IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 3, Mar 2022

Urban Flooding and Its Implications for the Future

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ABSTRACT: Metropolitan flooding is becoming a significant threat because of increased densification of urban areas, land-use changes, and environmental changes. The conventional method of dealing with floods is to design single-reason seepage structures, dams, and levees. These strategies, on the other hand, are well-known for increasing flood risk and devastation of riverine ecosystems in both urban and rural settings. Humans depart from the strength hypothesis in this study and provide an option to increase urban flood flexibility. The researcher identifies areas where current challenges need greater community urban flood management across the board. The concept emphasizes flexibility and achieving cooperative energy between increased ability to cope with stormwater overflow and better urban experience and utility. People recognize research is necessary such as investigations into improved maintainable but also versatile stormwater executives in particular, ability to adapt of stormwater frameworks, energy use reduction, effective land use, transportation but also financial nexus, ecological way, ensuring basic foundation, but also resolving obligations questions. In this paper, the author talks about flooding in cities and future concerns.

KEYWORDS: Environmental, Flexibility, Flood, Urbanization, Urban.

1. INTRODUCTION

Flooding in cities is becoming more common for a variety of reasons. The rate of urbanization is increasing. Currently, over 54 percent of the world's population lives in cities, and by 2050, about 66 percent of the entire population will live in cities. As a result, metropolitan areas are growing and, for the most part, becoming denser. Many cities are attempting to reduce their negative

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environmental impact, and the densification of existing metropolitan areas has resulted in a complex urban planning framework to accommodate rapid urbanization while limiting development on agricultural land. Because of the vast amount of impermeable surfaces, industrialized land is more vulnerable to floods than the ambient climate (Pervin et al., 2020).

1.1. Flood Resilience and Flood Management:

The board for urban flood hazard focuses on assessing and reducing flood danger, as well as preparing for effective response to, and recovery from, actual floods, to reduce disruptions, interruptions, and associated expenditures that are equivalent to a city's preferred progress after some time. As a result, flexibility is the limit of a structure, such as a city, to continue to develop in a preferred and expected path while remaining within human and ecological boundaries (Rana & Routray, 2018). When focusing on the controllable progress of urban areas, which includes individuals with inclinations and expectations for their future as well as organizations attempting to satisfy them, this approach to dealing with variety is sensible. City planners establish visions and strategies for the future use of metropolitan areas. Plans may last for years or even decades, during which time the city changes fundamentally and consistently as a result of purposeful and proactive human actions, reducing the relevance of each of the three main approaches to dealing with flexibility recently identified. If a city's versatility is defined as its ability to consistently create in the desired direction, then this flexibility is a rented building controlled by the city's ability to envision, perceive, modify to, but instead profit from various changes, disturbances, interruptions, or disasters that may harm what human beings value. In an ambiguous, equivocal, complicated, and dynamic globe, maintainable improvement aims to supervise hazards, and flexibility seems to be the limit for doing so (Manawi et al., 2020).

1.2. Flood Control Techniques:

Following a series of devastating floods throughout Europe, the EU Flood Directive was adopted in 2007. The Flood Directive specifies two plan levels, including the "worst-case scenario" and the "worst-case scenario". The Flood Directive, without a doubt, focuses on riverine flooding. However, pluvial floods, or flooding caused

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locally by an overburdening of the municipal waste system caused by unusual precipitation, pose a significant threat to cities all over the world. Because traditional urban waste frameworks rely on subterranean lines, they have often been designed to respond to precipitation with a long-term repetition period or less, to keep a strategic distance from massive measures (Zhu et al., 2018). More outlandish events are allowed on purpose to create immersion in certain areas, such as highways, structures, and constructing basements. Indeed, also with a strategy that involves creating of long-term repetition period, the risk of exceeding fundamental criteria during a period in history period is 40%. Furthermore, the risk associated with repetition periods that are based on current, constrained knowledge is substantial. The EU Flood Directive stipulates that, regardless of the repetition time chosen, there is always a non-negligible risk of framework failure. Regrettably, it remains to reveal this well-known fact as well as a portion of the crucial supposition among all partners, specifically the general public (Cook et al., 2016).

1.3. Water Management Beyond the Traditional Pipe System:

1.3.1. Integrated Approach to Urban Planning and Design:

Continuous urbanization will result in increased supplement and toxin discharges from watersheds, putting human health and biological systems in jeopardy. Because trans-scale thinking is lacking, seepage and flood security frameworks are often based on expensive and solid subterranean arrangements. More consecutive overburdening of lines is creating flooding of public and private property as a result of high-escalated precipitation. Because most cities use connected sewage systems to handle waste, more untreated sewage floods may be expected in the future. Simultaneously, metropolitan areas are becoming denser, resulting in less room available for subterranean infrastructure, especially with the widespread use of waste lines. Building up the subterranean water foundation will be far more expensive in the future along these lines. Instead, urban expansion should lead to less and slower surface overflow, which necessitates greater soil and surface penetration. Applying surface arrangements and improving waste frameworks, where needed, are critical steps in reducing flood effects. Using urban areas as

ISSN PRINT 2319 1775 Online 2320 7876
Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 3, Mar 2022

coordinated elements of the seepage system opens up a lot of possibilities (Song et al., 2019).

1.3.2. Flood Management Using Integrated Approaches:

Planning large water board layouts in the urban environment is a multi-disciplinary endeavor that requires a combination of logical or aesthetic techniques, as well as a different kind of link between green or blue resources. Surface arrangements often include several components for penetration, storage, conveyance, evapotranspiration, as well as treatment (Mignot et al., 2019). The urban greenery and water executives are united in the blue-green foundation to guarantee the urban scene or its biological but instead hydrological benefits. Blue-green foundation not only mitigates flood effects and enhances sensitivity to environmental change in fruitful models, but it also improves the quality and day-to-day surroundings of urban settings in terms of enhanced heat mitigation, increased biodiversity, or improved air quality. It may also be able to accommodate fuel and medicine production, as well as benefit the local economy and promote public engagement. Both the water stream and the urban setting may function as shared drivers thanks to an ecological urbanism (Sañudo et al., 2020).

1.4. India's Factors Causing Urban Floods:

Stormwater rushes into a metropolitan environment at a faster pace than it can be absorbed into the ground, transferred to a waterbody (river, lake, etc.), or stored in a reservoir, resulting in urban flooding. River floods, flash flooding, coastal flooding, and fast snowmelt are all examples of enhanced water flow. By emphasizing flood peaks, heavy rainfall tends to become more significant flood dangers. Although the causes of urban floods are many, they are often considered as the consequence of a combination of physical and anthropogenic influences (Ali et al., 2021).

- Encroachment:

As more people travel to cities in pursuit of work, the demand for housing land grows, raising the economic worth of available land. People begin to settle on an ownerless unoccupied property, such as low-lying places around water bodies.

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These encroachments may sometimes span the whole catchment region, and in the worst-case situation, the water body would be completely obliterated.

- Pollution:

Urban population densities are expanding at an alarming pace, much faster than they were planned to. Solid waste disposal, sewage lines, stormwater drains, and other supporting infrastructure facilities are not being created to meet the rising demand. As a consequence, unmanaged street debris clogs drainage systems, and inappropriate solid waste disposal into water bodies occurs. The STP's design capability at the city level is readily exceeded, resulting in the untreated wastewater sewage into rivers or canals. Clogging and siltation occur as a consequence, severely lowering the flow capacity during a flood event (Ke et al., 2020).

- Illegal mining activities:

Illegal mining of natural sand and quartzite for construction purposes depletes the natural bed of rivers and lakes, causing lasting damage. This results in soil erosion and a reduction in the waterbody's water retention capacity, as well as an increase in the pace and size of stormwater flow and a shift in the water's natural route (Zhou et al., 2017).

- Interference with the drainage system:

These interferences may take the shape of poorly built roadways, bridges, railway lines, and check dams, which obstruct the flow of water and cause flooding. Due to rising land costs and a scarcity of land in city centers in Indian cities and towns. In low-lying places, new constructions are springing up, mainly as encroachments on lakes, marshes, and riverbeds. The breadth and depth of the water bodies are drastically decreased, obstructing the natural flow of water in certain cases.

- Unplanned tourism activities:

For decades, water bodies have been employed as tourist attractions. Water plants and other forms of eutrophication are being removed from rivers and lakes, which would otherwise be required to reduce runoff speed. These operations must be closely monitored to ensure that they have no negative consequences for the

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ecosystem of the water body. Cultural or religious celebrations also pollute waterways by dumping non-biodegradable materials into rivers and lakes, lowering water quality. During floods, suspended particles and contaminants rush into the surrounding area, providing a health danger.

- Lack of administrative framework:

Waterbody protection was not the main focus of urban planning; this was only discovered after recent deluge disasters in major cities caused massive economic losses. Instead of enacting rigorous legislation to limit or eliminate encroachment on drainage channels and wetlands, the local government has been granted authority to regulate development by granting them legal ownership rights to the property. The government has taken relatively little action to designate waterbodies as a protective environment free of pollution and encroachment.

1.5. The Impact Of Floods On Indian Cities' Urban Environment:

Floods in cities have far-reaching consequences, particularly in terms of direct or indirect economic damage. Flood risk is a combination of population exposure and economic activity sensitivity, as well as vulnerability for social or economic elements. The impact of such floods on people's lives and livelihoods, which is a part of their susceptibility, should be understood. Flooding may compromise the structural strength of structures in an impacted region if it lasts for a long time. Buildings by the riverbank or on a slope are vulnerable to damage due to soil erosion, which weakens the foundation. Small huts and makeshift shelters may be swept away. Floods cause significant damage to crops, stores, and industry, particularly warehouses (Song et al., 2019).

Urban floods are often linked to death and bodily harm, either directly as a result of floods but rather indirectly as a result of illnesses transmitted by water-borne diseases during the flooded period. The stranded mental health suffers as a result of their loss of refuge and relatives. These injuries may result in long-term psychological anguish. During an intense flood occurrence, trees and vegetation were carried away, resulting in ecological damages. Sewage or solid waste washing into homes and neighborhoods causes a slew of problems, including disease

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outbreaks and financial losses to families. In the event of such an occurrence, recuperation is a time-consuming and exhausting procedure (Khan & Govil, 2017).

The study's main emphasis is on determining the factors that produce inundations in urban areas, especially in light of India's rising urbanization. Human involvement, rather than natural factors, is the primary source of urban floods. Even while climate change has a significant part in raising the risk, it is an indirect outcome of man's destruction of the environment. A considerable rise in surface runoff has been recorded as a result of population growth or changes in land-use patterns (Gupta et al., 2020).

2. DISCUSSION

Only until the 1990s was urban flooding regarded as a problem of municipal or local government, but it now attracts the attention of catastrophe and environmental specialists. Due to their high sensitivity and dangers, urban floods have been designated as a catastrophe. Every nation suffers a high number of deaths and significant economic losses as a result of it. Particularly in developing nations like India, where population levels are high and the country has seen significant population expansion in recent decades owing to heavy migration to urban areas, there are many concerns regarding unregulated and unsustainable development. Increased population causes more urbanization, greater impervious land, less infiltration, as well as increased surface runoff, as well as changes in topographical or drainage profiles, which increase water flow in proportion to the rate of urbanization. Indian cities are growing outwards in Greenfield development areas, swallowing natural elements such as forests, water bodies, and agricultural land, converting cities into urban agglomerations. The susceptibility of these urban agglomerations to urban floods is exacerbated by a slew of issues and concerns. Several Indian cities have been devastated by disastrous floods in recent times, which have disrupted citizens' daily lives, caused significant property damage and deaths, and harmed the country's economic progress. As a result, it's critical to comprehend the numerous causes of urban floods as well as the potential consequences for the urban environment.

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Even under current climatic circumstances, floods that inflict urban damage are infrequent occurrences, which make predicting the average recurrence interval (ARI) for the most intense floods difficult. Any effort to estimate modifications for low likelihood flood occurrences under double CO_2 circumstances exacerbates these issues. Despite these challenges, the study's goal is to give knowledge on the nature of future floods under greenhouse climate conditions and to estimate the consequences for urban flood losses.

3. CONCLUSION

In the preceding, we discussed concepts related to urban flood strength and highlighted a few areas where the wider populace has to adjust their thinking to achieve our goal: coordinated flooding the board structure that can react to changing dangers by increasing urban strength. A robust urban water management system is necessary for addition to a functional common society. It is critical to recognize that urban neighborhoods are urban socio-biological frameworks in which many partners may collaborate to develop many rational solutions to the unexpected problem of flood anticipation in densely populated urban areas. There are a few issues that have still to be resolved, and the most pressing ones are listed here. Transdisciplinary research may be able to identify roadblocks, learn from good models, develop new cycles, and aid progress in the mentioned zones. The key issue should be assessing present or future urban drainage to cope with the increased danger of urban floods caused by regional and local variables. Only by changing the way we build our cities can we reduce the effects of urban floods. People recognize the need for research into continued to improve maintainable but also versatile storm water management executives in particular, stormwater frameworks' ability to adapt, energy utilization reduction, efficient land use, transportation and also financial nexus, economic and environmental way, ensuring basic foundations, but also resolving obligations queries. The author of this article discusses flooding in cities but also future concerns.

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