LITERATURE REVIEW –International literature

01

Mayr, M., Alonso, C., & Rouse, C. (2017, May). Blue-green network planning as a spatial development and climate-resilient strategy: The case of Belmopan, Belize. Paper presented at the Caribbean Urban Forum 2017, Belize City, Belize. UN-Habitat.

Objective : To develop a blue-green network (BGN) plan as a climate-resilient and flood mitigation strategy for Belmopan City by integrating spatial planning with ecosystem-based adaptation.
Methodology : Multi-scale analysis of flood-prone zones at the urban, sub-watershed, and site levels. Scenario development comparing Business-As-Usual (BAU) and Blue-Green Network (BGN) approaches.
Tools Used : GIS-based spatial analysis for land use, hydrology, and vulnerability mapping.Hydrological modeling to simulate flood extents under different urban development scenarios.
Remote sensing for land cover classification.
Key Outcome : The study proved that implementing a blue-green network can significantly reduce flood risk while promoting sustainable urban growth and ecosystem services.

02

Ariyarathna, I. S., Abeyrathna, W. P., Jamei, E., & Chau, H.-W. (2023). A review of the application of blue–green infrastructure (BGI) as an effective urban flood mitigation strategy for livable and healthy cities in Australia. Architecture, 3(3), 461–476.

Main Objective: The study aimed to conduct a thorough review of available flood mitigation techniques, with a focus on the emergence and effectiveness of Blue-Green Infrastructure (BGI) as a strategy, particularly in the Australian context.
Methodology: The research employed a systematic review followed by a scoping review. This involved a literature review of urban flood mitigation and BGI. A bibliometric analysis was also conducted.
Tools: The study utilized VOSViewer software version 1.6.19 for the bibliometric analysis.
key outcome : of the paper is that Blue-Green Infrastructure (BGI) is recognized as an effective measure in addressing unexpected floods, offering benefits such as mitigating urban flooding, improving environmental quality, and enhancing community health and well-being.

03

Owusu .G., & Asumadu-Sarkodie, S. (2022). Urban Flooding, Adaptation Strategies, and Resilience: Case Study of Accra, Ghana. In Urban Flooding and Climate Change (pp. 249-270)

Main Objective: The study examined the impacts of flooding and the adaptation strategies in two flood-prone residential areas in Accra, Ghana. It also sought to explore flood control measures, adaptation strategies, and the reasons why interventions to address flooding in Accra have been ineffective.
Methodology: The study involved a survey of 320 household heads to determine the local impacts of floods and community adaptation strategies. Interviews were also conducted with key stakeholders from government agencies and private urban planning consultants to gain a broader understanding of government interventions and challenges.
Key outcomes: Key flood control interventions included dredging before the rainy season and demolition of unauthorized buildings near waterways. These interventions have been largely ineffective due to rapid littering and re-siltation of waterways. The study emphasizes the necessity for more robust engineering solutions to enhance Accra's resilience to floods.

04

O'Donnell, E., Thorne, C., Ahilan, S., Arthur, S., Birkinshaw, S., Butler, D., Dawson, D., Everett, G., Fenner, R., Glenis, V., Kapetas, L., Kilsby, C., Krivtsov, V., Lamond, J., Maskrey, S., O'Donnell, G., Potter, K., Vercruysse, K., Vilcan, T., & Wright, N. (2019). The blue-green path to urban flood resilience. Blue-Green Systems, 1(1), 172–189.

Objective: The research aims to investigate how transformative change may be possible through a whole systems approach to achieve urban flood resilience (UFR). This involves optimizing Blue-Green and Grey systems, managing stormwater as a resource, and focusing on the interfaces between planners, developers, engineers, and beneficiary communities.
Methodology: The research tests locally-defined methods and models in several UK case studies. It employs a suite of linked research methods and models to simulate physical processes.
Tools: CityCAT models are used to assess pluvial and fluvial flood risk. WaterMet is used as an urban water system performance model. SHETRAN handles multi-fraction sediment transport. The BEST Evaluation tool (CIRIA, 2018) is used.GIS visualization is employed.

05

Su, Y.-S. (2016). Urban flood resilience in New York City, London, Randstad, Tokyo, Shanghai, and Taipei. Journal of Management and Sustainability, 6(1), 92-108.

Objective: The article aims to analyze the disaster resilience of global cities to flooding. It uses case studies of six global cities to help other cities prepare for future flood events. The study also seeks to identify strategies to prevent urban flooding and suggest urban flood resilience policies.
Methodology: The research involves case studies of six global cities: New York City, London, Randstad, Tokyo, Shanghai, and Taipei. It also includes literature reviews to build on the current urban flood resilience discourse.
Key Outcomes: The study provides an analysis of global cities' disaster resilience to flooding.It offers insights into the flood vulnerabilities and preparedness of the selected cities.The research suggests policies and strategies to enhance urban flood resilience, particularly for Asian cities.

LITERATURE REVIEW – Indian literature

06

Kaur, R., & Gupta, K. (2022). Blue-Green Infrastructure (BGI) network in urban areas for sustainable storm water management: A geospatial approach. City and Environment Interactions, 16, 100087.

Objective: The paper aims to develop a geospatial technology-based approach for identifying Blue-Green Infrastructure (BGI) networks.It also employs graph theory and a gravity model for sustainable stormwater management in Ahmedabad, India.
Methodology: The study introduces a replicable approach.It integrates five key criteria for Suitability Analysis: slope, drainage density, land cover, hydrologic soil group, and proximity to roads.Core patches are selected as nodes in a GIS environment.Corridors are identified using the least-cost path function.Selected corridors are assessed using a gravity model.
Tools: The study utilizes geospatial technology.It employs graph theory and a gravity model.GIS environment is used.

07

Dangwal, A., & Sharma, A. (2022). Mitigation of urban flooding using blue-green infrastructure: A case of Dehradun, India. Disaster Advances, 15(11), 50-61.

Objective: The study aims to mitigate urban flooding through blue-green infrastructure development in Dehradun, India.
Methodology: The study uses Geographic Information System (GIS) and remote sensing. It aims to understand Land Use Land Cover (LULC) change in the period 1995-2020.The study also estimates the surface run-off generation of this period using the weighted co-efficient and Soil Conservation Service Curve Number (SCS-CN) methods.
Tools: Geographic Information System (GIS)Remote sensing
Key Outcomes: The result reveals that with the blue-green infrastructure, rainwater harvesting potential can be increased to 82.03 MLD. Groundwater recharge would increase to 2.66 MLD. With this, the rainwater harvesting potential becomes equivalent to 37% of the water supply for the design period of 2031.

08

A.K. Gosain, P.K. Khandelwal and S. Kulshrestha (2009), Urban Floods: Case Study of Delhi.

Objective: The study aims to provide a case study of urban floods, focusing on Delhi.
Methodology: The document provides a descriptive account of the history, geography, and drainage systems of Delhi. It discusses the various factors responsible for floods in the area. It also outlines structural measures for flood mitigation.
Key Outcomes: The document provides a detailed profile of Delhi, including its history, topography, and vegetation. It identifies key drainage channels and their discharge capacities.The document highlights factors contributing to floods, such as the meandering nature of the Yamuna River and human fecal disposal practices. It discusses the impact of structural measures on the Yamuna River's behavior.

09

Gupta, K. (2009). Urban floods: Case study of Mumbai. Disaster & Development, 3(2), 99-120.

Objective: The paper aims to describe Mumbai's drainage system, the details of the flooding, and the measures being taken by the city to mitigate such floods in the future.It also intends to make the Mumbai experience helpful for other metropolitan cities in planning response strategies for similar disasters.
Methodology: The document provides a description of Mumbai, including its geography and rainfall patterns. It details the events of the 2005 floods in Mumbai. The paper discusses the city's drainage system and flood mitigation measures.
Key Outcomes: The paper describes the unprecedented rainfall and its devastating effects on Mumbai in 2005. It provides details about Mumbai's drainage system. The study outlines measures being taken to mitigate floods in the future.

10

Sundarmoorthy, T., Ramadurai, L., & Anuthaman, N. G. (2009). Urban floods: Case study of Chennai. Disaster & Development, 3(1), 105-152.

Objective: The study aims to provide a case study of urban floods, focusing on the city of Chennai.
Methodology: The document offers a descriptive account of Chennai, including its history, topography, and vegetation. It details the city's infrastructure, specifically road networks and drainage systems. The study discusses the impacts of floods on Chennai. It also examines the factors that contribute to floods in the city.The study presents flood alleviation projects and their objectives.
Key Outcomes: The document provides background information on Chennai, including its historical development, geographical location, and vegetation. It describes the city's road network, highlighting key national highways and radial roads. The paper also details Chennai's canals and other drainage channels, including the Buckingham Canal. It discusses the historical development of the city's road patterns. The document outlines the impacts of floods on Chennai and the factors contributing to these floods, such as uncontrolled urban sprawl and the loss of natural drainage systems.

LITERATURE REVIEW – Policy based literature

11

World Meteorological Organization (WMO). (2012). Urban Flood Management in a Changing Climate. Integrated Flood Management Tools Series No. 14. Associated Programme on Flood Management (APFM).

Objective: To guide urban planners and managers in reducing urban flood risks using integrated flood management while supporting sustainable urban development.
Methodology: Follows a stepwise process of problem identification, stakeholder engagement, hazard and risk assessment, strategy formulation, and implementation with monitoring.
Tools: Uses flood risk maps, urban drainage modeling, GIS, participatory methods, cost-benefit analysis, and decision support systems.
Key Outcomes: Promotes proactive flood risk management, integrates flood control with urban planning, enhances community participation, and creates multi-functional urban spaces.

12

National Disaster Management Authority (NDMA). (2010). National Disaster Management Guidelines: Management of Urban Flooding. Government of India, New Delhi. ISBN: 978-93-80440-09-5.

Objective: To provide national-level guidelines for effective management of urban flooding risks in India, focusing on preparedness, mitigation, and integrated flood risk management.
Methodology: Formulated through stakeholder consultations, expert inputs, workshops (including Indo-US workshop), and analysis of urban flood scenarios, institutional frameworks, and technical systems relevant to Indian cities.
Tools: Early warning systems, Doppler weather radars, flood forecasting models, hydrological information systems, spatial decision support systems (SDSS), urban drainage design manuals, and vulnerability assessments.
Key Outcomes: Strengthened institutional capacity, establishment of technical frameworks for urban flood management, development of early warning systems, and integrated planning strategies for reducing urban flood vulnerability.

13

National Disaster Management Authority (NDMA). (2017). Standard Operating Procedure for Urban Flooding. Government of India, New Delhi.

Objective: To establish a standardized procedure for coordinated and effective response to urban flooding situations in India by defining roles, responsibilities, and actions for all concerned stakeholders.
Methodology: Prepared through multi-stakeholder consultations under the National Disaster Management Authority (NDMA) framework, involving hazard identification, vulnerability assessment, preparedness planning, response planning, and institutional capacity building.
Tools: Early Warning Systems (EWS), Doppler Weather Radars, GIS-based vulnerability mapping, Urban Flood Management Plans (UFMPs), Incident Response Systems (IRS), and Integrated Command and Control Centers (ICCCs).
Key Outcomes: Improved inter-agency coordination, operationalization of Urban Flood Management Plans, establishment of effective early warning and response systems, and enhanced preparedness and response capacity of Urban Local Bodies (ULBs) and State agencies.

14

Karnataka State Disaster Management Authority (KSDMA). (2021). Karnataka State Action Plan for Flood Risk Management 2021. Government of Karnataka.

Objective: To formulate an action plan to reduce the impacts of floods in Karnataka through preparedness, mitigation, response, and recovery strategies for effective flood risk management at the state, district, and local levels.
Methodology: The plan is developed through hazard, vulnerability, and risk assessments, integrating global and national disaster risk reduction (DRR) frameworks. It involves consultations with government departments, district administrations, ULBs, PRIs, NGOs, and community representatives.
Tools: Flood hazard and vulnerability mapping, early warning systems, capacity-building programs, standard operating procedures (SOPs), GIS-based analysis, disaster databases, and training modules for stakeholders
Key Outcomes: Strengthened institutional mechanisms for flood management, improved flood forecasting and early warning systems, enhanced preparedness and response capacity at all levels, and the establishment of a comprehensive flood risk management framework for Karnataka.

15

Bruhat Bengaluru Mahanagara Palike (BBMP). (2023). Bengaluru Climate Action and Resilience Plan (BCAP) Summary Report. Bengaluru, India.

Objective: To address the impacts of climate change on Bangalore by formulating the Bangalore Climate Action and Resilience Plan (BCAP) focusing on mitigation, adaptation, and resilience across key urban sectors.
Methodology: The plan was developed through a multi-stakeholder consultation process, sectoral assessments (energy, transport, waste, water, urban planning, and biodiversity), climate risk and vulnerability assessment, GHG inventory, and future scenario modeling following the C40 Climate Action Planning Framework.
Tools: Greenhouse Gas (GHG) Emission Inventory Tool, Climate Risk and Vulnerability Assessment Framework, C40 Pathways Model, Scenario Analysis, and Stakeholder Consultations.
Key Outcomes: Identification of key risks and vulnerabilities for Bangalore, sector-wise mitigation and adaptation strategies, proposed action plans targeting net-zero GHG emissions by 2050, and improved institutional mechanisms for climate resilience.

LITERATURE REVIEW – Bengaluru city literature

16

Ramachandra, T.V., & Mujumdar, P.P. (2009). Urban Floods: Case Study of Bangalore. Disaster & Development, Vol. 3 No. 2, April 2009.

Objective: To analyze the causes, impacts, and management of urban floods in Bangalore with a focus on urbanization-induced changes in land use, hydrology, and drainage systems.
Methodology: The study employed spatial analysis of land-use changes (1973–2007) using remote sensing data, hydrological modeling, field surveys, flood event analysis, and assessment of the drainage network's capacity and encroachments.
Tools: Remote sensing (Landsat, IRS), GIS-based analysis, rainfall and runoff modeling, field validation, hydrological simulation models, and ground surveys.
Key Outcomes: Rapid urbanization (466% increase in built-up area) reduced vegetation and wetland cover leading to floods

17

Dr. Ashok Sanganal (Faculty AT and Disaster Management) (2012), URBAN FLOOD MANAGEMENT – A CASE STUDY OF BANGALORE

Objective: To assess the causes, extent, and impacts of urban flooding in Bangalore, especially focusing on vulnerable slum areas, and to propose effective flood mitigation strategies.
Methodology: Conducted field surveys, rapid appraisals of flood-prone areas, analyzed secondary data from city agencies, and applied a case study approach combining physical and socio-economic analysis.
Tools: Used GIS and remote sensing for mapping, hydrological assessment for analyzing stormwater drain capacity, and stakeholder consultations to gather local insights.
Key Outcome: Found that encroachments on drains and lakes, poor sewage and solid waste management, and unplanned urbanization are major contributors to flooding, leading to recommendations for drain remodeling, lake rejuvenation, floodplain zoning, and updated building regulations.

18

Knight Frank India. (2023). Bengaluru Urban Flood Report 2023.

Objective: To assess Bengaluru's urban flood vulnerability, analyze causes, and recommend multi-scale strategies for sustainable flood management.
Methodology: The study used a combination of secondary data analysis, field surveys, hydrological catchment analysis, blue-green network assessment, and flood-prone area mapping.
Tools: Satellite imagery (Sentinel, Google Earth), GIS mapping, rainfall and runoff analysis, and spatial analysis using GIS-based hydrological tools.
Key Outcome: The study identified 179 flood-prone hotspots, highlighted lake and drain encroachments, proposed integrated flood management strategies, and recommended institutional strengthening for effective flood mitigation.

19

Tewari, P., Anshu, D., Dwivedi, S., & Kumar, S. (2023). Increasing Frequency of Urban Floods: Lessons from Bengaluru Floods, 2022. Disaster & Development, Vol. 12, Issue 01, January to June 2023.

Objective: To investigate the causes of the 2022 Bengaluru floods, focusing on the role of urbanization, poor infrastructure, and climate change in intensifying flood risks.
Methodology: The study is based on secondary data analysis, including government reports, news articles, and academic literature, to examine the contributing factors and impacts of the flood.
Tools: Literature review, spatial understanding of drainage networks, and qualitative assessment of urban planning and infrastructure conditions.
Key Outcome: The study concludes that rapid urbanization, poor drainage infrastructure, unplanned development, and climate change are the main drivers of recurrent urban flooding in Bengaluru, and recommends improvements in infrastructure, land-use regulations, and sustainable urban planning.

20

Kulranjan, R., Palur, S., & Nesi, M. (2023). How Water Flows Through Bengaluru: Urban Water Balance Report. Water, Environment, Land and Livelihoods (WELL) Labs, Institute for Financial Management and Research, Bengaluru.

Objective: The report aims to analyze how water flows through Bengaluru. It seeks to provide an urban water balance report for the city.
Methodology: The report utilizes a variety of primary and secondary data sources. The authors made reasonable assumptions to estimate water and wastewater flows in Bengaluru's water system.
Tools: The report relies on data visualization through maps.
Key Outcomes: The report provides a comprehensive analysis of Bengaluru's urban water balance. It includes estimations of water and wastewater flows within the city.

MITIGATING URBAN FLOODS : A PLANNING STUDY ON CONNECTING BLUE-GREEN NETWORK IN KORAMANGALLA - CHALLAGHATTA VALLEY IN BENGALURU CITY

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