

Making an Urban Oasis

The Use of Space Syntax in Assessing Dhanmondi Lake Revitalization Project in Dhaka, Bangladesh

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Abstract

Within a process of rapid urbanization, Dhaka city is faced with the constant threat of encroachment of land and water bodies like lakes, canals and rivers by the public and private sectors to accommodate housing and commercial facilities to the growing population. This phenomenon is changing the residential landscape of the city into a mixed land-use pattern. Dhanmondi, a high class planned residential area lying in the heart of the city is an extreme example of such an urban sprawl. Here, the uncontrolled and unauthorized growth of different urban amenities such as retail centres, hospitals, clinics, schools and other commercial activities are rapidly diminishing the open spaces which also served as the social and cultural spaces by the lake side green plateau passing throughout the entire neighborhood.

To cope with this extreme urban situation, Dhaka City Corporation commissioned a local architectural practice, to revitalize the lake and the adjacent area to enhance the social, economic, cultural and environmental sustainability of this residential neighborhood. The idea was also to invite people from other parts of the city so that the lake can be protected from encroachment by creating a buffer zone in between the allotted residential plots and the lake. In reality, the project appears to be a successful model by restoring the lake and environment of the neighborhood. It is considered as a paradigmatic strategic urban project in a developing city like Dhaka. The scheme significantly restores and manages an urban water front development and incorporates visionary design strategies to avoid encroachment by the city.

By using 'Space Syntax' techniques, this research allows us to investigate the actual spatial characteristics of the lake side development project. The study will enable us to understand the accessibility and locational importance of Dhanmondi and the lake from local and global perspective of Dhaka. The research findings suggest that, an increased connectivity throughout the spaces in the lake side development scheme, has successfully integrated the segregated water body and the residential neighborhood into a continuous whole. The spatial intelligence of the design process lies, in the creation of a high level of social and spatial interface among people from different parts of the city.

1. Introduction

Bangladesh is in the world's largest delta system and has the greatest flow of river water to the sea of any country on earth (Novak, 1993:22). The country is surrounded through an intricate system of waterways and tidal channels. It is regarded as one of the most environmentally stressed zone in the world - contributed by vicious tropical cyclones, tornados, and mostly by life threatening monsoon floods (Meulder and Shannon, 2008). Dhaka the mega city ¹ capital of Bangladesh, with a population of over 13 million, is no exception like other developing cities of South Asia. The city is on the higher ground – the southern edge of an alluvial old terrace – in a low - lying region and at a strategic position regarding the water- routes of the country. The city is bounded by The Buriganga River on the south, Tongi Khal on the north, Balu River on the east and Turag River on the west. The edges of the high lands are flanked by marshes and old river beds. A substantial portion of the adjoining low-lying areas have recently been brought under the structured zones of the city due to the accelerated rate of the urban growth in Dhaka (Asaduzzaman and Rob, 1997).

1.1 Encroachment of Land and Water bodies in Dhaka

Once, urban life and activities of historic Dhaka was associated with a system based on rivers, canals, lakes and ponds; hence the city was inseparable from the water. Water resource management should arguably be at the core of the city's planning and development, but everyday realities and the ineffectiveness of development controls has resulted in wide spread illegal encroachment, land filling and severe environmental degradation of water bodies (Shannon and Nilufar, 2008). Therefore, the water bodies in Dhaka are under serious threat to become obsolete. Moreover, within a rapid urbanization process – an extensive growth of informal settlements, private housing and the consequent commercial developments instigate the process of encroachment. This phenomenon is radically changing the landscape of the city through a rapid urban expansion and threatening its ecological balance as well. The population growth of Dhaka stands at 56.5% in the last decade, which is very high, among which rural to urban migration is causing a rate of increase in population by 5 % per annum (Hossain.S, 2008). This uncontrolled urban growth and unplanned nature of urbanization is rapidly increasing the city's boundary. The government sector simply cannot provide adequate urban facilities to this growing population consequently the private sector is intervening into the development process. The profit motivated private developers are taking advantage of such a consequence. The low-lands, lakes and khals ² are illegally filled for the development of speculative housing and other commercial projects to facilitate upper and upper middle class residential areas in the city.

1.2 Changing land use in Dhanmondi Residential Area

Dhanmondi ³ is an extreme example of such an urban sprawl. Dhanmondi, located in the central part of the city (FIGURE 1) is one of the high class residential areas of Dhaka city. It is the first planned area, developed in the early fifties to provide residential accommodation to high and higher middle income groups of population in Dhaka city. The settlement of 472 acres structure centres upon a natural depression – eventually named Dhanmondi Lake. The water body was later excavated to create a somewhat gridiron system of 1000 number of quite large residential plots. Previously, the 5-metre deep, 37-hectare Lake was a navigational channel connected to the surrounding river system – which later used to function as a storm water drain through a linkage with Begunbari Khal.

In course of time, this residential neighborhood and the lake have witnessed drastic transformations. Since 1990s', an uncontrolled growth of shopping complexes, educational institutions, clinics and hospitals, banks and other commercial activities ruthlessly changed the residential character of the area into a mixed land use pattern (FIGURE 1). Moreover, the generous garden plots with single houses were subdivided. In 2006 the plot numbers increased to 1585 (Shumi, 2006) and multi-story high density apartment buildings dominate the trend. Consequently, the area's population and transport congestion multiplied exponentially and densities reached an unmanageable situation. The infrastructure and other facilities were stretched beyond limits, which in turn resulted in environmental degradation. The lake became a dump yard of pollution – receiving unauthorized sewerage outlets, drainage discharges, surface run-off and even solid waste from various sources (FIGURE 2). The public sphere along the lake side was therefore detached through a 2 meter high boundary wall and remain the back of the neighborhood. As a

consequence, the lakeside plot owners attempt to extend their original plot boundary towards the lake side. This common practice of encroachment threatened to the shrinkage of the lake by expansion of the built up area.

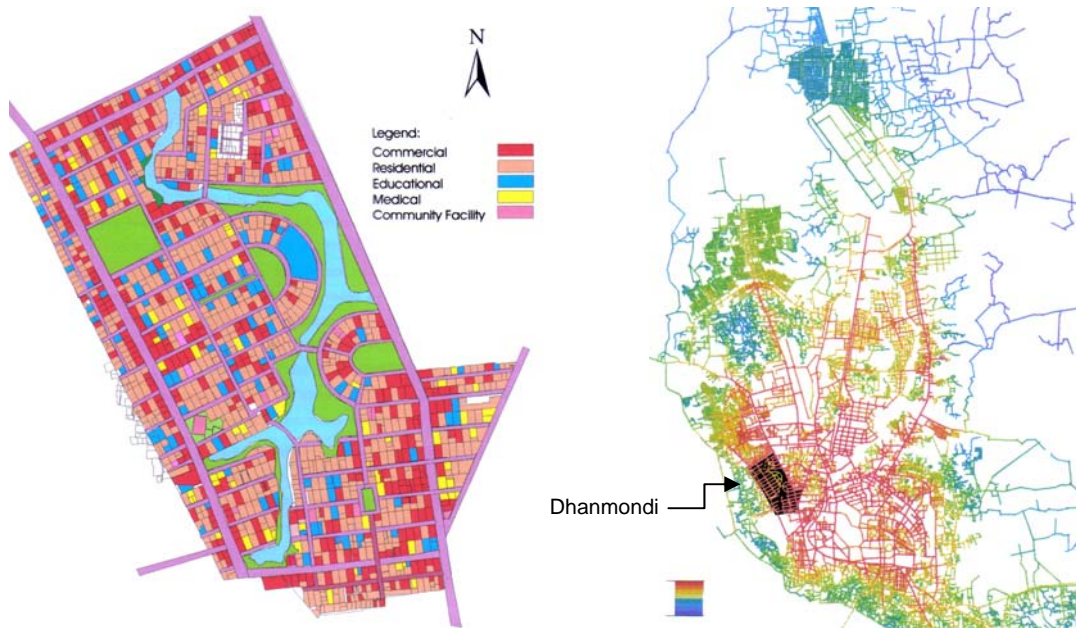


Figure 1

Land use map of Dhanmondi (2007) & Axial map of Dhaka City (2007) – Source : Khan, N. 2008



Figure 2

Dhanmondi area and the lake before development (disintegration, physical and environmental deterioration) – Source : Khan, N. 2008 & Vitti Sthapati Brindo Ltd, Dhaka 1998

1.3 Attempts towards Dhanmondi Lake Revitalisation

In 1998, the Dhaka City Corporation (DCC) commissioned Vitti Sthapati ⁴ Brindo, a private Dhaka-based architectural practice, to redevelop the lake side waterfront. Dhanmondi, being located

along the globally integrated routes of the city (FIGURE 2) in different stages of its growth, the area remain spatially accessible to the people from all parts of the city. From this notion, the project undertook a vision of the government to provide a place of recreation for the urban community of Dhaka city, as a part of an acute demand of the urban dwellers.

The project included community participation to address the problem of encroachment and environmental degradation in Dhanamandi residential area. To regain the encroached land areas, initially the project had to carry on some eviction of the illegally encroached local land owner. To do this the concept was to face the Local community not to avoid. Finally, the project stretches with an area of 85.6 acres out of which almost 31 acres of land area and rest 54.6 acres as water body.

**AERIAL
VIEW
OF THE
LAKE
AREA**



Figure 3

Identification of successful activity nodes along Dhanamandi lake area to increase the quality of prevailing urban spaces and later public response in reality - Source : Vitti Sthapati Brindo Ltd, Dhaka 2008

2. Design Approach - Restoration of the Lake and Regain Environmental Sustainability of Dhanmondi

This section briefly explains the design concept to revitalize the lake and the lake side area. The first thing that came into consideration was to decontaminate the lake water, shape up the water shade area, open it up and make it easy accessible to public. This was made possible through a public private partnership, as mentioned in the previous section of the discussion.

The lake was made accessible to the public realm, by increasing both - physical and visual connectivity between the lake side water front and the neighborhood. However, the concept was not appreciated by the client DCC. The bureaucratic thinking process in a rapidly urbanizing context, suggests that, all development projects be protected by safety fences where public access is restricted. This orthodox thinking of the client was rejected by the design team and continued to carry on with an open idea of connectivity. The visibility was ensured by replacing high fences with low green hedges so that the lake become visible from the periphery roads. Physical connectivity was achieved by insulating walk ways through the periphery of the lake side and also approaching from the side roads from accessible locations. To make this link sustainable, some passive activities became a pre requisite along the walk ways (FIGURE 3). The circular path around the lake side acted as the-necklace and the facilities that generate moderate traffic resembled as the precious stone concerning the oneness of the sustainable issues.

The scheme looked for some moderate function that will generate less traffic in the residential area. Functions like, Food kiosk, Drink corner, Small restaurants, Community boat club, Community health club, Open air theatre and children's play area, were distributed in different visually and spatially strategic locations throughout the development. The concept was to act these functions as attractor, to bring in more people in the lake side areas. To implement this idea the functions were appropriately placed: A few large green spaces were selected in strategic locations with better visibility towards the lake and accessible from within the neighborhood. To avoid direct traffic flow from the busy and congested peripheral roads of the neighborhood, contributing to the major road network of the city, the functions were embedded in more localized areas.

Considering the management aspects of the project and to make it financially self sustainable, these facilities would generate income and hence could be maintained modestly by a public private partnership. In reality, the idea contributed to the restoration of the overall environmental quality of the serene lake side area.

3. Space Syntax analysis - understanding the spatial realities

This part of the study attempts to investigate the actual spatial characteristics of Dhanmondi Lake Redevelopment Project. The study uses Space Syntax methods to identify the spatial sustainability of the project in three levels; First, the locational significance of Dhanmondi area in the context of the city; Second, the spatial nature of accessibility and space organization of different activities along the periphery of the lake, and Third, the spatial logic of the lake side development as an integrated urban system when embedded within the residential neighborhood.

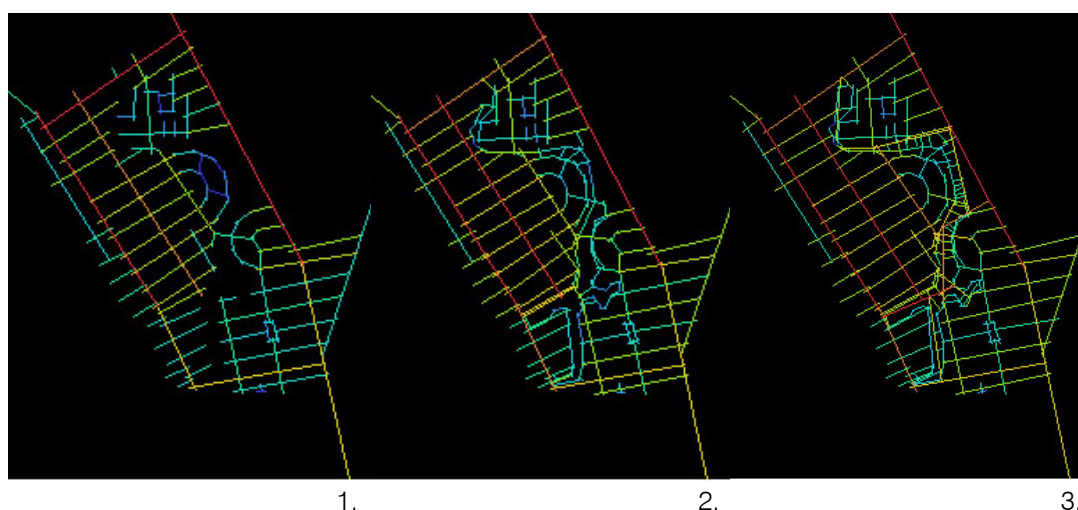
In the global context of Dhaka city (FIGURE 1) Dhanamondi remains one of the highest integrated residential area. The analysis shows that, throughout the study period the peripheral roads gain the maximum local ($R=4$) and global integration ($R=n$) within the spatial structure of Dhanmondi. Among the peripheral roads, three highly integrated roads of the area constitute 2 percent global integration core of the city. This indicates a significant morphological character of Dhanmondi – portraying how a planned area has been structured as a part of the whole urban system of Dhaka city. When analysed as an independent system, the spatial structure of the neighborhood remain unchanged. However, as an independent local area and when embedded in the larger urban grid of the city – the internally distributed spaces throughout the residential area remain segregated in all level of the analysis.

The axial map of Dhanmondi including the lake side development along with the lake represents the potential design decisions - ensuring syntactically strategic locations for locating different

activities in space. The segregated internal streets within Dhanmondi became highly integrated by their spatial integrity with these integrated activity zones (TABLE 1). However, the locally segregated spaces of Dhanmondi has been intentionally made accessible by integrating them with the lake and the lake side development (FIGURE 4), rather opening the water front from the integrated peripheral road network of the neighborhood. This restored the residential character of the area to a reasonable context.

Syntactic Measures	Dhanmondi in 1995	Dhanmondi in 2007 with the Lake -side walk way	Dhanmondi in 2007 with the Lake & Lake side development
Global Integration R=n			
Mean	1.3655	1.3090	1.5564
Max	2.2233	2.1474	2.4828
Local Integration R=4			
Mean	1.5801	1.5997	1.8168
Max	2.4250	2.5086	2.7011
Connectivity CN			
Mean	3.3473	3.6287	4.1215
Max	17.0000	19.0000	21.0000

Table 1
Different syntactic measures of Dhanmondi - before and after Lake side development



1. Global Integration of Dhanmondi as an independent system
2. Global Integration of Dhanmondi with the lake side development
3. Global Integration of Dhanmondi with the lake and lake side development

Figure 4
Syntactic analysis of Dhanmondi showing the change in "Integration core" integrating the lake with the community

4. Discussion and Conclusion

With a limited financial ability, absence of proper land control policies and pressure of other primary urban issues, such as, housing for the urban poor or provision of basic infrastructure for a rapidly urbanizing context like Dhaka – the challenges and strategic importance for realization of urban design are unthinkable. The success of Dhanmondi Lake Redevelopment Project opens the possibilities for urban design in Dhaka. However, the neighborhood has been made accessible to

the public realm through inclusion of a City scale recreational area. This causes new problems like, traffic congestion, poor maintenance of the area; hence the chance of farther environmental deterioration etc. However, these minor issues are causing problem only to the local people facing the main peripheral access routes of Dhanmondi. In broader aspect, it is an overwhelmingly successful project by accommodating all class of people from the global context of the city - within a minimum financial and physical intervention through the residential neighborhood.

This paper, on the basis of space syntax analysis of the spatial patterns of development in Dhanmondi Lake Revitalisation project, has revealed the fact that; in their present condition, increased integration between the spatial order of the lake side development and the surrounding urban system of the neighborhood is about the principles of continuous connections among different grid morphology. This phenomenon is further emphasized by locating different activities at strategic and integrated locations through the lake side walkway. This spatial integration in turn, restores the lake side area from encroachment and environmental degradation.

Urban design and landscape architecture are unusual commissions in a developing city like Dhaka, where urban development tends to be controlled by limited financial resources and development priorities. In such a context, the project encouraged public involvement by shaping up the public realm in the global context of the city. In spite of the problematic territorial effects in Dhanmondi, the larger concern to protect the water body from diminishing away remains undoubtable. In critiques view, "The Dhanamondi Lake redevelopment in flood-prone Dhaka, Bangladesh is a paradigmatic strategic urban project in a growing city. The scheme simultaneously restores and manages a significant urban water resource, provides public recreation space, and incorporates visionary design strategies to avoid encroachment by the city. Modernity coupled with an indigenous intelligence is indeed timeless and can guide Dhaka well in to the coming century." (Shannon and Nilufar, 2008).

Notes

- 1 The term 'Mega city' is frequently used as a synonym for words such as super-city, giant city, conurbation, and megalopolis. There has been little agreement about the size of the mega city. Mega cities are defined as cities that were expected to have at least ten million inhabitants by the year 2000. Please see World Bank's *Urban Policy and Economic Development: An Agenda for the 1990s* (Washington: World Bank, 1993).
- 2 Khal is a Bengali word, meaning small channel.
- 3 Dhan means paddy, and mondi means market in Bengali.
- 4 Sthapati Bengali word meaning Architect and brindo means a group of people.

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