



URBANIZATION TREND AND THE SOCIO-SPATIAL TRANSFORMATION OF PERI-URBAN KHULNA, BANGLADESH

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Abstract

Urbanization in the Global South has been primarily focused on achieving rapid economic growth. However, this trend has raised concerns about the impact it may have on the transformation of local spatial morphology and socio-economic functioning, especially in peri-urban areas. Despite previous efforts to explain the structure of peri-urban regions, using conceptual frameworks such as Desakota and urban fringe, there still exists a lack of understanding regarding how the morphological structure of these areas have developed responding to contextual challenges, and whether the current infrastructure-based planning interventions aimed at promoting growth may create a spatially unjust city. To address this gap, this research employed a qualitative approach to examine the effects of infrastructure-centric planning on peri-urban areas in Bangladesh, using Khulna as a case study. The research findings reveal that peri-urban areas have played a significant role in the development of a dynamic socio-spatial relationship, providing migrants with economic opportunities to use their previous skillsets for survival. Despite this, the rapid urbanization trend is causing dynamic land-labor relationships in peri-urban regions to become more rigid, which is hindering the adaptive capacity of the peri-urban landscape. To maintain Khulna's pro-migrant character and inherent adaptive capacity, the study suggests that the previous morphological pattern of the peri-urban landscape needs to be integrated into mainstream planning. Even though this landscape may seem disorganized and chaotic, it should not be dismissed as it conflicts with modern planning approaches that prioritize strict orderliness. Instead, by embracing this approach, the city can ensure that its growth trajectory is both financially feasible and equitable, while being economically sustainable on a regional level.

Keywords: Urban transformation, Peri-urban morphology, Khulna, Infrastructure-centric development, Global South

Introduction

In the past three decades, urbanization in the Global South has changed more quickly than in other regions of the world. Current estimates suggest that by 2050, cities in the Global South, particularly those in East Asia, South Asia, and Africa, may house 96% of the additional urban population, which is over three billion people (Lancet, 2017; Onodugo and Ezeadichie, 2020; UN-Habitat, 2020) and a majority of them will have to depend on peri-urban areas for survival. Urbanization's focus has thus recently shifted from the Global North to the Global South (Parnell & Robinson, 2012), particularly towards its peri-urban zones due to the associated challenges in planning (Roy, 2009). Generally, the process of urbanization beyond the urban administrative boundary is understood as Peri-urbanization. Many earlier studies have criticized the use of a binary difference between urban and rural areas because they did not adequately describe the peri-urban zones around cities. Peri-urban areas, which are located on the outskirts of cities, are significant due to their high human population density and the presence of vulnerable groups with high rates of poverty (Hutchings et al., 2022). Such areas are being transformed from rural to urban encouraging economic growth through the specialization of labor and growth of non-agricultural sectors. In the Global South, peri-urban regions serve as 'multi-functional territories' (Hossain & Rahman, 2021) and also termed as 'transitional spaces' between the urban core and the nearby rural landscapes, where new actors and activities are

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frequently accommodated. Consequently, socio-spatial and socio-economic activities have emerged spontaneously (Follmann, 2022), creating unique relationships between land and labor. However, some scholars consider this type of spontaneous urban growth as problematic for the cities of the Global South due to their piecemeal developmental nature in terms of space, society and economy (Follmann, 2022). Ranganathan and Balazs (2015) criticized peri-urbanization by linking such processes as illegal, haphazard, and unplanned urban growth. While other scholars positively argued for peri-urbanization as they found peri-urban regions supporting the entrepreneurs living in the margin by creating new market opportunities whereas urban core economically supports only an exclusive economic class (Chen, Zhang, Liu & Zhang, 2014). Yet, the widely used urbanization and planning theories developed in the Global North often fail to comprehend the changing characteristics of the distinct and dynamic peri-urban morphology in the Global South (Roy, 2009).

This research intends to contribute to that scholarly gap, by examining how Bangladesh's present boom in infrastructure-centric development has been affecting the socio-spatial dynamics of the peri-urban regions of its key cities. It explores Khulna as a case study since it plays a significant role for maintaining sustainability in the coastal region of Bangladesh. Khulna is the third-largest city in Bangladesh and is a developing metropolis (Alam et al., 2023). According to recent academic studies, 91% of Khulna's urban landscape has naturally developed through organic processes and is adaptable to morphological and social change (Sowgat & Roy, 2020). The peri-urban areas surrounding the city possess distinct morphological characteristics that have enabled them to effectively accommodate migrants over time (Sowgat, Wang & McWilliams, 2017; Alam & Miller, 2019; Alam et al., 2020). A thorough examination of the spatial attributes of peri-urban morphology allows us to gain insight into its adaptive qualities and how they have been impacted by recent infrastructure-focused planning efforts, which have unfortunately undermined the city's pro-migrant character and the socio-economic cohesions that have been cultivated over the years.

Theoretical discussion: Peri-urbanization in the Global South

During the 1980s, most countries of the Global South centralized their economic and administrative services within the boundary of cities (Barbosa, 2022). Cities have become the hubs of economic growth, attracting rural migration. Due to their low income and high urban land prices, the migrants usually settle informally in the emerging regions on the outskirts of cities (Ávila Sánchez, 2001; Arabindoo, 2009; Mansilla, 2018). Scholars define such type of urbanization as Peri-urbanization (Ravetz et al., 2013).

Follmann (2022) explains peri-urbanization as the process by which rural communities on the outskirts of large cities gradually urbanize, usually in a piecemeal way. These peri-urban regions are mostly transformed from rural to urban relying on the surrounding resources and contain a mosaic-like mix of rural and urban land uses, livelihoods, and lifestyles (Follmann 2022). Such areas actively contribute to economic growth, rapid urbanization and population increase, and remain under extraordinarily intricate global pressure (Aguilar et al., 2022; Woltjer, 2014). In several studies, it is already documented that, the socio-political and socio-cultural aspects have had a significant impact on the peri-urbanization process in the Global South. In such regions of the world, peri-urbanization is typically linked to illegal, haphazard, and unplanned process of urban growth. It is anticipated that such areas will gradually become more urban in a "piecemeal fashion" through re-transforming by neoliberal and other global imperatives (Ranganathan & Balazs, 2015). These regions require significant resources and thus creates multiple socio-spatial and socio-ecological conflicts due to competing claims for the same resources (Allen, 2014; Dupont, 2007). Therefore, the people living here are highly vulnerable to various economic risks (Ravetz et al., 2012).

Follmann (2022) identified three fundamental components of such peri-urban regions of the Global South, namely territorial, functional and transitional where the term "territorial" refers to territorial demarcation, "functional" refers to interactions between various systems and "transitional" refers to socio-temporal shifts (Barbosa, 2022). On the other hand, Inostroza et al. (2013), Edwards (1991), and Luisa Maffini & Maraschin (2018), respectively, emphasized urban sprawl, urban fragmentation, and social segregation as the main causes leading to the growth of such peri-urban areas. Furthermore, rather than focusing on the spatial characteristics of dense centers and low-density outer peripheries, several studies have highlighted a functional approach that emphasizes the relevance of mobility flows for the analysis of connectedness and numerous ecosystem services (Barbosa, 2022).

Marshall & Dolley (2019) argue that the peri-urban morphology is frequently demarcated by the neoliberal space reorganization due to the co-opted environmental concerns of the powerful urban elites and a wide range of complex feedbacks are produced as a result of shifting land use, resource extraction, pollution, and livelihood shifts.

In Latin America during the 1980s, the political, economic, and social transformations had a profound impact on urban peripheries. Inostroza (2017) spatially characterized the urban peripheries of the Global South examining three Latin American cities: Bogota, Lima, and Santiago de Chile. She observed certain physical characteristics of peri-urban growth that frequently integrate with urban cores and have emerged through informal processes. The creation of peri-urban regions and their spatial patterns thus became the result of socio-territorial and environmental fragmentation. However, the processes cannot be explained by globalization but rather by the concentration of property rights and the appropriation of land (Lukas et al., 2020). While evaluating the peri-urban transformations in the case studies of the province of Chacabuco, north of Santiago de Chile, Lukas et al. (2020) also observed that territorial changes are due to the development of urban mega-projects for affluent social segments. Fadda and Jirón (2002) explained such peripheral developments as the result of poor urban planning which place additional burdens on local governments. Isunza Vizuet and Méndez Bahena (2011) investigated socioeconomic and spatial dynamics of low-income peripheral urbanizations in Mexico City and found property rezoning by local governments as the main factor promoting peri-urbanization. Using Landsat imagery of Mexico City's northern outskirts from 2000 to 2014, De la Luz Hernández-Flores et al. (2017) determined the factors such as population increase, migration, employment in the low-profile economic sectors, distance from urban centers and road networks as the main drivers of peri-urbanization. Marques da Costa and Antonello (2021) established a connection between peri-urban expansion and the residential segregation processes identified in municipal-level urban planning instruments.

According to Tellez's (2018) research on Bogota's urban expansion, the city's peri-urban areas have expanded due to the transportation system's requirement for lengthy commutes. In the Colombian district of Llano, Romero Novoa (2022)'s research reveals that the sector's social integration or dispersion is related to the expansion and fragmentation surrounding the road's development in the peri-urban areas. Brites (2016) investigated the recent changes resulting from Yacretá hydropower facility on the Paraná River, Paraguay and found the emergence of a new urban formation and the dispersion of the metropolis as the cause of expulsion the poor people to the urban peripheries.

The above studies, however, cannot adequately reflect the spatial structures and economic processes associated with peri-urbanization in the cities of South Asia. Among the very little research conducted, Lin (2001) tried to identify vital spatial attributes of Asian peri-urbanization. He used the term "Desakota" to explain the peri-urban spatial morphology of cities in Asia. Although, the term "Desakota," was initially coined by McGee (1991) to describe the confusing rural-urban spatial formations in Asia, developed in contrast to the rural-urban dichotomy utilized in classic urban models. Desakotas have been understood as densely populated rural regions with a mix of industries and agricultural pursuits. These spatial patterns are frequently encountered between large cities and near significant road networks. Desakotas' economic transition from traditional agriculture to locally scaled industrial activity was inferred a consequence of urbanization. McGee (1991) explains the characteristics of Desakota in three different categories. The first characterizes Desakota as an area with declining rural settlement, changing patterns of land use, and a reduction in the population dependent on agriculture. The second has been explained as secular transitions from agriculture to non-agricultural activities, but these are concentrated mainly in the urban centers and surrounding areas. Household income, better transit connections, and enhanced infrastructure are all related to these developments. Instances of this kind include cities like Calcutta, India and Java, Indonesia. Finally, high-density areas with poor economic growth are those classified as the third type. The population growth in these areas is usually rapid, with surplus labor, and enduringly poor productivity in low-income agriculture and non-agriculture. Examples of these sorts intend to explain the morphological characteristics of the cities of Bangladesh and the southern regions of India.

Notably, the above studies provide a fixed template for understanding the morphological features of the peri-urban areas in Bangladesh, yet these can hardly comprehend the changing developing conditions experienced by many cities in Bangladesh. These also can hardly capture how recent planning trend is informing and shaping the morphological characteristics. The country has been undergoing extensive infrastructure investment since 2008.

Very little scholarly researches have been done so far to corroborate and delineate the morphological features of peri-urban areas. In Sacaba, Bolivia, Ledo Espinoza (2021) investigated the challenges that peri-urban areas faced as a response to urban growth plans. The results argued for the necessity of formal acknowledgement and mainstreaming of peri-urban settlement –which conventional urban planners often failed to take into serious account. Finding effective and contextual strategies in land use planning is vital for sustainable and inclusive future of the cities (Follmann et al., 2022). Due to the research gap, the majority of settlements within the peripheries are left to be disposed of being informal, and that may cause significant social segregation and socioeconomic inequality. Moreover, the existing planning policies merely work as a regulatory apparatus for forcefully displacing low-income inhabitants to elsewhere (De Sousa, 2010).

Methodology

The study is exploratory by nature and has assumed a qualitative research approach using ethnography in the investigation process. The paper makes use of the urban tissue study as a practical analytic framework for morphological analysis to identify and describe the urbanization trend in peri-urban areas (N'mah & Priyoga, 2022). In the study of urban morphology, urban tissue refers to a coherent morphology and function (Oliveira, 2021). It is the smallest unit of the urban landscape, which includes both natural and man-made elements.

Three representative urban tissues were selected from the southern part of the urban periphery in Khulna on the basis of varied socio-economic activities (Figure 1). The selected tissues were located adjacent to *Nirala Abashik*¹– a planned residential area developed by the Khulna Development Authority (KDA) in the early 1980s (Figure 2). This southern part of the peri-urban zone has been selected for investigation because significant changes in land-use occurred between 2005 and 2022 (Figure 10). A major catalyst of this change had been two nationally significant transportation infrastructures, that were constructed during this time: Khan Jahan Ali Bridge-locally known as Rupsha Bridge, (opened in 2005), that connected the city with Mongla Port, the second-largest and busiest seaport in the country; and the Padma Multipurpose Bridge (opened on June 25, 2022) which connected Khulna city directly with the nation's capital, Dhaka. Through, both of these transportation projects, a direct road connection has been established between Mongla Port and the capital Dhaka through Khulna.

Three urban tissues, selected from this zone, for detailed examinations are: (i) Tissue 1: Nirala *Digh*² and surroundings (ii) Tissue 2: Abdul Jalil Lane and (iii) Tissue 3: Bagmara Main Road, Ria Bazaar and surroundings (Figure 1)

To collect data on the tissues, site visits and investigations were carried out in two phases. The first one was conducted in October 2021, and the second phase in October 2022. In both phases, the study employed interviews, walkthrough analysis, map analysis and physical feature surveys in the selected urban tissues and their zones of influence. However, the spatial characteristics of the selected peri-urban tissues and associated socio-economic activities were mapped and assessed in detail through the semi-structured interviews taken in the second phase of the survey. Non-probability sampling was used in the interviewee selection because the investigation selected a small number of samples to explore the real-world challenges rather than draw statistical conclusions about the general population (Yin & Fan, 2003). The 'Judgmental Sampling' approach was used to choose the interviewees consciously in order to collect important information that cannot be learned from random selections (Maxwell, 1996).

Visual data were collected by taking photographs, videos and on-site sketches. The research also examined maps, including satellite images, land-use maps, photographs and video recordings on the selected sites documenting the periods between 2005 and 2022. Finally, in-depth interviews and focus group discussions were conducted among stakeholders to triangulate the data sets.

¹ Residential Area in Bangla

² Large Pond in Bangla

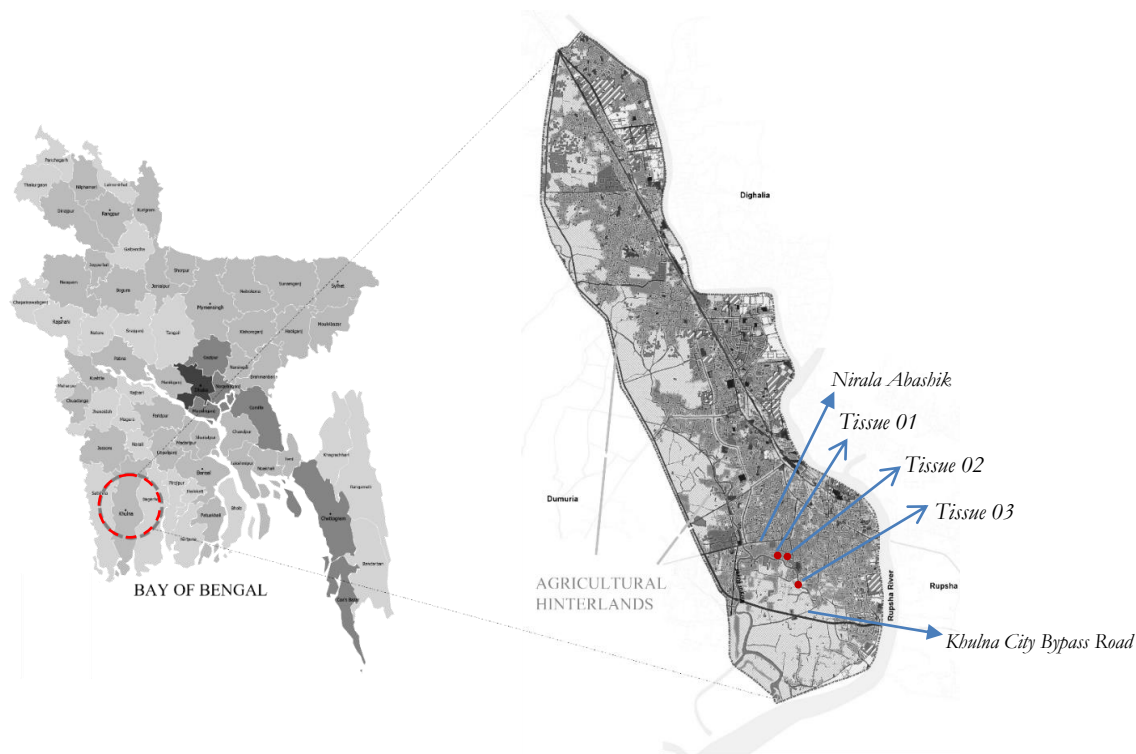


Figure 1. Location of Khulna in Bangladesh (Left) and location of the three selected tissues (Right).
(Source: Google Earth, 2022)

Observations and Findings

Khulna and its Urbanization Trend in History

Khulna, Bangladesh's third-largest city, is a growing metropolis. A historical overview of Khulna's urbanization shows that it developed as a colonial market town but later transformed into a significant industrial center of East Pakistan (now Bangladesh) in the 1950s. It managed to pull large-scale internal migration to Khulna due to the abundance of new employment opportunities in the industry. Consequently, during that period Khulna's population rose sharply making the urban areas of Khulna expand quickly (Parvin & Mostafa, 2010). In 1961, a master-plan was first developed by the Khulna Development Authority (KDA) for a region of 70 square miles (181 square kilometers) with a projected lifespan of twenty years. The Master Plan considered Khulna as the country's most important industrial center and the primary objective was to establish planning principles to develop industries (KDA, 1961). The 'readily available supply of labor' was considered a good opportunity for industrial expansion in Khulna (KDA, 1961: 35). The Plan divided the city into primary land use zones, creating a hierarchy of transportation networks and a set of controlled zones (KDA, 1961 & 2013). The Plan warned against sporadic, unorderly development in particular for the peri-urban areas, as it conceded that a bottom-up nature of development would result in a 'most haphazard' and 'sprawling pattern' of expansion' (KDA, 1961: 22). Even for the industrial areas, it restricted a mixture of housing and industry. The industry housing was planned to be allocated in the large residential areas (KDA, 1961: 40). After independence, in 1971, a major uplift in Khulna's industrial sector occurred, when the new government nationalized a majority of the industries including almost all the jute mills (Parvin & Mostafa, 2010). The government adopted such a policy to strengthen the industry's contribution to the national socio-economic development. However, throughout the past four decades, industries have declined significantly. Global shifts in political-economic conditions as well as that of national politics were one of the reasons leading to

the process. Thousands of people working in the industry lost their jobs due to the drastic decline in the industry. Therefore, the lack of employment made the socioeconomic situation of the migrant workers worse (Parvin & Mostafa, 2010). The guideline that any development consideration regarding the migrant labors was to fit into the framework of the 1961 Master Plan, created a fixed and static land-labor relationship in the industrial city. When failed as an industrial city, the migrant workers suffered extensively due to their inability to engage in alternative land-labor relationships within the master planning framework. This resulted in poverty, unrest and depopulation among the workers for decades. In 2001, KDA adopted a new master plan, where land use allocation of the 1961 Master plan served as one of the major guiding factors as many parts of the city and its infrastructures were already built up following the 1961 Master plan (KDA 2013). During this period, Khulna City experienced population growth, remarkable expansion and urbanization (Hasan M. et al 2000). The city covered 45.65 sq. km of land area and had a population of 751,000. The city corporation area expanded across 31 administrative wards and 184 neighborhoods (locally known as 'Mohalla'). The city has continued to expand mostly through unplanned urbanization, withstanding its economic declination and deficiency of employment opportunities (Sowgat & Roy, 2020; Roy et al., 2018). As predicted by the 1961 Master Plan, urban sprawl has resulted from Khulna's spontaneous evolution (Alam & Miller, 2019). In the periphery, agricultural land use increased until 2010 and started to decrease in 2020 (Alam et al., 2023). Khulna's agriculture has decreased by 49%, and its water bodies have decreased by 19% during this period. This measurement clearly shows the rapid loss of agricultural land and natural water bodies. These transformations have had a great impact on reshaping the future of this city (Sowgat & Roy, 2020; Roy et al., 2018), as the change may affect the land-labor relationships developed by the migrants living at the periphery in their pursuit to survive in the city.

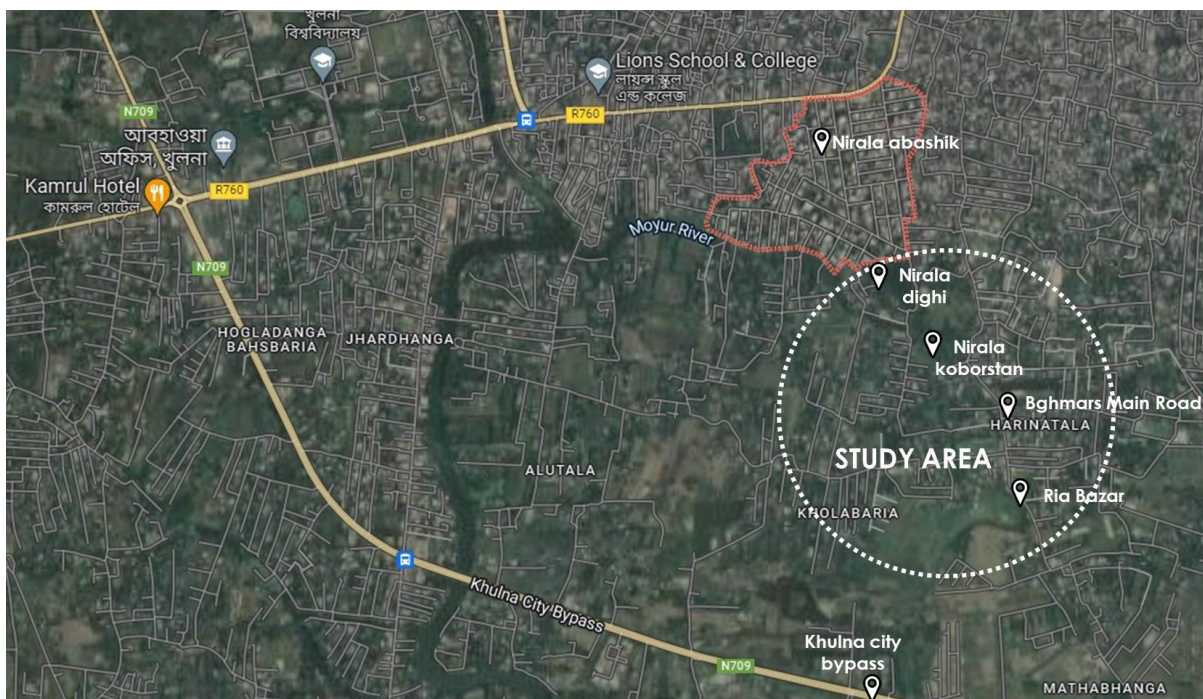


Figure 2. Satellite image of the study area (marked in dotted circle) at the present context (Source: Google Earth, 2022)

The construction of many significant infrastructure projects, including the Khan Jahan Ali Bridge and the recently completed megaproject, the Padma Multipurpose Bridge, a direct connection has been established between Mongla and the capital Dhaka, bringing ample opportunities for expanding regional connections, hence flourishing both national and local economic activities. Moreover, the morphological and social adaptiveness of such regions also has the inclusiveness to embrace the migrants over the years (Sowgat et al., 2017; Hakim & Lim, 2013). Following the commissioning of the Padma Multipurpose Bridge, it is anticipated that economic activity in Bangladesh's south-west would significantly accelerate in the coming years. Due to this infrastructure-led development policies and fast economic growth, Khulna, the central city of the south-western region of Bangladesh, is predicted to encounter a severe blow from rapid urban transformation. Current scholarly research corroborates the prediction as Khulna's peri-urban zones are continually losing their traditional open spaces, agricultural land-use, vegetation, and wetlands to serve the needs of relatively higher income group and their residential area as a result of increasing infrastructural construction and real estate expansion (Sowgat & Roy, 2020). In such pervasively diminishing trend, scholarly investigations are crucial for understanding the ways current socio-economic spaces in the peri-urban areas have functioned historically for helping the migrants and the poor to survive.



Figure 3. Map of KDA Masterplan1961: Industrial Zone marked with black hatch (Left) & Proposed land-use in Master plan (Right) (Source: KDA, 1961)

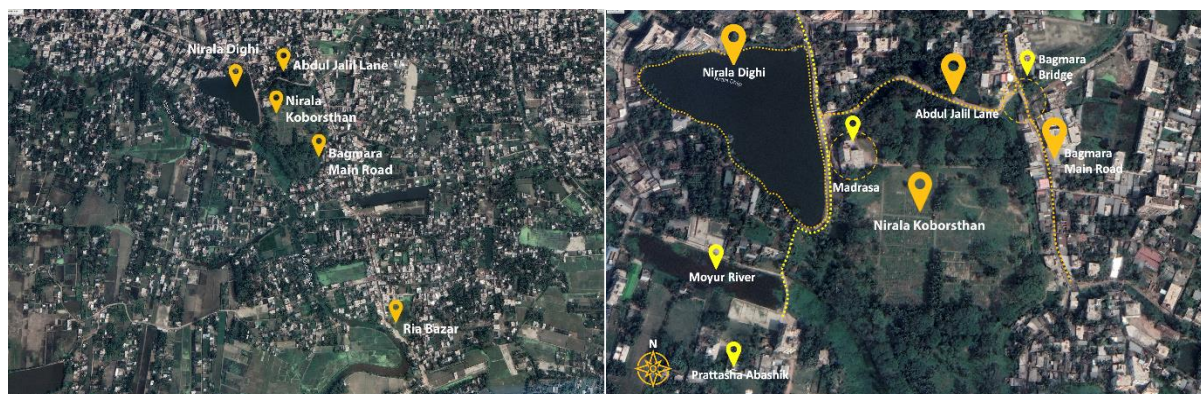


Figure 4. Morphological pattern of study area (Left) and blow-up showing significant landmarks (Right)
(Source: Google Earth 2022)

Findings from field observation

The following sections aim to enhance that comprehension by presenting key findings from three selected urban tissues in the southern part of Khulna's urban periphery.

Tissue 1: *Nirala Dighi* and surroundings

Nirala Dighi, a large pond situated at the periphery of the planned *Nirala Abashik* is surrounded by streets and open spaces. It holds immense socio-economic significance for the migrants who have settled in this part of the peri-urban zone. Alongside the *Dighi*, a narrow street is lined with single-story buildings, creating a unique low-rise physical environment that stands in stark contrast to the high-rise apartment complexes found within the planned residential area. To the east of the street, there is a madrasa complex and a graveyard known as *Nirala Koborstan*³ (Figure 4). Near the junction of *Nirala Abashik* and *Nirala Dighi*, there are several small grocery shops, informal eateries and a tube-well. Although tube-wells are not common in urban areas, they are very common in rural areas of Bangladesh. In the informal eateries of the neighbourhood, several rickshaw pullers and other workers were spotted relaxing and dining, while locals were observed fetching water. Varied socio-economic activities take place on the street along *Nirala Dighi* at different times of the day, making it a social gathering place (Figure 5). This specific location serves as a gateway for local people entering the city for business or other reasons, catering to an entirely different user group than those living in the planned residential area. However, there is no physical barrier to accessing the tissue-1 of peri-urban zone from *Nirala Abashik* area, except the fact that the road width of the latter is wider than that of the former. The traffic density along *Nirala Dighi* is low, with mostly motorbikes, paddle vans, easy bikes⁴ and pedestrians seen using the street which is primarily intended for pedestrians. Alongside the *Dighi*, both male and female are seen selling vegetables on the street using mats and plastic sheets, while others have been spotted offering fish in paddle vans (Figure 5). Most of the vendors were selling vegetables or other goods at a considerably cheaper price than the formal bazaar. A 55-year-old vegetable seller who had migrated from another district (Barisal) explained why he chose this particular area for selling his goods (Figure 6). He said, "My two brothers live in this area, and one has his own shop nearby." This motivated him to settle here. He managed to find an affordable house near the *Dighi* where he could live with his family. The area also provided him with a sense of social security.]

³ Graveyard in Bangla

⁴ Local name of battery driven three-wheeler



Figure 5. Activities around *Nirala Dighi* (Source: Field Survey 2021)



Figure 6. A migrant farmer from Barisal is selling vegetables beside *Nirala Dighi* (Left) & An owner of a tea-stall in Ria Bazar is showing his home in *Prottasha Abashik* (Right) (Source: Field Survey 2022)

The migrant man bought his goods from the wholesale market in the Sonadanga area (elsewhere in the city) daily in the early morning and stayed beside the *Dighi* from morning until Zohr prayer (noon prayer) for selling vegetables along with other sellers. Originally a farmer in Barisal, this individual faced a series of unfortunate circumstances including natural disasters and economic setbacks that made it difficult for him to continue agriculture. At an advanced age, he now resides in the peri-urban area of Khulna and earns a living by selling vegetables. The affordability of housing and the ease of adapting to a new livelihood, family connections, and social capital draw numerous other migrants to settle in peri-urban areas like Khulna. The spatial environment surrounding the *Dighi* and its adjacent areas presents opportunities for these migrants to reside in close proximity to the city at reasonable prices while earning enough to sustain themselves.

Tissue 2: Abdul Jalil Lane

Abdul Jalil Lane is a curved street that connects *Nirala Dighi* to Bagmara Main Road, running along the *Nirala Koborstan* (Figure 4). According to locals, this lane was built about four to five years ago as a shortcut to Bagmara Main Road. The spatial characteristics of this street are significantly different from those of the surrounding areas. Abdul Jalil Lane is relatively peaceful and quiet, with trees lining the way, and is constructed of concrete paving blocks to resemble a pedestrian walkway (Figure 7). To the south of this lane lies a small water channel along the graveyard. Pedestrians, motorcycles, and easy bikes frequently use this road. Livestock are also found to roam around the same street and adjacent water-body, resembling a rural landscape - chickens run loose in the streets, and

ducks can be spotted in ponds. Several homes that resemble village huts with courtyards, ponds, and large trees are located along the north side of this lane. It seems to be a "pocket of rural homesteads" concealed within the city fabric. The street narrows down as it advances and appears to come to an end at Bagmara Main Road. Locals are



Figure 7. Abdul Jalil Lane (Source: Field Survey 2021-2022)

afraid that these rural pockets will quickly disappear from Khulna's landscape because of the Khulna Development Authority's (KDA) acquisition of land for the extension of planned residential areas after the construction of ring roads and related connecting roads. A local businessman from Ria Bazaar who lived near the *Dighi* for more than 25 years added, "When KDA (Khulna Development Authority) acquires the farmlands and makes roads the land prices will be almost three times."

These narrow, brick-paved streets that often flooded with water and interconnect with each other are essential to informal urbanism (Figure 7). Like Khulna, they could enable a significant portion of the population in the Global South to stay connected with the city both economically and socially.

Tissue 3: Bagmara Main Road, Ria Bazaar and surroundings.

The Bagmara Main Road is a crucial route that connects Khulna's southern peri-urban zone with the central urban areas. Even though the surrounding developments are informal, this area has a different urban fabric than the region near *Nirala Dighi* and Abdul Jalil Lane. Along this street, a narrow strip of informal, single-story commercial areas has been developed. Most of them are small shops but just behind this commercial strip there are green agriculture fields. The road is not only used as a transportation corridor but also as a place for social interaction and informal business activities for the locals. Although the volume of traffic is significantly higher (mostly easy bikes) compared to the adjacent streets near *Nirala Dighi*, the road still serves both pedestrians and vehicular traffic. A small number of two or three-story buildings have been recently constructed along the street, most of the structures are single-story. The majority of the ground-level street facades are occupied by various small businesses such as metal shops, tea stalls, and grocery stores. However, it is distinctly visible that the trend of building multi-story structures is increasing (Figure 13).

Towards the southern part lies the Ria Bazaar, a local bazaar located along the Bagmara main road, with a number of grocery shops along with a fish and vegetable market arranged within a small space (Figure 8 & 13). The fish and vegetable market occupies a significant part of this bazaar, which acts as a hub for socio-economic activity among the locals. The customers and sellers mostly belong to the local neighborhoods, and people are often found socializing and spending their leisure time in tea stalls. Such social interactions are valuable for the migrants' job-seeking in the city and generate social capital for survival under the conditions of being anonymous and strangers in the city. Small businesses line up along both sides of the street at Ria Bazaar, and it acts as a surviving space for

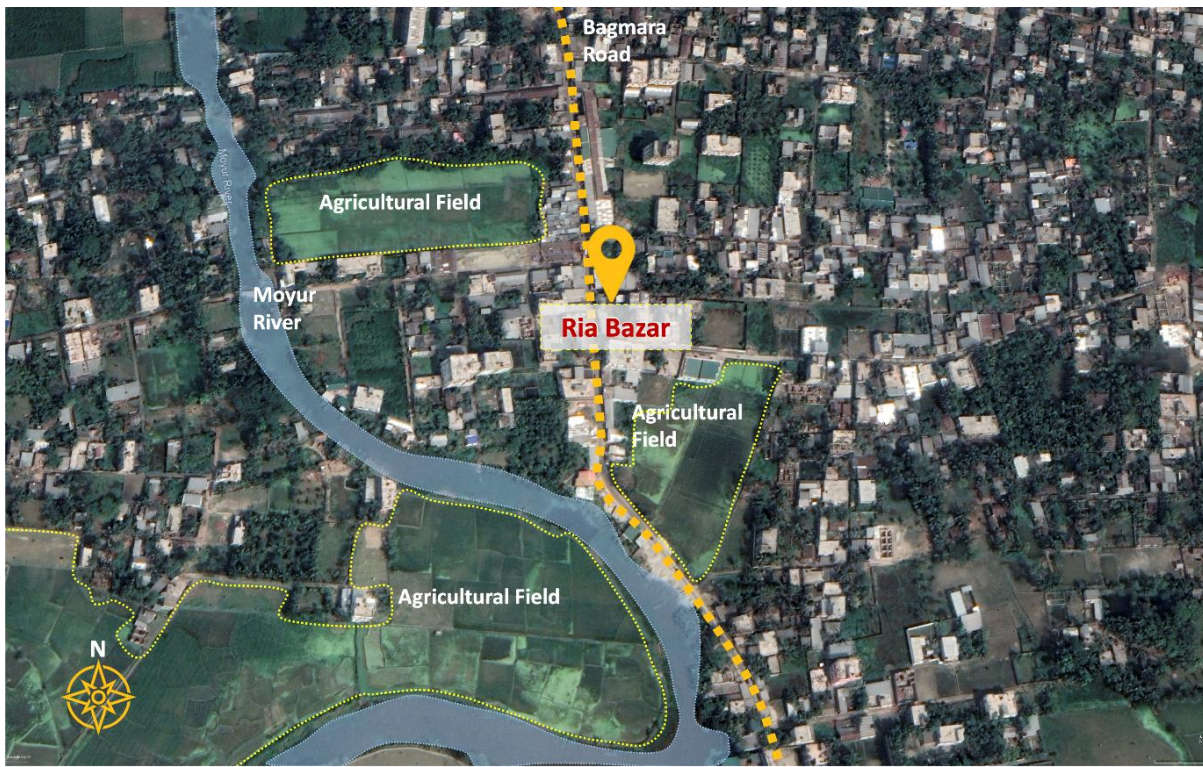


Figure 8. Surrounding land-uses near Bagmara Main Road and Ria Bazaar. (Source: Google Earth 2023)



Figure 9. Existing land-uses along Bagmara Main Road (Source: Field Survey 2021-2022)

many, including the owner of a small tea stall, who used to have a tailoring shop in Boro Bazaar inside Khulna city a few years back. As he could not afford the rent, he switched to tea making and took a tea stall in Ria Bazaar at a comparatively cheaper price. Ria Bazaar also saves him transportation costs as he resides nearby. This route (Bagmara Main Road) has now been connected to Khulna City Bypass Road through Harintana Road towards the south, yet shortly after passing the market, mosaics of paddy fields are found. A large sugarcane field is located next to the roadway on the west side of Bagmara Main Road near Ria Bazaar (Figure 8 & 9).

Table 1. A summary of the observations from three selected peri-urban tissues.

Tissue	Adaption Component	Morphological Attributes
Tissue 1 Nirala Dighi and the surroundings	Social capital maximization	Multifunctional socio-economic space: People living nearby use this space for shared interests like selling and buying products, gossiping at tea-stalls, relaxing near the pond etc.
	Affordability/ Access to urban area	Low and affordable land rent and easy access from urban core.
	Interactive space	Presence of mixed morphological elements like waterbody, graveyard, tube-well, temporary Bazaar, madrasa, small scale grocery and food shops, moving vans with necessary goods.
	Income generation opportunities	Temporary shopping zone along the street.
	Flexible livelihood opportunity	Different commercial activities at different time period of the day.
	Inclusiveness	Common drinking water collecting space (a common tube-well).
	Gender-responsive public space	Space with equal opportunity for both male and female to use for buying and selling.
Tissue 2 Abdul Jalil Lane	Non-human relations	Courtyards and ponds for rearing livestock within houses.
	Pedestrian dominance	Curve and narrow street configuration discourage motorized vehicle, easy access from different directions by walking or local transports.
	Place making	Courtyards surrounded by houses resembling rural areas.
	Introvert community perception	Visually hidden from other localities.
Tissue 3 Bagmara Main Road, Ria Bazaar and surroundings	Hybrid socio-economic activity	Spontaneous heterogenous commercial development along the street. Street, individual shop and the local Bazaar act as a socio-economic interactive space.
	Skill utilization	Cultivable large green fields co-exist with the narrow commercial stripe.
	Circular economy	Well connectivity with the urban center , affordable land rent for shops, cheap mode of local public transport (easy-bike) encourages small scale entrepreneurships.
	Sense of community	Tea stalls and Bazaar space as local gossiping spots. Shopkeepers are mostly local and know each other.

The land opposite (east) of the sugarcane field has been divided into many smaller plots in recent years and marked with a sign for a private real estate company (Sabuj Bangla Abashon Prokolpo) (Figure 9). Some old small shops are already converted to shops for electronic goods such as TV, Refrigerator etc. The trend clearly shows that agricultural land is rapidly converting into residential plots developed by real estate companies and the small business outlets of locals are being replaced by brand shops in a 'piecemeal' way.

Analysis

With the current planning interventions focused on economic growth, the urban fringes have undergone significant changes in traditional morphology. The built-up area of Khulna city has increased by an average of 4.87% between

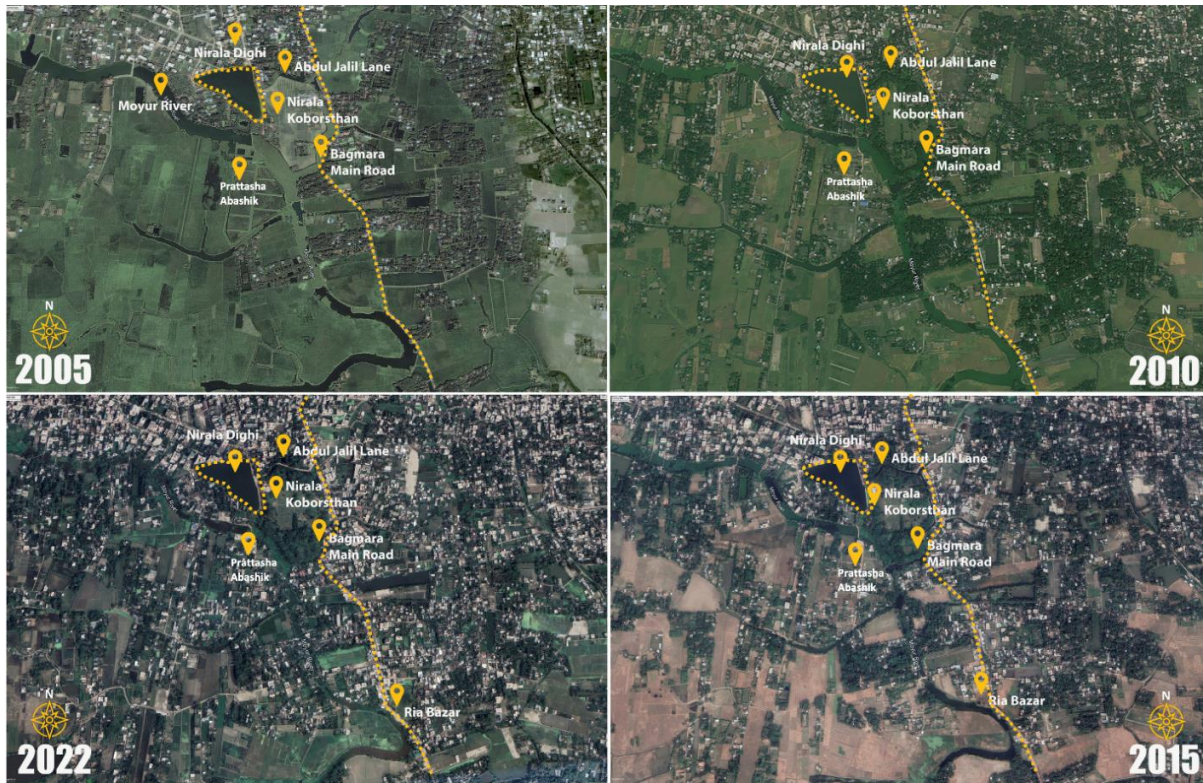


Figure 10. Morphological transformation of the study area within 2005 to 2022. (Source: Google Earth 2023)

1991 and 2020, leading to the loss of 4.66 sq. km. of water bodies, 1.84 sq. km. of vegetation, and 41.59 sq. km. of arable land. This transformation has brought about extraordinary expansion and densification in Khulna, with alterations being observed in 111 neighborhoods or 60% of all neighborhoods (Sowgat & Roy, 2020).

The satellite images of different periods between 2005 and 2022 clearly show that the land-use changes in the region were abrupt and rapid. A significant portion of the region that was once agricultural land in 2005 and 2010 had been lost by 2015. Although the loss of agricultural land was slow between 2005 and 2010, the changes took a rapid turn after 2015 (Figure 10). The land-use transformation in the peri-urban landscape had a significant impact on the morphological character of the city on at least three fronts. These are as follows:

Shrinkage of Agricultural Land and Transformation of Livelihood Pattern

Between 2005 and 2010, only the street layouts of a newly planned residential area, named *Prattasha Abashik*, were visible in the agricultural land located at the southern part of the Moyur River water channel (Figure 10). However, after 2015, the rate of land conversion drastically increased as residential areas began to encroach on agricultural land in the peri-urban zone (Figure 10). This has resulted in a significant shrinkage of agricultural land, which has negatively impacted the livelihoods of locals. Many migrants and locals have been forced to leave rural areas due to unemployment, poverty and food insecurity, and they chose this zone because of its cheap living costs and easy access to the urban core for employment. The migrants have unique livelihood patterns that they have developed over the years, and some possess rich agricultural skills that they utilize in peri-urban areas due to the landscape's scope. This has led to a harmonious land-labor relationship that has grown over time. The central urban area also

benefits from cheap labor and goods produced in the peri-urban landscape at reasonable prices. However, the establishment of the Khulna city bypass at the southern end of the study area has led to the rapid and unfamiliar encroachment of commercial activities within agricultural fields in the southern back zone. This has resulted in the shrinking of agricultural fields, jeopardizing the agricultural livelihood of migrants and converting them to cheap labor in the city economy (Figure 11). This trend of converting agricultural land to commercial use is alarming, as it threatens the unique livelihood patterns that have developed over a prolonged period, and it has the potential to displace many more locals and migrants in the future.



Figure 11. Transformation of agricultural land into residential subdivided plots in Bagmara and surrounding Area. (Source: Field Survey 2022).

Insensitive Transformation of Traditional Spatial Character

Field survey reveals that the morphological character of the study area includes a mixture of small single-story houses made of temporary materials, large and small water bodies and water channels, large trees, and agricultural lands. The inhabitants tend to have informal living patterns - they gather and gossip in small tea stalls and restaurants. Cattle, hens, and ducks are also reared commonly in this area. A significant percentage of people are engaged in small-scale entrepreneurship. Moreover, the central area serves as a marketplace for the livestock and agricultural products made in the region. Due to the location's proximity to the core, rent and transportation expenses are reasonable, which allows a different segment of the local population to work as service providers in the central metropolitan region. The use of easy bikes as a low-cost mode of public transportation is very popular here. Over the past decade, there has been a significant decline in the natural morphology of peri-urban settlements due to the construction of infrastructure projects. The focus on increasing the economic value of land and growth have led to the construction of multi-story buildings that are encroaching on peri-urban areas, even going so far as to cover up natural water bodies (Figure 12). The result is that these new constructions stand out like islands in the surrounding landscape. However, these new structures are often erected with little or no consideration for the local socio-economic system and its functioning in space. They often accompanied by walls or other barriers, further isolating them from the surrounding community. This lack of attention to the local context leads to a disruption of the earlier settlement organization.



Figure 12. Transformation of traditional spatial character near Bagmara and surrounding area.
(Source: Field Survey 2021-2022)

Loss of Social Spaces and Inclusiveness

The studied areas have developed over time without any formal planning intervention. The needs of the poor and migrants have been taken into consideration in a bottom-up approach. This has resulted in socializations, unique behavioral patterns, and organizations in the economic spaces that have helped micro-scale businesses to thrive (Figure 13). The overlapping functions on streetscapes support mutual co-existence and protect a city that is spatially just and inclusive. These spaces have their own logic of formation that protects diversity in production and a sense of place-making. In such settings, architecture and urban growth are fluid and constantly negotiating to meet the needs, challenges, and various thresholds of the poor. The growth of new markets to cater to the needs of the new economic class and respective aesthetics can make the city modern and aspirational, but it can also damage the very morphology of Khulna – that used to be socially vibrant, multicultural, and supportive.



Figure 13. Transformation of social spaces in Ria Bazaar & Bagmara Main Road.
(Source: Field Survey 2021-2022)

Discussion

The 1961 master plan for Khulna was built upon the strong industrial growth of the region prioritizing a specific land-labor relationship for urban development (Figure 3). However, this approach did not allow much room for migrants to use their existing skills, such as agriculture, within the city's boundaries. Migrant workers were engaged as cheap laborers to work in industries, and they were to be accommodated in planned residential areas of the city. Mass production in industries using the available labor is the key factor for attaining rapid economic growth, where the connection between land and labor was mostly accommodational.

When the industries were shut down in the 1980s, the laborers who had been converted to work as specific sectors in industries lost their jobs and all employment opportunities. The failure of the industries and the subsequent master plan led to the continued decline of the city's population. While the economy of the city remained in a declining state for decades, the peri-urban regions that were not included in the city master plan then, evolved and utilized different bottom-up planning methods outside the planned Master Plan framework to accommodate the migrants.

In analyzing the morphology and the urbanization trends of the peri-urban areas, the finding of the paper contradicts Fadda and Jirón (2002) who showed urban peripheral developments as the result of poor urban planning. In Khulna's case, the paper also could not find the peri-urban growth as 'piecemeal' and 'haphazard', as termed by Ranganathan & Balazs (2015). It counters Fadda and Jirón's (2002) view that claimed peri-urban areas as an additional burden on local governments for providing services.

Instead, this paper found the peri-urbanization in Khulna as a self-generated planning process within the dynamic land-labor relationships. The peri-urban zones created a symbiotic relationship with the core urban areas, where the latter is indispensably dependent on the services of the former. The most important aspect of this dynamic land-labor relationship was how it supported the migrants in the adaptation processes when the formal planning system of the city declined to acknowledge them.

In the case of Khulna, 48.45% of people living in the city are migrants (Sowgat et al., 2017). Natural catastrophes in the southwest coastal belt of Bangladesh, coupled with a lack of employment prospects and a scarcity of healthcare and educational resources in rural and small urban areas, have caused migration towards Khulna (Sowgat & Roy, 2020). Moreover, the adaptive type of peri-urban landscape, their integration with the planned landscape and close proximity to the core are among the primary reasons that attract migrants towards Khulna. Follmann (2022) discovered such peri-urban regions as a 'mosaic-like mix' of rural and urban land uses, livelihoods, and lifestyles. This study also found similar characteristics in the study area. There existed a cohabitation of rural and urban land uses, livelihoods, and lifestyles where the rural redefines the order of the urban landscape. However, in recent times, due to the advent of an infrastructure-led development paradigm for economic growth, the morphology of peri-urban Khulna is gradually diminishing.

Peri-urban areas in Khulna, have been subjected to actively (re)organize the landscape to achieve the national goal of economic growth, GDP and industrialization. Aguilar et al. (2022) & Woltjer (2014) demonstrated a similar trend in the transformation of peri-urban in their studies. Ravetz et al. (2013) observed peri-urban places without development as a burden to metropolitan centers that makes residents particularly prone to numerous economic hazards. This study's findings contradict the comments of Ravetz et al. (2013) as it finds organically grown economic ties with land and labor. Such ties were kept by such an arrangement that the migrants could continue to utilize the peri-urban districts of Khulna City as a momentary engagement through which they might improve their economic situation and, in some cases, survive at their crisis moment and return to their village or employ the agrarian skill-set that they had amassed through time. They can utilize and convert their skill-set here, and the peri-urban setting offers the potential for doing so, even though their skill-set is substantially transformed in certain situations.

This unique peri-urbanization model in Khulna and the resultant urban tissues, as discussed in the paper, have the strength to generate a mechanism of cohabitation on a regional scale. In the context of the coastal crisis situations of Khulna, the capacity of the peri-urban landscape to create flexible, adaptive and versatile interactions between land and labor is crucially valuable and spatially just. Such a model prevents the city from deteriorating economically, even in both city and regional-scale crises. The morphology of peri-urban enables migrants to be actively involved simultaneously in both the urban and rural landscapes. This protects their ties to the agriculture system.

This study though revealing the unique attributes of the peri-urban morphology disagrees with Inostroza et al. (2013), Edwards (1991), and Maffini & Maraschin (2018), who respectively, emphasized urban sprawl, urban fragmentation, and social segregation as the main problems of urbanization and that led to the growth of such peri-urban areas. Instead, the paper reveals how the peri-urban zones for Khulna historically acted as a refuge space either for the people living near climate-vulnerable coastal regions. It sees the current morphology of the peri-urban as a counter mechanism against the powerful urban elites who regularly co-opt environmental concerns during peri-urbanization to grab the land – which is typically characterized by the neoliberal reconfiguration of space. Through this process, the land has become inevitable in Khulna with the advent of extensive infrastructure development. This transformation by incurring a drastic change of the versatile land-labor relations in peri-urban Khulna, could justify, as Lukas et al. (2020) noted, the growth of urban mega-projects for wealthy socioeconomic groups, but could cause pervasive damage to the adaptive capacity of the city in regional context.

Conclusion

The findings of this research tend to support several key aspects that may have consequences for urban design decisions for the sustainable and inclusive growth of similar pro-migrant cities as Khulna. The peri-urban zones of Khulna have or maintain adaptability in morphology that have the capacity to captivate the migrant's socio-spatial transformation process in harmony with the prior livelihood patterns. As a result, there was sensitivity, adaptability and inclusiveness in the transformation process, both in morphologically and functionally. With the recent introduction of modern, more top-down infrastructure-led development paradigm interventions aimed at achieving rapid economic growth, Khulna's peri-urban morphology is progressively changing and tends to be declining.

This type of transformations severely affects the morphological adaptability of such sensitive regions, and eradicates functional inclusiveness systematically. If such infrastructural growth is not properly reviewed and sensitized towards such cities' peri-urban morphology, the historically developed pro-migrant character may get lost. This does not imply that the peri-urban areas of similar cities do not require infrastructural development; instead, the paper suggests that this development needs to be accompanied by well-guided and sensitive urban design policies so that the future growth of cities like Khulna does not eradicate the most humane or resilient character of its urban morphology.

The previous bottom-up peri-urban model, however, has a unique set of connections with the landscape that retains the skill-set and can help the city's labor needs in a similar manner. These transitional zones acted as service-providing zones for the core area, having a symbiotic relationship with the existing city both in spatial and functional attributes. It is very uncertain that the future peri-urban tissues will be created with such inclusiveness within them as well as with the urban core.

Therefore, it is crucial to understand Khulna's characteristics before adopting a new development paradigm. Though, peri-urban is referred to in the literature (Follmann, 2022) as an abstract process, a blending of rural and urban, where both rural and urban landscapes exist in the landscape; but there is not yet a city. Khulna's peri-urban regions are quite distinctive, and it is a must to investigate the pattern of migrations to this city and the adaptability of the landscape before intervening in such socio-spatially sensitive peri-urban regions – in order to preserve Khulna's pro-migrant character.

Conflict of Interests

The authors declare no conflict of interest.

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