Typo-morphological Analysis of Urban Settings Developed Alongside Malnichhara: Sylhet as a Case Example

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ABSTRACT

One of Sylhet city's most notable topographical features is its chharas, or streams, which are intricately woven into the city's urban fabric. These chharas generally begin in the hillock areas on the outskirts of this city, travel through the city's urban framework, and eventually join the Surma river. One of the prominent chhara in the city that exhibits a distinct environment within the urban fabric is Malnichhara. For instance, it is the landmark itself in some places and concealed inside the urban fabric in others. As a naturally occurring blue network, chhara is being given particular consideration when it comes to city development in the near future, and it is being considered to capitalize on it. For this reason, the morphological analysis of urban settings interwoven with chhara is necessary. Such analysis will indicate to us what characters or factors have impacted chhara to emerge as a prominent visible form component in different places and have enabled it to house public functions depending on it. As a methodology in this article, the obtained map and literature have been used to analyze the typo-morphology of urban settings. The typo-morphological analysis developed here would help making decisions regarding blue network rich city planning or relevant issues.

Keywords: Typo-morphological Analysis, Sylhet city, Malnichhara, Blue Network, Morphological Evolution of Form Components.

INTRODUCTION

The ongoing interplay between human actions and natural landscapes shapes urban form. Rivers, canals, and streams are examples of water features that have historically shaped settlement patterns and impacted the urban growth morphology in many South Asian cities (Conzen, 1960; Moudon, 1997). The water phenomenon is physically necessary for human settlements on our Bengal delta. The morphology of urban forms and even building types are shaped by this mutual dependency. Sylhet city vividly illustrates this relationship through its network of chharas—perennial streams that traverse its undulating topography. These chharas, which emerge from the nearby hillocks and drain into the Surma River, serve as both geographical factors of urban development and ecological corridors (Brammer, 1996). The typo-morphological investigation of the communities surrounding Malnichhara ("Chhara" is the local word for a water stream) in Sylhet city, in the northeastern part of Bangladesh, will be the focus of this research project. Malnichhara is the most prominent of the thirteen major chhara that are woven throughout the city.

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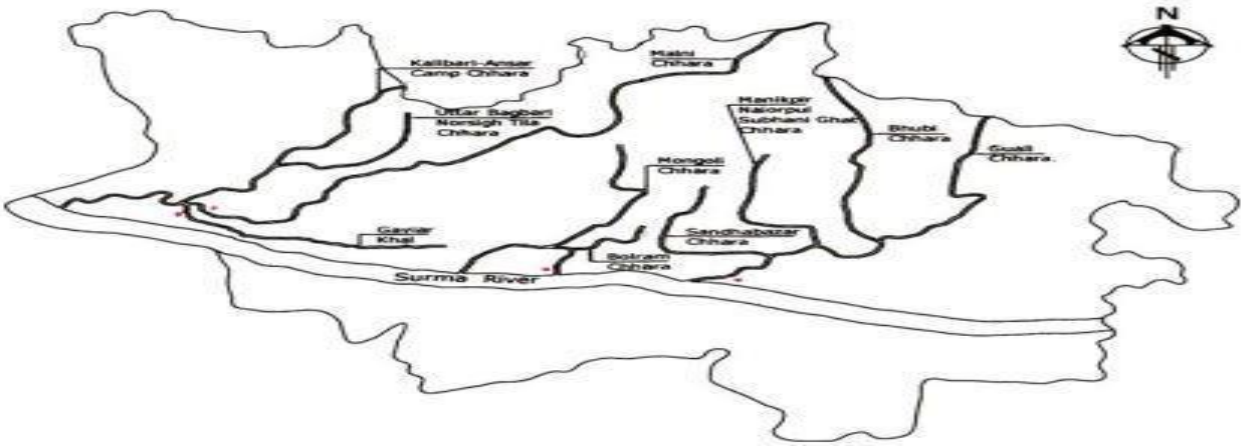

Figure 1: Chharas running throughout Sylhet city, Source: Rahman et al., 2007

Malnichara originates from Malnichara tea garden, then flows toward the Airport-road and enters the city at Choukidekhi. Then it passes several residential areas such as Badambagicha, Elaskandi, Housing Estate, Jalalabad Residential Area and crosses the Sunamganj road at Dorshon Dewri. Then the chhara flows over the Zarnar Par and crosses the Subidbazar-Mirer Moidan. The chhara joins the Surma River behind the Tapoban Residential Area after passing over Bagbari and Kanishail. In this journey, in some places the chhara is quite hidden in the urban fabric and in some places, it comes out as a prominent component, runs parallel with the public road, making it familiar for it's spatial quality. Again, in some cases this chhara is just a mere drainage in the backwards of any residential area.

Typo-morphological analysis provides a rigorous methodological framework for interpreting this relationship in urban setting. Typo-morphology was first introduced by Conzen (1960) and then developed by Caniggia and Maffei (2001). It studies how urban form has changed over time through morphological continuity and typological metamorphosis. It investigates how spatial structures such as plots, buildings, and street networks—adapt over time in response to environmental, socio-economic, and cultural factors (Whitehand, 2001; Oliveira, 2016). It is a framework for understanding city morphology. It makes use of categories and variations to describe the physical development, variety, and shape of urban environments. By identifying and systematizing their characteristics, the goal of typological analysis as a classification procedure is to distinguish the traits, variations, connections to the urban environment, historical time, and social structure that gave them existence. This permits us to develop a typological framework that facilitates visualizing the various aspects of the city better.

To analyze the morphology of a city, it requires finding out the form components of its urban environment. Urban form generally encompasses several physical features and non-physical characteristics. It includes size, shape, scale, density, land uses, building types, urban block layout and distribution of green space. For some cities, the blue network is a prominent component that is interwoven with the urban fabric of the city. It emphasizes the urban fabric in many ways and also gets affected itself and creates a new juxtaposition. Which is the case of Sylhet city with it's chharas. This kind of blue networks have drawn a lot of attention in modern urbanism as being essential to resilient and sustainable city planning. Planning and design methods centred on water highlight the systems' ecological, social, and aesthetic roles (Fratini et al., 2012; Steiner, 2011). Reviving Sylhet city's distinctive geographical feature is currently a priority for responsible authorities. Measures are being conducted to revitalize its natural blue networks. Chharas are regarded as a significant type of urban fabric element for the city of the future. The problem of encroaching the land of chhara is another issue that law enforcement is addressing.

In order to analyze the morphological features of urban environments created along a natural blue network, this paper analyzes the Malnichhara stream as a case study. The study finds typological variances and spatial adaptations along several stream segments using cartographic interpretation and literature-based analysis. The results are intended to support more general conversations about resilient landscape design and blue-network-based city planning in Bangladesh and throughout South Asia.

Background Of the Study

Sylhet's urban form is deeply influenced by its network of chharas—hill-fed streams that thread through the city before joining the Surma River. Among them, Malnichhara alternates between being a visible public edge and a hidden, drainage-like back-of-plot corridor, reflecting contrasting relationships between water and adjacent land uses. Rapid urbanization, encroachment, and enclosure by boundary walls have fragmented these blue networks, reducing accessibility and ecological quality while exacerbating waterlogging. A typo-morphological lens—examining plot orientation, street alignment, setbacks, and land-use interfaces—can clarify how institutional/public edges with frontage and visibility support livelier, better-stewarded waterways compared to enclosed residential edges. Establishing this morphological baseline is essential for planning strategies that restore visibility and access, guide edge design (e.g., walkways and setbacks), and integrate blue-green infrastructure into Sylhet's everyday urban life.

Objectives Of the Study

The objective of this research is to examine the relationship between Malnichhara and its surrounding urban fabric through a typo-morphological analysis. It focuses on identifying how different areas of Sylhet city adjoining the stream have developed distinct spatial patterns and edge conditions. By critically observing the development trends along this active blue network, the study aims to uncover the spatial, social, and ecological implications of these variations and to generate insights that can inform future planning and revitalization strategies.

Specific Aims and Hypothesis

The specific aim of the study is to reveal the factors responsible for the differing contexts of Malnichhara—sometimes emerging as a prominent, accessible urban feature, and at other times being reduced to a hidden drainage channel. The underlying hypothesis is that urban edges with higher visual and physical accessibility, particularly where institutional or public uses are located, foster livelier, healthier, and more resilient relationships with the stream. In contrast, purely residential edges with limited access and back-facing plots tend to degrade the chhara into a polluted and marginalized corridor.

METHODOLOGY

In order to better comprehend the work and techniques, a literature review was conducted for background research and conceptual development. This was accomplished in large part by reading various books, study reports, journals, and other materials. A qualitative method for assessing the urban fabric using the typo-morphological approach in the chosen locations would highlight the concepts that need to be developed and provide an example of a standard that can represent the situation. Apart from these, the methodological framework is demonstrated below:

a) The study related information of the urban context was collected from secondary sources that provide a distinct idea on this study.
b) To carry out the typo-morphological analysis, 3 zones with visibly different characters were taken beside the Malnichhara within the Sylhet city. Zone 1: Jalalabad Residential Area, Zone 2: Sagor Dighir Par, Subidbazar, Zone 3: Topoban Residential Area.
c) Figure Ground Map study and mapping assessment are done to explore the interplay between the chhara and other form components.
d) Structured a comparative table to make a visible comparison between different areas regarding the reasons for having different contextures.

Study Variables

The study focuses on the relationship between Malnichhara and its surrounding urban fabric through a typo-morphological lens. The dependent variables are the condition of the chhara edges, expressed in terms of liveliness, degree of accessibility, extent of encroachment, and overall environmental quality. The independent variables include adjacent land use (residential, institutional, or public), street alignment relative to the chhara,

building orientation, and plot setbacks. Covariates such as socio-economic characteristics of surrounding communities, presence of regulatory enforcement, and recent public realm interventions (e.g., walkways, vegetation, seating areas) were also considered in interpreting the results.

Statistical Analysis

The study primarily adopts a qualitative comparative analysis (QCA) of three zones adjacent to Malnichhara. This involved figure–ground mapping, spatial observation, and comparative discussion to identify morphological differences across contexts. Descriptive statistics were used to summarize patterns of accessibility, land use, and encroachment. Maps were prepared using data obtained from Google Maps and Google Earth, complemented by field observations for on-site verification and spatial analysis. No advanced inferential statistical methods were required, as the study is exploratory and qualitative in nature.

Ethical Approval

This research did not involve human participants or animal subjects. All data were derived from secondary sources, maps, and field observations of the built environment. Therefore, ethical approval was not applicable

to this study.

RESULTS

Malnichhara traverses Sylhet from the Malnichhara Tea Garden, crossing Airport Road near Choukidekhi, then passing Badambagicha, Elaskandi, West Pir Mohalla, Housing Estate, Jalalabad Residential Area, and Dorshon Dewri before joining the Surma River at Topoban. Three zones with distinct edge conditions were selected for analysis.

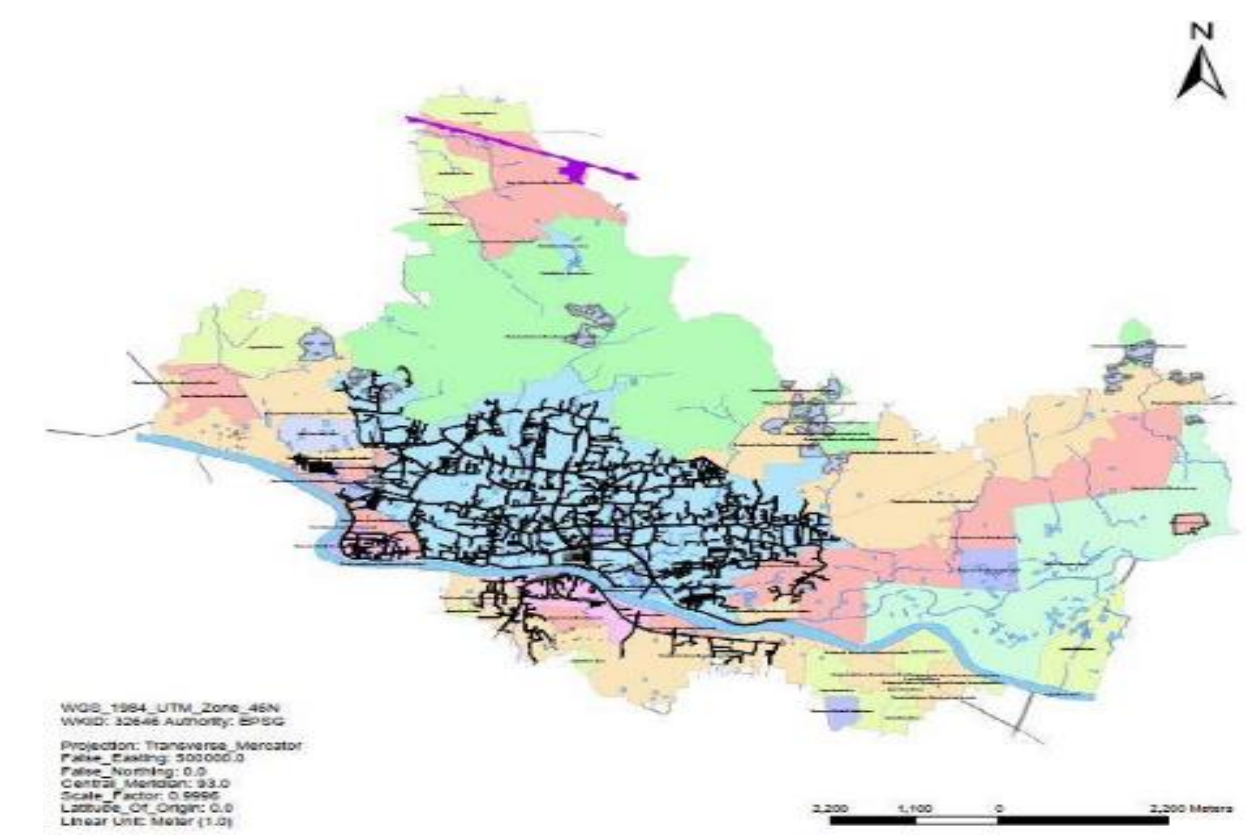

Figure 2: Sylhet City map, Source: Urban Development Directorate, Sylhet

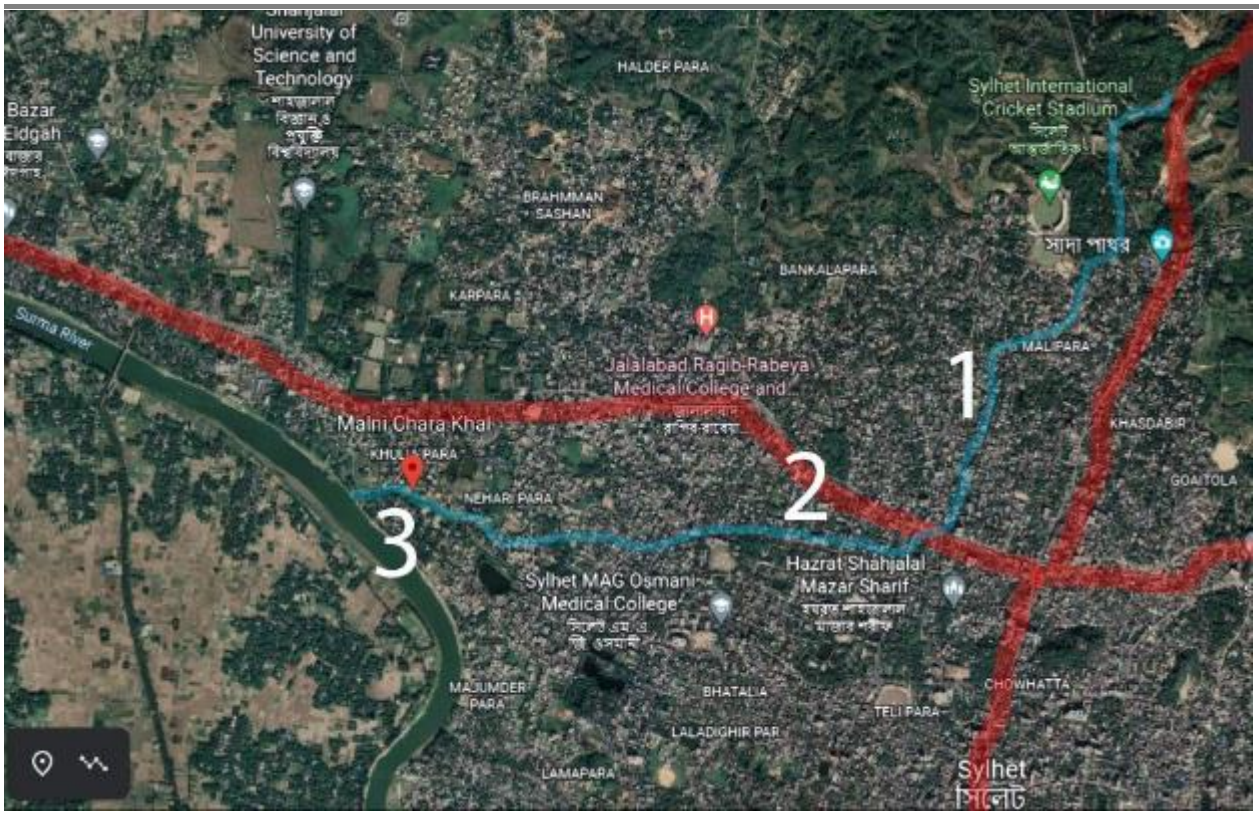

Figure 1: Major Road Axis of Sylhet City (red marked), Malnichhara (blue marked) running across the city joining Surma river, Zone 1: Jalalabad Residential Area, Zone 2: Sagor Dighir Par, Subidbazar, Zone 3: Topoban Residential Area. Map Source: Google Earth

Zone 1: Jalalabad Residential Area

In Amborkhana, the chhara runs east of Jalalabad Residential Area and west of Housing Estate. Although a perpendicular street from Darshan Deuri runs for some distance roughly parallel to Malnichhara, a strip of land remains between street and stream; local streets toward the chhara end as dead-ends. Physical and visual access are limited by boundary walls; most plots back onto the chhara with few openings. Encroachment and the use of the stream as drainage (household sewer connections and dumping) are common, producing a polluted, malodorous canal and discouraging any frontage development. Oversight is comparatively low due to the residential land use, making design intervention difficult.

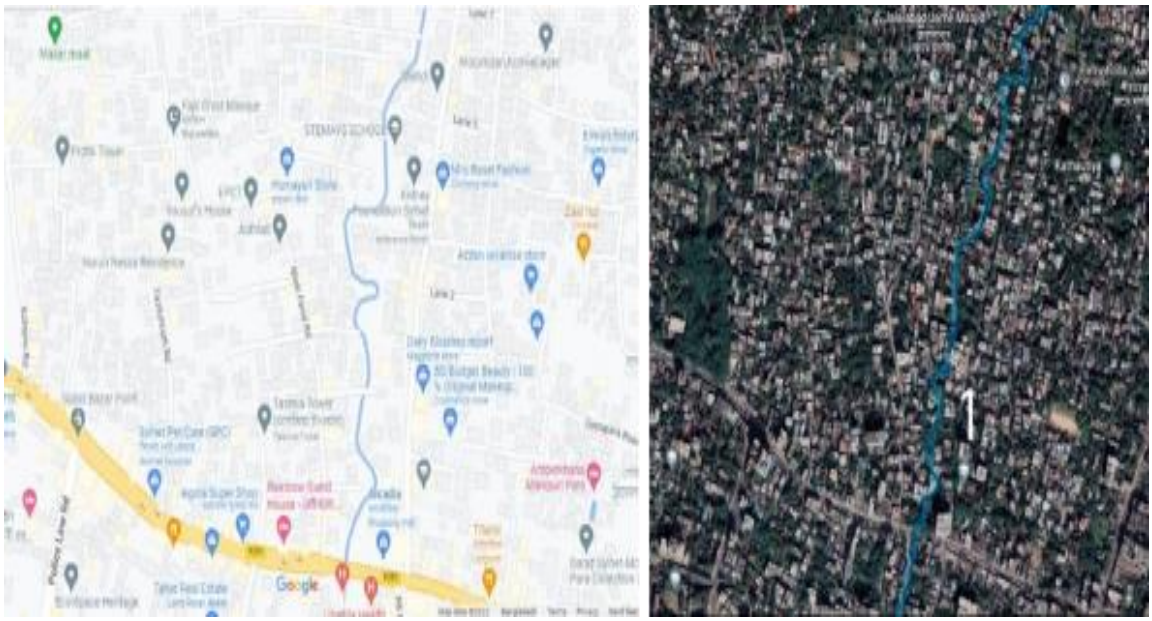

Figure 2: Jalalabad Residential Area, Map Source: Google Maps & Google Earth

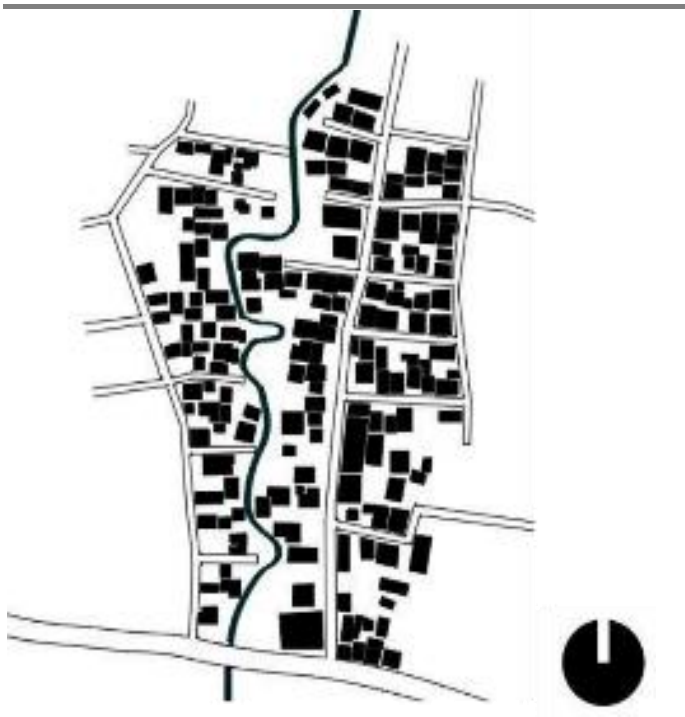

Figure 5: Zone 1: Figure ground map of Zone 01: Jalalabad Residential Area, Base Map Source: Google Map

Zone 2: Sagor Dighir Par, Subidbazar

An east–west road runs directly beside the chhara here. The north side is predominantly residential with limited roadside commercial activity, while the south side hosts institutions (e.g., Blue Bird School, Sylhet Nursing College) and other public functions (mosque, Monipuri crematorium and Cultural Centre). Despite several plots backing the chhara, generous setbacks and openings toward the water makes it visible from the road. The corridor is visually and physically accessible across many points. Development of slums, land encroachment and waste disposal were not observed. Here setbacks allow natural vegetation to persist; a recently built chhara-side walkway and seating parallel to the road has activated daily use (walks, meetups). **Here nearby households seem orienting their building fronts and verandas toward the stream.**

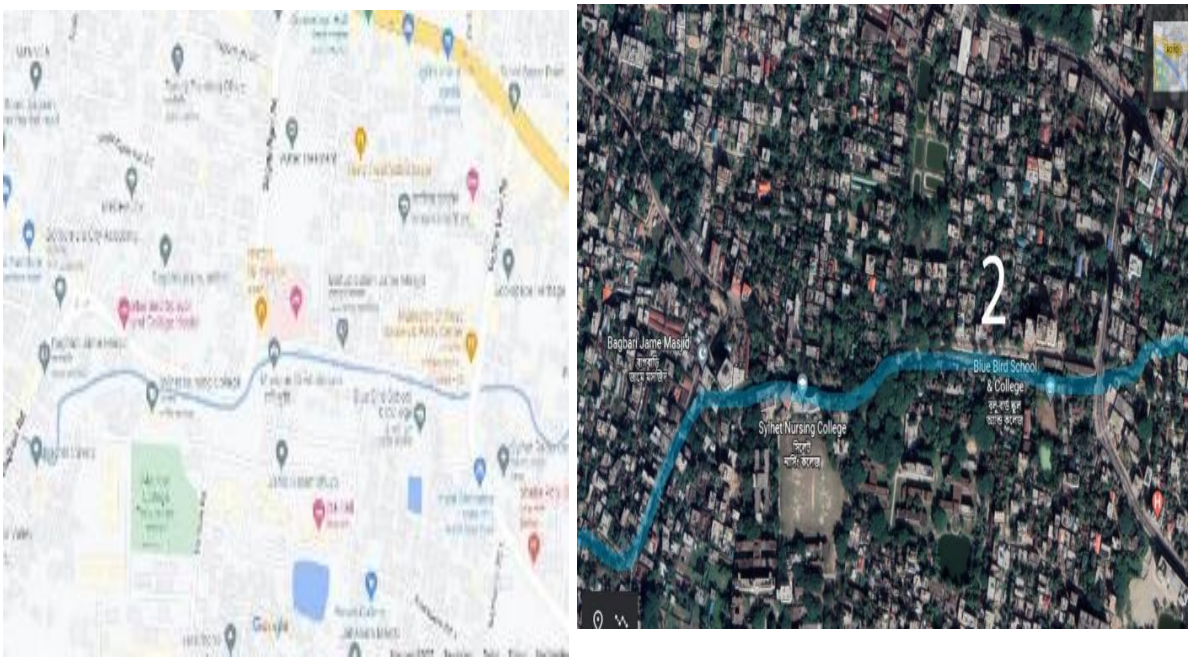

Figure 6: Zone 2: Sagor Dighir Par, Subid Bazar, Map Source: Google Map & Google Earth

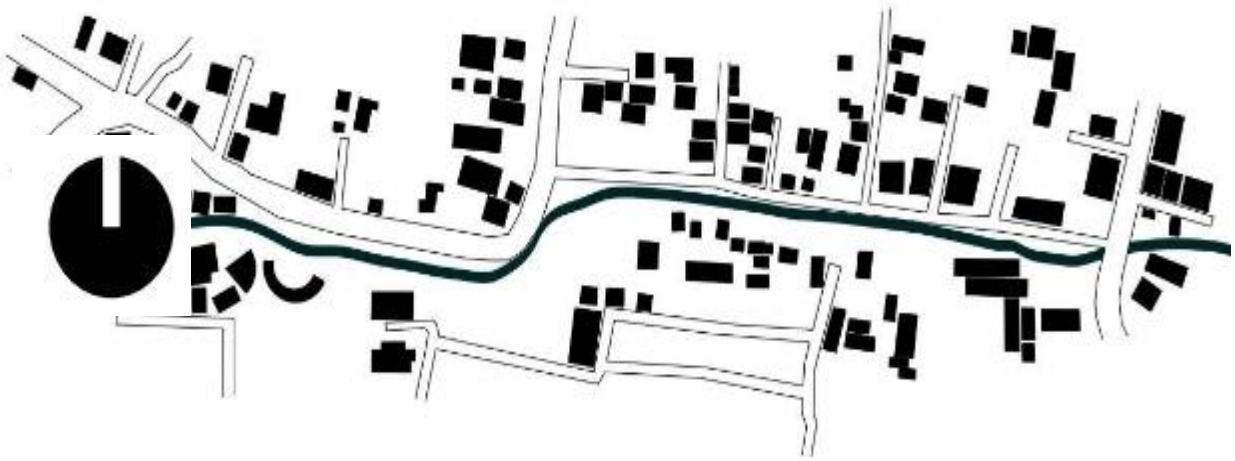

Figure 3: Figure ground map of Zone 2: Sagor Dighir Par area, Base map Source: Google Map

ZONe 3: Topoban & Surma Residential Area

Near the city's periphery, Malnichhara meets the Surma River. The area is visually open and physically accessible; residents south of the chhara cross here to reach the Topoban road as a shortcut, enlivening the boat-ghat and improving natural surveillance. Older residents use the chhara-side space for walking/exercise; children and youth use adjoining green areas as playfields. Accessibility and everyday activity correlate with lower encroachment and an overall healthier edge condition, creating opportunities for further water–urban realm interventions.

Synthesis across zones. Edge behavior varies systematically with land use, street alignment, accessibility, and plot orientation: residential back-of-plot edges with low visibility (Zone 1) exhibit drainage-like conditions and encroachment; institutional/public edges with setbacks and a parallel street/walkway (Zone 2) remain active and stewarded; and open, traversed recreational edges (Zone 3) show low encroachment and higher perceived security.

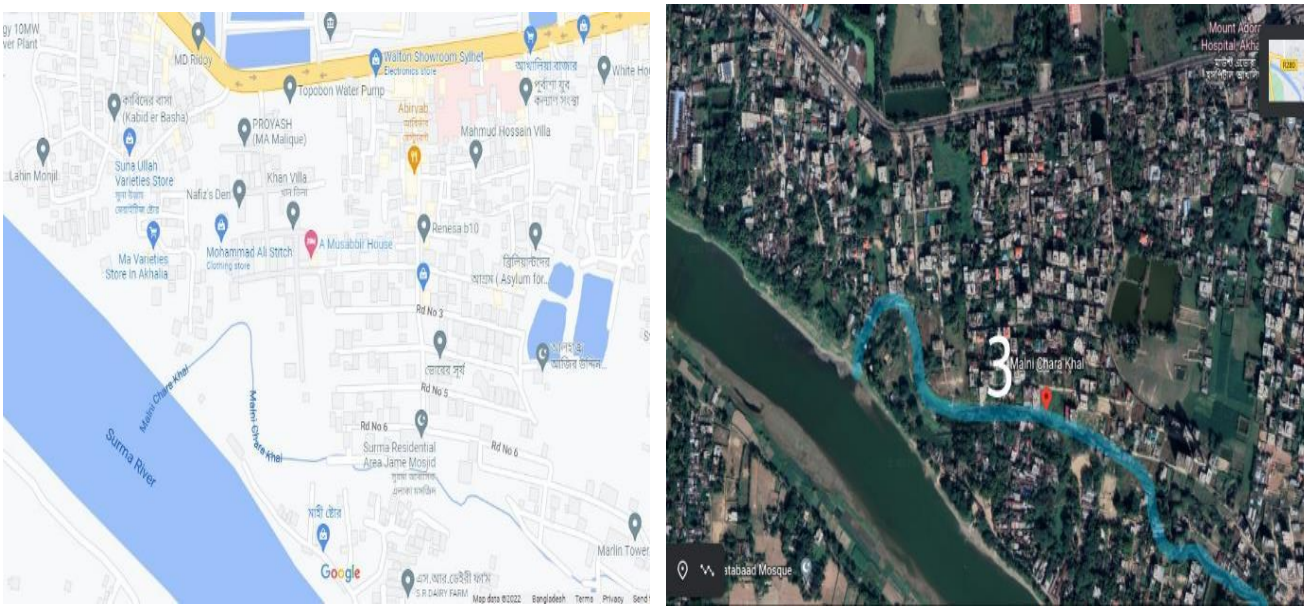

Figure 4: Zone 3: Topoban & Surma Residential Area, Map Source: Google Maps & Google Earth

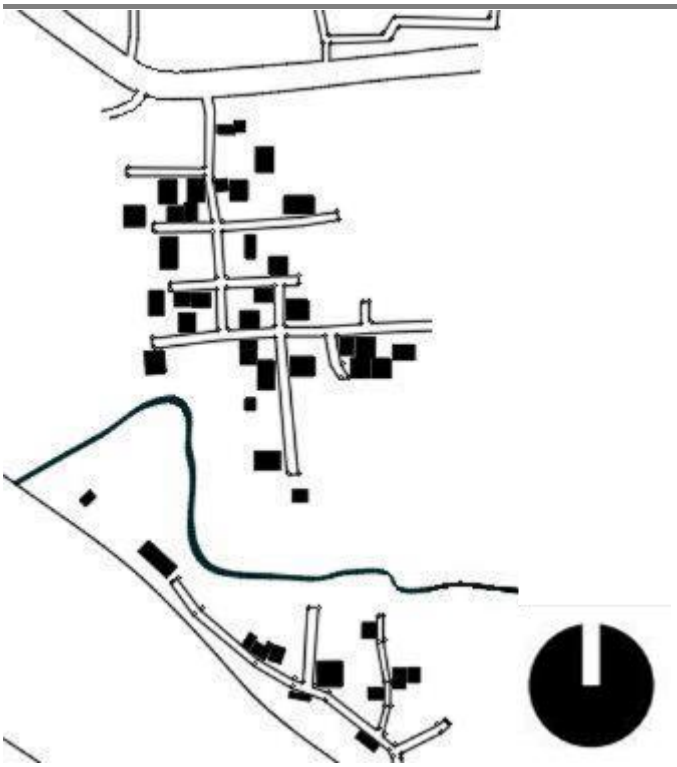

Figure 5: Figure ground map of Zone 3: Topoban Residential Area, Base map Source: Google Map

DISCUSSION

This study shows that Malnichhara's edge conditions are not uniform and they co-vary with adjacent land use, visibility and access. Where residential plots back onto the stream and are screened by boundary walls, the chhara is treated as hidden drainage with sewer outfalls, waste disposal and encroachment. These conditions suppress frontage development and make subsequent design intervention difficult. In contrast, edges that maintain setbacks, openings and a parallel public way remain visually and physically accessible. These edges exhibit everyday use, natural vegetation and neighborhood stewardship which together deter dumping and squatting.

The role of street parallelism and public frontage is particularly evident at Sagor Dighir Par where an east–west road runs alongside the chhara and institutions line the opposite bank. Even when buildings back the water, consistent setbacks and openings preserve visual ties to the corridor, enabling oversight and ancillary uses at the rear without compromising privacy. The recently added riverside walkway and seating amplify routine presence, which together with vegetation allowed by the setbacks correlates with lower encroachment and cleaner conditions.

At Topoban, permeable access and everyday crossing through the boat-ghat sustain an active edge where elders exercise and children play in the adjoining green. This open and traversed condition improves natural surveillance and helps stabilize the corridor, again aligning visibility and access with better environmental performance and perceived security.

Taken together, the zone patterns support the working hypothesis that edges with higher visual and physical accessibility often coincident with institutional or public frontages or parallel streets tend to be livelier, better stewarded and ecologically healthier than enclosed residential backs. Residential back-of-plot configurations concentrate outfalls and walls, mask the water, and make encroachment and pollution more likely. Publicly legible edges invert that logic by inviting movement, contact and soft landscape which in turn discourage misuse.

Implications for planning and design follow directly from these mechanisms. First, maintain or create continuous public edges along priority reaches, with clear sightlines, modest setbacks and coded rear or front interfaces so that buildings can open toward the water without privacy compromise. Second, treat the corridor

as blue-green infrastructure pairing hydrologic controls with small-scale public realm elements such as seating, shade and vegetation that support everyday presence and stewardship. These directions resonate with water-sensitive urban design approaches which integrate water movement into the built environment to improve livability. Third, enforcement and servicing matter. Restrict direct sewer connections, regularize solid-waste management and address boundary encroachments particularly in back-facing residential stretches identified in Zone 1.

Finally, this is an exploratory, qualitative comparative analysis across three zones. Expanding the sample and adding quantitative measures such as audited access points, encroachment counts, vegetation cover and water-quality proxies would strengthen causal claims. A finer-grain longitudinal study, before and after walkway installation or across seasonal flows, could test how specific interventions shift edge behavior over time. Nonetheless, the present morphology-to-behavior links offer a practical baseline for prioritizing segments where visibility, access and public-edge continuity can yield the largest returns in Sylhet's blue-network revitalization.

CONCLUSION

Water occurrences have historically been a physical necessity for human settlements in our Bengal delta. This interdependency affects the morphology of building types as well as urban patterns. The same is true of Sylhet, a mountainous city in Bangladesh's northeast territory. A typo-morphological study of the urban fabrics in the vicinity of Malnichhara reveals distinct relationships between the architectural forms and water channels. Their interactions have a big influence on the traits, look, and future growth of the urban fabric. The goal of modern urban planning and development methods is to make the most of urban water bodies. Here, a thorough examination and analysis of typo-morphology is crucial.

One of the main issues with the urban growth on the chhara-side is the land use pattern. Residential development typically increases the likelihood of land invasion. Physical accessibility is hampered as a consequence. In severe situations, chhara becomes totally obscured by urban fabric and is no longer visible. Consequently, this natural water route is regularly abused. Chhara becomes contaminated as a result, surpassing any process of renewal. On the other hand, it makes room for the water channel's active existence if the next land has institutions or other public uses. It eventually promotes the development of other public functions. Depending on or in addition to chhara, participation and engagement provide opportunities for continued growth and renewal. Movement next to the chhara is activated by street-like functions. By preventing encroachment-like activities, it thereby increases the security for maintaining the chhara's existence. These types of water conduits inherently serve the public interest or involve huge numbers of people. They profit from relying on these blue, natural infrastructures as well. Their interactions have a significant impact on the urban fabric. Analyzing these urban fabrics can also reveal their underlying narratives, personalities, and connections.

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Conflicts Of Interest

The authors declare that they have no conflicts of interest related to this research.

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