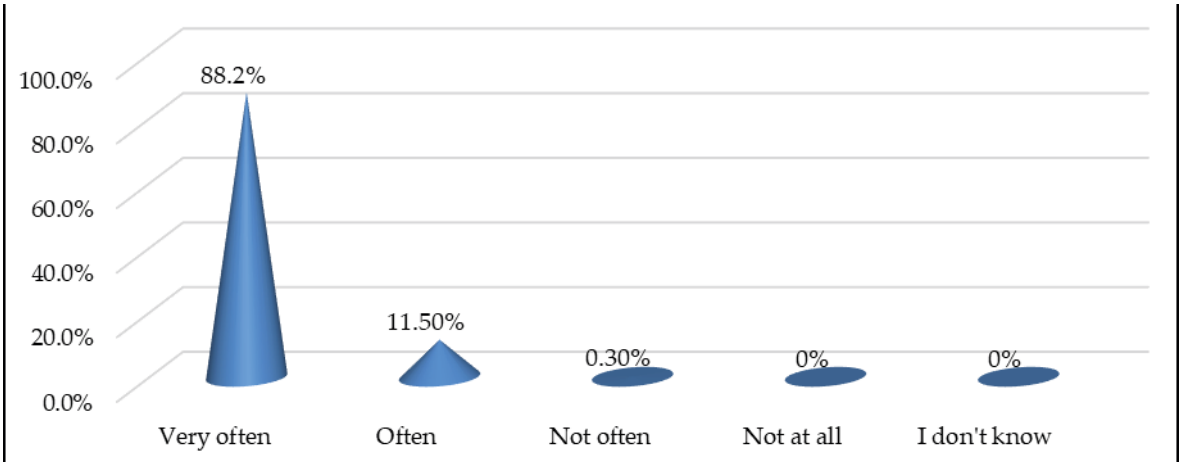

Figure 3. Showing the incidence of rainstorm disasters in the study area

Figure 3 presents the incidence of rainstorm experiences in the study area. The result of 88.2% of the respondents showed that rainstorm occurs very often in the area. Apart from primary data obtained from the respondents on the incidence of rainstorms in the study area, Secondary data was also obtained from the State Emergency Management Agency (SEMA) to support the occurrence of this disaster.

Table 2. Profile of Rainstorm in Ikole LGA Ekiti State on 3rd March 2023

S/N	Name of Locality	No of Victims	Items Destroyed
1	Oke–Ako district	62	Roofs were completely and partially blown off, and mattresses, books, ceilings, crops electricity facilities and economic trees were pulled down.
2	Ijesa –Isu district	48	Many Roofs were completely and partially affected mattresses, pillows food stuffs, markets, schools and electronics were damaged. Death of livestock. Walls collapsed
3	Ikole district	42	The roof was blown off completely, farm crops were destroyed walls completely collapsed, and documents, books, rugs, ceilings, mattresses, furniture and electronics. Crops and Institution buildings

Source: Field study and Ekiti State Emergency Management Agency (2023) Ekiti- State

Table 2 confirmed the incidence of rainstorm disasters in the Ikole Local Government area, through interviews of the disaster managers from Ekiti State Emergency Management Agency. Practically, the study area was seriously ravaged by this menace as obtained from the results. The study area is grouped into three districts with many towns and villages under them. Several persons have been rendered homeless after a two-hour torrential downpour which started at about 3 pm and destroyed more than 152 buildings, electricity facilities and another vital source of livelihood in Ikole Local Government Area of Ekiti State on Friday, March 3**.** Findings from the study showed that some frequently suffered from rainstorm disasters in the area. The implication is that most damages and injuries occurred when there was little or no early warning and preparedness for an impending rainstorm thereby causing the victims to be vulnerable. This is an eye-opener for government and disaster management authorities to have an existing rainstorm management plan. Having a strategy in place to handle rainstorms can lessen the likelihood of losses due to dangers, guarantee timely and suitable aid for victims when needed, and facilitate a speedy and long-lasting recovery. According to Peter (2017), individuals and the government alike should make it a priority to implement sound planning and development policies that raise awareness of the dangers posed by wind and rainstorms and encourage sufficient preparation for their rainstorms.

Table 3. The Cost Implications of the Rainstorm Damage to houses/apartments in Ikole LGA, Ekiti- State Following the Rainstorm of 3rd March, 2023.

Responses	Frequency	Percentage
Less than #250,000	98	26.8
#250,000-500,000	43	11.8
#501,000-750,000	3	.8
#751-1,000,000	4	1.1
Above #1,000,000	12	3.3
Reconstructed by government	80	21.9
Abandoned/No capacity	125	34.2
Total	**365**	**100.0**

Table 3 above shows the amounts of re-roofing of the buildings damaged through rainstorms. These amounts reflect the costs of buying roofing materials like bundles of roofing sheets, nails, ceilings, planks, and loads of sand and the cost of labour among others. Also, from Table 3, it could be seen that the result showed that 34.2% of the respondents abandoned their properties due to a lack of financial capacity and financial constraints. By implication, the impacts and frequency of rainstorm disaster in the study area is enormous in such a way that it has destroyed respondent's buildings for which they have no economic strength and capacity to put the roofs in the right shape thus, increasing their economic hardship. This is in agreement with Yande's (2009) study where an increasing number of people are at risk every year; most of them live in low-income nations where poverty makes them susceptible to natural catastrophes.

Table 4. Impacts of coping strategies/ relief measures on the victims of rainstorm disaster in the study area.

Items	Responses	Frequency	Percentage
Relief Strategy	Rope your roof down	23	5.9
	Add roof clips (Ojagba)	338	86.9
	Stone bonding (putting stones on the top of the roof)	15	3.9
	Trees planting	13	3.3
Modes of Educating Communities	Through the use of Non-Governmental Organization	54	13.9
	Through the use of community leaders	146	37.5
	Through the use of media such as TV/Radio	94	24.2
	Through sensitization by government agencies	95	24.4
Relief materials by the government	Nails	38	9.8
	Money	35	9.0
	Mattresses	16	4.1
	None	290	74.6
	Others	10	2.6

Source: Research work 2023

Table 4 presents the relief strategies used by individual household members for rainstorm adaptation. The majority of the respondents added roof clips. The residents in the study area chose to adopt the available and affordable strategies due to their socio-economic status. The economic base of the region is very poor because majority of the people live in rural areas where farming is their major preoccupation and source of income. By implication, all the relief measures mentioned were short-term measures which have limited capacity to control rainstorm events. This was supported

by Yang *et al.* (2018) in their study that, national and international collaboration may be required to alleviate a disaster if domestic cooperation is insufficient since foreign organizations sometimes have access to more resources (such as money, materials, and technology) than their domestic counterparts. Peter (2017), suggested that proactive measures by individuals and government should be in place to protect themselves and their communities from wind while constructing.

The research also showed that the best method used by communities to educate people on rainstorm disasters is majorly through the community leaders (37.5%) while the use of social media, TV/radio recorded 24.2% which happened to be the least. By implication, educating and giving the public early warning on the impending danger through social media is low. The result of this finding is in agreement with the United Nations Office for Disaster Risk Reduction (UNISDR) which states that Community-based preparedness and early warning systems help save lives, protect property, and reduce economic losses. I think this can be achieved if the communities are equipped and prepared. On the other hand, this negated Aysan (1993), who pointed out in his findings that other causes of vulnerability to rainstorms include lack of access to information and knowledge, as well as lack of public awareness. (Ayse et al., 2005) pointed out in their study that there should be awareness and preparedness by training the residents on preventive, protective and behavioural measures to combat rainstorm risk.

Meanwhile, the result showed that 74.6% of the study participants representing the majority did not receive any material from the government when their houses were affected by rainstorms. By implication, the efforts of the government to assist rainstorm disaster victims are limited and not effective. No wonder, most of the structures affected by rainstorms in the study area were abandoned. Probably due to poor involvement of the government in controlling rainstorms, corruption or embezzlement of funds earmarked for the victims.

4. Recommendations

Based on the findings of this study, the researchers recommended possible solutions that would ensure long-term measures in minimizing rainstorm menace and mitigate the effects as observed from the study area and for sustainable development. Therefore, the following measures were recommended:

- There should be adequate funding by the government for rainstorm disaster victims in the reconstruction of their buildings. This could be in the form of money, building materials, and evacuation of victims from disaster-prone areas to safer areas.
- There is a need for the construction of storm stormwater drainage system in the study area and the planting of low-height vegetation by individuals and the government to serve as a wind-break.
- To protect the physical and socio-economic systems in the study area, there are multiple mitigation options to implement at the building level for individuals such as the modification of the roof structures and styles. Use of gable roofs preferably than flat roofs because it is difficult to retain water and non-susceptible to roof damage.
- Government and disaster managers should frequently review the processes and activities used to develop the emergency response plan, such as hazard vulnerability and capacity assessment, disaster risk identification, community risk reduction planning and risk reduction management and disaster response, evacuation and first aid plans.
- Government, stakeholders and NGOs should consider the pre-disaster measure as a priority by setting up various information programmes to educate and provide an early warning system to the public on the dangers of rainstorm disasters and sensitize them on the benefits of planting trees.

5. Conclusion

It is now very important for the Government, all stakeholders and individuals to take definite steps to prevent rainstorm impacts. This is because of its socio-economic impacts such as emotional trauma, injuries to individuals and fatalities /deaths, financial and economic impact and. damage to equipment, buildings and infrastructure. Based on the information gathered from the victims and disaster managers about the effects of rainstorm disasters in the study area, it is clear that rainstorm disasters are highly destructive within the natural and man-made environment. Its impacts are enormous ranging from loss of life, massive economic, social, and environmental destruction, and exposing people to numerous risks and dangers. Similarly, most of the relief measures provided by individuals and government to cushion the effects of rainstorm disasters are short-term measures which at times, can be delayed or not getting to the victims at all. For a better and more efficient method of handling rainstorm disasters, the researcher gave recommendations below.

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