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A STUDY ON THE EFFECTS OF FLOOD WITH SPECIAL REFERENCE TO CHENNAI

[1] P.L.Mamishna
[1] Undergraduate Scholar
[1] Saveetha School of Law,
[1] Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, Tamil Nadu, India

Abstract: Floods are natural disasters that can have devastating impacts on communities, economies, and the environment. Climate change, urbanization, and deforestation are some of the factors that contribute to the increased frequency and severity of floods. Floods can have devastating impacts on communities, infrastructure, and the environment. They can cause property damage, displacement of people, loss of crops and livestock, and even loss of life. In addition, floods can also lead to erosion, soil and water pollution, and damage to natural habitats and ecosystems. The major objectives of the study were to find the most affected area due to flood, to analyse the main cause and worst effects of flood and to examine whether the government initiatives for the precautions and safety recovery are effective. The researcher has adopted empirical research for the survey as their research method. Convenient sampling method has been implied to collect the data. The sample size of the data collected is 205. The data was collected totally in Chennai and all the respondents were from all ages. Both primary and secondary data was collected for this research paper. The primary tool used for this data is the data collected through the online questionnaire from people of all ages. The secondary data was collected through online articles and journals from various websites. Chi-Square test and Bar Charts by using SPSS software is being utilized as a tool for analysing the data. This research found that people think that houses and apartments are the most affected by floods through heavy rain. The researcher came to know that infrastructure damage, crop destruction and devastation are the main and worse effects of flood. The society wants the government to involve more in the relief process of floods and amend laws on it. Overall, addressing the complex and evolving challenges posed by floods requires a comprehensive and adaptive approach that considers the unique conditions and needs of different regions and communities. By working together, governments, communities, and other stakeholders can reduce the risk and impacts of floods and create more resilient and sustainable communities.

Keywords - Flood, Water, Rain, Relief, Environmental Damages.

INTRODUCTION:

A flood is a natural disaster that occurs when an area or region experiences an overflow of water that submerges land that is usually dry. Floods can be caused by a variety of factors, including heavy rainfall, snowmelt, storms, dam or levee failures, or a combination of these factors. Floods can have devastating consequences for people, animals, and infrastructure. Floodwaters can destroy homes, businesses, and other buildings, as well as damage roads, bridges, and other forms of transportation. In addition, floods can cause soil erosion, contaminate water supplies, and lead to the spread of waterborne diseases. There are several types of floods, including flash floods, river floods, coastal floods, and urban floods. Flash floods occur rapidly, typically within six hours of a triggering event, and can be extremely dangerous. River floods occur when a river or stream overflows its banks and can last for several days or even weeks. Coastal floods occur when a storm surge or high tide inundated coastal areas. Urban floods happen when heavy rainfall overwhelms the drainage systems of cities and towns. To reduce the impact of floods, measures can be taken such as building floodwalls, levees, and dams to control water flow and reduce the likelihood of flooding.

Additionally, early warning systems can help to alert people of potential floods and give them time to evacuate or prepare for the event.

Causes of floods: Heavy rainfall: Heavy rainfalls can cause water levels to rise quickly, leading to flash floods, Snowmelt: When snow melts, it can result in a large amount of water that can lead to floods, especially when combined with heavy rainfall, Dam or levee failure: When dams or levees break or fail, they can cause a sudden release of water that can cause floods, Coastal storms: Strong winds and heavy rainfall from coastal storms, such as hurricanes or typhoons, can cause storm surges that result in coastal flooding, Urbanization: Urbanization can lead to the increase of impervious surfaces such as concrete, which can prevent water from being absorbed into the ground, increasing the risk of flooding.

Impacts of floods: Loss of life: Floods can be deadly, resulting in the loss of human lives, Property damage: Floods can damage homes, businesses, and other buildings, resulting in significant economic losses, Displacement: Floods can force people to evacuate their homes, leading to temporary or permanent displacement, Environmental damage: Floods can cause soil erosion, deforestation, and other forms of environmental damage, Disruption of infrastructure: Floods can damage roads, bridges, and other forms of transportation, disrupting the movement of goods and people, Waterborne diseases: Floods can contaminate water supplies, leading to the spread of waterborne diseases. Overall, floods can have significant impacts on people, animals, infrastructure, and the environment. It is essential to take measures to reduce the likelihood of floods and to have early warning systems in place to alert people of potential flood risks.

The Effects of floods: The effects of floods can be wide-ranging and can have a significant impact on communities and ecosystems. Some of the effects of floods include. Damage to property: Floods can cause extensive damage to homes, businesses, and other buildings, resulting in significant economic losses, Disruption of infrastructure: Floods can damage roads, bridges, and other forms of transportation, making it difficult or impossible to move people and goods, Loss of life: Floods can be deadly, resulting in the loss of human lives, Displacement: Floods can force people to evacuate their homes, leading to temporary or permanent displacement, Environmental damage: Floods can cause soil erosion, deforestation, and other forms of environmental damage, Waterborne diseases: Floods can contaminate water supplies, leading to the spread of waterborne diseases, Economic impact: The economic impact of floods can be significant, resulting in the loss of jobs, decreased productivity, and increased insurance costs, Psychological impact: Floods can have a significant psychological impact on individuals and communities, leading to stress, anxiety, and other mental health problems, Impact on wildlife: Floods can have a significant impact on ecosystems, disrupting wildlife habitats and causing the loss of plant and animal species. Overall, floods can have a devastating impact on communities and ecosystems. It is essential to take measures to reduce the likelihood of floods and to have emergency response plans in place to mitigate the effects of floods when they do occur.

Preventive Measures: Prevention measures can help to reduce the likelihood and severity of floods. Some of the prevention measures include. Building flood defences: Building flood defences such as dams, levees, and floodwalls can help to prevent water from flooding homes and other buildings, restoring natural floodplains: Restoring natural floodplains can help to absorb and store excess water during heavy rainfall and snowmelt, reducing the likelihood of floods, Maintaining drainage systems: Regular maintenance of drainage systems, such as cleaning out debris and repairing damaged pipes and channels, can help to prevent flooding, Managing urbanization: Managing urbanization by avoiding building in flood-prone areas and incorporating green infrastructure, such as rain gardens, can help to reduce the risk of floods, Early warning systems: Early warning systems, such as flood monitoring and alert systems, can help to provide people with information about potential flood risks, giving them time to prepare or evacuate, Land-use planning: Land-use planning can help to ensure that development occurs in areas that are less vulnerable to flooding, Educating the public: Educating the public about the risks of floods and how to prepare for them can help to reduce the impact of floods on communities. Overall, prevention measures can help to reduce the likelihood and severity of floods. It is essential to take a comprehensive approach to flood prevention that includes both structural and non-structural measures.

Government initiatives: Governments can play an important role in preventing and managing floods through various initiatives. Some of the government initiatives include. Floodplain mapping: Governments can create and update floodplain maps, which provide information on the areas that are most at risk of flooding. This information can help to inform land-use planning decisions and improve flood warning systems, Infrastructure investment: Governments can invest in flood control infrastructure, such as dams, levees, and floodwalls, to protect communities from floods. Risk assessment and management: Governments can conduct risk assessments to identify areas that are most at risk of flooding, and develop strategies to manage those risks, Early warning systems: Governments can invest in early warning systems, such as flood monitoring and alert systems, to provide people with information about potential flood risks, giving them time to prepare or evacuate, Land-use planning: Governments can develop and enforce land-use planning regulations that limit development in flood-prone areas and require new development to incorporate flood-resistant design, Flood insurance: Governments can provide flood insurance to homeowners and businesses to help them recover from flood damage, Public education and outreach: Governments can educate the public about the risks of floods and how to prepare for them, including providing information about evacuation routes and emergency procedures. Overall, government initiatives can play an important role in preventing and managing floods. A comprehensive approach to flood management that includes a combination of structural and non-structural measures, along with public education and outreach, can help to reduce the impact of floods on communities.

Factors affecting the topic: There are several factors that can affect the likelihood and severity of floods. Some of the key factors include. Climate change: Changes in global climate patterns, including rising temperatures and more frequent and intense precipitation, can increase the likelihood and severity of floods, Land use: Land use practices, such as deforestation and urbanization, can increase the amount of runoff and reduce the natural absorption of water, leading to more frequent and severe floods, Topography: The topography of an area, including the slope of the land and the presence of hills and mountains, can affect the flow of water and the risk of floods, Hydrology: The hydrology of an area, including the size and shape of rivers and the amount of water they carry, can affect the likelihood and severity of floods, Infrastructure: The infrastructure in an area, including dams, levees, and drainage systems, can affect the ability of an area to manage floods, Population growth: Rapid population growth in flood-prone areas can increase the number of people and buildings at risk of flooding, Socioeconomic factors: Socioeconomic factors, such as poverty and inadequate housing, can increase the vulnerability of communities to floods. Overall, understanding the factors that affect floods is important for developing effective flood management strategies. By addressing the underlying factors that contribute to flooding, communities and governments can reduce the likelihood and severity of floods and minimize their impact on people and ecosystems.

Current Trends: There are several current trends related to floods and flood management that are worth noting: Climate change: Climate change is expected to increase the frequency and severity of floods in many parts of the world, particularly in areas that are already prone to flooding. As a result, there is increasing focus on strategies to adapt to the impacts of climate change, such as investing in more resilient infrastructure and updating floodplain maps to reflect changing conditions, green infrastructure: There is growing recognition of the potential for green infrastructure, such as green roofs and rain gardens, to reduce the risk of floods by absorbing and slowing the flow of water. This approach is seen as a more sustainable and cost-effective alternative to traditional flood control infrastructure, Data and technology: Advances in data collection, modelling, and other technologies are providing new opportunities to improve flood management strategies. For example, satellite data can be used to monitor changes in water levels and help predict flood risks, while social media and mobile applications can help disseminate flood warnings and other information to the public, Community engagement: There is increasing recognition of the importance of engaging communities in flood management strategies. This includes involving community members in the development of floodplain maps and other planning processes, as well as providing education and outreach on flood risks and preparedness, international cooperation: Floods are a global problem, and there is growing recognition of the need for international cooperation to address the issue. This includes sharing information and best practices, as well as working together on initiatives to reduce greenhouse gas emissions and mitigate the impacts of climate change. Overall, these trends reflect a growing recognition of the importance of taking a holistic, adaptive, and collaborative approach to flood management that considers the complex and changing nature of floods and their impacts on communities and ecosystems.

Comparison with other countries: Floods are a global phenomenon that affects many countries around the world. While the causes and impacts of floods can vary depending on the region and local conditions, there are some similarities in the strategies used by different countries to prevent and manage floods. For example, many countries invest in flood control infrastructure such as dams, levees, and floodwalls to protect communities from floods. Many countries also create floodplain maps to inform land-use planning decisions and improve flood warning systems. Governments in many countries provide flood insurance to homeowners and businesses to help them recover from flood damage. However, there are also differences in the approaches taken by different countries to prevent and manage floods. Some countries, particularly those in areas that are more prone to flooding, may have more extensive flood control infrastructure and more comprehensive flood management strategies. Other countries may rely more on non-structural measures such as land-use planning and public education to reduce the risk of floods. For example, the Netherlands is well known for its extensive flood control infrastructure, including an extensive system of dikes and dams, while Japan has developed sophisticated flood warning and evacuation systems to protect its population from floods. Overall, while there are some common strategies used by different countries to prevent and manage floods, the specific approaches taken can vary depending on local conditions and priorities.

OBJECTIVES:

- To find the most affected area due to flooding.
- To analyze the main cause and worst effects of flood.
- To examine whether the government initiatives for the precautions and safety recovery are effective.

REVIEW OF LITERATURE:

Dean et.al., made a study on Flood effects on invertebrates, sediments and particulate organic matter in the hyporheic zone of a gravel-bed stream. The researcher investigated the effects of a flood on the fauna and physical habitat of the hyporheic zone of the Kye Burn, a fourth order gravel-bed stream in New Zealand. The composition of the hyporheos differed over the three sampling occasions with fewer taxa collected immediately post flood than preflood. The equitability of the community was higher on both post flood occasions, consistent with the reduced densities of two abundant taxa (Leptophlebiid and Copepoda). The study provides little evidence that the hyporheic zone (to 50 cm) acted as a significant refuge during the flood event, although movements to or recolonisation from sediments deeper than 50 cm could explain the recovery of many crustacean and mite taxa within one month.

Howard S Wheater made a study on Flood hazard and management: a UK perspective. This paper discusses whether flood hazard in the UK is increasing and considers issues of flood risk management. Studies suggest that historical effects, while potentially large at small scale, are not significant for large river basins. Storm water flooding within the urban environment is an area where flood hazard is inadequately defined; new methods are needed to assess and manage flood risk. Climate change impacts on flooding and current guidelines for UK practice are reviewed. Large uncertainties remain, not least for the occurrence of extreme precipitation, but precautionary guidance is in place. Finally, current levels of flood protection are discussed. Reassessment of flood hazard has led to targets for increased flood protection, but despite important developments to communicate flood risk to the public, much remains to be done to increase public awareness of flood hazard.

Stephen et.al., made a study on Volatile fluxes during flood basalt eruptions and potential effects on the global environment: A Deccan perspective. The researcher examines the role that the flood basalt eruptions may have played during times of mass extinction through the release of volcanic gases. This phase consists of a series of huge eruptions, each yielding 103–104 km3 of magma. Each eruption lasted on the order of a decade or more, and built an immense pāhoehoe-dominated lava flow field by eruptive activity along fissures tens to hundreds of km long. Most flood basalt provinces largely consist of tholeiitic basalt, and the work reviewed herein indicates that most tholeiitic fissure basalt eruptions have similar degassing characteristics. We might assume that flood basalt eruptions follow the same degassing pattern, with at least 75% of the burden of dissolved magmatic S and CO2 released at the vents. In the future it will become increasingly important to determine the volumes erupted in individual flood basalt eruptions if we are to be able.

Samuel et.al., made a study on Floods continue to pose the greatest threat to the property and safety of human communities among all natural hazards in the United States. This study examines the relationship between the built environment and flood impacts in Texas, which consistently sustains the most damage from flooding of any other state in the country. Specifically, we calculate property damage resulting from 423 flood events between 1997 and 2001 at the county level. We identify the effect of several built environment measures, including wetland alteration, impervious surface, and dams on reported property damage while controlling for biophysical and socio-economic characteristics. Statistical results suggest that naturally occurring wetlands play a particularly important role in mitigating flood damage. These findings provide guidance to planners and flood managers on how to alleviate most effectively the costly impacts of foods at the community level.

Sammy et.al., made a study on Social vulnerability and the natural and built environment: a model of flood casualties in Texas. This study impacts on the hurricanes, tropical storms, and tornados indicate that poor communities of colour suffer disproportionately in human death and injury. Few quantitative studies have been conducted on the degree to which flood events affect socially vulnerable populations. Specifically, we examine whether geographic localities characterised by high percentages of socially vulnerable populations experience significantly more casualties due to flood events, adjusting for characteristics of the natural and built environment. Odds decrease with the number of dams, the level of precipitation on the day before a recorded flood event, and the extent to which localities have enacted flood mitigation strategies. The study concludes with comments on hazard-resilient communities and protection of casualty-prone populations.

Patrick et.al., made a study on Ecosystem effects of environmental flows: modelling and experimental floods in a dryland river. Successful environmental flow prescriptions require an accurate understanding of the linkages among flow events, geomorphic processes and biotic responses. We describe models and results from experimental flow releases associated with an environmental flow program on the Bill Williams River (BWR), Arizona, in arid to semiarid western U.S.A. Quantified the effects of small experimental floods on the differential mortality of native and exotic riparian trees, on beaver dam integrity and distribution, and on the dynamics of differentially flow-adapted benthic macroinvertebrate groups. Results of model applications and experimental flow releases are contributing to adaptive flow management on the BWR and to the development of regional environmental flow standards. General themes that emerged from our work include the importance of response thresholds, which are commonly driven by geomorphic thresholds or mediated by geomorphic processes, and the importance of spatial and temporal variation in the effects of flows on ecosystems, which can result from factors such as longitudinal complexity and ecohydrological feedbacks.

Klement Tockner et.al., made a study on River flood plains are model ecosystems to test general hydro geomorphic and ecological concepts. A major challenge in ecology is to link patterns and processes across different spatial and temporal scales. Flood plains are ideal model ecosystems to study the processes that create and maintain environmental heterogeneity and to quantify the effects of environmental heterogeneity on ecosystem functioning and biodiversity. Hence, biodiversity in a river corridor context is hierarchically structured and strongly linked to the dynamic biophysical processes and feedback mechanisms that drive these chronosequences over broad time and space scales. Today, the active conversion of degraded ecosystems back to a more heterogeneous and dynamic state has become an important aspect of restoration and management where maintaining or allowing a return to the shifting habitat mosaic dynamism is the goal with the expected outcome greater biodiversity and clean water among other valuable ecosystem goods and services.

Reza Ghazavi et.al., made a study on Impact of Flood Spreading on Infiltration Rate and Soil Properties in an Arid Environment; Water Resource Management. Flood spreading (FS) is one of the suitable methods for flood management and water harvesting that increases the groundwater recharge, makes soil more fertile and increases nutrients in soil. It is also a method for reusing sediment, which is usually wasted. The purpose of this paper is to investigate the impact of flood spreading on physical and chemical soil properties (soil texture, infiltration rate, pH, EC, Na, P, K, Ca, Mg, Cl, HCO3, and SO4). It is examined that the soil properties change in the flood spreading projection area (FSP). The physico-chemical properties of soil and infiltration rate were measured in different soil depths at both flood spreading and control area. The results show that the flood spreading operation can be influenced by the area that is under this operation. This study allowed us to investigate the mechanisms that regulate the infiltration rate and chemical soil properties throughout a seasonally flooded area.

Yuichi Onda et.al., made a study on An overview of the field and modelling studies on the effects of forest devastation on flooding and environmental issues. The researcher made intensive field observations as well as monitoring of discharge, water quality, and soil erosion have been conducted in forest plantations in order to identify the effects of forest cover and management practices on runoff generation, sediment transport, and downstream environmental issues. Five experimental catchments, each with rather uniform lithology, were established in both managed and unmanaged plantations of Japanese cypress and cedar, as well as broadleaf forests. Remote sensing techniques were employed to identify broad scale forest stand and soil surface conditions. As part of this integrated study, these field-based monitoring and remote sensing techniques provide information for modelling runoff generation and developing adaptive management schemes with respect to catchment-scale water resources.

Bonaiuto et.al., made a study on Flood Risk: the Role of Neighbourhood Attachment. The general aim of this study is to investigate the relationship between Neighbourhood Attachment (NA) and several Environmental Risk (ER) features – flood risk perception, concern, attitude, intention and coping behaviours – taking also into account the effect of objective risk area. Two general hypotheses are tested in the present study, each one detailed into five operational hypotheses. The survey was conducted both in a fluvial/pluvial and coastal/pluvial contexts. Areas were chosen after a qualitative study of Authorities knowledge, and after a quantitative preliminary study conducted to understanding citizens flood knowledge systems and flood experiences. A purposive sampling procedure was used because it was important to include in the sample household and/or workers and/or students in flood risk areas that experienced flooding in the past. Subjects filled in the questionnaire voluntarily in about ten-fifteen minutes, with written general instructions and supported by one of several researchers who recruited them for the sample.

Fontenot et.al., made a study on Effects of Environmental Hypoxia Associated with the Annual Flood Pulse on the Distribution of Larval Sunfish and Shad in the Atchafalaya River Basin, Louisiana. The researcher examined the relationships between larval fish abundance and hypoxic conditions in the ARB during 1994 and 1995. Overall, there was a strong positive relationship between DO level and the presence of larval sunfish and shad. Higher DO levels were most strongly associated with the presence of larval sunfish in 1994 but with the presence of larval shad in 1995. These abundance patterns appear to be related to differences in ARB inundation during the 1994 and 1995 flood pulses. The mean monthly river stage for 1994 was consistent with a 34-year average, but the mean monthly river stage in 1995 was significantly lower in April and higher in June. Because widespread hypoxia limits the nursery potential of large areas of the inundated floodplain, the reproductive success of many ARB fishes would benefit from a water management plan designed to increase the exchange of water between the main channel and backwater areas.

Neil C.Sims & Matthew J. Colloff made a study on Remote sensing of vegetation responses to flooding of a semi-arid floodplain: Implications for monitoring ecological effects of environmental flows. Environmental flows are used to support the structure and function of floodplain, wetland and riverine ecosystems that are subject to stress from drought, climate change or water resource development. The financial costs of environmental flows are considerable and it is therefore highly desirable that the ecological benefits are monitored. Productivity of floodplain vegetation is a critical ecological response to flooding, and represents an indicator of ecosystem 'health', being linked to structural integrity, habitat provision, nutrient cycling and numerous other ecosystem functions. Productivity of floodplain plant communities is hard to measure, being highly variable over time depending on seasonal and climatic factors and the frequency, magnitude and duration of flood events. This analysis shows that a flood which inundated more than 50% of the Paroo River Wetlands in 2008 increased NDVI by up to 19% above non-flood levels and for a period of 13 months following flood recession. This approach has applications in planning environmental flows and in monitoring the ecological responses.

Madsen et.al., made a study on A review of applied methods in Europe for flood-frequency analysis in a changing environment. The report presents a review of methods used in Europe for trend analysis, climate change projections and non-stationary analysis of extreme precipitation and flood frequency. The report concludes with a discussion of research needs on non-stationary frequency analysis for considering the effects of climate change and inclusion in design guidelines. Trend analyses are reported for 21 countries in Europe with results for extreme precipitation, extreme streamflow or both. The studies reviewed indicate that there is some evidence of a general increase in extreme precipitation, whereas there are no clear indications of significant increasing trends at regional or national level of extreme streamflow. For some smaller regions increases in extreme streamflow are reported. The review indicates a gap between the need for considering climate change impacts in design and actual published guidelines that incorporate climate change in extreme precipitation and flood frequency. The researcher suggested that there is a need for developing more consistent non-stationary frequency analysis methods that can account for the transient nature of a changing climate.

Siamak Boudaghpour, Majid Bagheri & Zara Bagheri made a study on the Estimation of Flood Environmental Effects Using Flood Zone Mapping Techniques in Halilrood Kerman, Iran. High flood occurrences with large environmental damages have a growing trend in Iran. In general, environmental effects and damages caused by a flood in an area can be investigated from different points of view. The current essay is aiming at detecting environmental effects of flood occurrences in Halilrood catchment area of Kerman province in Iran using flood zone-mapping techniques. The intended flood zone map was introduced in four steps. Steps 1–3 pave the way to calculate and estimate flood zone map in the understudy area while step 4 determines the estimation of environmental effects of flood occurrence. Based on our studies, wide range of accuracy for estimating the environmental effects of flood occurrence was introduced by using flood zone-mapping techniques. Moreover, it was identified that the existence of Jiroft dam in the study area can decrease flood zone from 260 to 225 ha and also it can decrease 20 % of flood peak intensity. As a result, 14 % of flood zones in the study area can be saved environmentally.

Diakakis et.al., made a study on Mapping and classification of direct flood impacts in the complex conditions of an urban environment. The case study of the 2014 flood in Athens, Greece.Urban flooding is a gradually increasing problem as the urban population expands into floodplains. In urban environments, flood vulnerability is significantly increased as a more concentrated population and assets makes flooding costly and challenging, in terms of impact estimation. This work focuses on mapping and classifying impacts after the catastrophic 2014 flood in Athens, Greece. The study proposes a method for classifying flood effects into four categories including: the natural and built environment, mobile objects and human population, organized in five classes of increasing severity, i.e. minor, weak, moderate, strong and extreme. Flood effects are grouped based on the qualitative nature of the recorded effects, allowing the development of an impact-severity map. Mapping of the 2014 flood effects indicated specific locations where the severity of impacts was distinctively higher than others, providing a holistic overview of the flood's effects and highlighting the usefulness of the approach in future flood protection planning.

Jiake Li, Bei Zhang, Cong Mu & Li Chen made a study on Simulation of the hydrological and environmental effects of a sponge city based on MIKE FLOOD. Based on the pilot area of a sponge city in Northwest China, the MIKE FLOOD models of urban flood and nonpoint source pollution are established. The uncertainty analysis of model shows that such parameters as hydrological reduction factor, imperviousness, and decay constant have big influences on the total runoff, peak flow, and water quality. The measured data of the rainfall events 20160724 and 20160623 are used to calibrate and validate the model. It is all assimilated without discharge and waterlogging phenomena. LID measures have a better control effect on water quality and water quantity of urban rainstorm runoff; however, the effect of LID measures will reduce with the increase in recurrence interval.

Sudershan et.al., made a study on Ensemble-based flood vulnerability assessment for probable maximum flood in a changing environment. This study focuses on the Etowah Watershed located in the northwestern Georgia, US. We selected this watershed because it includes a major reservoir and urban areas and lies in a relatively flat topographic region, allowing transposition of PMP storms. The Etowah Watershed has an estimated drainage area of 4821 km2 (1861 mi2; Fig. 1) and is a part of the Alabama-Coosa-Tallapoosa (ACT) River Basin. It drains parts of 15 counties in Georgia and covers major urban areas. This study demonstrates a high-resolution process-based hydro-meteorological modeling framework to generate ensemble-based PFMs for two selected domains for the worst-case flood scenarios (i.e., PMF). An ensemble of 120 moisture maximized PMP storms were acquired from Rastogi et al. (2017) for historical time period and future climate projections. PMF estimates were then generated by driving DHSVM at a 90-m grid resolution.

Kaoru Kakinuma et.al., made a study on Flood-induced population displacements in the world. Strengthening the resilience of societies to extreme weather events is an urgent and critical priority around the world. Extreme weather often causes population displacement that compromises human security. Environment-induced displacement is multifaceted because climate extremes, population, and socio-economic conditions, among other factors, converge to influence individuals' decisions to move. When large-scale, catastrophic floods occur, people tend to move both suddenly and rapidly for survival. Quantifying the patterns and mechanisms of such displacement at global scale is essential to support areas at high risk for climate-induced displacement. The researchers suggest that low-income countries, particularly in Africa, face a high likelihood of flood-induced displacement and need to develop adaptation measures to mitigate the potential for displacement and the associated risks.

Min Zhou et.al., made a study on Dilution or enrichment: the effects of flood on pollutants in urban rivers; Environmental Sciences Europe. The researchers studied that flood events increase the risk of sediment erosion and hence the release of particle-bound pollutants besides other processes that can be observed during such events like transportation, lateral distribution and other. Macropollutants, such as acids, salts, nutrients, and natural organic matter, are usually diluted by flooding, while the effect of floods on micropollutants is still unclear. The environmental risk was observed to be mainly arise from the presence of OPPs, which increased after flooding. The researchers found out that The concentrations of macropollutants in surface water and sediments, and 14 micropollutants sediments were enriched after the flood. These results suggested management on urban river should focus on potential risk of OPPs. The current study therefore could provide scientific evidence and regulatory reference for urban river ecosystem protection.

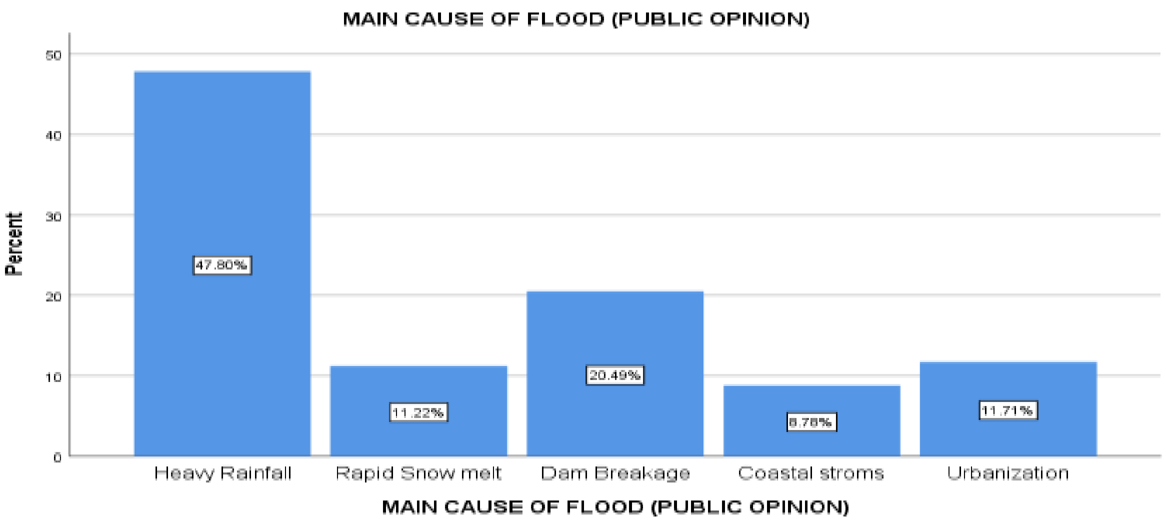
Sarah E. Crawford et.al., made a study on Remobilization of pollutants during extreme flood events poses severe risks to human and environmental health. The researchers well recognized that the frequency and intensity of flood events are increasing worldwide, the environmental, economic, and societal consequences of remobilization and distribution of pollutants during flood events are not widely recognized. Loss of life, damage to infrastructure, and monetary cleanup costs associated with floods are important direct effects. The global examination of floods caused by a range of extreme events (e.g., heavy rainfall, tsunamis, extra- and tropical storms) and subsequent distribution of sediment-bound pollutants are needed to improve interdisciplinary investigations. Such examinations will aid in the remediation and management action plans necessary to tackle issues of environmental pollution from flooding. River basin-wide and coastal lowland action plans need to balance the opposing goals of flood retention, catchment conservation, and economical use of water.

METHODOLOGY:

The researcher has adopted empirical research for the survey as their research method. Convenient sampling method has been implied to collect the data. The sample size of the data collected is 205. The data was collected totally in Chennai and all the respondents were from all ages. Both primary and secondary data was collected for this research paper. The primary tool used for this data is the data collected through the online questionnaire from people of all ages. The secondary data was collected through online articles and journals from various websites. The independent variables which were asked in the questionnaire were their gender, age, educational qualification, employment sector and area of residence. Government initiatives on flood, most affected place, worst effects, rating the improvement status of laws regarding flood were the dependent variables that were asked in the questionnaire. Chi-Square test and Bar Charts by using SPSS software is being utilized as a tool for analyzing the data.

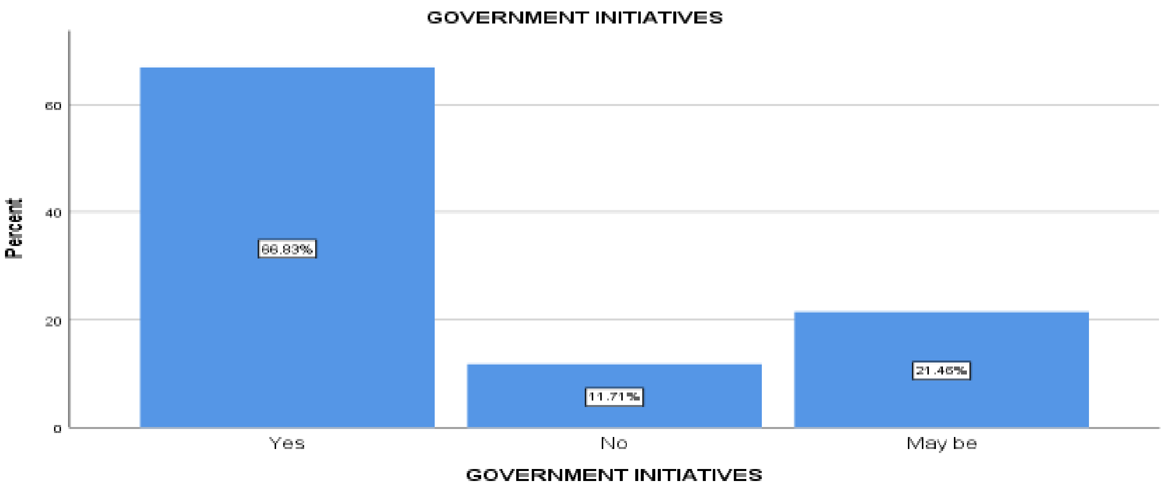
DATA ANALYSIS:

FIGURE 1:



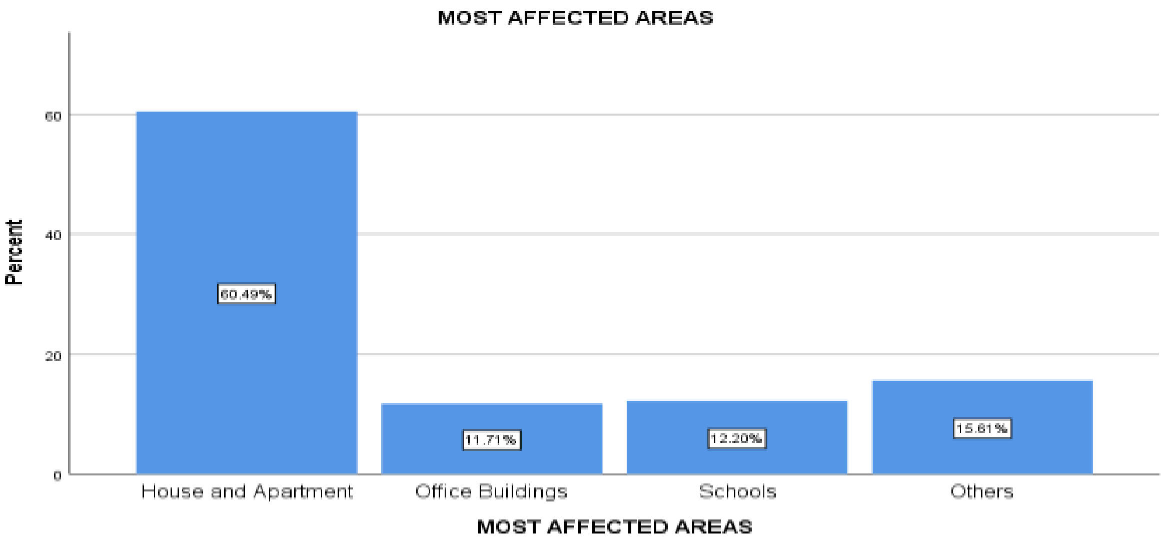
LEGEND: Figure 1 shows the main cause of flood in public opinion.

FIGURE 2:



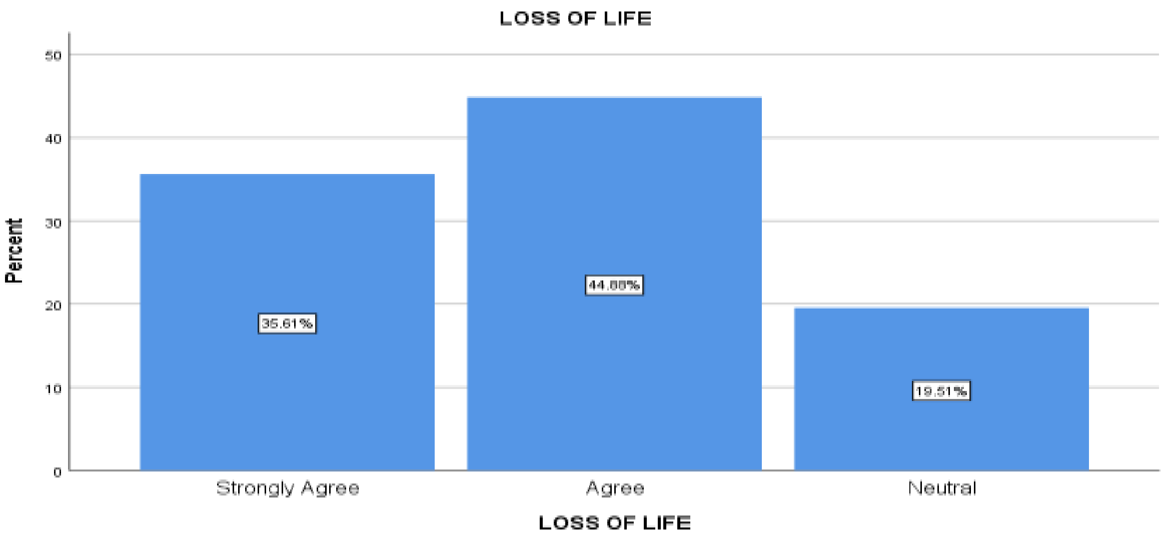
LEGEND: Figure 2 portrays the government initiatives in flood is effective or not.

FIGURE 3:



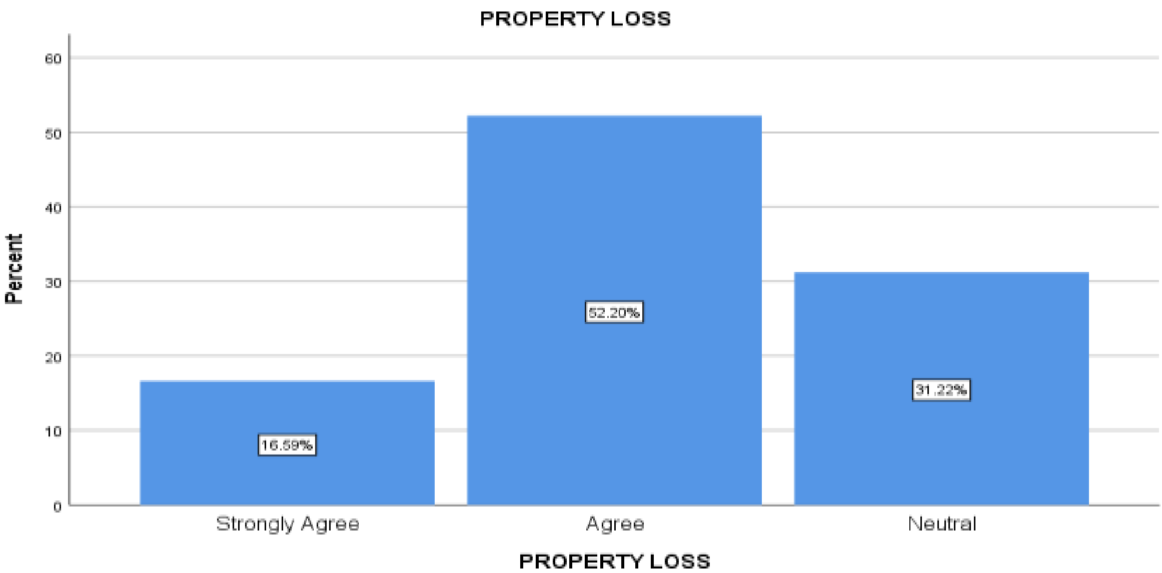
LEGEND: Figure 3 exposes the most affected areas during floods.

FIGURE 4:



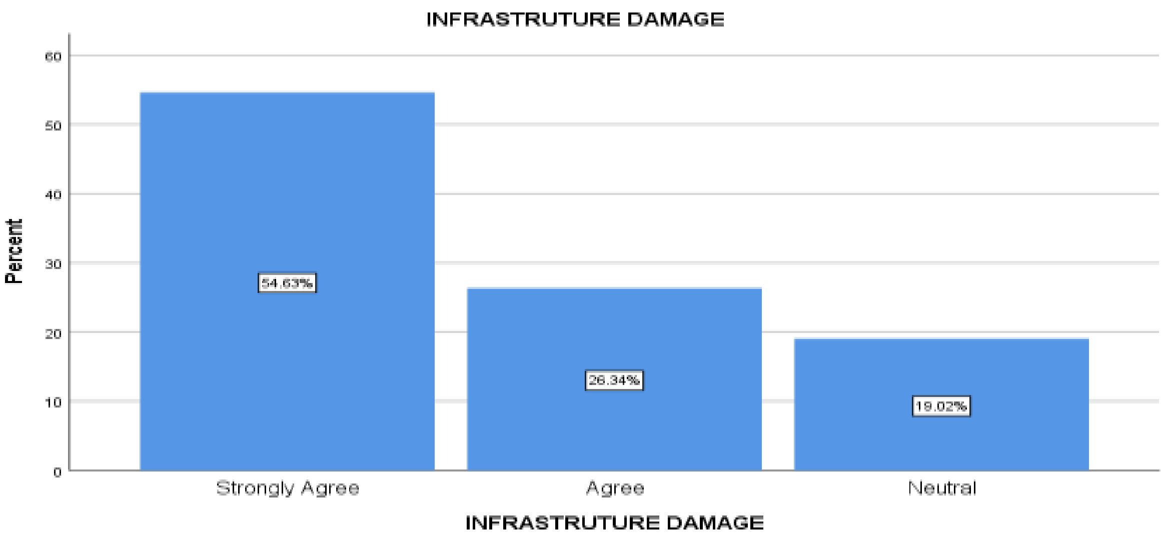
LEGEND: Figure 4 shows the loss of life during floods.

FIGURE 5:



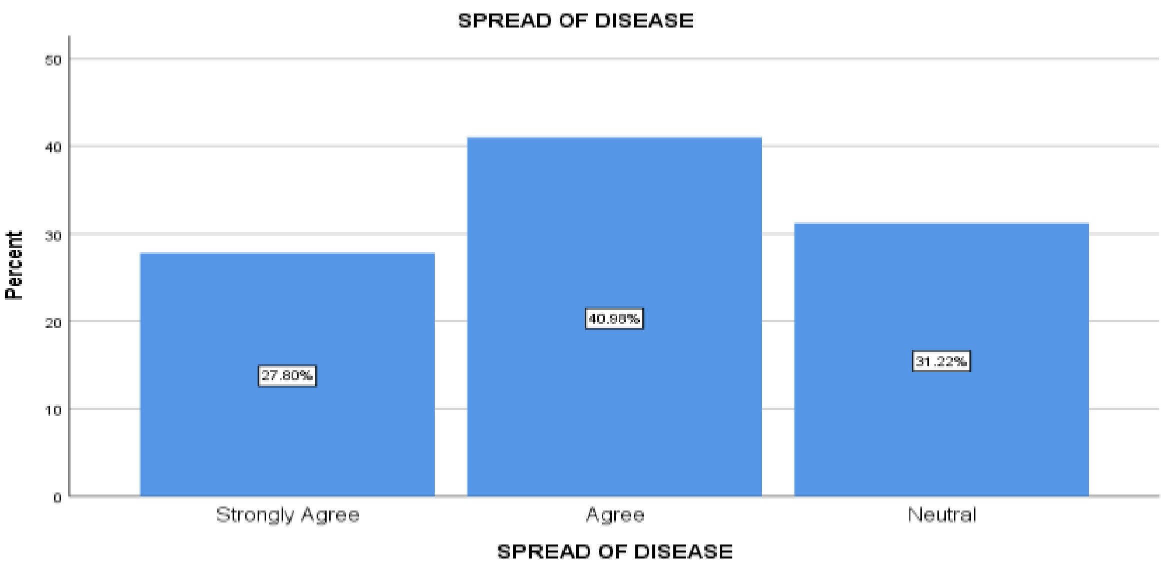
LEGEND: Figure 5 shows the property loss during floods.

FIGURE 6:



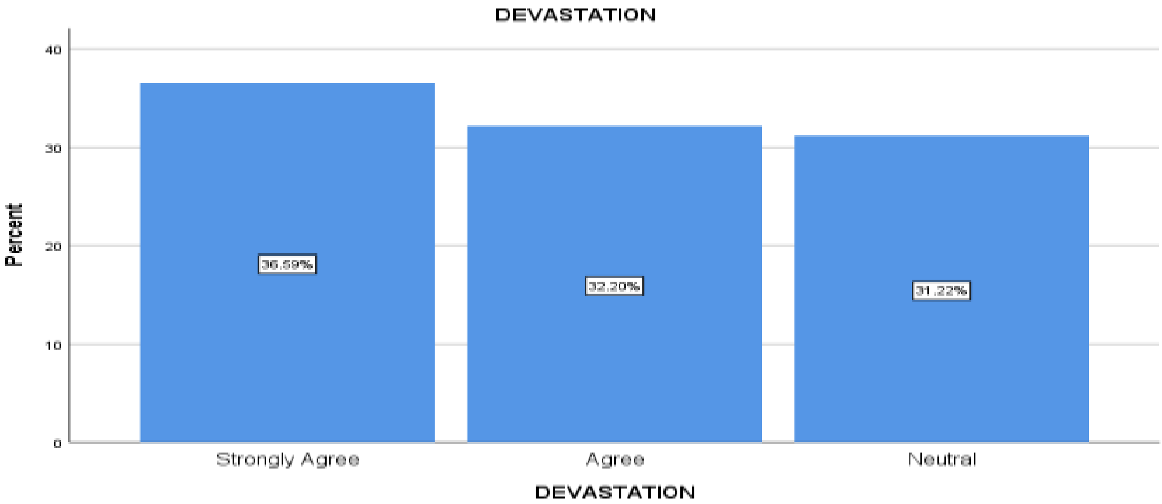
LEGEND: Figure 6 shows the infrastructure damage during floods.

FIGURE 7:



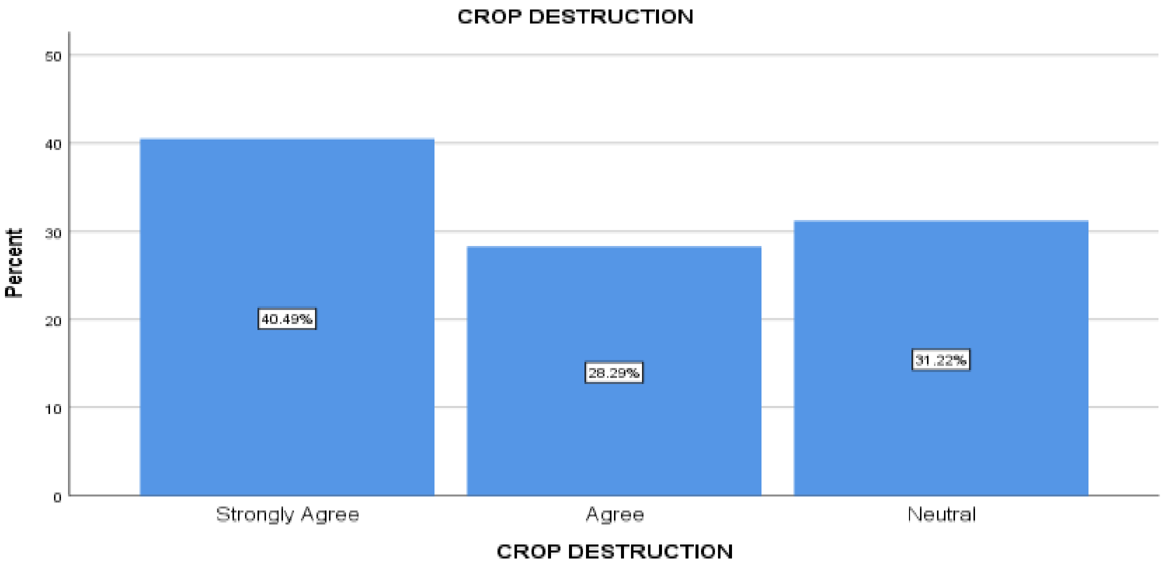
LEGEND: Figure 7 exposes the spread of disease during floods.

FIGURE 8:



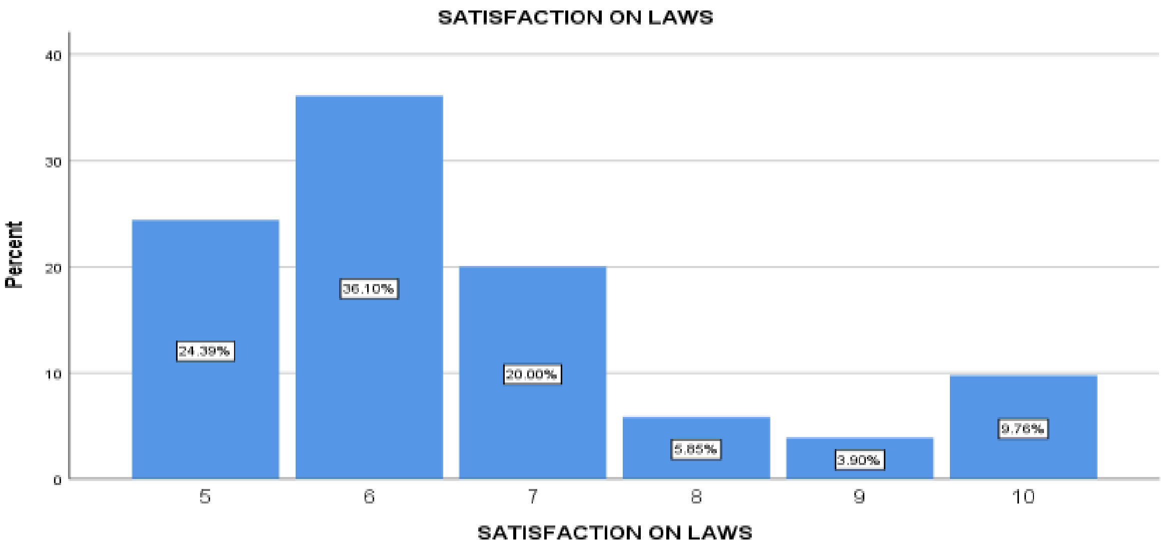
LEGEND: Figure 8 describes the devastation during the floods.

FIGURE 9:



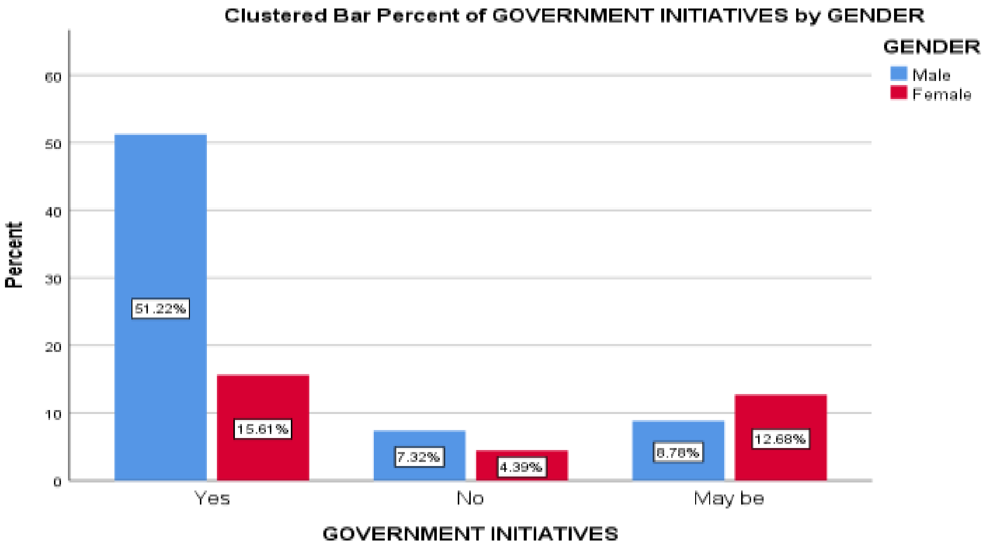
LEGEND: Figure 9 shows the crop destruction during floods.

FIGURE 10:



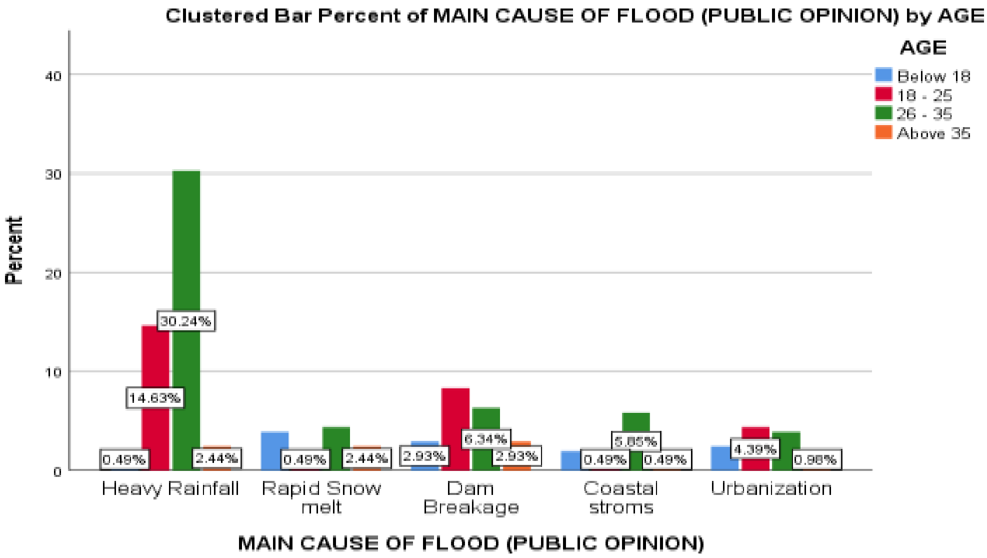
LEGEND: Figure 10 reveals the satisfaction of laws in flood relief among the society.

FIGURE 11:



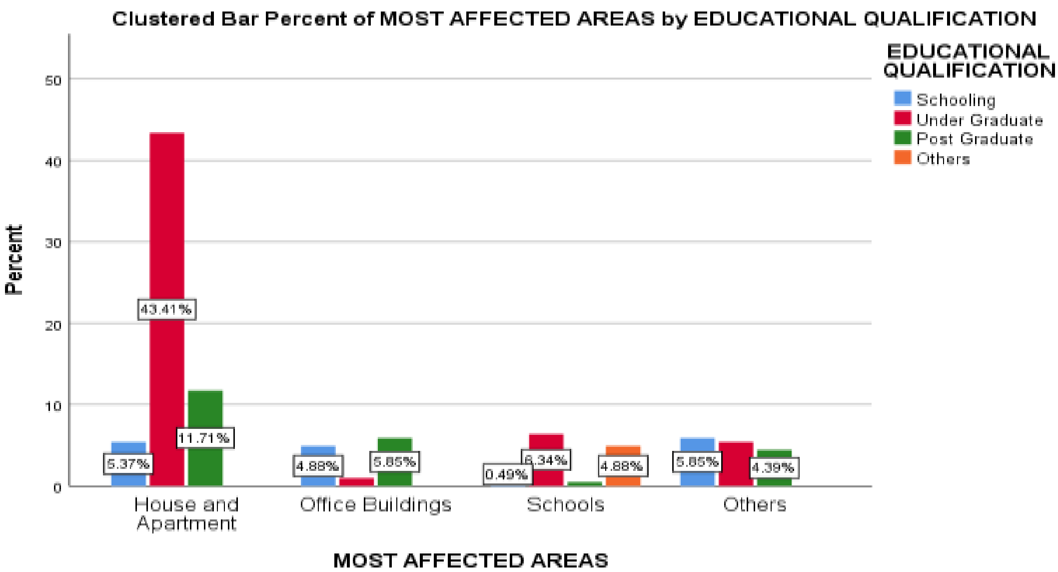
LEGEND: Figure 11 represents the satisfaction of government initiatives with gender.

FIGURE 12:



LEGEND: Figure 12 shows the reasons given by age for the main cause of flood on their perspectives.

FIGURE 13:



LEGEND: Figure 13 shows the respondents thought that most affected areas are by their educational qualification.

STATISTICAL TESTS:

CHI-SQUARE TEST 1:

NULL HYPOTHESIS: There is no relationship between gender and their thought of most affected areas by flood.
ALTERNATIVE HYPOTHESIS: There is a relationship between gender and their thought of most affected areas by flood.

CROSS TABULATION TABLE:

GENDER * MOST AFFECTED AREAS Crosstabulation

Count

		MOST AFFECTED AREAS				
		House and Apartment	Office Buildings	Schools	Others	Total
GENDER	Male	84	14	14	26	138
	Female	40	10	11	6	67
Total		124	24	25	32	205

CHI-SQUARE TABLE:

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.169[a]	3	.160
Likelihood Ratio	5.358	3	.147
Linear-by-Linear Association	.516	1	.473
N of Valid Cases	205		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.84.

INTERPRETATION: The calculated P value is 0.160. Since, P value is greater than 0.05.
NULL HYPOTHESIS REJECTED
ALTERNATIVE HYPOTHESIS ACCEPTED
So, there is no relationship between their gender and thoughts on the most affected areas during the flood.

CHI-SQUARE TEST 2:

NULL HYPOTHESIS: There is no relationship between employment status and government initiatives.
ALTERNATIVE HYPOTHESIS: There is a relationship between employment status and government initiatives.

CROSS TABULATION:

EMPLOYMENT STATUS * GOVERNMENT INITIATIVES Crosstabulation

Count

		GOVERNMENT INITIATIVES			
		Yes	No	May be	Total
EMPLOYMENT STATUS	Government	69	1	6	76
	Private	44	4	21	69
	Business	20	13	7	40
	Others	4	6	10	20
Total		137	24	44	205

CHI-SQUARE TABLE:

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	61.428[a]	6	.000
Likelihood Ratio	61.467	6	.000
Linear-by-Linear Association	30.547	1	.000
N of Valid Cases	205		

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 2.34.

INTERPRETATION: The calculated P value is .000. Since, P value is lesser than 0.05.
NULL HYPOTHESIS ACCEPTED
ALTERNATIVE HYPOTHESIS REJECTED
So, there is no association between employment status and their thought on the effectiveness of the government initiatives.

CHI-SQUARE TEST 3:

NULL HYPOTHESIS: There is no relationship between residential areas and government initiatives.
ALTERNATIVE HYPOTHESIS: There is a relationship between residential area and government initiatives.

CROSS TABULATION:

RESIDENTIAL AREA * GOVERNMENT INITIATIVES Crosstabulation

Count

		GOVERNMENT INITIATIVES			
		Yes	No	May be	Total
RESIDENTIAL AREA	Urban	92	8	9	109
	Rural	26	14	13	53
	Semi-Urban	19	2	22	43
Total		137	24	44	205

CHI-SQUARE TABLE:

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	51.000[a]	4	.000
Likelihood Ratio	47.277	4	.000
Linear-by-Linear Association	35.322	1	.000
N of Valid Cases	205		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.03.

INTERPRETATION: The calculated P value is .000. Since, P value is lesser than 0.05.
NULL HYPOTHESIS ACCEPTED
ALTERNATIVE HYPOTHESIS REJECTED
So, there is an association between the residential area and government initiatives.

<u>CHI-SQUARE TEST 4:</u>

NULL HYPOTHESIS: There is no relationship between residential area and infrastruture damage due to flood.
ALTERNATIVE HYPOTHESIS: There is a relationship between residential area and infrastructure damage due to flood.

CROSS TABULATION:

RESIDENTIAL AREA * INFRASTRUTURE DAMAGE Crosstabulation

Count

		INFRASTRUTURE DAMAGE			
		Strongly Agree	Agree	Neutral	Total
RESIDENTIAL AREA	Urban	51	30	28	109
	Rural	40	12	1	53
	Semi-Urban	21	12	10	43
Total		112	54	39	205

CHI-SQUARE TABLE:

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.209[a]	4	.002
Likelihood Ratio	21.923	4	.000
Linear-by-Linear Association	1.651	1	.199
N of Valid Cases	205		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.18.

INTERPRETATION: The calculated P value is .002. Since, it is less than 0.05.
NULL HYPOTHESIS ACCEPTED
ALTERNATIVE HYPOTHESIS REJECTED
So, there is an association between their residential area and infrastructural damage due to flood.

RESULTS:

Figure 1 shows that the main cause of rainfall is heavy rainfall with 47.80%. ***Figure 2*** tells that 66.83% people are satisfied with the government initiatives taken for the flood reliefs. ***Figure 3*** shows that 60.49% of the respondents answered houses and apartments for the most affected areas. ***Figure 4*** tells that the respondents agree with 44.88% that loss of life took place. ***Figure 5*** shows that 52.20% of the samples agree that property loss plays a role. ***Figure 6*** tells that 54.63% of them strongly agree that infrastructure damages played a drastic role in the worst effects of the flood. ***Figure 7*** shows that 40.98% of the people agreed that spread of disease took place during the flood. ***Figure 8*** tells that 36.59% of the respondents strongly agree that devastation took place. ***Figure 9*** exposes that 40.49% of them strongly agree that crop destruction takes place. ***Figure 10*** reveals that 36.10% rated 6 as their satisfaction grade on the laws implied in flood relief. ***Figure 11*** represents that 51.22% and 15.61% of the male and female answered yes respectively on their satisfaction on government initiatives. ***Figure 12*** shows that 30.24% of people aged from 26 - 35 years old answered that heavy rainfall was the main reason for flood. ***Figure 13*** represents that 43.41% of the respondents answered that houses and apartments are the most damaged area during the course of flood.

DISCUSSION:

As people of our society have faced floods most known because of heavy rainfall only which made the results to fall on the factor of heavy rainfall as the main reason of flood. The satisfaction of government initiatives are not quite enough not full filled as many couldn't reach out to the help needed at that time. During the flood all the people lost their shelter, property, and many more during the flood. Many damages including the infrastructure and health cursing diseases during the course of flood due to stagnant water. Farmers' crops got devastated and lack of food took place. However, there are also emerging trends in flood management that reflect changing conditions and priorities, such as the increasing focus on adapting to the impacts of climate change, the use of green infrastructure, the use of data and technology, community engagement, and international cooperation. Floods are natural disasters that can have devastating impacts on communities, economies, and the environment. Climate change, urbanization, and deforestation are some of the factors that contribute to the increased frequency and severity of floods. Floods can have devastating impacts on communities, infrastructure, and the environment.

LIMITATION:

The major limitation of this research study is the time that has been utilized is an extremely short period of time for a quality paper. The sample frame of the research was limited to a particular zone which was conducted around Poonamallee which is situated in Chennai. As the research was conducted with the sample size of 205 which would not represent the actual answers that will be gained while gathering the report from all the people in India.

CONCLUSION:

Floods are natural disasters that can have devastating impacts on communities, economies, and the environment. Climate change, urbanization, and deforestation are some of the factors that contribute to the increased frequency and severity of floods. Floods can have devastating impacts on communities, infrastructure, and the environment. They can cause property damage, displacement of people, loss of crops and livestock, and even loss of life. In addition, floods can also lead to erosion, soil and water pollution, and damage to natural habitats and ecosystems. The major objectives of the study were to find the most affected area due to flood, to analyse the main cause and worst effects of flood and to examine whether the government initiatives for the precautions and safety recovery are effective. This research found that people think that houses and apartments are the most affected by floods through heavy rain. The researcher came to know that infrastructure damage, crop destruction and devastation are the main and worse effects of flood. The society wants the government to involve more in the relief process of floods and amend laws on it. The researcher suggests the people to be precautionary and prepared for any crucial situations to face so. The future scope of the study is to examine the development of laws on the topic of flood. Thus, to prevent and manage floods, governments and communities use a range of strategies, including flood control infrastructure, land-use planning, public education, and flood insurance. However, there are also emerging trends in flood management that reflect changing conditions and priorities, such as the increasing focus on adapting to the impacts of climate change, the use of green infrastructure, the use of data and technology, community engagement, and international cooperation. Overall, addressing the complex and evolving challenges posed by floods requires a comprehensive and adaptive approach that takes into account the unique conditions and needs of different regions and communities. By working together, governments, communities, and other stakeholders can reduce the risk and impacts of floods and create more resilient and sustainable communities.

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