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An Overview of the Literature on Green-Blue Infrastructures

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Abstract:

As the threat posed by climate risks has grown, several worldwide cities have modified their approaches to urban planning and architecture. These changes aim to counter typical infrastructure practices by utilizing natural solutions that combine green and blue elements (rivers, seas,). This project research paper examines the new idea of "BGI" and evaluates plans and initiatives that are now underway in India and around the world. Additionally, it points out ways that India's cities might take advantage of the blue-green area to promote resilience and equity, respond to climate dangers, and spark economic shifts that would lead to sustainable urban futures.

Keywords– **Nature Based Solution, Green Infrastructure, Ecosystem Services.**

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I. INTRODUCTION

Hazards to human comfort and environmental justice are growing in urban areas due to climate change. Three of the primary threats to sustainability are disasters from nature, adverse weather conditions, and biodiversity depletion; the fourth having the lack of climate change mitigation. Temperature increases are predicted to have a negative decadal impact on countries. The potential contribution of blue (seas, rivers, lakes, wetlands) and green (trees, parks, gardens, playgrounds, and woods) areas to resolving these issues is receiving more and more attention This concept of green and blue infrastructure is often used to guide these discussions [1, 2, 3]. The possible role of blue and green spaces is becoming more and more recognized in attempts to address these issues; this is frequently done through the idea of green and blue structure [4, 5].

II. OPPORTUNITY

The expansiveness of harmless to the ecosystem foundation is upgrading biological system wellbeing can help both human and ecological wellbeing when blue-green framework is utilized in regions like lodging water and transportation 6 the format and style of the encompassing region could impact the personality of the city green spaces work on tasteful and moral credits.

III. HISTORICAL BACKGROUND

Two more national flagship projects in India that seek to enhance urban living through the combination of blue and green aspects are AMRUT, the Atal Mission for Rejuvenation and Urban Transformation, and the Smart Cities Mission. The NAPCC is enhanced by these programs. AMRUT works on issues like water supply, sanitation, and green space upgrading, whereas the Smart Cities Mission concentrates on solutions like open space preservation, sanitation, water supply, and raising the standard of living for residents [7].

Figure-1 Madurai Meenkshi Amman Temple

Blue-green initiatives are being included into master plans and action plans by a number of Indian cities, including Bengaluru, Delhi, Bhopal, Madurai, and others, even though they are a relatively new idea. The goal is to improve the natural blue systems that already exist in the town and its nearby communal spaces by means of a structured approach [8]. These cities, as well as many others in India, are already high-density constructed regions with a variety of issues, such as mixed land use, overlapping agency authority, skewed development patterns, technological obstacles, and socio-political will. There isn't much room for blue-green installations in high-density locations due to land constraint, which implies that the construction of urban blue-green infrastructure must be very efficient and flexible.

IV. PRESENT STUDY

Like many other cities in the Global South, Indian cities also struggle with challenges of urban poverty, inequality, and unplanned settlements. We are examining the urbanized region of India's ten most populous cities in order to look at the relationship between changes in blue-green infrastructure, such as surface waters, green cover, and recharge zones, and urban (built-up) expansion. In these ten cities, the interplay between urbanization and natural infrastructure poses a risk to almost thirty percent of India's urban population. Satellite photos and remote sensing data are used to monitor changes in blue-green infrastructure and urbanization in the ten research cities between 2000 and 2015.

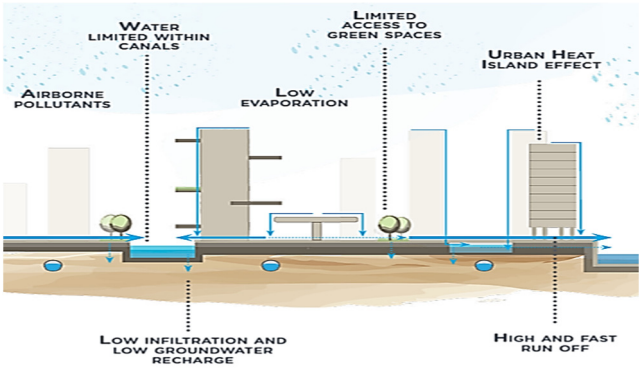

Figure-2 Absence of BGI Approach

The cities that are the subject of the inquiry are Bengaluru, Surat, Ahmedabad, Chennai, Delhi, Hyderabad, Jaipur, Kolkata, Mumbai, and Pune. To investigate the relationship between urbanization and natural infrastructure, two spatial intervals are used: 20 km (0–20 km) and 50 km (20–50 km) from the center of each research town. Satellite photos allow us to examine the genuine geographical extents of metropolitan regions with respect to built-up areas, blue cover, and green cover change trend. In ten Indian cities, the study uses existing approaches for spatial evaluation and analysis to ascertain the spatial extents of various manmade and natural characteristics.

This study's focus is limited to using satellite imagery alone to establish correlations between increases in the built-up area and their consequences on the natural infrastructure. The environmental framework in metropolitan areas is changing due to a number of interrelated factors, including urbanization, weather extremes brought on by changes in the climate, and other human beings like farming and quarrying.

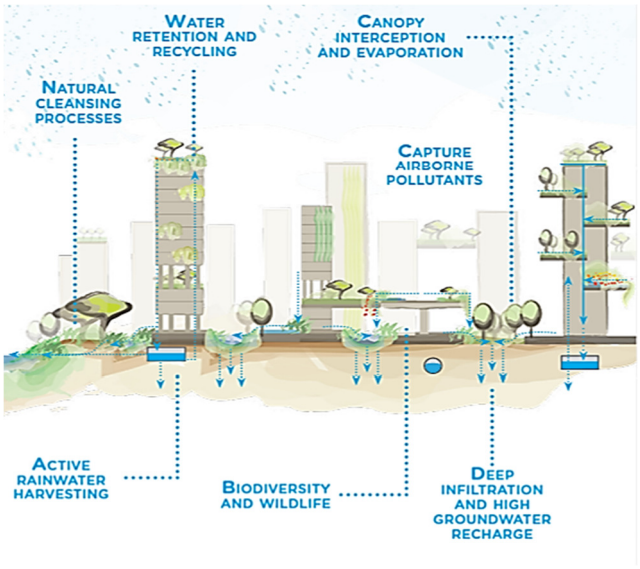

Figure-3 Integrated of BGI Approach

V. LITERATURE REVIEW

1) Economical preservation as well as restoration organizing within the designs of both blue and green infrastructures. An analysis of the Mediterranean Intercontinental Biosphere Reserve: Andalusia, Spain – Morocco (2018): This research presents a novel methodology for the systematic selection of

cost-effective restoration sites in support of blue and green infrastructure designs, based on ecosystem services, biodiversity, and ecosystem condition.

The investigation aims to offer a systematic technique for restoration zone allocation in GBI designs that considers factors such as ecosystem-related services ecological state and biodiversity. Implementing GBI is thought to be a potentially useful response to global change, and this approach could guide additional applications of the EU GBI Strategy in scenarios involving transboundary ecosystems.

2) Blue-green architecture: An examination of a case research taking into account the supplementary roles of vegetation and water. 2019: The investigation examines the technique of blue and green planning for arrangement, which focuses on varying objectives and issues related to vegetation and water in urban environments. This study examines the extent to which collaborative resource utilization benefits blue-green projects by analyzing four case studies. It is simpler to identify information gaps and current fixes thanks to the case studies' graphical depiction of the blue and green components. The study underscores the need for a new planning methodology that incorporates green and blue aspects at an early stage. The need for more of them is increased by climate change.

3) Multicriteria analysis and different urban service models are applied to the planning of green infrastructure (2022): In a peri-urban catchment in Greater Kuala Lumpur, Malaysia, the study focuses on multi-criteria analysis and multiple urban ecosystem service (UES) models for green infrastructure (GI) design. The authors discovered trade-offs and synergies between the different services after evaluating the coexistence and overlap of hotspots. The five GI strategies—urban park expansion and conservation, headwaters conservation, greening of existing infrastructure, and reforestation for biodiversity—were analyzed using a multi-criteria approach based on ecosystem service parameters.

4) Nature-Based Solutions: A typology to direct multifunctional planning of nature-based solutions in urban green infrastructure (2022): The article provides a typology of urban green infrastructure (GI) and an assessment of the ecosystem services that each type of GI provides to solve concerns unique to cities, all backed by data. The manner in which these services combine to offer multiple capabilities for the deployment of nature-based solutions (NBS) in urban planning contexts is also explored. Making decisions about addressing important urban challenges through public-private partnerships and governmental initiatives can be aided by the typology developed in the study. Through the integration of the sociological, urban, and biophysical perspectives, it offers a deeper understanding of the benefits and co-benefits associated with urban geoengineering.

5) Sustainable Cities and Society: Examining the establishment period of Blue-Green Infrastructure for urban cooling through satellite images (2023)
This paper discusses the concept of Blue-Green Infrastructure and how it might help lower the dangers associated with heat in urban areas. It highlights how important it is to understand the Cooling Establishment Time of a BGI. The study's approach can help researchers and decision-makers understand the dynamics of BGI cooling over time and strike a compromise between long-term fixes and short-term retrofits.

6) Using satellite imagery to investigate blue-green infrastructure establishment time for urban cooling. (2023): The article discusses the primary drivers of urban blue-green infrastructure as well as the common misconception that biodiversity conservation is an intrinsic benefit rather than an essential part of planning. The authors emphasized the importance of BGI's ecological function as "stepping stones" or linear corridors for fragmented ecosystems. The study demonstrates how to apply the framework to prioritize and rank various sites for BGI initiatives that help the enhancement of biodiversity in the lowlands of Switzerland. The authors emphasize how important it is to consider

specific environmental conditions while developing small-scale BGI therapies in a functional manner.
climate change. Factors influencing the degree of heatwave awareness among city dwellers may vary from city to city. All natural, semi-natural, and artificial networks of ecological systems within, around, and between urban areas are encompassed by the concept of "green infrastructure". Many societal and personal benefits can be obtained from green infrastructure.

7) Urban Forestry & Urban Greening: Urban dwellers' perceptions and preferences about green infrastructure to support cities in mitigating the effects of climate change (2023): A systematic review of the surroundings services furnished by using inexperienced infrastructure-turned into achieved by way of the have a look at using the preferred Reporting objects for Systematic opinions and Meta-Analyses statement. Examining 199 studies that satisfied the eligibility requirements demonstrated the need to approach many ES concurrently and to conceptualize GI.

VI. CONCLUSION

By integrating regarding the constructed surroundings, blue and green framework has the proficiency to improve metropolitan regions tenacity and sustainability. A more environmentally friendly future that increases biodiversity, elevates living standards, and lessens the effects of weather change can be attained by adopting BGI as a progressive strategy.

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