INTEGRATING A HERITAGE RIVER IN THE URBAN FORM THROUGH LANDSCAPE INTERVENTIONS: STUDIES ON ADI GANGA, KOLKATA

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ABSTRACT

Urban rivers form a vital part of a city's ecosystem and culture due to their multiple environmental, socio-cultural, and economic contributions. They are instrumental in a city's siting, functioning, and sustenance, but in return, they get physically altered, exploited, and neglected. This paper gives insight into a very significant and once heritage urban river, the Adi Ganga, which has imparted a strong sense of identity and character to the Indian megacity of Kolkata. Drawing on historical and existing maps, archives, and present-day data, the study provides an understanding of the river, its decline to a sewer, and the tensions under which it operates while responding to the urban form that surrounds it. It then discusses the potential of developing an environmentally sustainable "eco-cultural landscape" consistent with the adjacent physical urban form, in the backdrop of the river's historical, sacral and cultural context. The landscape strategy employs urban morphological and bio-ecological approaches to revive, restore and reinstate the physical, emotional, and ecological connections with the river. A resilient urban riverfront-cum-public open space is envisaged integrating the socio-cultural heritage of the river, the rich aqua-terrestrial ecosystem, and the adjoining urban ensembles.

Keywords: urban river, Adi Ganga, Heritage River, river restoration, cultural landscape

INTRODUCTION AND BACKGROUND

Cities and water are inextricably linked. Wetlands and waterways form a vital part of the urban ecology and culture by supporting the growth, functioning and sustenance of a city. The Indian city of Kolkata had a fascinating landscape of wetlands, rivers, canals, lakes, and marshes, which are instrumental in a city's siting, transformations, functioning and sustenance (Fig 1). During the early-Colonial period (17th-18th century), the British engineers and town-planners used their technical expertise to control the natural system of rivers, canals, and marshes for the dual purposes of drainage–sewerage–sanitation and trade–transportation (Mukherjee 2009-2010). The rich natural heritage of Kolkata, British town-planning policies and local socio-cultural practices gifted the city with unique physical characteristics, and distinctive eco-cultural urban landscape features. Gradually, due to neglect, improper maintenance, and lack of funds, these urban waterways started suffering from the damaged natural flow, siltation, erosion, pollution, and reduced aquatic biodiversity. One of the worst affected of them is the Adi Ganga - the heritage river, which has been taken up in the current study.

This article recognises Adi Ganga as an integral component of Kolkata's cultural heritage and an element of collective memory and identity. It considers the socio-spatial relationship between the river and urban form over a historical trajectory that leads to careful landscape design strategies for its potential revival in order to maintain integral spatial and cultural relations between the cities. It also attempts to suggest landscape strategies that may potentially revive the ecological and socio-cultural, including religious, significance of this holy river and reintegrate these with the urban life of Kolkata. Specifically, an urban eco-cultural landscape is proposed by adopting a landscape

ecological approach, using urban morphology as a tool for understanding and addressing the surrounding urban form.

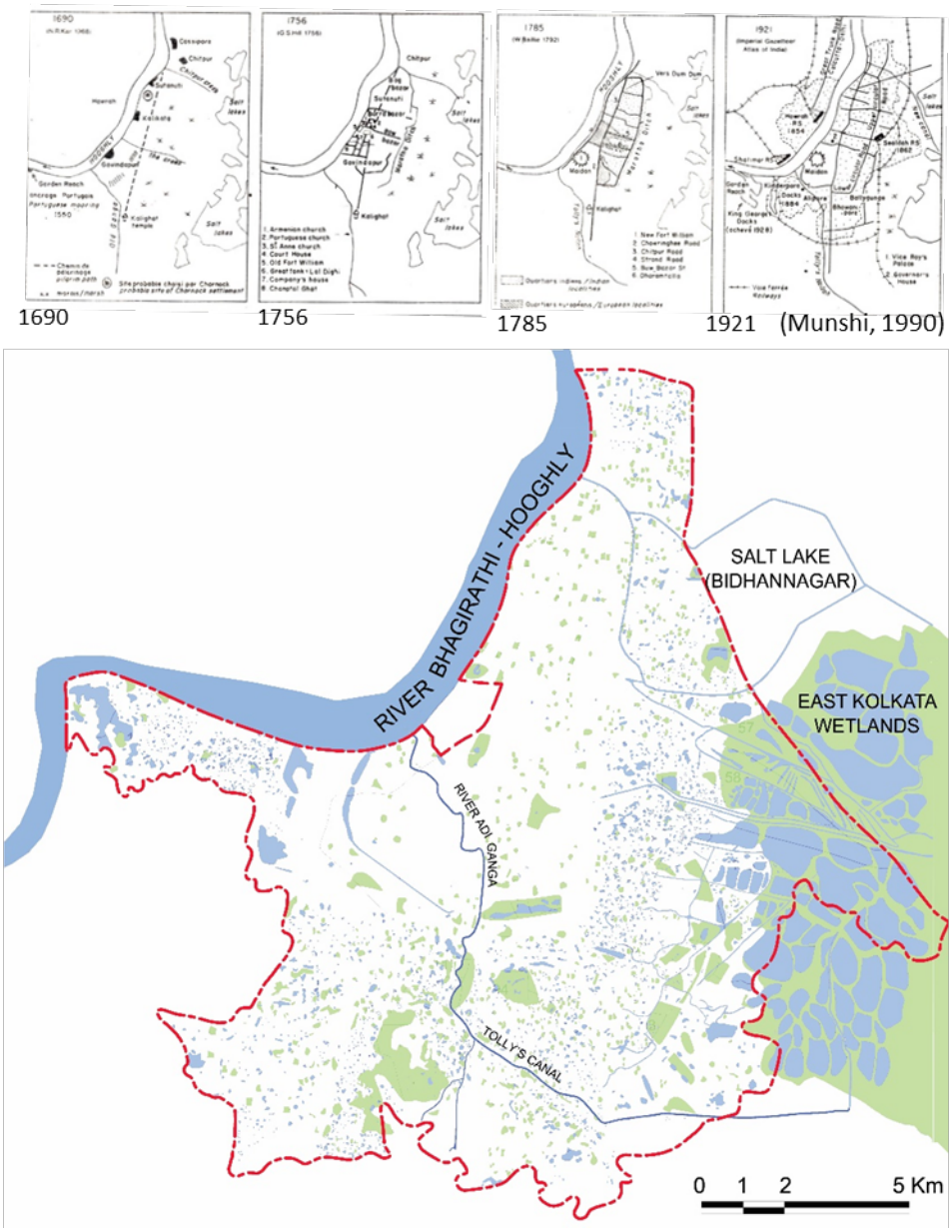

Figure 1 Gradual transformation of Kolkata from its conception to the present day

METHODOLOGY

The present study is based on data sourced from archival maps, scholarly works, peer-reviewed journal papers, newspaper reports, social media feeds, government documents, and literary works by medieval and contemporary authors. It uses contemporary web-based services such as Google Earth and Google Maps, and computer-aided drafting software such as AutoCAD for preparing the city maps and analysing the urban morphology of the study area.

The study is structured in two parts. First, it elucidates the river's heritage value by historical and geographical analysis to understand the causes of the present situation. Second is a morphological analysis of its surrounding urban form to analyse the socio-spatial relationship between the river

and the city. The cultural-cum-sacral qualities of the river, along with the different scales, contexts, land-use activities, and open-space structure of the adjoining urban landscape components provide a systematic and dynamic approach to its revival.

ADI GANGA – A HERITAGE URBAN RIVER

Adi Ganga is a paleo-distributary of the Bhagirathi-Hooghly, which again is a distributary of the national river Ganga, the sacred-most spine of Indian culture. Mention of this river is frequently found in medieval books, historical archives, and religious texts. Adi Ganga is Kolkata's urban river of immense historical, religious and socio-cultural significance as described here.

- *Religious:* The sacred temple of Kalighat, dedicated to Goddess Kali, the black incarnation of the Hindu deity Shakti sits on the bank of Adi Ganga. Kalighat was previously known as Kali-Ksetra, which is believed to be the reason behind Kolkata's nomenclature.
- *Socio-cultural: P*ilgrims used to take a holy dip (*Gangasnan*) in the sacred waters of Adi Ganga and burn (cremate) their dead along the banks. People also visited the *ghats* (stepped embankment to access the water) for their daily chores. The noted ones are Keoratala Ghat (the Hindu burning ghat), BalaramBasu's Ghat, Mukherjee's Ghat, Hindu Mission Ghat, Kalighat, Ghatak Ghat, Prasannamayi's Ghat, Rashbarir Ghat, Tarpan Ghat, Kudghat, and Rathtala Ghat.
- *Transportation:* Medieval literature states that during the 15th to the 17th century, it was a significant navigation channel, which ferried people and commodities (Mandal, 2018).
- *Drainage:* From medieval times till present, it acts as the central drainage basin of southern Kolkata. Previously it was connected to the Bidyadhari, and after the death of the latter, it was connected to the river Kulti (Kultigong).

Although historically, it had been the "original channel" of river Ganga, as the name suggests, currently, the hydro-morphology of this ancient river is very different from the original one. Alibordi Khan, the then Nawab of Bengal, artificially diverted it from its origin at Dahighat to Sankrail through an excavated canal called "Kata Ganga" during 1739–56 (Rudra, 2018). Another portion of this river, known as Tolly's Canal, was artificially excavated by Major William Tolly during 1775–77 to connect it with the River Bidyadhari (also declared dead at present) to increase navigability (ibid). Finally, Kolkata Metro planted the last death nail during the construction of around 300 pillars each at a distance of 20 metres, through the heart of the river without seeking any environmental clearance (Mukherjee, 2016). On top of these, siltation, sedimentation, waste disposal, and water pollution have reduced this heritage river to a shallow, fetid canal for carrying the city's wastewater.

However, Adi Ganga, with its sacred *ghats* retains its sanctity in the common social discourse. This river corridor is a classic example of environmental sustenance as part of the urban ecosystem, cultural value as evidence of its history and transformation, aesthetic value as a visual element, and social value that reflects human identity. The cultural heritage embodied by the Adi Ganga will be at critical risk if the river's purity and sanctity are not restored. Several sporadic efforts, policies and programs for its restoration had partial, debatable success.

RESULTS AND DISCUSSIONS

For the present study, the critical and sacred-most stretch of Adi Ganga is considered, which spans roughly 55 Kms from its origin at Dahighat to the historic Kalighat temple and the adjacent

Keoratala Burning *ghat* (Crematorium). Over this span the urban form is influenced by colonial history, socio-economic conditions, cultural traditions, social practices, and spatial geographies. However, the spiritual, cultural, and historical aspects remain untapped in terms of their recreational potential or heritage value. The river appears fragmented with an almost non-existent physical or cultural relationship with its precincts in particular and the rest of the city. Pollution and siltation have degraded the water quality, while bank erosion and unauthorised encroachment have further added to the misery (Fig 2). The eco-cultural qualities associated with the river need to be evoked, preserved, and passed on to future generations, contributing to its environmental sustenance and collective memory.

Figure 2: A pictorial comparison of inherent dichotomies the Adi Ganga near the Kalighat Temple Complex

LANDSCAPE DESIGN STRATEGIES

The complex, interrelated issues associated with the Adi Ganga require a design-driven, integrated approach based on a deep understanding of the socio-cultural and traditional contexts, spatial thinking, and environmental responsiveness. The landscape design focuses on a continuous linear riparian edge to form a rich eco-cultural landscape integrating the open edges of the river, its rich aqua-terrestrial biodiversity, and the adjacent urban form considering the following approaches:

a) Socio-cultural and heritage conservation (Urban morphological approach) - Urban regeneration and landscape conservation is proposed by amalgamating the green, open spaces and history and culture with an intent to

- Revive, and restore the physical, emotional, and spiritual connections with the river within the framework of sustainability
- Achieve a spatial continuity and integrity of urban form by connecting the individual morphological units with the socio-cultural, religious, and historical values associated with the river
- Harness natural site assets and resources to integrate the secluded and abandoned river back into the cityscape by creating vibrant public open spaces, tourist attractions, and transport nodes, creating awareness and jobs.

b) Ecological Conservation (Bio-ecological approach) - The research suggests naturalistic ways to restore the invaluable ecology of the aqua-terrestrial interface and the riverine ecosystem. The strategy aims to

- Reinstate the ecological significance of the river by converting it into a sustainable and resilient river that helps to combat natural disasters and climate change risks
- Take a holistic approach towards a more habitat rich and spatially complex landscape that upgrade the degrading living standards in its environs

Based on the above principles, a resilient urban riverfront is envisioned by dividing into the following zones responding to the physical urban environment and landscape components around the Adi Ganga in this particular stretch (Fig 3).

- *"Colonial landscape"* – The Fort William and surroundings consisting of Maidan, Royal Calcutta Turf Club, and Victoria Memorial is an ideal example of the contemporary urban cultural landscape - a synthesis of various socio-cultural, ecological, and aesthetics of contemporary society. A Colonial landscape design characterised by local vegetation and informal arrangement of landscape elements is envisioned along this edge. The strong geometrical forms of British architecture complemented by clear, uninhibited stretches of greenery provide ample opportunity to carve out a series of connected landscapes with a focal point.
- *"Memorial landscape"* – The River in this stretch runs through a Christian Cemetery and a Hindu Crematorium. While the Bhawanipur Cemetery, being the resting place of Commonwealth War martyrs, is an example of collective memory, the Keoratala Crematorium is a shadow of personal mourning, grief, and loss. In the form of plants, water, butterflies, and birds, nature can evoke the dichotomy of death and life, thus creating an ambience to contemplate the loss amidst the cacophony of busy urban life. A memorial landscape incorporating the elements of remembrance and emotion is proposed in these spans to create an association with mourning and memory, personal or communal.
- *"Immersion Landscape"*- Alipore Zoological Garden (also known as the Calcutta Zoo) is India's oldest formally stated zoological park. Although the riverine landscape outside the zoo boundary has little connection with the landscape inside, a hint of common shared space between humans and animals can be recreated in continuation with zoo landscape.
- *"Reconciliation landscape"* – The Alipore Central Correctional Home (previously known as Presidency Jail) started operation during the British rule to house political prisoners. Although physically or visually, there is no communication with the world inside the formidable walls, a reconciliation landscape design may reflect the ideology of freedom, equality, and fraternity by showcasing the selfless sacrifice of those who fought the independence movement or the incarcerated souls presently living inside. It also reflects the state-of-being of the inhabitants, their past, and transformation into a future of reconciliation.
- *"Sacral landscape"* – Faith is an inseparable part of human life, be it an individual, society, or culture; hence it becomes an essential component of culture and gives way a cultural landscape. A sacral landscape comprising non-materialistic, symbolic elements influenced by local culture, religious practices, spiritualism, and nous of sanctity is imagined near Kalighat, integrating the utility-cum-ritualistic character of the *ghats* and other temples.

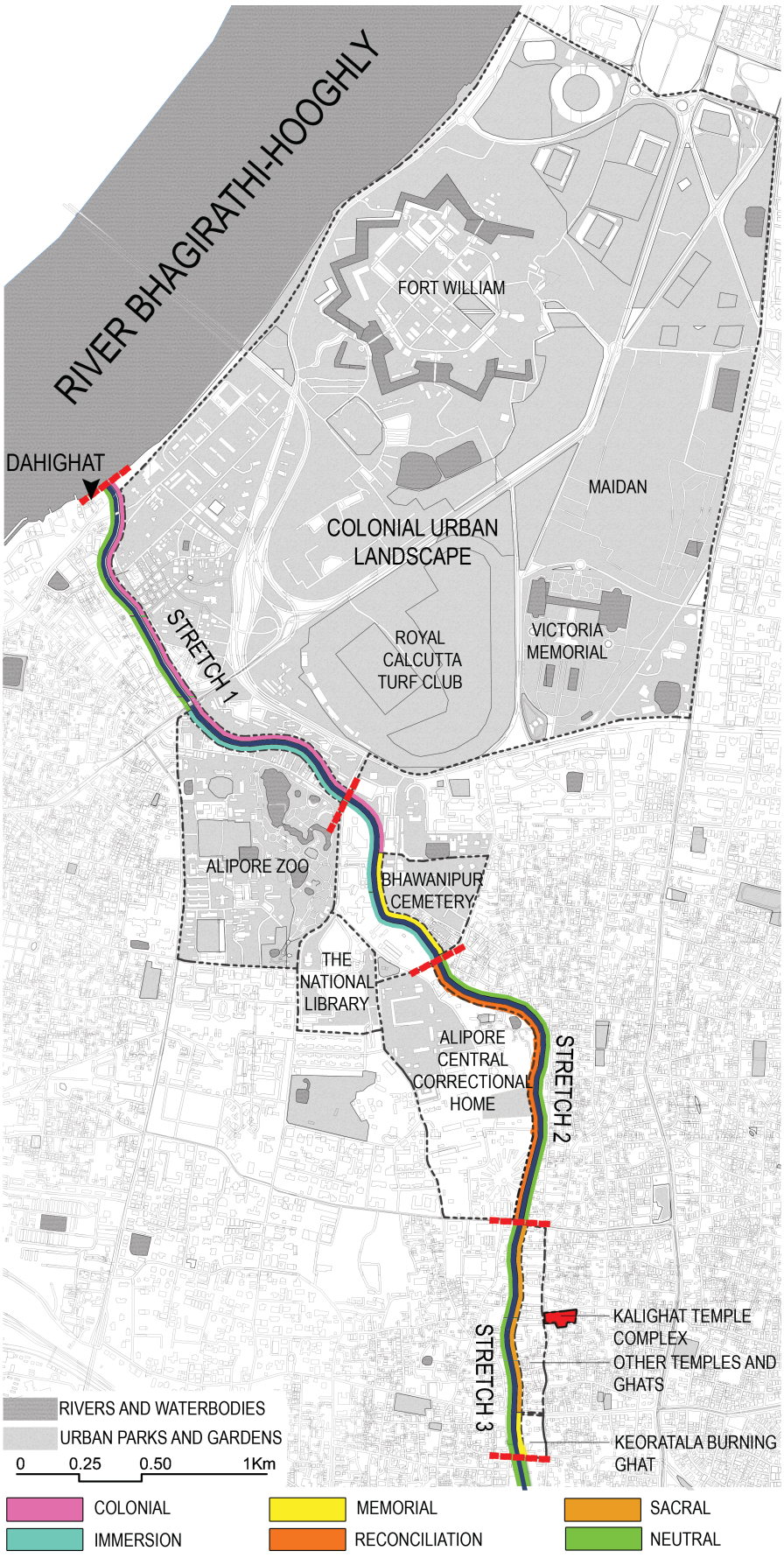

Figure 3: Proposed landscape design strategy for the Adi Ganga riverfront in the studied stretch

URBAN MORPHOLOGICAL APPROACH

The figure-ground analysis of selected stretches (Fig 4) explores the built-open space to understand the tangible reconnection potential of the surrounding with the river's intangible character. The contrasting fabrics and textures create a juxtaposition of opportunities and adversities that defines the scope of integration of the river into the urban form.

STRETCH 1 - The dispersed fabric in Hastings (right) contrasts from the densely-packed, mixed-use fabric of Khidirpur (left).

STRETCH 2 - The large open spaces in the Alipore Jail (left) contradict the very high density and very few open spaces of Bhawanipur (right)

STRETCH 3 - High density, mixed-use form along both edges, articulated by sacral-cu-mutilitarian character of the ghats (right)

Figure 4 Study of urban form (figure-ground) along the selected stretch

The above figure indicates a contrast of public architecture versus dense residential morphology on either side of the river. However, a spatial continuity can be achieved through the organic lanes and articulated public spaces in the dense mix-use localities such as Khidirpur, Bhawanipur, and Kalighat. This provides a direct physical connection with the river in the form of permeability, linkages and social integration. On the contrary, the stretch along Alipore Jail lacks signs of identity and association due to the intimidating prison wall, which does not blend in; hence the landscape follows a linear form with little amalgamation with the surroundings. Again, there is a full scope of blending the riverfront with the formal colonial urban landscape near the Hastings or the Alipore Zoo, where planned open spaces are plentiful.

BIO-ECOLOGICAL APPROACH

Bio-ecological restoration methods are proposed to improve the overall landscape and create an uninterrupted, vegetated buffer is proposed that spans the length of the channel and acts as a cleansing mechanism for the site. Native vegetation and natural erosion control materials such as locally available stones, coconut and jute logs, coir mats, jute nets, and geotextile fabric are suggested for bank stabilisation, filtering of pollutants, and control of in-stream habitats. The indigenous trees like *Shorea robusta* (Sal), *Dalbergia sisoo* (Sheesham), *Pongamia pinnata* (Karanj) and *Azadirachta indica* (Neem) and grasses like *Chrysopogon zizaniodes* (Vetiver), *Cymbopogon spp.* (Lemongrass), *Pennisetum spp.* (Fountain grass), and *Typha spp.* (Cattail and Bulrushes) are recommended.

CONCLUSIONS

Water is the principal existential and motivation for the formation, transformation, and sustainability of cities and Kolkata is no exception. Kolkata's heritage river, the Adi Ganga, is a

river of vast socio-cultural heritage and environmental contributions. In return, it got degraded and eventually disconnected from the city's life and memory due to neglect and insufficient restoration initiatives. The suggested landscape design proposes an eco-cultural landscape with its dynamic, complex urban form, its intangible legacy, and rich aqua-terrestrial interface. Historically, rivers are considered the starting point of human civilisation, which caused the gradual transformation from nomadic life to building settlements and later cities, thus establishing societies and cultures. This study connects the missing links of former cultural association with the river and its present urban form to establish the long-lost connection with the river. It attempts to integrate the river into the eco-cultural heritage of the city by using principles of urban morphology and bio-ecological approach. It weaves the two-dimensional urban tissue with the three-dimensional urban form to create a rich eco-cultural landscape integrating the array of fragmented open spaces along either side of the river. The trails of historical succession, contemporary sustenance, and a sustainable future may restore the ecological and metaphysical connotation of this holy river into the urban life of Kolkata.

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