

## **FROM ENCROACHMENT TO ECOLOGY: NATURE-BASED STRATEGIES FOR RIVERBANK REGENERATION**

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### **ABSTRACT**

Once a nature-based ecological enclave with a river network at its edge, the north-eastern part of Dhaka city has now been transformed in an unplanned manner by urban intervention, eventually leading to riverbank encroachment, pollution, and disruption of ecological balance. The Beribadh road near Eastern Housing created a barrier, which isolated the Turag River from the local community. During the early 2000s, the river floodplain was still close to Beribadh road, but later faced massive encroachment by powerful political groups. The inadequate road infrastructure in Eastern Housing has led to the residents' detachment from the river. Sonali Bazaar Market, situated between the housing area and the Beribadh road, is exposed to intense air and noise pollution from heavy traffic of Beribadh road. This paper represents a design research to identify ways to re-establish this diminished connection which resulted into pedestrian vulnerability, lack of open space, water pollution and losing river's natural flow through Nature-Based Solution (NbS), pedestrian walkways with public amenities, multifunctional eco-market, dedicated urban green pocket spaces, improved riverine habitat, and a replicable model for small-scale riverfront regeneration in the rapidly rising Bangladeshi context. A qualitative research approach was employed, combining land-use mapping, pedestrian movement density analysis, and socio-spatial observation through site survey and community engagement to identify encroachment patterns, opportunities for public spaces, and high-density nodes. Five NbS strategies were selected based on site condition and feasibility: River and Stream Renaturation, River Floodplains, Urban Farming, Green Corridor, and Open Green Spaces. The interventions were designed with the aim of restoring riparian habitat and strengthening community connections to the river. The Eco-market, a commercial hub for the residents, is strategically placed at the pedestrian convergence point to establish an intermediary zone between the residential area and the Beribadh road. The re-imagined floodplain will serve as an urban farming zone and space for public gathering, which will enhance user engagement. This replicable design strategy can be placed on one or more encroached riverbanks around the city of Dhaka according to the site context and need as it re-establishes the long-lost connectivity between river and human settlement. Through this strategy, three heterogeneous land-use categories (water bodies, commercial zones, and residential zones) can be woven into a single thread, resulting in enhanced human-nature integration.

**Keywords:** *Nature-Based Solution (NbS), Encroachment, Riverfront Regeneration, Community Connectivity, Ecological Balance.*

## 1. INTRODUCTION

The high rate of urbanization of Dhaka, the largest city and most densely populated in the world, has always been closely connected to the destiny of its hydrological system. The city of Dhaka had previously ecological corridors and cultural lifelines (rivers such as the Turag), which offered transportation services, enabled agriculture, and formed the urban identity (Kabir et al., 2022; Islam and Hossain, 2014). The north east that was an ecological enclave is now under the pressure of urbanisation, encroachment on riverbanks, pollution as well as fragmentation. The study of Turag basin reveals that the change in land use and the uncontrolled development has undermined the riparian ecosystems and restricted community access to the water (Islam et al., 2014; Kabir et al., 2022; Tania et al., 2021). Ecosystem disruption and loss of community to their traditional norms due to unregulated land use change and encroachment have destroyed the Turag. Researchers have made an emphasis on the fact that such pressures weaken cultural connections and turn the river into a fringe (Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021).

To address these issues, our urban design study in the north-eastern Turag corridor will be used to restore the lost linkage between the river and the surrounding community using integrated Nature-Based Solutions (NbS). Using the qualitative approaches- land use mapping, density analysis of pedestrian movement, and social spatial observations, context-sensitive design strategies were developed, including high pedestrian walkways, multi-purpose eco-markets, green pockets in cities, and riverine habitat development, to enhance ecological and community connectivity. The pivotal element of this strategy is the change of encroached flood areas into multi-purpose bioregions, such as urban agriculture and community socialization areas, and made replicable throughout Dhaka riverbanks. The findings in this research paper are based on the local fieldwork and stakeholder interaction as well as international best practices, with a focus on the theme of how NbS and socio-ecological design frameworks are applicable in restoring urban rivers corridors and rejuvenating community lives in at-risk cities with rapid urbanization. The Turag River design strategies, which is innovative, constitutes a modular approach towards promoting resilience, inclusive urban waterfront redevelopment.

## 2. METHODOLOGY

The study used a qualitative, multi-scalar design research approach to respond to the challenges of riverbank encroachment, pollution and socio-ecological disconnection found through historical satekkite images that are intertwined with one another. This was comprised of Land-use mapping (satellite and field-based), Pedestrian movement density analysis (through direct observation and space syntax) (walkable street network, sample size: 72 persons, Time: 11:00 am to 6:30 pm for 1 day), Socio-spatial observation methods (stakeholder interviews through questionnaire and experience walking in the city). The study in the case assumed an iterative participatory design model that incorporated three participatory engagement sessions with the community residents in the area, who had moved to the capital seeking livelihood at the expense of different regions of the country. This sessions were participated by women and children and working class male population. The outcome of each sessions helped to find out the socio-economic vulnerability of this specific group of people. The combination of vernacular architecture and the present ecologically-based design models have been a result of the insights made after making the site visits in which the community dependence on the local materials and climatic-based methods of building construction has highlighted the importance of vernacular knowledge. These observations shaped the design framework in terms of the conventional approaches which are inherently sustainable and geared to the local context. The methodology also goes on to take the following steps:

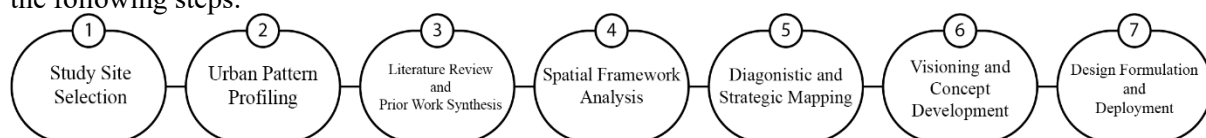


Figure 1: Methodology (Source: Authors)

## 2.1 Land-use Mapping

The mapping of the Turag waterfront in terms of land use reveals built up land, vegetation, water bodies, floodplain, and encroached land. Such mapping, based on satellite and GIS research, can demonstrate the ecological discontinuity, urban sprawl, and riparian separatism in river systems in Dhaka (Islam and Hossain, 2014; Tania et al., 2021; Kabir et al., 2022).



Figure 2: Existing Land-use Map (Source: Authors)

Table 1: Commercial Land-use Data (Source: Survey by Authors)

Category	Total Area (sqft)
Roadside Shops	9,234
Informal Market	31,493
Formal Market	15,262
Other Businesses	118,967
<b>Total Commercial Area</b>	<b>174,956</b>

Table 2: Industrial Land-use Data (Source: Survey by Authors)

Category	Total Area (sqft)
Bus Repair Workshop	7,728
Sand Excavation	30,188
Industrial Dump Site	59,160
Mechanical Workshop	36,712
Light Mills and Workshops	13,839
<b>Total Industrial Area</b>	<b>147,627</b>

The GIS and the remote sensing with satellite images taken in 2006-2017 show growth along the Turag. The temporal analyses are useful to monitor the built up growth, loss of wetlands and encroachment of floodplains, which reflects ecological fragmentation in the riverfronts of Dhaka (Islam and Hossain, 2014; Tania et al., 2021; Kabir et al., 2022). Remote sensed data of encroached riverfronts validated by ground truthing to use of GPS positions and classified land use data, namely trade, housing, industry, agriculture and cultural functions. Research works prove that GPS field checks are essential to proper maps based on satellites in the complicated urban environment of Dhaka (Islam and Hossain, 2014;

Tania et al., 2021; Kabir et al., 2022). Existing land-use map of the site is mentioned in figure 3. The empirical data of land-use area analysis are tabulated in table 1 and table 2.

## **2.2 Pedestrian Movement Density Analysis**

To examine human-river connectivity and the pedestrian movement it was necessary to use space syntax and field observation. It has been found that this combination unveils the role of spatial configurations that determine accessibility, interaction, and ecological integration of waterfronts (Hillier and Hanson, 1984; Karimi, 2012; Koch and Marcus, 2016). Choice indices and space syntax integration determined high pedestrian density areas, which guided the design of walkways and community space. Research indicates that these instruments can be used to predict successfully and guide movement and accessibility in social-lively and ecologically linked urban areas (Hillier and Hanson, 1984; Karimi, 2012; Koch and Marcus, 2016). The number of pedestrians were observed on-site at various times of day and week and assisted in calibration of model outcomes.

## **2.3 Socio-Spatial Observation Techniques**

Socio-spatial observation methods were deployed in both structured and unstructured methods as follows:

1. Structured observations as quantitative data on the users of the river, time of use and their activities.
2. Unstructured observations and on-site interviews were deployed to understand the affective, sensory and social nuances of community-place interactions specially where disconnection and marginalization were seen.

These strategies helped to structure the fundamental components of the design in order to tackle pressing urban challenges like nature restoration, flood management, food access and to support community health. Elements operated in different scale were interconnected to form an urban ecosystem that sustains by itself. Natural systems were used to control water flow and the greenery cools down the air and purifies it where urban farming increases community participation and involvement. The empirical data of formal and informal settlement are tabulated in table 3 and table 4.

Table 3: Formal Settlement Data (Source: Survey by Authors)

<b>Category</b>	<b>Total Area (sqft)</b>
Eastern Housing	390,276
Other Residential Buildings	15,589
Total Area	405,865

Table 4: Informal Settlement Data (Source: Survey by Authors)

<b>Category</b>	<b>Total Area (sqft)</b>
Slums	64,457
Bede Settlement	35,850
Total Area	100,307

## **3. BACKGROUND**

The Turag River, which is a tributary of Buriganga, was in the past the transport artery and cultural interface of Dhaka. Having been referred to as Kohor Doriya or the river of pain, it was strongly connected to the community livelihoods and stories. It went beyond symbolism and served as a trade and communication center that connected rural hinterlands with the city (Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021). The riverbanks of Dhaka had connected settlements, farms and markets and the Turag was a socio ecological channel of transport, trade and community life. Recent research indicates that these relationships have been destroyed by intrusion and unplanned urbanisation

(Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021). The river made the city turn into a strategic commercial hub during the Mughal and colonial eras as it was a good place to connect Dhaka to its hinterlands as well as the river helped to carry on trade and transport in more regions such as Tongi and the Ashulia. Urbanization, population increase, industrialization have contributed to pressure on the rivers in Dhaka since the end of the 20<sup>th</sup> century. The basin of the Turag was not an exception, and the fast change in the land use and uncontrolled development disrupted the ecosystems and divided the communities (Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021). The north east growth of Dhaka by informal settlements and real estate has intruded into the banks of Turag. The ecological and land use research demonstrates how the uncontrollable expansion transformed the riparian areas into the disputed urban frontiers (Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021). Developments in industries and settlements have taken up floodplains and wetlands and formed disjointed settlements and watercourses to the Turag, which is now a blue green corridor divided. Research indicates that riparian ecosystems, connectivity, and flood risk were broken due to unregulated land use change and encroachment (Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021). This environmental change not only changed the hydrological regime, but also broke the traditional connection between the communities and the river, undermined the sociocultural identity based on the riverine lives. The wetlands and floodplains in Dhaka have been transformed into residential, commercial, and industrial complexes that have broken the eco-systems, making them vulnerable to floods. Research of the Turag basin indicates that uncontrolled land use change and encroachment have changed wetlands to built up areas which has compromised ecological services and increased the vulnerability of urban areas (Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021). Encroachment is a process that usually advances with informal or explicit support of local politics, it weakens the official planning and environmental laws (Khaled, 2025). Dhaka has lost more than three quarters of its wetlands since 1960s, and built up areas along river corridors increased by 160 per cent. Such an encroachment is supported by longitudinal studies, which reveal extreme fragmentation of riparian ecosystems (Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021). Urban wetlands stabilize flood waters, clean water, retain carbon and sustain biodiversity, enhancing the urban resilience. Research validates these three ecosystem services: climate regulation, water quality, and habitat support, which are more endangered by fast urbanization (Kabisch et al., 2017; McInnes, 2017; Kabir et al., 2022). River degradation is further aggravated by pollution. The Turag River is lined with untreated industrial effluents such as dyes, chemical substances, and waste water, among the domestic sewage and solid waste (SEU Journal of Architecture, 2023). These contributions produce low dissolved oxygen water in the river, high biochemical oxygen demand water, and river water that is highly contaminated by pathogens- making it unsuitable to most uses and causing the aquatic biodiversity to collapse (SEU Journal of Architecture, 2023). The boatmen, fishers and traders of Turag have been displaced because of ecological fragmentation affecting livelihoods and cultural identity. Research indicates that river based economies were lost and riparian communities were marginalised through pollution, encroachment, and unplanned urbanisation (Islam et al., 2023; Kabir et al., 2022; Tania et al., 2021). The riverbanks of Turag are now industrial plots, depots, houses and land fills, which leave no space to the community. Research indicates that intrusion and uncontrolled development replaced social interactions, destroying ecological roles and social networks (Islam and Hossain, 2014; Kabir et al., 2022; Tania et al., 2021).

Although the Turag has a historic socio-ecological role, the policy gaps and the lack of enforcement have enabled encroaching and polluting the site, discrediting the official problem-solving structures. Current systems are still reactive, fragmented, and politically undermined and cannot protect wetlands or community relationships. The regeneration of river fronts in the world like that of Bishan Park or Sponge Cities is based on good governance and resources that are lacking in Dhaka. This paper thus justifies NbS as a viable option: cheap, flexible and socially community-based, it provides context-specific solutions to ecological recovery where traditional solutions fail.

#### **4. LITERATURE REVIEW**

The concept of peripheral urbanism as developed by other authors, such as Gautam Bhan and Ananya Roy, redefines the idea of city development based on its outskirts, instead of its core (Bhan, 2019; Roy, 2024). This situation is mirrored in Dhaka, Mirpur Beribadh location, where urbanization is rapid but the ecology and slum is not formally planned. The connecting linkage of Turag River to the local communities was disturbed by the embankment constructed in the 1990s, which resulted in spatial injustice and degradation of the ecology (Tania, et al, 2021).

Mostafavi and Doherty define ecological urbanism as the effort to incorporate natural systems in the urban plan to make these cities more resilient and sustainable (Mostafavi and Doherty, 2010). The theory is operationalized by Nature-Based Solutions (NbS) which solves urban problems, utilizing ecological interventions. In this study, five NbS strategies have been chosen, including river renaturation, floodplain restoration, urban agriculture, green corridors, and open green space, to regain the ecological balance and reconnect communities to the river. Such solutions are inspired by the experience of other parts of the world, including Bishan-Ang Mo Kio Park in Singapore and China, the Sponge City Program (Wang and Li, 2024; Henning Larsen, 2012). Placemaking is an interactive process that incorporates daily utilization, culture and socialization into communities to form meaningful places. In the literature of urban design, it is discussed as process and product, which improves identity, functionality, and resilience (Silberberg et al., 2013; Lew, 2017; Carmona, 2019). The proposed eco-market of Mirpur Beribadh is a social and ecological bridge that combines the style of the vernacular architecture, passive ventilation, and permeable surface. Copenhagen Superkilen Park demonstrates inclusive urbanism, which embraces multicultural symbols and participatory forms of interaction as the components of socio-cultural inclusion and social resilience (Larsen, 2016; Mehta and Palazzo, 2020; Carmona, 2019). This design logic is informed by international case studies. Canopia Urbana in Barcelona that transformed a high-traffic intersection into a green park with multifunctional purposes that incorporate drainage and green infrastructure to be resilient and socially engaging. European project analyses indicate the regenerative capacity of stormwater management, biodiversity, and placemaking on urban spaces (Pauleit et al., 2017; Mell, 2017; Hansen and Pauleit, 2014).

Sivas Riverfront, Turkey is a good example of how flood prone areas may be restructured to form ecological and recreational corridors. Research demonstrates that these types of projects combine flood control measures, regeneration, and placemaking to create multi-purpose landscapes enhancing unity and resilience (Ersoy and Koc, 2019; Kaya and Celik, 2020; Yucel, 2017). Lastly, qualitative techniques, which include land-use mapping, pedestrian tracking, and socio-spatial observation, were used to determine the encroachment zones and high density nodes. These aids were used to determine the location of NbS interventions and social facilities so that the design answers both the ecological factors and the demands of the community. The Mirpur Beribadh site, which is fragmented does have latent potential in terms of ecological restoration and civic renewal. The design proposes an imitable image of Dhaka in its water bodies, residential areas, commercial fringes and thus offers a pattern that can be used to replicate the other riverbanks in Dhaka which are under threat as well. This literature background affirms the contextually sensitive, community-based approach to the regeneration of ecological aspects of urban areas.

## **5. DESIGN STRATEGIES**

### **5.1 River and Stream Renaturation**

River renaturation brings balance of nature since it removes daylighting canal streams, hardening banks, reinstating hydrological connectivity and ecological processes. Past research points out the beneficial effects of floodplain restoration, channel renaturalization, and ecological rehabilitation as alleviating the effects of urbanization and enhancing resilience (Clement, 2016; Kail et al., 2015; Wohl et al., 2015). The process of riverbank reshaping with gentle slopes and riparian buffers helps to enhance flood-water management and absorption, erosion reduction, fish habitats, birds and invertebrates (Islam, et al, 2023). By substituting concrete hardened embankments with riparian buffers and soft edges,



## **6. SUPPORTIVE URBAN DESIGN ELEMENTS**

The elevated pedestrian riverfront walkway which is the major component of this design will ensure both physical and visual connection between the housing residents and the river. As vernacular material will be used to make this structure, it'll ensure a safe walkway for the pedestrian for daily use while accessibility is also enabled. Connection with the neighborhood through green pocket spaces will ensure the stakeholder's accessibility towards the walkway which acts as the spine of the design. The eco-market, working as the buffer zone between the residential zone and the Beribadh road, is made of vernacular materials like bamboo and locally produced structural materials with roof gardens on top helps to grow the production of local building materials. The necessity of designing a new market arose as the existing market has cleanliness and zoning issues, accompanied by an unhealthy and polluted environmental quality. All built structures including the eco-market, shaded pavilion, walkways are built with vernacular architectural design such as lattice screening, permeable materials to ensure rainwater permeability, overhanging roofs to ensure shade during rain. Experimental bioswales on roads were designed to ensure infiltration and replenishing groundwater.

## **7. IMPLEMENTATION**

### **7.1 Spatial Layout and Zoning**

The re-designed site layout keeps the traditional land-use zoning as it has been observed that the existing layout helps to keep the residential zone from vulnerability of air and sound pollution where the market in between helps as a buffer zone for the pollutions. The riparian buffer zone along the river bank helps to enhance the biodiversity quality of both the river and its bank. Floodplain terraces helps to return the river its lost river arm which helps to grow fresh foods for the adjacent neighborhood while ensuring livelihood for the locals also. The floodplain wetland park helps to reduce re-encroachment by powerful bodies as it will be in continues use all through the years in different seasons. Pedestrian circuits will connect the design elements as the eco-market, green pocket spaces, play areas, nodal points into an individual nodal point that ensures reducing community classification. Pocket parks, rain gardens, and bioswales are distributed throughout the site for stormwater detention and community recreation. The proposed masterplan is mentioned in the figure 5 and proposed eco market node and elevated walkway are portayed in figure 6.

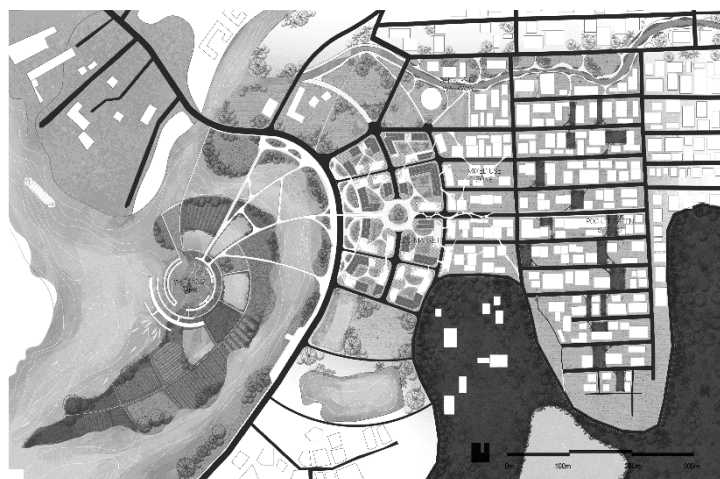


Figure 4: Proposed Masterplan (Source: Authors)

### **7.2 Stakeholder Engagement**

The design process included two community engagement sessions and interviews with local residents, shop owners, employees that helped to find out the fundamental need of the stakeholders and locate the

potential zones to reclaim. These also helped to find out the potential gender inequality among the stakeholders.

Table 5: Stakeholder Analysis and Relocation

Stakeholders	Remarks
Industry Owners	Considering for Elimination
Shop and Market Owners	Considering for Relocation
Informal Vendors	Considering for Relocation
Salesman and Industry Workers	Considering for Relocation
Housing Dwellers	No Change
Informal Settlement Dwellers	Considering for Relocation

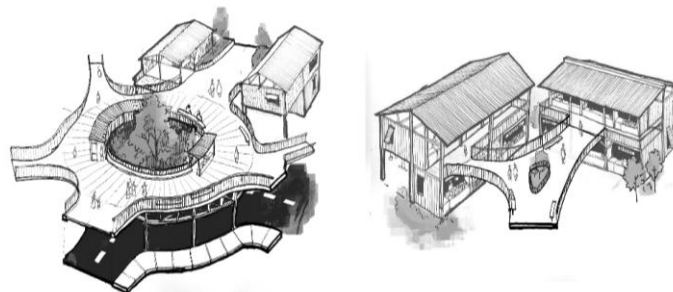


Figure 5: Proposed Eco Market Node and Elevated Walkway (Source: Authors)

### 7.3 Policy, Governance and Institutional Coordination

This can be linked to the Bangladesh Delta Plan 2100 and Dhaka Structure Plan 2016-2035 that strengthens the intentions in wetland restoration, flood resilience, and ecosystem services. Research demonstrates that local interventions combine with these frameworks and enhance good governance, disaster preparedness, and entrenches NbS in long term resilience planning (Hossain, 2020; Alam & Rabbani, 2007; Dewan, 2013). The research advocates for: Re-enforcement of riverbank protection and anti-encroachment policies, Strategic partnerships between the city, local NGOs, and grassroots organizations for maintenance and programming, Inclusion of NbS metrics into municipal performance evaluation and Technical guidelines for replicability (design standards, monitoring protocols).

## 8. QUESTIONING LITERATURE TO FRAME RESEARCH GROUND

Although peripheral urbanism has proven a valuable proposition in explaining the fringes of Dhaka, it usually presumes that informal settlements and ecological boundaries are inert objects of urban growth. The non-attachment of the community to the Turag River in Mirpur Beribadh is not only the result of peripheral disregard, but also an intentional infrastructural action of building an embankment. This brings us to the question: can the peripheral urbanism explain well the situations when state-led projects proactively break ecological and social connections? The current work thus builds on the concept by placing the peripheral growth in the context of disputed political and ecological dynamics. The approaches of ecological urbanism and Nature-Based Solutions (NbS) tend to be promoted as universal resiliency procedures. However, their use in informal, encroached riverfronts in Dhaka has not been explored. The rest of the world precedents such as Bishan Park or Sponge Cities are governed by powerful authorities and provision of resources, which are not present in Mirpur Beribadh. The question that is raised in this paper is the transferability of such models but NbS is framed as flexible, inexpensive interventions that have to be reconfigured by local socio-spatial realities. The study basis, therefore, is experimentation on the localization of ecological urbanism at weak and marginal contexts. The literature on placemaking prioritizes co-creation and inclusivity, although much of it is based on the Western experience of urban development. Placemaking in Dhaka has to grapple with informal economies, the gendered spatial access, and lack of infrastructures. The proposal of the eco-market is thus not a direct copying of Superkilen Park yet an adaptation of the same in context of the observed pedestrian movements and the needs of the community. This puts placemaking as a means of

negotiating fragmented urbanism and not merely the importation of global design approaches. The ecological regeneration within formal contexts can be indicated by the example of Canopia Urbana as an international case study or the Sivas Riverfront project. Nevertheless, their dependence on city government and mass investments is a contrast to the divided rule of Dhaka. Through a challenge on these precedents, the study finds the gap: how can ecological benefits through small-scale, community-based intervention be attained in resource-limited settings? This is the gap that marks the originality of the Beribadh NbS framework. Lastly, the research methodological dependency on the qualitative instruments-land-use mapping, the pedestrian tracking and the socio-spatial observation-grounds the study in empirical realities as opposed to the abstract assertions. The study poses its study ground by interrogating the literature and modifying it to site-specific results, which proposes development of a replicable, context-sensitive NbS model of the regeneration of the peripheral riverfront in Dhaka.

## **9. DISCUSSION**

The Turag intervention shows that Nature-Based Solutions are viable and needed in the restoration of the urban rivers of Dhaka. The research is a solution to urgent problems- flood risk, heat island, food security, urban poverty, ecological fragmentation- through the application of indigenous knowledge and modern design, thus providing social co-benefits (Petrasova, et al, 2019). Land ownership dispute, poor governance and maintenance are some of the constraints of riverfront restoration. It is observed that the lack of cohesiveness in institutions, as well as ineffective land use regulations, contribute to the negative encroachment in rivers of Dhaka, making it difficult to manage the ecological condition in the long-term (Alam and Rabbani, 2007; Dewan, 2013; Hossain, 2020). Spatially, it is observed that, with the restoration of river access, new community interaction, economic activity, as well as increased safety, can be spurred, provided, of course, that designs are inclusive and attentive to vulnerable populations (women, children, the elderly, informal workers) (Degen and Rose, 2023). The wise calibration of the pedestrian walkways, active edges and green pockets provides walkability and informal surveillance. The combination of demonstration-by-research methodology, which integrates participatory observation, and programmatic flexibility is essential to scalability and context sensitivity of replication in other river fronts in Dhaka and other similarly fast urban growing cities (Petrasova, et al, 2019). Adaptive governance, streamlined land regularization and community management should be incorporated in policy structures in order to be successful.

## **10. CONCLUSION**

The turnaround of the Turag River corridor in north-eastern Dhaka is a good example of a paradigm shift on city riverfront regeneration. Our design studies affirm that nature-based solutions based on participatory and context-based models can re-establish lost river-community relationships, increase urban resiliency to climate and produce ecological health, social inclusion, and urban vitality benefits. The major findings of the study are: Ecological restoration of the riverine environment should also be inalienable with the re-connection of the community, which is possible through the accessible, safe, and continuous walkways, eco-markets, as well as integrative green pockets. Flood resilience, local food security and dynamism of urban social life can be achieved through retrofitting encroached floodplains as productive, flexible, seasonal community spaces. NbS-based strategies rely on effective governance, continuous maintenance and significant integration of the various local stakeholders in all of the phases of their conception to stewardship. The process of replicability depends on the close documentation of design standards, participatory tools, etc. and policy-institutional congruence, so that lessons can be generalized among the numerous riverbanks that are degraded in Dhaka. The trend in the world to ecological urbanism and comprehensive waterfront is on the increase. to urban deltas and megalopolises of the world (Mostafavi and Doherty, 2010). The Turag River design study is a part of this story, offering a prototype of the climate resilience, integration of nature and humanity, and fair and sustainable city futures.

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## **DECLARATION OF USE OF AI**

The study, field observation, interviews, data analysis, interpretation of results, documentation, research design, conclusion and figures included (with sources mentioned) all are genuine, produced and conducted by the authors. Use of Microsoft Copilot AI was done structuring the final manuscript, verifying references and paraphrasing in few sections which were thoroughly reviewed, edited and verified after multiple reviews by the authors to ensure accuracy and authenticity.

AI tools that has been used: Microsoft Copilot.

Purpose of using AI tool: AI was used for generating initial draft text (which were edited later), grammar checking, referencing and paraphrasing.

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