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Water and Architecture: The process of design myths and integrated image of Dhaka city in the primordial time

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Abstract: *The modern planned towns are futile when modern environments are described as ‘most hated’ and ignore the functional meaning for adopting nature in the process of urbanization. It raises the question of the contemporary process and methods of urban planning where the word ‘modern’ frequently used as ‘better than the old.’ The dramatic counter-revolution has seen in the contemporary urban design theory in the last few decades. It frames space by revealing the traditional experiences and resources in modern urbanism. But, it is tough to predict the spatial dimension of the city today while the agglomerations are becoming significant with its surrounding sprawl and interwoven with space. However, traditional urbanism is now the reaction of modernism, where embracing the idea of space seeded in the 1960s. Those concerns are still relevant for the comprehensive designs of contemporary master planning in many rapidly developing cities where traditional spaces are quickly torn down and swept away. The debate between modernism and traditionalism are now a crossroad in city planning. The emerging complexity and chaos could unlock the natural order in a variety of phenomena that are measured before. The idea of evolution is not the idea of transformation of space, but it had the repercussions for space to nature and functioned as diverse politics, economy, and socio-cultural physiognomies. Therefore, building a bridge between modern and tradition could transform the contemporary built environment with the universal concern of space in the urban planning and design: that is, how to create better urban space and emulate traditional urbanism? Adaptive incremental growth with functional order in nature and diversity of forms in the evolutionary process means a combination of continuity and change towards future transformation of the city. In some extent, the complex functionality of living things and economic mechanism are interpreting urban evolution as a fact of urban change. This paper is diagnosing the urban evolution through the structural variation, and traditional linkage on it could help us to comprehend urbanism from the crossroad of city planning and design.*

Keywords: *Water, Tradition, Image, Space*

I. INTRODUCTION

Today, the success of the cities depended on the development of technical and natural infrastructure rather than its location. Waterfront sites provide an opportunity for the redevelopment of centralized urban space and make its local image visible to the global arena. On the other hand, many environmental and urban regeneration efforts are successfully made by the importance of central waterfront development in the city, such as Bilbao, Shanghai, Amsterdam, and Havana. And, those cities transformed from the industrial port city to the economic service city with the success of the physical realm of city space where waterfront playing a vital role in the first instance. However, waterfronts are most often considered as a degraded space in the contemporary city center due to its industrial operations, chemical discharges or abandon space next to the water. Also, the quality of contemporary urban expression is subject to restructuring water and its spatial position in the built environment. However, water is the emerging platform in a city where architects, urban designers, planners, and other related professionals can experience their contemporary visions of the urban capital by articulating valuable urban spaces and the interfaces of the urban border (city, water, and territory). Bilbao and Shanghai are the two examples of waterfront transformation [1] with the new expression of the city landscape. Both transformed along their respective water edge where they rediscover the identity of space from the abandoned industrial zone under the strategic development of water. Individually, Bilbao is the case of creating a new image of the city, and Shanghai is an economic transition to create the quality of space with the critical issue of industrial transformation. However, in both case regeneration of urban space is characterized by water in a relationship between the built space and its topography. The Guggenheim Museum (1997), the Calatrava Bridge (1997) and the river (Ria de Bilbao) edge development upsurge the international interest and reshaped the image of new Bilbao. On the other hand, in Shanghai Huangpu river development, the background view of the water from the

Pearl television tower, the mouth of Suzhou Creek and the master plan of Shanghai (Shoreline open space, regional open space and ferry routes) all give a new economic expression to the Shanghai waterfront. In both cases, redevelopment of urban space transforms the waterfront as a heart of the city's cultural, social, economic, and everyday civic life. Amsterdam and Havana provide another example of revitalizing historical identity and conservation of space [1] through the process of water development and real estate exploitation for capital gain. The contemporary ideology was the heart of waterfront development and reinventing the existing physical structure in the city center. The old fabric of Amsterdam city formed on the water which is constructed by a reproduction response of human-made dikes.

This city back to the waterfront redevelopment in the late nineteenth century when the construction of central station broke the relationship between the city center and the river IJ. And, waterfront development was the central concern to reinvent the connection between the old urban fabric and the new developments. On the other hand, Havana is now dealing with similar issues of waterfront redevelopment in the critical initiative of the city's economic growth. Amsterdam defined as a financial and cultural capital of the Netherlands, where the historic inner city is an example of urban revitalization and innovative development. In the 1960s, due to the lack of space and poor accessibility to water cause an economic shift from the city center to the periphery. But the new form of water-based transformation and economic activity rediscover the city center, culture, tourism, and retail activities. In the physical dimension, the city transformed into a series of half-circles which are originated in the core area along the IJ and progressively expanded away from it. And, those semi-circular shaped of the central medieval city is surrounded by the seventeenth-century canal belts with rows of trees and stretching out street along the curvilinear waterways. On the other hand, Havana is uncharacteristic city (twentieth century) city due to its political and economic instability and demand for mass production of housing and infrastructure to maintain its growth and space. The city of Havana (Le Ciudad de la Havana) is one of the main Island (northwest cost) in a protected bay (Bahia de la Habana) in Cuba. Although, the country's industry focused on agricultural production, but the economic transition transforms the city Havana to attract investment in real-estate development. And, it creates a new market for housing development and economic prosperity by producing a threat to historical and architectural treasures in the inner city that is Havana today.

Therefore, a balance between the demands of economic capital and the historic consideration was the major issue for waterfront development in the city structure. On the other hand, the shift of harbor activities from the inner city makes an opportunity to remake the city Amsterdam under the connection between the bank of river IJ and the historic center. Consequently, the waterfront transformation turns into a bold contemporary architecture to reinvent the city image (for example, the new metropolis museum by the Italian architect Renzo Piano). Also, the allocation of harbor activities also opened up the area for new residential development with commercial and retail facilities in the dense city center of Amsterdam. However, housing (Social and affordable) was the major urban component for the redevelopment of river bank IJ. In such a way, the city increased land value with the benefit of water in the densely populated city of Amsterdam.

In some extent, the active water policy for central urban development was the important instrument for reshaping the social structure and the composition of neighborhoods. Another approach is so-called 'Anchors' of the river IJ where the urban development aims to connect the islands with the diversity of the inner city. Therefore, the city is investing in infrastructure and high quality of public spaces at the strategic location. In this way, the city is seeding its development next to the water for reinforcing the relationship between the islands and inner-city centers. Conversely, Havana is representing contemporary urban history.

Where Baroque and neo-classical architecture constituted the old fabric of the town in a square based economic activities. However, the harbor and remain of the old town wall define old Havana. The commercial importance of the historic city center revitalized with the engagement of water for the promotion of the old town center. Such, urban transformation balanced with residential production of space, which gives a rhythm of the existing urban fabric and traditional linkage of water with commercial and leisure uses. It also links to the small territorial villages to the water.

However, both cities provide us an opportunity to explore the nature of the waterfront and the heritage of the city. Where Amsterdam has a long history of waterfront redevelopment and Havana is just beginning its endeavor. In some extent, waterfront redevelopment allows the integration of old and new expression. And, it is the contemporary attitude to rethink the cultural production of space and the role of heritage in the built environment. Therefore, "contextualism, in this sense, is not about the reproduction of the old but about the ability of the new to make a relationship with the old" [1]. However, conceptualizing the city image is to be ordered in the contemporary space for functioning the old fabric and the integration of new transformation with its identical infrastructure like water.

II. WATER AND MODERN MOVEMENT

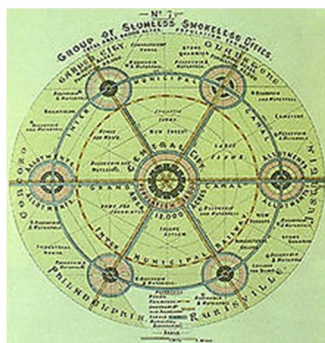


Fig 1: Ebenezer Howard's Famous Garden City diagram with the network of canals (Inter municipal canal and Grand Canal), reservoir and waterfall (1898).

In the city planning, perhaps the proposal of the linear city by Arturo Soria y Mata [2] was the modern design movement to articulate space in order through the planning vision of the whole city. The central spine (railroad or tramline) of the city and the regular pattern of street grid structure was made the city more flexibility to grow in case of planning need or design. The city was parallel to a river so that the dominant wind could blow from the residential areas to the industrial strip. Moreover, the separated zone of a linear city consists of different functional use of sectors so that it could add more sectors and go across to the country. The elongated urban formation of Ciudad Lineal in Madrid systematized by the conception of social and political issues, hygiene and modern technology such as including pneumatic tubes for letters and packages. Stephen Marshall added a note from the Soria y Mata that "An architecture of the cities is as necessary as the architecture that teaches how to construct buildings" [3]. In 1898 Ebenezer Howard Published 'Tomorrow: A Peaceful Path to Real Reform' which was significantly reviewed [4] as 'Garden cities of tomorrow.' This revolutionary idea of the green movement in the city planning was based on social and urban reform to evade industrial crisis of urban poverty, overcrowding of urban space, low wages, dirty alleys without a drainage system, poorly ventilated houses, toxic substance and lack of interaction with nature. In some extent, it was the vision of slum less town where the relationship between town and country organized under the deliberation of natural background of the traditional city in a shape of unity. However, Howard's diagram is still famous and one of the most influential models in the city planning history, where this novel idea conceived in many cities. The concept of the garden city was illustrated from his famous three magnet diagram which addressed the question 'where will people go?' under the choice of 'town,' 'country' or 'town-country.' However, the Garden City Diagram consists of seven clusters of city centers of individual self-contained settlement. The countryside between the centers are also part of the whole city, and it is not leftover or residual space. It is part of the design and part of the entire city [3]. Besides the modern features (roads, circular railroads, the industry at the edges, land use zoning, civic functions at the centers, intermediate zones of housing and shopping) Howard's Garden City represent a good network of the inter-municipal canal of the water system. This idealistic decentralized city is not only serving the series of cross streets thru the town centers but connected all scale of the city centers thru water network where the central town center is associated with a grand canal. The centers are functionally individual and interdependent, which give a sense of the traditional city based on the environmental movement where they are all integrated and reliant part on the whole system. The significant number of demarcation about reservoir and waterfall in the edge and between the centers of the diagram is showing the concern of water security in the city planning and design. In some extent, maybe this city could be better understood as a 'water city' rather than a 'Garden City.' Water is emerged as an urban element in the arrangement of town centers to interconnect cities and country, industry and agricultural, centers, and people. However, water reinvented in the diagram as an essential part of the whole unity of the city that also reflects the traditional web of water in the modernist movement of city planning. In some extent, Howard's novel visions are critically addressed against capitalism to build social collaboration in the planning system that is still inspirational for the contemporary city planner and designer. Reconstitution of natural features in the systematic urban order was the credential movement for planning future cities. Here, water was the core of the physical structure, and green was the core for a functional structure to create the modern city environment for the people, city, and country. The diagram of the garden city concept married with the town and limited scale of suburban thru the green belt of agricultural land, natural reserve zone (forest) and the network of canals. On the other hand, it is blending the city and nature by keeping the individual identity of towns and country where towns are mostly independent and realized by the economic interest of the citizens. However, Howards notes that the city should be planned and organized as per the needs of the people and their environment.

A. Open-space and Corbusian transformation



Fig 2: Ville Contemporaine, ‘contemporary city’ (1920).

In the 1920s, Charles-Édouard Jeanneret (known as Le Corbusier) outlined a series of idealistic rational cities, where he offered different approaches to solve urban congestion, disease, pollution, overcrowding of space, urban population, and density of Industrial city. Le Corbusier envisioned the ‘Radiant City’ (also known as towers in the parks) and provided green open spaces in between of large scale of residential towers. Unlike Ebenezer Howards, spaces delineated with a different zone of functional uses (with separate sectors devoted to housing, offices, industry, and government). Le Corbusier’s idealistic vision of polarized urban space and modernist vision had an influential impact on the planning and building of cities in the 20th century. This predominated pattern was [re]materialized in the design of massive public housing projects in America for slum clearance in the era of urban reconstruction, when the traditional city transformed into a chaotic mixture, then the ‘Radiant City’ definite space in order through the separation of zoning. According to Stephen Marshall [3], Le Corbusier translates the earlier ideas of linearity, extensibility, modern transport, rationality, zoning, and construction of technology in a novel revolutionary form of space. Also, the ‘Radiant City’ is a radical departure from the traditional city both in terms of city design and urban order of space. The revolution of urban forms embracing open spaces in order and the intervention of segregated transport system (between fast vehicle and slow pedestrian) that format this innovative diagram to the foundation of the modern movement.

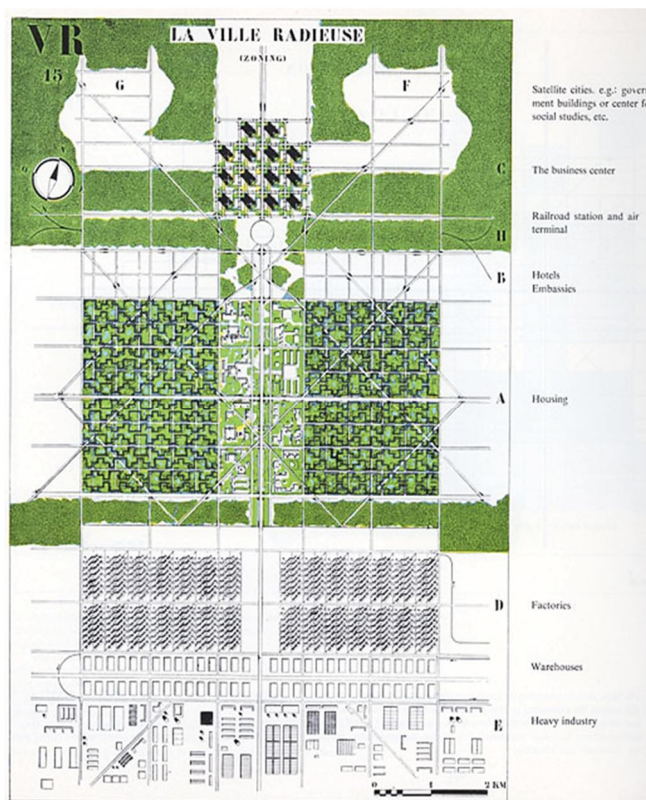


Fig 3: Le Corbusier’s “Radiant Cities” (1935) was built around large towers set far apart to provide residents with equal access to light, air, and open space.

Source: Le Corbusier’s “The Radiant City” (1933).

In ‘the Radiant City’ skyscrapers are plugged into the conventional street-grids, multi-lane traffic ways connected with conventional building frontages, railway station cross the business center, streets derived as an urban economic form, residents separated from vehicular routes, Satellite cities and the embedded neighborhood units in the traditional urban fabric are all came in urban order as a synonymous of modernism- as illustrates in the figure (3). Le Corbusier opens up the city sky for all by accommodating a large population in the skyscraper of housing blocks, rectangular green space for parks, and transportation hub in a systematic urban order to regulate urban density. Subsequently, his designed has an effective means of open spaces to create better-living pattern for the mass population living in a compact space. Here, space transformed for an improved urban lifestyle with social dynamics and living environment. In some extent, the spatial organization of space was radical, systematical, and linear order that is also reflecting the modern method of the zoning space in the city planning.

B. N-Choe and the City Beautiful

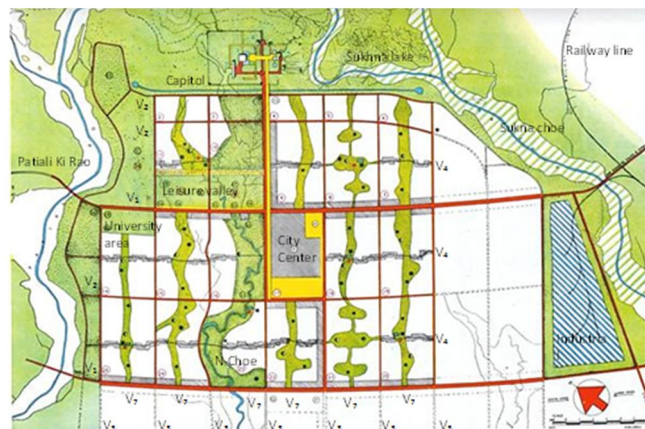


Fig 4: The master plan of Chandigarh city: defining the urban grid, green strips, and location of water bodies. The Master Plan was developed by Le Corbusier (1966).

The city ‘Chandigarh’ is the masterpiece of Le Corbusier’s urban design and architecture. Chandigarh is the capital city and a union territory in the northern part of Indian Punjab and Haryana. In 1948, the empty flat site selected on account of various attributes of topography. Where, the consideration of adequate natural source of water, the gradient of the land for natural drainage system, and a beautiful landscape of panoramic mountains in the backdrop were the primary contemplation. Though the city planning was contrary to the traditional pattern of Indian cities, the boldness of space was transformed the natural space into the shape of the superblock. However, the city represents modernism in the context of India, where the regeneration of traditional neighborhood into superblock design was the principal unit of city structure. In some extent, the master plan was signified as the post-war ‘Garden City’ where the vertical and high-rise building precluded by keeping an eye to the living behaviors of the local people and open spaces. Le Corbusier designed the master plan of Chandigarh (the city beautiful) in the le modular¹ system and the analogous to human body: where, Head- is the Capitol complex in Sector 1(place of sovereignty) which defined the upper limit of the space; Heart- is the city center in sector 17; Arms or intellect- is the cultural and educational institutions; Stomach or viscera- is the commercial or industrial zones; Arteries or circular system- is the network of roads and pedestrian of the 7Vs; and Lungs- is the leisure valley or open spaces and rivulets under the green sectors. However, the spatial relationship of the deliberated design elements and natural topographies integrated into the urban landscape of innumerable open spaces. The urban core (the city center) and the environmental core (the naturally reserved zones in the north) implicitly signified in the intersection of the urban grid and ecological grid of the Chandigarh city. Consequently, the extension of gridiron patterns transformed in the deliberation of water bodies and the interface of green in-between of water and urban built spaces. The city edge delimited by the peripheral water bodies of Patiali Ki Rao in the west and Shukna choe² in the east. Also, the N-choe seasonal stream intersected the city center that is also a part of peripheral streams. Besides

¹ The ‘Modulor’ is an anthropometric scale of proportions devised by the Swiss-born French architect Le Corbusier (1887–1965). It was developed as a visual bridge between two incompatible scales, the imperial and the metric system (Corbusier, 2000). Le Corbusier developed the Modulor in the long tradition of Vitruvius, Leonardo da Vinci’s Vitruvian Man, the work of Leone Battista Alberti, and other attempts to discover mathematical proportions in the human body and then to use that knowledge to improve both the appearance and function of architecture (Ostwald, 2001).

² The word ‘choe’ means stream or river in the Punjabi language. And the N-choe known as Nalaa or Stadium nalaa or Ataawa choe among the local people.

the orthogonal shape of gridiron pattern for future expansion and separation of functional space, water and green web controlled the evolutionary shape of the city towards nature. Also, the urban design and architectural aesthetics of the master plan were preserved the natural flow of the environment under the conservation of hierarchical landscape of open spaces and axial networks. Then, an integrated axial system of seven type circulation (7Vs) introduced in the master plan: where V1 is the fast roads connecting Chandigarh to other neighbor towns, V2 is the arterial roads, V3 is the fast vehicular roads, V4 is the meandering shopping streets, V5 is the sector circulation roads, V6 is the access roads to houses and V7 is the footpath with bicycling track along the green strips. Also, the right-angle urban form of the grid system shows the hierarchy of movement pattern that segregated residential zones from the traffics. On the other hand, the plan dedicated that every dweller should have three elements of sun, space, and green. Also, the primary module of the city design was the sector of the neighborhood unit. Therefore, the city consisted of 30 sectors which considered with varies functional zoning, centers, recreations, worship, the topography of the area, plot sizes and walking distance to the social service and shopping centers. The orders of the spaces are common and focusing on the social movement of the living pattern. However, the hierarchy of green spaces integrated into four levels in the city structure. In the city level green space (public) is connected with water bodies in the east (Shukna lake and Shukna choe); secondly, free-flowing central landscape of green space (public) coupled the entire city and the small stream N-choe (locally known as nalaa); thirdly, semi-private green space (shared) for neighbourhood green pockets; and fourthly, private green space for residential units. In a sense, the inclusive city landscape with green floorings merged into the systematic order of urban circulation. Where the interior stream of N-choe is acting as a flood controller connected with the part of 'Patiali Ki Rao' and 'Shukna choe' of the exterior streams. Also, the green sprawl of spaces integrated to the central spine of the seasonal rivulet gradient of N-choe, which was conceived by the Le Corbusier as the 'lungs' of the city landscape. However, the different scale of urban spaces and the city center also plugged into the central part of the landscape thru the water flow of N-choe. Besides the negative critics of the over the dimension of space (human scale), the Chandigarh is a unique example of gridiron pattern where the flow of green and water body spatially adopted in the city structure. The continuity of the natural space of the urban filter in the urban floor creates an impression of green living under the green corridor of biodiversity. Today, the prerequisite contemporary crisis of landscape and open space was dramatized in the modern Chandigarh city by the master architect of Le Corbusier and his team³, where the landscape became the part of socio-urban life and recreational space for the city dwellers and explorers.

III. TRANSFORMATION AND WATER EDGE

The concern of urban space evolved at the end of the 1960s for improving the built environment and making space for the public realm. Consequently, it was the product of postmodern thinking process by the modernist architects, urban planners, landscape architects, and other related professionals. In this initiative, the meaning of urban space discussed into three intensities. Firstly, the ecological significance that implicates with adapting the natural environment to facilitate the quality of the built environment with the importance of the physical environment. For this reason, urban design intervention derives as a dynamic way of preserving the natural resources and the strong relationship of the functionality of space. Secondly, economic significances, where the economic growth and technical improvements transform the structure of the space to the production of the space. Therefore, the quality of the built environment significantly affects the local, regional, and international images of global and local economic actions. Thirdly, social, and cultural significance, where the cultural and traditional identity of local place and commercial activities are essential elements for conserving the image of the community development. In a sense, it attracts investors and tourist to link with the identity of space through the idea of cultural-led regeneration of waterfront development [5]. However, 'the space of difference' and 'respect to the environment' are all looming as of the spirit of postmodernism. Also, it debates the physical quality and role of urban space in the built environment. In the earliest city planning, artistic medieval and renaissance form by Camillo Sitte (1889) was the evocative remedy of urban space and that the method of the medieval town humanizing the contemporary city. However, he significantly accentuated on the esthetic quality of space in the city's public realm into a frame of the timeline. But, in the early 20th century "The improvement of cities and towns" [6] and "Modern Civic Art" [7] by Charles Mulford Robinson were the aesthetic movement in the field of urban design. However, the 1960s ingenuity of urban regeneration and urban design by Jane Jacob's, Kevin Lynch's, Gordon Cullen's, Christopher Alexander's works were the milestone to constitute the urban space. Where Jane Jacob's work [8] "The Death and Life of Great American Cities: The failure of town planning" criticized modernism that publicly unidentified space transformed like a 'city in the park' and those spaces are the instigator for anti-social activities. She also

³ Le Corbusier was assisted by three senior architects, Maxwell Fry, his wife Jane B Drew and Corbusier's cousin, Pierre Jeanneret. However, the Master Plan was developed by Le Corbusier who also designed the Capital Complex and established the architectural control & design of the main building of the city. The designs of housing for Govt. employees, schools, shopping centers, hospitals were disturbed among the three senior architects (Chandigarh Administration, 2014).

advocates 'eyes on the street' which mean the revival of the public space, streets, and squares in the city development. Then, Kevin A. Lynch [9] issued "The image of the city" which advocates the evolution of space and concept of legibility based on five basic elements (paths, districts, edges, nodes, and landmarks). Gordon Cullen's work [10] "The Concise Townscape" examined the traditional artistic approach to city design that also found in the idea of Camillo Sitte, Barry Parker, and Raymond Unwin. His 'serial vision' conceptualized urban landscape as a series of related linked spaces and esthetic quality of urban quarters enriched the vocabulary of urban designers. However, Jacob, Lynch, and Cullen's works transformed the city from the perspective of civic people. Other books, such as Aldo Rossi's "The Architecture of the city" [11], Venturie's "Learning from Las Vegas" [12], Colin Rowe's "Collage city" [13], and Peter Calthorpes's "The Next American Metropolis" [14] were all focused on the theoretical subjectivity of space. While Rossi brings a concept of "Historicism" and "Collective memory." Then, Rowe and Koetter proposed a "Collage metaphor" new and old forms within the same urban space. On the other hand, Calthrope developed a strategy for sustainable urban living at the medium density and the concept of TOD⁴. Above works gave a momentum of a postmodern indication to urban design for making a successful space in the built environment. Their work vibrates the terms of 'historicism,' 'sustainability,' 'livability,' 'aestheticism,' and high quality of urban mechanisms. In some extent, the re-experience of urban space appears as a by-product of postmodernism [15].

Consequently, the transformation of post-industrial cities and waterfront developments are the pragmatic implementation of postindustrial movement. However, the post-industrial cities fragmented from physical, social, and economic activities. When industrial space leave the nature of water into toxic contamination and unutilized space in the city center, then the post-industrial movement sought several questions about how space should transform to reveal water edges? Moreover, what is the appropriate relationship between waterfront and space to make a city a better place for the people? How could the segregated space be reconfigured to integrate old town center and the water edge? Over the last fifty years, unplanned industrial development next to the water destroying the valuable city assets by decreasing civic value in the collective conscience. Vancouver and Sydney are two waterfront cities that are exemplifying the transition of space from the industrial to the contemporary environment under the redevelopment of water and level of urban amenity in the space. In the concern of urban regeneration effort and access to the waterfront reconnect the water as a center of the city life.

In the industrial history, the waterfront of the Vancouver city was mainly engaged in seaborne shipping facilities, railway yards, shipbuilding yards, and lumber-based industry. However, over the last three decades under the redevelopment of former industrial space transform the waterfront into a model of the post-industrial city. Where, the unique success was to implement high quality of urban space next to the water, high-density development along the inner waterfronts while many cities around the world are rapidly transforming the less dense suburban area or territorial settings due to lack of inner-city development. On the other hand, Sydney is considered as a 'waterfront city' where it's the scenic view of the harbor makes the inner city different from the reality of water and continuity of space. Besides the success story of the city, highways at the waterfront, political fragmentation and less access to the waterfronts desecrated the city from the opportunity to integrate water edges as a one solidarity system. However, Sydney transformed in the two distinct of urban realms: one is the harbor, and another one is the city where those realms connected in a few transected space. However, among them, the harbor is the most powerful realm that is projecting the city image and defining the identity of space (Harbor Bridge and Opera house) with a strong relationship with water. In some extent, it is the urban reward by the nature of water position in the city. However, both cities were the commercial interest of the British colonized period for the strong relationship of the harbor.

The form of both city centers was reflecting its industrial harbor area in a new landscape of water settings and developed the shape of the peninsula towards the water. Vancouver and Sydney, both city, struggle with the difficulty of urban redevelopment to build the image of the water in the city structure [1]. Also, the contextual quality of space and the acknowledgment of the water was the resource for the city [re]development. In some extent, the experience of urban regeneration with the strategy of water in both cities could be an example of the explosive growth of contemporary cities in South Asia, where those developing cities could benefit from the redevelopment of the waterfront. The contemporary complexity and challenge of urban water are to connect the city image with water. The continuity and transformation of space should conserve the identity of space and the city center where the city is originated and shaped by the water infrastructures and lines of access to the water. The end of the twentieth century and the beginning of the twenty-first century has come with the unstable contemporary urban transformation over the territory and water edges. This rapid urban expansion and industrial sprawl on the territory breakdown the spatial image of the city and the structure of

⁴ TOD = Transit Oriented Development.

the historic urban fabric. For this reason, the traditional relationship between water and the city is either fragmented or disappeared. And, shaped by the contemporary sprawl of urban growth, abandoned industrial space in the city center and imposing vast factories on the territorial landscape [16]. Consequently, contextualizing waterfronts should be spatially interpreted as an essential paradigm of tradition and modernity for the contemporary growth of the city. Radically shifting the urban fabric and acquired more peripheral space with a less accessible form of the urban network create difficulty on the waterfront and territorial development. They rapidly urbanized without recovering the heritage of space in the process of urban transformation. In some extent, redevelopment of the waterfront is an indispensable contemporary search to enhance urban quality for the 'construction of the image of the modern city.'

However, according to Richard Marshall [1], the result of urban transformation depends on:

- 1) Opening up the waterfront to the public.
- 2) Development of accessibility to the waterfront where pedestrian access is essential, especially about link route with city centers and outlying or territorial zones.
- 3) Upgrading the waterborne transport system by the public entails and re-launching urban mobility.
- 4) Highlighting the environmental and urban features of the waterfronts, consolidate nature, city landscape from defining the border of the city and water.
- 5) Ensuring the quality of water for territorial agricultural activities and the aqua ecosystem for preserving the environmental flow of biodiversity.

Also, waterfront redevelopment is a testing ground for restructuring the density of the city with the strategic importance of paradigmatic urban growth and population compactness in the space. However, the theme of globalization waterfront is further resounding with the significant result of the maneuver in the urban fabric. And the places are: Victoria and Alfred Waterfront in Cape Town, Puerto Madero in Buenos Aires, Port Vell in Barcelona, London vast Docklands area, the eastern port of Amsterdam, Kop Van Zuid in Rotterdam, and Berlin is closely associated with water due to presence of two rivers and lakes inside the urban fabric which are all the primary concern for urban redevelopment. In the United Kingdom (Liverpool, Glasgow, and Cardiff); in France (Le Havre, Dunkerque, and Saint-Nazaire); in Germany (Hamburg, Bremen, Kiel); in Spain (Valencia, Malaga, and Cadiz); in Italy (Genoa, Venice, Naples, and Trieste) are few global instances that adopt water strategy for recurring heritage and linked the diverse urban features to the individual context of local traditions. The co-presence of water-related civic activities transforms the city life into impressive landscapes that entail urban complexity. In a sense, urban complexity is a quality that differentiates and articulated urban order. For this reason, "(...), the complexity of the city is a product of intelligent and continuous work of construction, often over many centuries" [1].

The primary task of the waterfront is to characterize urban border in the interface of water, city, and territory. Reinforcing the centers that linked to the heart of the city, and hinterlands that are behind the water needs to spatial improvement for protecting central zones and distant territorial spaces. For as an example, the experience of Barcelona in the 1990s in the construction of Olympic village was redefined urban border along the seafront that continues city landscape to the water with a significant number of public spaces and activities.

However, postindustrial cities are struggling to redesign industrial abandoned space by comprehending the imprint of postmodernism that could be the vital policies for contemporary growing cities. In some extent, re-composition, regeneration, and recovery of the urban transition of space are essential, where re-composition means the physical and functional constitution of space with centers of commercial activities.

Regeneration means revitalizing or re-examining the position of water as a center of the city to embrace the functional aspect of waterfront and redefining the role of water as an image of the entire city that has a great meaning on the everyday civic, and social life. Recovery means the choice of the introduction of new waterborne activities in the residual spaces where restructuring and restoration of space have significant historical means.

From the above viewpoints, many postindustrial cities represented as a laboratory of waterfront re-development considering their internal and external transformation of space.

However, the post-industrial cities transformed into the act of urban renewal at the end of the twentieth century, where water was of strategic importance to define the innovative urban quality. That, offer higher living standard with a vision of water heritage in a national and international scale. Predominantly, in Europe, the waterfront strategy is identified as a leading force for the future transformation of the city design.

IV. CITY'S GROWTH AND PAST GLORY



Fig 5: The City of Dhaka and the River Buriganga (1861). A painting by Frederick William Alexander De Fabeck⁵.

Source⁶: V & A, 2012.

Dhaka, formerly spelled as 'Dacca' in the British rule. Today, it is the capital and one of the oldest city of liberated Bangladesh. The history of Dhaka originates with the existence of indigenous settlements in the past era that is now Dhaka dating from the 7th century. Epistemologically, this region was ruled by the Buddhist kingdom of Kamarupa before passing to the control of the Sena dynasty in the 9th century [17, 18]. After the Sena dynasty, Dhaka was successively ruled under the Sultanates from the 14th century, by the Turkish and Afghan governors descending from the Delhi Sultanate before the entrance of the Mughals. The city established in 1608 as a 'Jahangir Nagar,' the capital of Mughal Bengal. At the age of Mughal, they developed three capitals: Dhaka, Murshidabad, and Kolkata. Among them, Dhaka was the oldest one. It was one of the largest and most flourishing cities of the Indian subcontinent and the center of the worldwide muslin trade. Later, the Nawab of Bengal shifted the capital from Dhaka to Murshidabad in the 1700s. After Mughals, It came under British control in 1757. British ruled this region for around 200 years until the independence of India. In 1947, Dhaka became the capital of the East Bengal province under the colony of Pakistan. After the independence of Bangladesh, Dhaka became the capital in 1971. The age of Dhaka city is about more than four hundred years older. However, Dhaka was well known as the city of fine muslin, mosques, gardens, and river Buriganga, where it has an equally long history of urban evolution thru water [19]. Also, it was a trivial town & commercial center before it derived as fame of Mughal capital of Bengal in the 17th century. Dhaka with the passage of water testifies different faces of history. Ancient pictures, paintings, and maps are the most efficient visual methods that can illustrate the colorful history of Dhaka. However, the growth of past settlements categorized in this section into the six historical segments. They are the Premughal (1205-1610), the Mughal (1620-1757), the East India Company (1758-1858), the British Colonial Period (1858-1947), the East Bengal (1947-1971) and Bangladesh (from 1971). In some extent, "Colonial South Asian Cities inscribed social and economic hierarchies upon expanding urban terrain. These hierarchies constructed out of different overlapping social divisions" [20]; spaces of social control, spaces of Autonomy, and spatial segregation of class populations. The paradigmatic image of the partitioned colonial city and boundaries of colonial urbanism provide an opportunity to what extent colonial urbanism constituted a coherent set of ideas and practices [20]. This section also represents the morphological revolution in Dhaka City thru the water. It reveals the spatial dynamics of urban space and water of Dhaka over the last 700 years from 1205-1971. The primary objective of this section is to examine the transformation of built space and analyze the traditional urban fabric of old Dhaka City.

⁵ The brothers Frederick William Alexander de Fabeck (1830-1912) and William Frederick de Fabeck (1834-1906) were both employed in the Medical Service in this region and at that colonial phase they sketches many architectural details of Mughal dynasty which still giving us the past living style and settlement pattern of this South Asian province.

⁶ V & A, 2012. Victoria and Albert Museum. [Online] Available at: <http://collections.vam.ac.uk/item/O105764/the-city-of-dacca-viewed-painting-de-fabek-frederick/>

A. Premughal transformation [1205-1610]

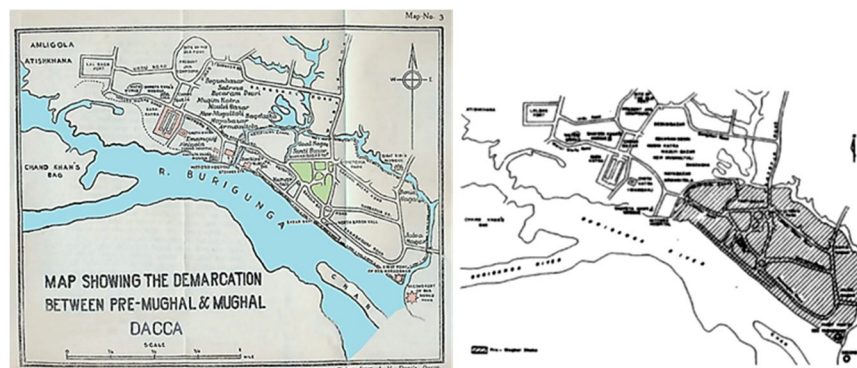


Fig 6: Water demarcation map between pre-Mughal and Mughal Dacca.

Left- Pre-Mughal Dacca bordered by river and canals. Right- land delineation of pre-Mughal Dacca.

Source⁷: Dani, et al., 2009; Ahmed, 2006; Islam, 1996.

In the Premughal period under the Sena dynasty (1095AD) this region (old Dhaka) was highly populated by the Hindu community with different local economic activities of craftsmanship. Then, those localities are rapidly transformed and clustered conferring their socio-economic endeavors into a diverse identical settlement pattern of ‘fifty-two bazaars’ with fifty-three streets. Also, this region locally named ‘Baunno Bazar O Teppuno Gulli.’ The individual settlements were rapidly growing with the cultural identity of local and agricultural products. It transformed this land into a productive place of the local market and exchange of commodities next to the canals and river Buriganga. However, those traditional street and water-based market activities were accelerating and tempting this land for trading in locally and regionally. Easy access to water transportation and trade encompassed political attention of power. An Afghan fort was erected in the Premughal era to control this land. Probably, it was the initial argument for the political and economic power of disposing of that transformed the ground into battle for space and trading center. Those market-based settlements were turned to linear organization of row houses in a very compact pattern with courtyards in the back and narrow frontage (6-10 feet) along the narrow lanes, for as an example, shakharibazar. In some extent, local economic and cultural evolution shaped the settlement patterns in this land, which later form a small scale of the town with the spatial consequence of water — moreover, the Premughal settlement bordered by the Buriganga river and its branches.

B. Mughal Transformation [1620-1757]

‘Dacca’ derived from a provincial capital with the existence of urbanized settlement under the Mughal domain. And, the city was called ‘Jahangir Nagar’ The city of Jahangir⁹. Therefore, during the Mughal period, this land was transformed into an authoritative metropolis in this region and capital of Bengal for its political, commercial, and water conveyance. Due to its precise location next to the river routes¹⁰, it became an important transnational hub for business and trade in locally and globally. Then, the land became a famous city for the fine muslin, jute products, and so on with its growth. Also, this region turned into densely populated town by shaped their settlement along the bank of river Buriganga and beside the internal canals (Dholaikhal). During this period, the city structure was rapidly extended (12 miles in length and 8 miles in breadth), and several significant edifices erected for administrative determinations. Bara Katra (official residence), Lalbagh Fort (before Buriganga River in the southwestern part of the old town) and etcetera were the example of governing edifice with Mughal architecture, which superciliously controls this Bengal region in the Mughal dynasty. From the sacred perspective, mosques¹¹ were also fabricated in this historic township with the rapport of holy water.

⁷ Dani, A. H., Chowdhury, A. M. & Caudhuri, A. M., 2009. *Dacca: a record of its changing fortunes*. 3rd ed. Dhaka: Asiatic Society of Bangladesh. Ahmed, E., 2006. Dhaka. [Online] Available at: <http://www.dhakadailyphoto.blogspot.com>, Islam, N., 1996. *Dhaka from City to Mega City: Perspective on People, Places, Planning and Development Issues: Urban Studies Programme*. Dhaka, Department of Geography. University of Dhaka.

⁸ Traditional neighborhood’s market place. And they are located in the old part of the city under the name of Laksmibazar, Banglabazar, Sutrapur, Jaluanagar, Banianagar, Goalnagar, Tantiabazar, Shakharibazar, Sutarnagar, Kamarnagar, Patuatuli, Kumartuli and etcetera.

⁹ Jahangir was the fourth Mughal emperor and ruled this region from 1605-1627.

¹⁰ Rennell, James (1742-1830) geographer and marine engineer who made an exploration of the Bengal river basins and mapped them for the first time. Born in Devonshire, England. To facilitate commercial navigation, Henry Vansittart, governor of the Fort William, gave him a commission in Bengal Engineers of the company’s army and entrusted him with the specific responsibility of making a survey of the major rivers of Bengal and their tributaries (Banglapedia, 2012).

¹¹ Binat Bibi Mosque (1454AD) situated near Dholaikhal (canal) and beside the Hayat Bepari’s bridge. Shaysta Khan Mosque (1664AD) and Saat Gombuj (seven dome) Mosque (1680AD) were situated by the river Buriganga. And, those all standing monuments were representing the Bengal and Mughal architecture.

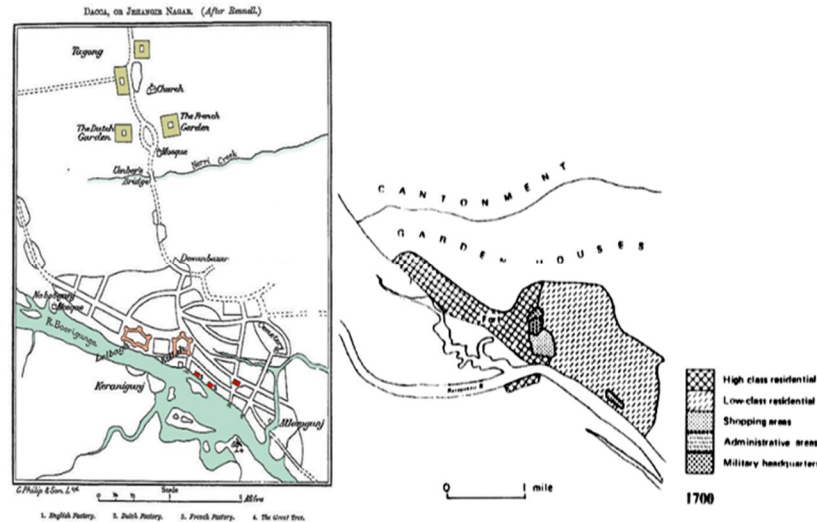


Fig 7: Dacca or Jahangir Nagar (1608): The Mughal capital of Bengal.

Left- James Rennell’s Dacca city map (1776) shows the location of factories (English factory, Dutch factory, and French factory) next to Buriganga River (Boorigunga) in the south and bordering peripheral Garden Houses (The Dutch Garden and The French Garden) next to ‘Nevri creek’ in the north.

Source¹²: Hyderabad State Library, India; Ahmed, 2006.

Right- Land use (residential segregation and central administration zones) map of Mughal Dacca (1700).

Source¹³: Ahsan, 1991.

At that time, the historic thoroughfares were mainly based on pedestrian lanes, and they were named by mahallas. Besides, Rivers and canals were the essential traffic conduit in this historic region. Several landing platforms formed next to the water, and they are locally known as ghat. Those ghats became a substantial landscape structure in the Mughal conveyance to the water. Also, several brick-arch bridges were built over the canals with Mughal architecture and construction method to preserve the stream of water and water conveyance. However, they are completely lost today. A magnificent view of mughal edifices and cityscape observed from the river Buriganga, which was the dominated part of the Mughal water landscape and civic structure. Consequently, Portuguese¹⁴ and Armenian¹⁵ settlements established in this town for trade and strategic position of the water route. In this reign, Dacca rapidly transformed into a great commercial importance and trading center for the whole of Southeast Asia. However, urbanization of Mughal Dacca was soon attracted by the European trading companies to settle here and established their factories for the cottage (shell works, bamboo, mats, fine cotton, and etcetera), and agricultural products. Hence, the Portuguese, the Dutch, the English, the French, and also the Armenians were all came and founded their trading posts and factories next to the water. Rivers and canals used as the principal means of communication for transport goods. Local lives deeply connected with manufacturing, trading commerce, and money-lending activities. However, Dacca was increased immensely with its economic activity during this Mughal regime. Then, Mughals were constructed (first and second) forts and governmental edifices at the strategic location beside the river mouths to defend this land. Also, they excavated artificial canals for quickly deployed Mughal forces. Conversely, many garden houses also established at the north in this period of a mughal economic era. The land use map of mughal settlement shows that low-class residential zone was beside the river Buriganga. Also, high-class residential growth was also settled along the river bank (west direction) and next to the island that is locally called Chand Khan’s Bag, and now it is called ‘Kamrangir char.’ However, Military, administrative, and shopping centers spatially located in the center of the historic town. Dacca was rapidly extended from the Buriganga River in the south to Tongi Bridge in the north, and its growth guided by the lowland area.

¹² Ahmed, E., 2006. Dhaka. [Online] Available at: <http://www.dhakadailyphoto.blogspot.com>

¹³ Ahsan, R. M., 1991. Changing Pattern of the Commercial Area of the Dhaka City. In: S. U. Ahmed, ed. Dhaka: Past, Present, Future. Dhaka: The Asiatic Society of Bangladesh.

¹⁴ Portuguese were involved in shipping rice, cotton and silked products. Beside the commercial activities they built churches.

¹⁵ Armenian trades were tied in jute and leather products. And, built the Armenian Church on 1781 in the Armanitola area.

C. British-colonial Transformation [1772-1947]

British period alienated under dualistic rules: British East India company (1772-1857) rule and The British Raj rule (1858-1947). The British East India Company¹⁶ conceded through under the partial control in 1772. However, the ‘English’ was initiated to settle their factories in Dacca from 1668. However, the English traders were earlier in this land in 1666. The company took complete control of this land in 1793; the city then became known by its anglicized name ‘Dacca.’ Then, the end of Mughal Dacca began to decline with its importance, and the town experienced cataclysmic famines, natural floods, fires, political conflicts and so on. In some extent, ‘Calcutta’ was growing in importance and served as the capital of British India. During this regime, Dacca underwent physical shrinkage, and the city’s population declined dramatically [21].

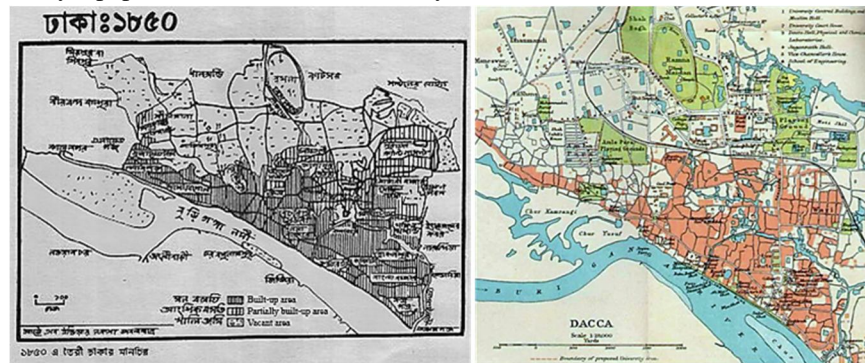


Fig 8: Dacca city maps in the British era.

Left- British Dacca (1850) demonstrate the location of Built-up and Partial built-up area next to river Buriganga and surrounded by the peripheral ‘vacant’ lowland area.

Source¹⁷: ANCIENT DHAKA, 2009.

Right- Dacca city map during the British rule (1924) shows the boundary of the proposal of University Dacca. The map also demonstrates the location of islands (char kamrangi, char yusuf), the shape of water bodies delimited by the regular (wari) and irregular pattern of street blocks, playgrounds, parks, and the metal road (rail line) clearly define the boundary of university Dacca and old town (puran Dacca).

Source^{12,18}: Ahmed, 2006; Dhaka town, 2014.

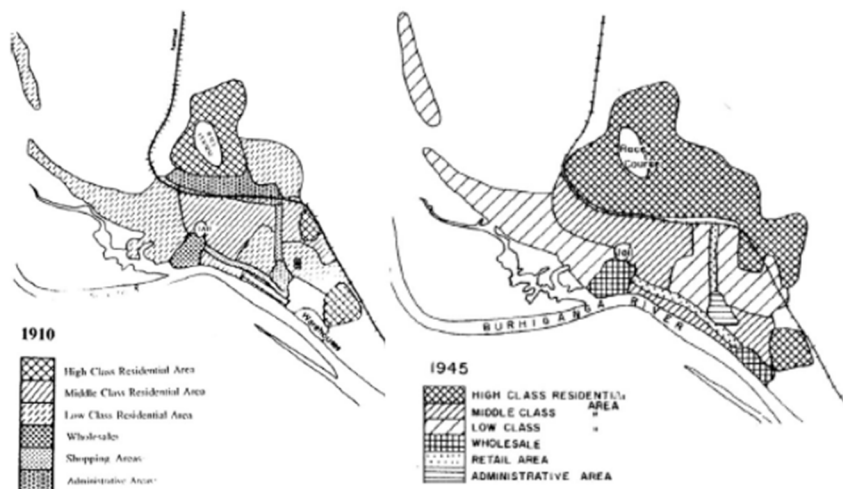


Fig 9: Landuse map (residential, wholesale, retail and administrative zones) of British Dacca and river Buriganga in 1910 and 1945.

Source¹³: Ahsan, 1991.

¹⁶ East India Company was appointed for imperial tax collector of the province Bengal-Bihar-Orissa by the Mughal emperor.

¹⁷ ANCIENT DHAKA, 2009. ANCIENT DHAKA. Celebrating 400 years of Dhaka. [Online] Available at: <http://www.ancientdhaka.blogspot.it/>

¹⁸ Dhakatown, 2014. DHAKATOWN. [Online] Available at: <http://www.dhakatown.net/dhaka-city-map>

Although, Dacca as an important economic city in the Bengal province under the British rule, it was served as a strategic link to the frontier of the northeastern states of Tripura Assam. However, in 1793, Dacca Nawab Estate was valued by the company with the agreement to fix the revenues that raised from this land. Then, under this company, Dacca Nawab Estate was grown up to become the largest reign in a part of eastern Bengal. At that time, a French trading center transformed into the residence of Dacca Nawab's family in 1830. That edifice later named Ahsan Manzil, which was beside the river Buriganga. Under the British Raj rule, (1858-1947) British Crown took direct control of this region in 1858. Then Dacca Municipality was established in 1864. In the second half of the nineteenth century, Dacca began to transform the Mughal town. As a result, medieval Dacca finally transformed into a modern city with metalled roads (railway, steel bridges, and etcetera), open spaces (Victoria Park, Baldha Garden), street lights and new edifices erected beside the Victoria Park for administrative (Carjon hall) and educational purposes. However, they established modern educational institutions¹⁹, public works, and townships development. A modern water supply system introduced in 1874 [17]. In the progress of consolidation of Dacca's commercial dominance in the Eastern Bengal, the Narayanganj-Dacca-Mymensingh railway opened in 1886. The inner part of the city roads was broadening with new edifices without following any definite plan. Dacca (partition of Bengal in 1905) became the capital of the new province of Eastern Bengal and Assam. At that time, the town planner Sir Patrick Geddes was appointed in 1906 to make a plan for the Dacca city; as it was recognized an important city for the British in India. However, he emphasized the protection of natural greeneries in the Ramna area, and broadening of roads for increased traffics. Geddes's emphasis was to conserve the character of an area while making plans to accommodate urban growth [22]. The land use pattern of the British period shows that high-class residential area was increased and moved to the northern part of the city. The growth enclosed by the Ramna racecourse. However, high-class mughal residential zone (besides the river) transformed into the low-class residential zone, and low-class residential zones beside the river Buriganga transformed into a middle-class residential area with retail activities in the British period. The high-class residential zones separated by the low-class and middle-class residential area by the dynamic demarcation of railway lines. However, the location of wholesale areas concentrated beside the river Buriganga.

D. East-Bengal transformation [1947-1971]

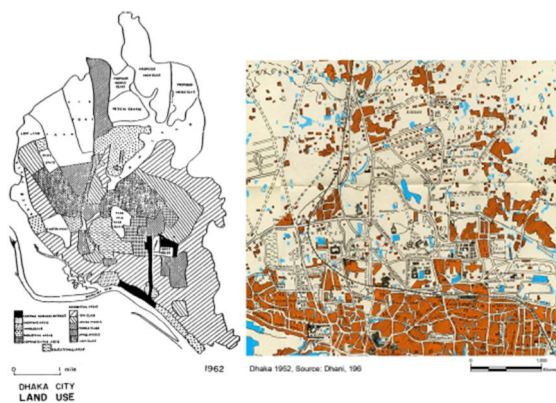


Fig 10: Dhaka East-Bengal (East Pakistan) maps.

Left- Landuse map of Dhaka in 1962.

Source⁷: Islam, 1996.

Right- Dhaka, 1952 shows the sprawl of water imprints and human settlements in the northern periphery.

Source²⁰: Dani, 1962.

In 1947, following the partition of India, Dhaka became the capital of East Bengal under the jurisdiction of Pakistan (West and East). During this division, the city passed through the critical political crisis thru the 'Bengali language movement.' Besides, the political impasse several prominent 'modern architectural development' took place in this rule. In this modernization process, 'New Market' was established (1952) as a commercial shopping center in the north of Azimpur, 'Kamalapur railway station' (early

¹⁹ In 1835 'Dacca College' was established as an English school where the local Muslim and Hindu students as well as Armenians and Portuguese were among the first graduates. Other educational edifices were 'Eden College' in 1880, 'Ahsanullah school of Engineering' in 1912 and 'University of Dacca' in 1921.

²⁰ Dani, A. H., 1962. Dacca: a record of its changing fortunes. Dacca: Reader in History, University of Dacca and Curator Dacca Museum, Dacca Museum Quarter.

1960's) as an important central terminal²¹ for transportation between Dhaka and the rest of the East province. And 'Jatiyo Sangsad Bhaban' or National Parliament²² House (1961-1982) was located at Sher-e-Bangla Nagar. Dhaka underwent a rapid transformation, and it extended to the northern periphery for a higher-class residential area in high elevations of land. Because higher lands were available in the northward. Lowland in the east and west were vulnerable to annual flood and wetlands (marshes and swamps). Several satellite neighborhoods (grid pattern) were emerged in the northern direction to accommodate the city growth linearly. Under the Dhaka improvement trust, they were Dhanmondi (1955), Gulshan Model Town (1961), Banani (1964) and Uttara (1965) for the high-income group. And, Mohammadpur and Mirpur residential area along the north-south axis of Mirpur Road developed for rehabilitating the non-Bengali refugees, Azimpur and Motijheel for government employees, New Market for shopping and Tejgaon for industrial development. However, those physical developments were relatively significant on the spatial structure of the city and reflected the European concepts of urban planning and design with the functional zoning of land use structure. In some extent, Dhaka continues to expand towards the north. During this expansion, the old part of the city was ignored for spatial development and became congested with mixed-use unplanned urban movement due to the historic potential of commercial activities. Here, many residential areas were rapidly transforming into wholesale and retail activities. Historic edifices were segmented, and density mounted in the space to inordinate echelons. Because of illegal encroachment of open-space and the growth of self-organized settlement around the historic edifices were remarkably cut the traditional relationship of town, water, and open space. A new part of the city was extended its footprints by clutching canals and low land areas for new urban developments. The lack of planning implementation ignores the guideline of zoning from Sir Patrick Geddes, where he emphasized on water bodies and peripheral lowland areas as seen in the late colonial planning for Dhaka [23]. The idea has divided the city into two zones that offered an outline for the development of old town area with colonial offices, and residential edifices around the Ramna green area. But, the plan was not implemented. However, the influence of the guideline was very prominently evident in the map of Dhaka University area. As a result, lowland areas of in-between and around the new satellite towns occupied by the rural migrant peoples with unplanned growth and sprawl of informal settlement.

E. Transformation of Dhaka [1971]



Fig 11: Landuse map of Dhaka city, the capital of Bangladesh, 1995.

It shows the location of central business Zone next to river Buriganga which is connected (inner city and old town) thru the network of other business corridors (retail and wholesale); concentration of slum adjacent to river Buriganga which is occupied the deltaic islands (char kamrangi, char Yusuf) and the river bank; industrial zones next to waterbodies; administrative zones; mixed-use residential areas in the periphery; residential area (high class and middle class); shaped urban waterbodies (river and lakes) and non-urban zones (undefined lowland area) in city border.

Source⁷: Islam, 1996.

²¹ This railway station is one of the most modern and architectural marvel (a lotus-shaped shell structure covering functional buildings like an umbrella) in Dhaka designed by American architect Robert Boughey. The railway station is situated in the north-east side of Motijheel (CBD).

²² It is designed by architect Louis Kahn, the national assembly building, is one of the largest legislative complexes in the world, comprising 200 acres (800,000 m²). The design of the capital complex was developed taking into account the aesthetic heritage of Bengal, particularly including the connection of water and the character of Ganges delta. http://www.banglapedia.org/httpdocs/HT/N_0080.HTM

Moreover, after the liberation of Bangladesh (1971), the lowland areas of Dhaka capital city were rapidly transformed by the growth of ‘self-organized’ informal settlement. Today, in the contemporary period, sixty percent of the total built-up area of the city is occupied by the informal settlements. For this reason, both old and new part of the city shrunk in the footprints of informal settlements by losing its spatial relationship with all surrounding natural water bodies, open-spaces, floodplain areas, wetlands, and etcetera. Although, “The centrality of Dhaka and its role- both symbolic and instrumental (...)” [24]. But, “Dhaka City has undergone radical changes in its physical form, not only by territorial expansion but also through internal physical transformations over the last decades. These have created entirely new kinds of fabric. With these changes, the elements of urban form have changed. Plots and open spaces have been transformed into building areas, open squares into car parks, low land and water bodies into reclaimed built-up lands, etc.” [25]. However, the land use map shows the business corridor that directly linked to the river bank of Buriganga. Rest of the river bank of Buriganga occupied by the wholesale, industrial and low-class residential area. Consequently, a large scale of low-class settlements was also observable next to the water and on the peripheral low-land area. However, the high-class residential area occupied in the central part of the city. Moreover, the industrial area significantly developed inside the proposed residential zones and next to the lowland area. However, lower middle class, middle class, and upper-middle-class residential zones were also significantly emerged in this land use structure.

V. MUGHAL AND COLONIAL SPACE

The antiquity of Dhaka is the dilemma of the river Buriganga. In some extent, this river was the soul of Dhaka as well as the River Thames in London. The city is profound with its colonial architectures along with the riverfront view. However, Mughal architecture was more remarkable with water in this province. “A magnificent view of the mughal building was observed from the river because the riverfront was the most dominant part of Mughal city that can be approved through the river route” [26]. Historical edifices along the river bank were the ornament of river Buriganga and bazaars were the center of Mughal Dacca. Mughal Dhaka developed as a center of ‘market places’ (bazaars), and it was close to the river Buriganga that served as the principal means of communication. Also, rivers and canals used as a means to transport goods and people from surrounding territory. However, the city development was compact, and pedestrian movement next to the water was the main mode of travel [27]. In the painting of Charles D'Oyly and Fredrick William Alexander de Fabeck framed the ruined character of Mughal architecture and water landscape. Also, the colonial movement of this region enrooted in the wide range of rotation of the river Buriganga. However, this river was the origin and heritage of old Dhaka. Also, it raised the evidence of ancient Dhaka and living pattern of colonial settlements in this context. This section epitomizes water in the colonial architectures. It reveals the spatial relationship with water and historic edifices in the colonial settlement patterns. It shows that the water was a part of the landscape, built frontage, transportation, and dignity of space in this southern region.

A. Cityscape and Water



Fig 12: Panoramic riverfront view of the city Dacca and the outline of settlements along the river Buriganga (1847).

Source²³: *The British Library Board, 2010.*

²³ *The British Library Board, 2010. The British Library. Explore the World's Knowledge.*

Image online. [Online] Available at: http://www.imagesonline.bl.uk/?service=page&action=show_home_page&language=en

B. River and Canal



Fig 13: The landscape of river Buriganga and floodplain area (the 1880s).

The photograph shows the view of old Dacca (Dhaka) on the left bank of the river with an identity of Hindu temple at the water's edge.

Source²³: *The British Library Board, 2010.*

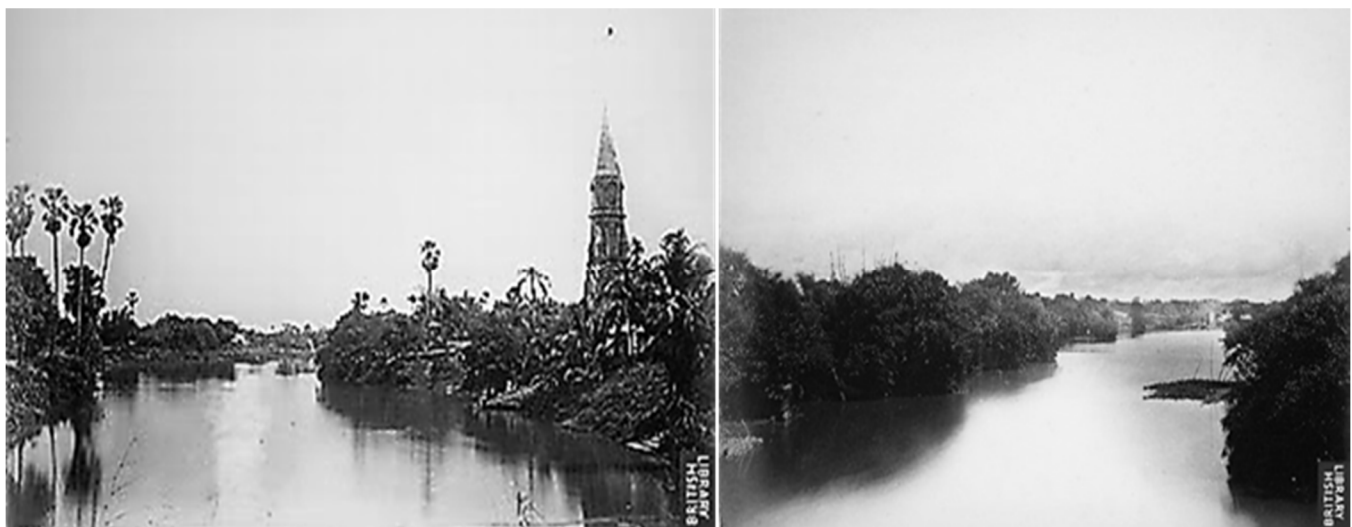


Fig 14: Valuable dense vegetation along the riverbanks and canals (the 1870s).

Left- The territorial landscape of river Buriganga with a Hindu temple tower and tall Palm trees (Asian palmyra palm, toddy palm, or sugar palm) at the edge of the water.

Right- A classical landscape of the interior canals (Dolai Khal) which is depicting as a part of river Buriganga in the old Dacca city.

Source²³: *The British Library Board, 2010.*

C. Ritual Space and Water



Fig 15: Riverfront temple and mosque. Above identical photo and painting shows water was an imperative holy landscape of religious structures and sacred ceremonial activities (ritual purification, and ablution).

Source²³: *The British Library Board, 2010.*

Top- Dhakeshwari Mandir (Darrassari Temple) by Fritz Kapp in 1904. The temple was built in the 12th century (pre-Mughal) by the Raja Ballal Sen (second ruler) of the reign of Sena dynasty of Bengal (1160–1179). There is a myth that the name of the old town is derived from the meaning of Dhakeshwari Mandir (Goddess of Dhaka) and the activities of Durga Puja with the instrument of Dhak. However, it was placed on the bank of the river Buriganga.

Bottom- The ruined ‘Saat Masjid’ or ‘Seven Domed Mosque’ (1680AD) on the branch of river Buriganga at the northwest outskirts of Dacca, etching by Sir Charles D'Oyly²⁴ in 1814. It was built during the reign of Shaista Khan (1664-1688) the subahdar (governor) of Bengal province (subah) in the Mughal²⁵ era.

²⁴ Charles D'Oyly (1781–1845), was appointed as a collector of Dhaka (1808-1811). Then, he made a good collection of paintings and folios of the antiquities of Dhaka. And those evidence exhibit the ruins of Dhaka in the Mughal era.

²⁵ During the mughal era several mosques were erected next to the water, and they were the iconic part of Mughal urban fabric and the city was termed as ‘the city

D. Ancient Architecture and Water

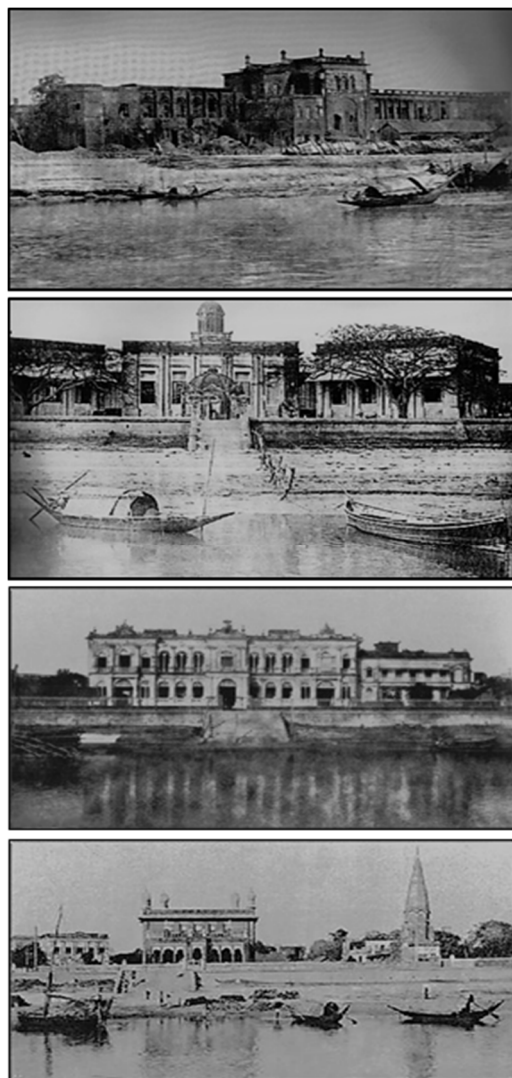


Fig 16: In the course of Mughal and British era of old Dhaka,

many significant riverfront structures were located in the rapport transport point (Meeting point of the road and water passage) or next to the water with a landing platform (ghat) to access water and water conveyance.

Top to Bottom:

- 1) The ruined view of Choto Katra (small caravanserai) on the bank of river Buriganga in 1875. It was constructed in 1663 during the Mughal regime to accommodate for officials and growing family of Shaista Khan. Source: Department of Archeology, Bangladesh.
- 2) Riverfront view of Mitford hospital and landing platform on the way to river Buriganga.
- 3) Ruplal house and landing platform on the northern bank of river Buriganga. In the late 19th century many mansions (buildings) were lining the waterfront like Ruplal house. And, it was designed by an architect of the Martin Company in Calcutta with a magnificent characteristic of Renaissance architecture.
- 4) Northbrooke Hall, locally known as 'Lalkuthi' for its deep red color, is located on the north bank of river Buriganga. It was built in the late 19th century as a 'Town Hall' and named after Lord Northbrooke, Viceroy of India (1872-1876). And, it represents the combination of Mughal architecture with the European style of Renaissance architecture.

of Mosques'. For as an example: Khan Mohammad Mridha Mosque, Kartalab Khan's Mosque, Star Mosque, Armanitola Mosque, Nawab Shaista Khan's Mosque, Chauk Bazaar Mosque, Farrukhsiyar Mosque, Hussaini Dalan, etc.

E. Peripheral Garden Houses and Water landscape



Fig 17: The exterior of the small garden house, Dilkusha, Dacca. Fritz Kapp took photographs in 1904.
 Left- A single storey garden house (Manuk House) with green landscape designed in the European style in the Nawab's Dilkusha Garden.

Right- A large tank or reservoir with a beautiful landing platform in the Dilkusha Garden.
 It is also known as a Dana Dighi (lake) and part of a big exterior canal.

Source²³: *The British Library Board, 2010.*

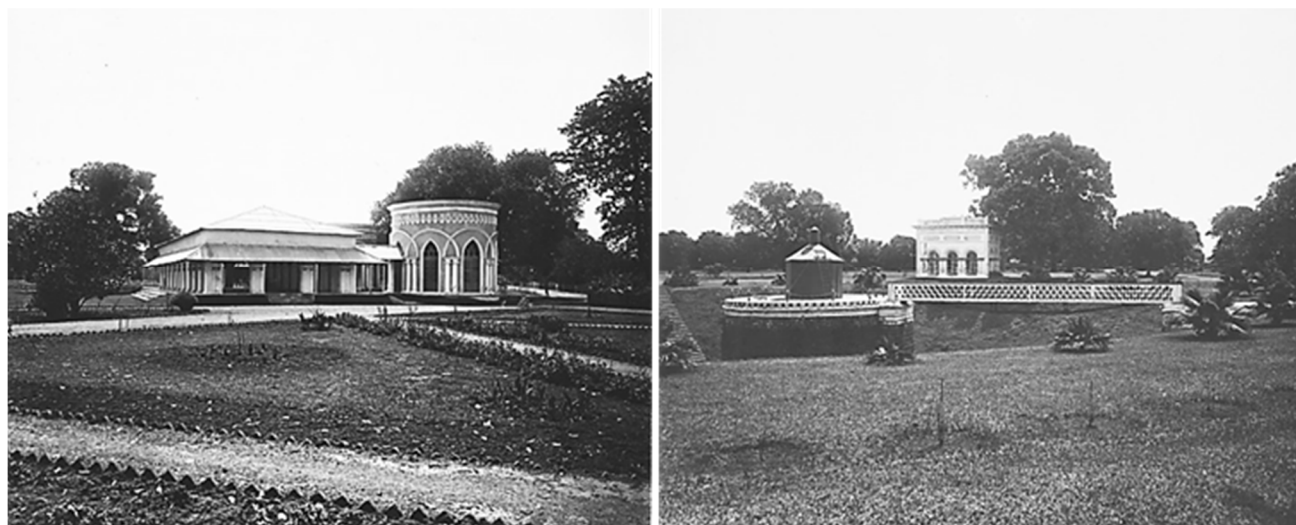


Fig 18: Nawab's Shahbagh Garden, Dacca. Fritz Kapp took photographs in 1904.
 Left- A landscape view of looking towards a pavilion in the Nawab's Shahbagh gardens in Dacca.
 Right- Photograph looking towards a water-tower in the Shahbagh Gardens in Dacca.

Source²³: *The British Library Board, 2010.*

During the Mughal and British rule, several garden houses established in the interior and exterior of the old Dacca with a beautiful deltaic landscape (lowland) of this province, and the city also identified as 'the city of gardens.'

F. Transformation of Bridges



Fig 19: Tungy or Tongi (over the river Turag) bridge in the northern limit (some fifteen miles away from the river Buriganga) of Dacca.

Left- Ruins of Tunny Bridge in Mughal settlement. Sketch by Charles D'Oyly in 1825.

Right- 'Iron Girder Bridge' erected in the British era in Dacca. Johnston and Hoffman took a photograph in 1885.

Source²³: *The British Library Board, 2010.*

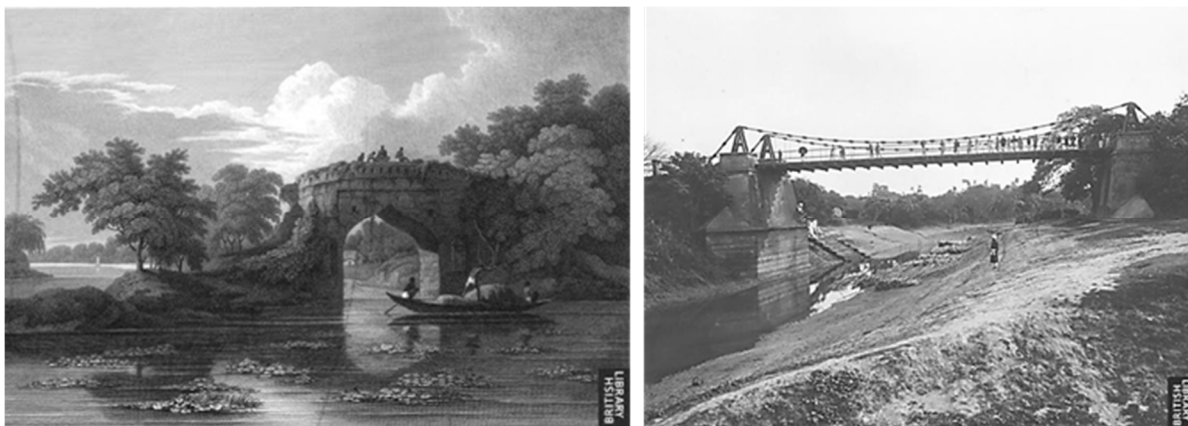


Fig 20: Tantibazar Bridge (Over the Dulai Creek) in the southern limit (Buriganga River) of Dacca.

Source²³: *The British Library Board, 2010.*

Left- Ruins of Tantibazar Bridge on Dulai khal was built during the Mughal period. Sketches by Charles D'Oyly in the 1830s.

'Dholai khal' canal was excavated in 1608-1610 by Islam Khan (the first Mughal Subahdar of Dacca) from Balu River to protect the old town and provide internal communication passed through this area. The canal flowed through the heart of the old town and joined to the Buriganga River.

Right- 'Iron suspension bridge' erected in the British era on Dulai khal in Dacca.

The photograph was taken by Fritz Kapp in 1904 and locally known as 'Lohar pool.'

Source¹²: *Ahmed, 2006.*

In the Mughal and British era, several bridges²⁶ were erected over the canals or creeks to preserve water and natural flow in the interior and exterior of old Dacca. However, in this growing settlement, Brick Arch Mughal Bridges were rapidly replaced by the Iron Bridges in the industrial movement of British Dacca, without protecting the identity of Mughal Bridge Architecture.

²⁶Tanti Bazaar Bridge, Masandi Bridge, Narinda Bridge, Amir Khan's Bridge, Srichak Bridge, Babu Bazaar Bridge, Rai Shaheb's Bazaar Bridge, Nazir Bazaar Bridge, Chand Khan's Bridge, Hattir pool, and Pagla bridge (Paugla Pool).

VI. CONCLUSION

'Water as a structuring element of urbanity' that play a fundamental role in the historical evolution of the city and its traditional relationship to the living patterns for space and economy [28]. Rapid 'urbanization and its impact on water' [29-33] complicate contemporary space where unplanned urban growth is fragmenting built heritage, territory, and the city image. The relationship between the traditional city and contemporary urban growth is a critical issue for contemplating water in the city landscape. Opening up the large scale of water edge in the densely built environment is an opportunity to rearrange historical centers with their adjacent water landscape. In some extent, it reveals civic expression in the modern way that can reinforce the traditional character and quality of the historic space. However, protecting the historic core and the transformation of space can build a bridge in the gap between the old and new. The contemporary nature of rapid urban economic interest and urban population growth is transforming the space rapidly where the city's 'health' is necessary to equate with its balanced growth [34]. The historic fabric is imperative to continue the creation of the identity of space by preserving the traditional image of the space. Also, the competing issues are the same as the territorial and inner city development with the meaningful connection of historical centers [1]. Consequently, what kind of spatial learning we can get from the traditional water cities and interpret to the contemporary city for the future urban planning and design? In some extent, the benefit of urban water retrieves the traditional image of the town in a way that is structuring urban and territorial environment [35]. Also, waterfront development, rediscover and regenerate the past water system that engaged with space with everyday traditional city life. Consequently, 'reimaging cities' [36] by integrating with water resources as a natural habit in the city and territorial landscape is a contemporary resonate of space movement.

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