

Interface Reconnect: Strategies for Sustainable Peri-Urban Ecological Set-up, Case: East Kolkata Wetlands

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Abstract - This paper began from the quest of an effective approach towards sustainable peri-urban landscape. It questions the present trend of laying infrastructural networks without taking into consideration the natural setting of the place. East Kolkata Wetlands (EKW) covering 125 sq.k.m. provides the context for exploring strategies to save the ecological balance and its relation with morphology of the local settlements. EKW, located on the eastern fringes of Kolkata, is such significant peri-urban landscape, because of its uniqueness in harnessing natural resources of the wetland system for fisheries and agriculture through ingenuity of local communities with their traditional knowledge, which is under threat at present. The concern is that the local economy is being pushed out by the new emerging economies and large centralized allocation of infrastructure around EKW. The article is an attempt to explore the idea of juxtaposing the natural landscape and infrastructure as a probable answer to the modern day threats on urban ecological setups. Strategy of the decentralized allocation of soft infrastructure will determine the nature of transformation in this area and ensure a long term sustainability of the wetlands, its people, their economy and thus the city of Kolkata. It tries to super-impose the ecological and economical networks to achieve a mosaic of various small-scale activities empowered by institutions, intense activity nodes as places for socio-economic exchange. The process is supported by guidelines for spatial pattern and form of new developments to maintain eco-urbanity of the place.

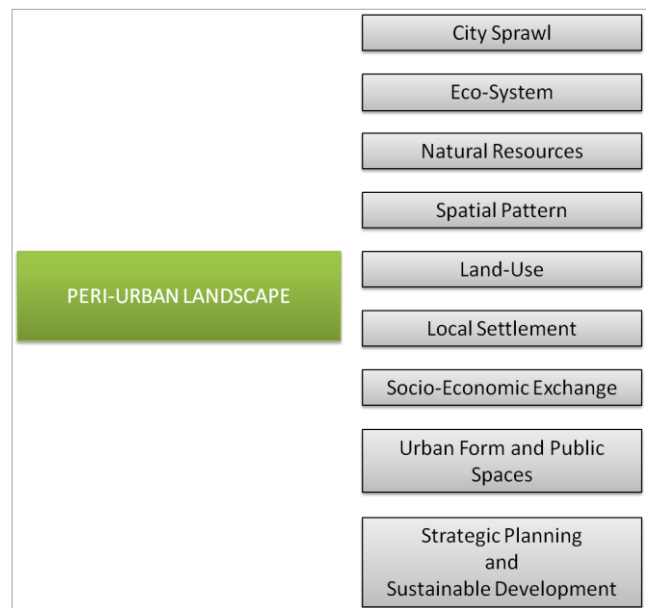
Key Words: Peri-Urban, East Kolkata Wetlands, Decentralized, Soft Infrastructure, Eco-Urbanity

1. INTRODUCTION TO THE CONCEPT OF PERI-URBAN LANDSCAPE

The concept of Peri-Urban Landscape is not new in the field of urban planning and design. However, the concept has been modified over time. Peri-urban landscape depicts research and design works of morphological setting 'ON THE EDGE' [5] of rapidly changing city peripheries at present context. It explores the pattern of urbanization / settlement pattern, diversity of activities and nature of urban-form at these rapidly changing edges. It also attempts to find not only the spatial pattern, but the dynamic flows related in these transition zones. The concept of peri-urban landscape defines territorial analysis of the underlying patterns and emerging spaces as eco-urban interface. Peri-urban areas

can be defined as areas around or outside the city core that are ecologically and socio-economically integrated with their core city. They function as a transitional zone between the city and its hinterland / countryside, characterized by intensive flows of natural resources, goods, and people from and to the city. They also serve as the interface between urban, rural and natural areas with relatively rapid growth, dynamic and mixed physical and socio-economic attributes. It appears as spatial conglomeration of ecology, people, socio-economic activity and physical form of city.

Fig -1: The domain of Peri-Urban Landscape
(Source: Author)



Peri-urbanisation, which refers to the process of urban transformation in city peripheries, is becoming an important spatial phenomenon in our informational and globalised society. Peri-urbanisation can be triggered by the development of irregular settlements, new towns, mini-cities in the form of gated communities, industrial estates and other forms of large-scale urban functions around big cities. Many cases, it has been experienced that the city periphery is facing irregular and haphazard development, resulting into a townscape and spatial pattern which has no specific identity of itself. Finally it loses the process of 'IMAGE MAKING' [2]. Moreover, the natural integrity of ecology with built environment at the periphery has been destroyed many a times.

The paper first sketches the concept of peri-urban landscape and the context selected. It attempts to give a deep understanding of the historic evolution of the area, also discusses on the present scenario. On the basis of critical analysis of the selected case, it concludes with a paradigm shift, raises research about interactions and linkages between sustainable landscapes and urbanism. A “paradigm shift” seems ready to emerge, following a movement, research about interactions and linkages between rural and urban areas in the form of spatial pattern and urban imagery. Hence the interface between two as explained “Peri-Urban Interface” [15] appears extremely significant for planning and design. A new research agenda can be emerged for not experiencing urban and rural development as separate issue, but integrated with each other.

2. CONTEXT OF EAST KOLKATA WETLANDS AREA

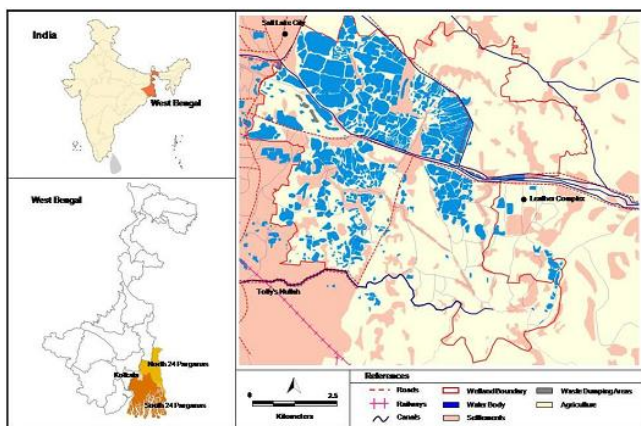


Fig -2: Location of the East Kolkata Wetlands (Source: Author)

The East Kolkata Wetlands (EKW), located on the eastern fringes of Kolkata city is one of the largest assemblages of sewage fed fish ponds spread over an area of 12,500 ha. These wetlands form a part of the extensive inter-distributory wetland regimes formed by the Gangetic delta. These wetlands sustain the world’s largest and oldest integrated resource recovery practice based on a combination of agriculture and aquaculture, and provide livelihood support to a large, economically underprivileged population of around 27,000 families which depends upon the various wetland products, primarily fish and vegetables for sustenance. Based on its immense ecological and socio cultural importance, the Government of India, declared East Kolkata Wetlands as Wetland of International Importance under Ramsar Convention in 2002. EKW is a unique example of harnessing natural resources of the wetland system for fisheries and agriculture through ingenuity of local communities with their traditional knowledge [9].

EKW is under severe pressure due to anthropogenic stresses. Changes in land use, change in the city edge image, new growth in and around the wetlands, encroachments, rapid siltation due to changes in hydrological regimes, pollution and stakeholder conflicts have greatly impaired the wetland functioning. The wetland has been under constant pressures for conversion for settlements and agriculture. The wetland ecosystem faces grave threat to its ecological character and identity and thereby endangering the overall sustainability of the resource recovery practices which forms the Wetlands International – South Asia Management Plan for East Kolkata Wetlands. Realizing the rapid degradation of the wetland, the Government of West Bengal through the East Kolkata Wetland Management Authority engaged Wetlands International – South Asia for formulation of an integrated management plan.

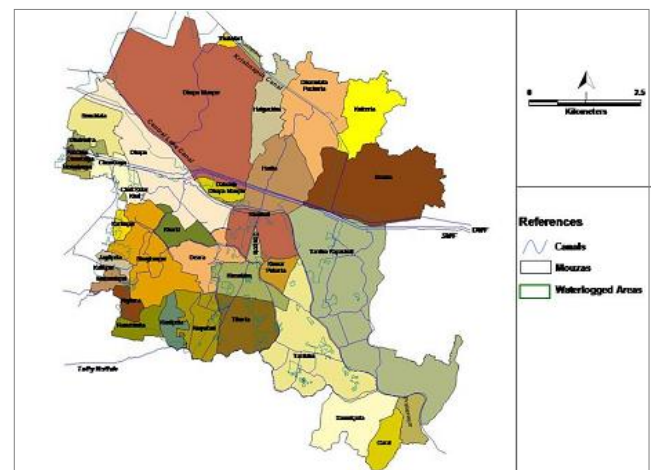


Fig -3: Mouzas of the East Kolkata Wetlands (Source: EKWMA Report, 2008)

The formulation of Integrated Management Planning initiates interventions at policy level, which majorly focuses on maintaining desired environmental quality in the region. It formulates strategies at regional level through comprehensive assessments involving state government departments, community organizations, research institutions and local communities. This recent attempt is extremely appreciating; however it does not take a holistic approach, which helps to intervene at the physical planning level. The preservation of ecology can’t be the only solution to the present scenario. The process has to take the other aspects of strategic planning like settlement structure, connectivity pattern, urban form regulation, image making etc into consideration together.

1.1 The Wetland Mechanism – A Sustainable Cycle

The East Kolkata Wetlands is unique because of the kind of symbolic relationship it shares with the city of Kolkata. It is a case, where a vast ecologically sensitive area, which is partly man-made and modified, is under human habitation

and majorly privately owned; yet it sustains and makes Kolkata an “Ecologically Subsidized City” (Dr. Dhrubojyoti Ghosh, Ecologist). Due to the topography of the city sloping towards the east, the city drains and dumps all its storm water, waste water and solid waste into the wetlands. This low-lying fringe of the city is inhabited by smaller communities, who practice agriculture and aquaculture with the help of the waste water thrown in this area. This process not only supports their livelihoods but also provides the city with the supply of agro, fishery and other products. Thus the wetlands not only functions as sponge or a lung for the city by purifying its waste before leaving it into the sea, but also acts as a vast expanse of open space for the city. It saves the city from the cost of manufacturing an artificial waste purification system.



Fig -4: Figure 4. The East Kolkata Wetlands (Source: Author)

1.2 The Structure of the Wetlands

As a whole – A fragmentation of canal networks, ponds of various sizes, shapes and depths defined by the ownership and administrative boundaries. **Partly** – Small chunks of mounds made out of earth dug from the wetlands itself define the structure and pattern of habitat and local settlement. The form of settlement is more of having temporary typology. These are like cells, flexible enough for multiplying and vanishing as per needs and sometimes can be joined / combined to form a bigger cell.

3. HISTORIC EVOLUTION OF EAST KOLKATA WETLANDS AND ITS ECO-URBANITY

The evolution process explains City transformation and changes in its regional landscape. Kolkata is located very near to the low-lying gangetic delta. Initially it had settlements of 3 villages on the bank of river Hooghly with a few salt water lakes around. When the colonizers came in, they wanted to set-up a new metropolis and therefore diverted the course of the river Hooghly and thus the East Kolkata Wetlands were formed from the inter-distributaries

marshes of the just shifted river course. As a resultant of this man-made forceful intervention, the city form of Kolkata came out to be linear with the growth direction towards the north and south. The redirected Hooghly River on the west and wetlands on the east restricted its growth towards these directions respectively. However, in course of time as Kolkata has emerged as the new metropolis of today, the city has grown faster towards its north and south surpassing the optimum travel distance. The Hooghly River being a harder edge did not allow any further development along it, but on the other hand, the East Kolkata Wetlands being a comparatively softer edge is attracting new developments. As the land is marshy, the modern day development is happening in an isolated fragmented manner and without any coherence with local settlements. The wetland is not a mere ecological feature or historic urban landscape abutting the city edge only, but serving the city and its people for various everyday purposes. Hence, these new and upcoming haphazard developments are destroying that eco-urban relationship and spoiling ‘Image of the City’. Especially after the laying of Eastern Metropolitan Bypass along this soft edge, the developments like new IT Campuses, Housing and Townships of huge footprints are coming at a faster rate and changing the land-water ratio of the wetlands.

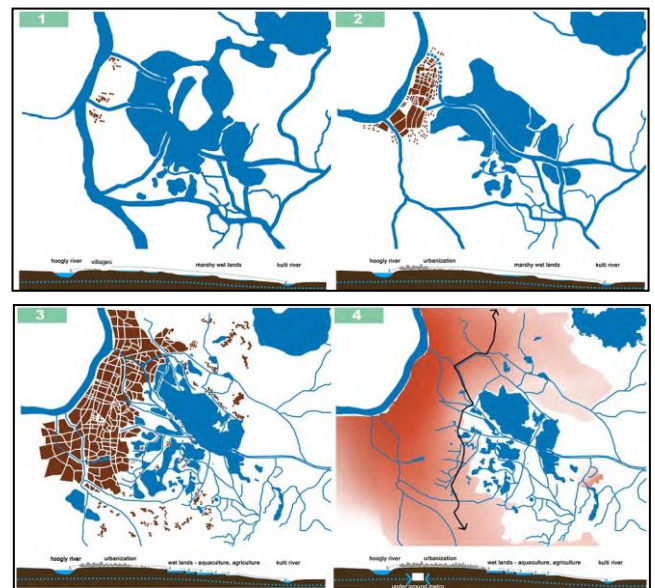


Fig -5: Change in Land-Water Ratio of the Historic Wetlands (Source: Author)

4. UNDERSTANDING OF THE PRESENT SCENARIO

Due to centralized acts of land filling like Salt Lake and Rajarhaat and introduction of Eastern Metropolitan Bypass right on the current day edge of the wetlands, it has emerged as a major transport corridor acting as a catalyst for generic, big foot printed developments. This nature of urbanization does not correspond with the resource recovery activities performed by the small communities within the wetlands.

The whole phenomenon is pushing the wetlands towards further east.

“One of the rare examples of environmental protection and development management, where a complex ecological process has been adopted by the local farmers for mastering the resource recovery activities”

- Ramsar Convention on Wetlands (East Kolkata Wetlands) [12]

Wetland is not only an ecological element, but social and economic part of huge population. The present scenario shows some key facts –

- The primary economy sector is being pushed out by new emerging economies.
- Allocation of services and infrastructure has become centralized.
- Large centralized and mechanized acts of engineering have taken over the multiple small scale and hand-made acts of development.

This primary observation raises the questions for future planning strategies –

- How to sustain the fast vanishing landscape of the wetlands?
- What sort of developments should happen on the wetlands?
- How the existing wetland system could be made more efficient?

The overall analysis of present scenario at larger regional scale strikes out the following understandings:

- The wetland area has been decreased gradually as the urbanization of Kolkata spread.
- The canal network in between the river Hooghly and East Kolkata Wetlands has been weakened.
- The laying of Eastern Metropolitan Bypass and Land Reclamation process for Salt Lake City has taken out huge chunk of the wetland areas.
- As the river edge is high, the city slope is towards the wetlands. The natural terrain of wetlands has a form of terraces with little undulations in between, which helps to collect the city waste and do aquaculture, pisciculture and agriculture at a huge scale out of the deposited waste and be beneficial to local communities and rest of the purified waste flows to Kulti River on the eastern side of it.
- Administrative boundaries are overlapping in and around the wetlands.
- The land-use is of mixed type and ever changing as per the on ground scenario.

Laying of EM Bypass was considered as the city edge at the eastern side. Accordingly, one of its edges towards the city had been filled with new developments initially. Gradually the other side of it is taking out the marshy land of wetlands at certain nodes by land filling for new real-estate developments and economic opportunities. Local communities and their livelihoods are completely been ignored in the entire process. The degree of transformation can be observed as there are huge pollution creating

industrial pockets appeared within accessible part of wetlands. This scenario creates a mix of knowledge sector, construction labour force, industrial activities, solid waste recycling, aquaculture, agriculture in and around the wetlands.

But the question can be raised that can the wetlands and its natural terrain can accommodate this mix altogether or rather the benefits of its existence will be erased in future due to these forceful acts. Can it sustain along with its resource-recovery economy network and presence of local community life? To understand the dynamics of land-water interwoven fabric, ‘Fabric Sample Study’ has been taken out along City-Wetland Edge. Key observations are as follows:

4.1 Traditional Habitat Pattern

Man-made bund or natural higher landform beside any sewage distribution canal exists or man-made micro level canal network is connected with big water bodies. Multiple bunds may cut around any community settlement in cut-fill process. Formation of sewage-fed fishery and evolution of community over the bund strip happened, creating economic benefits out of it. As a whole, the process creates a complete network of land and water creating a ‘living-working condition’. The local communities are distributed over the entire area on the basis of their specific type of occupation and still connected with others for their socio-economic exchange and other decision-making process.



Fig -6: Identified Locations of Traditional Habitats (Source: Google Earth Pro)

4.2 Traditional Habitat Pattern: under transformation

Large scale pollution creating industrial settlements like Bantala Tannery are taking lands from the marshy areas by filling up the localized low-depth small ponds, which are extremely suitable for local activities. The image of a natural eco-urban space, which comes out from the balanced co-

existence of natural landscape and local settlements is getting destroyed day by day. The image appearing is not in equity with one another and adding no value in identity of the place, becoming not contextual at all. The variation in image making out of the local activities related with the natural landform and the settlement pattern creates a uniqueness, which appears as evolved with time and as per the demand from the context itself. Whereas the new / upcoming monotonous residential or commercial development on huge chunk of reclaimed wetland does not create any variety in image making process, rather erases the traces of localized landscape and having no designed response towards its natural edge also.



Fig -7: Identified Locations of Traditional Habitats - under Transformation (Source: Google Earth Pro)

4.3 New / Upcoming developments – One time act of Land Reclamation



Fig -8: Identified Locations of New / Upcoming Developments (Source: Google Earth Pro)

The overall form and pattern of this eco-urban landscape evolve from the needs of everyday life of local people. Whereas whenever new developments happen, it begins from making the landform flat, which destroys the very basic ecological dynamicity of the place. Canal is filled up to create access for new high rise residential and commercial developments along canal edges.

This detail study provides base for the current day trends of one time acts of engineering, the primary economic sector (food production) being pushed out by the new emerging economies and large centralized allocation of services. Therefore attempts can be taken to explore the idea of combining the use of natural landscape and infrastructure as a probable answer to the modern day threats on urban ecological set-ups. The decentralized allocation of soft infrastructure will determine the nature of transformation in this area and help ensure a long term sustainability of the wetlands, its people, their economy and thus the city of Kolkata. The process can super-impose the ecological and economical networks to achieve a mosaic of various small scale activities empowered by institutions, intense activity nodes and new whole sale markets as places for economic exchange, which can be supported by strategies and guidelines for new developments to maintain an optimum land-water ratio.

5. DERIVING ISSUES – IMPACT ASSESSMENT ON ECO-URBANITY OF THE PLACE

Encroachment in and around the wetlands is becoming the major issue. It can happen by filling up land with garbage. The land-use has been changed sometimes, hence industrial use, storage or godowns appear in an isolated manner. Increased road infrastructure further fosters connectivity and hence growth / encroachment towards wetlands. The laying of Eastern Metropolitan Bypass can be mentioned with this reference, which shows the influence of a major connectivity. It has allowed encroachments through its softer and ambiguous edges. It is observed that there are several nodes or points having soft edge condition or having overlapped legal boundaries; formulate gateways for encroachment of new developments towards the wetlands. This initiates the transformation along the edge and its influences appear towards the inner core of the wetlands gradually, as explained in Figure 9. The major transformation happens in terms of the urban form and image of the place, which creates non-contextual environment and imbalance for the eco-urbanity of the space. Therefore the present day trend of developments with technology based heavy and hard infrastructures creates major impact on socio-economic processes of local settlements.

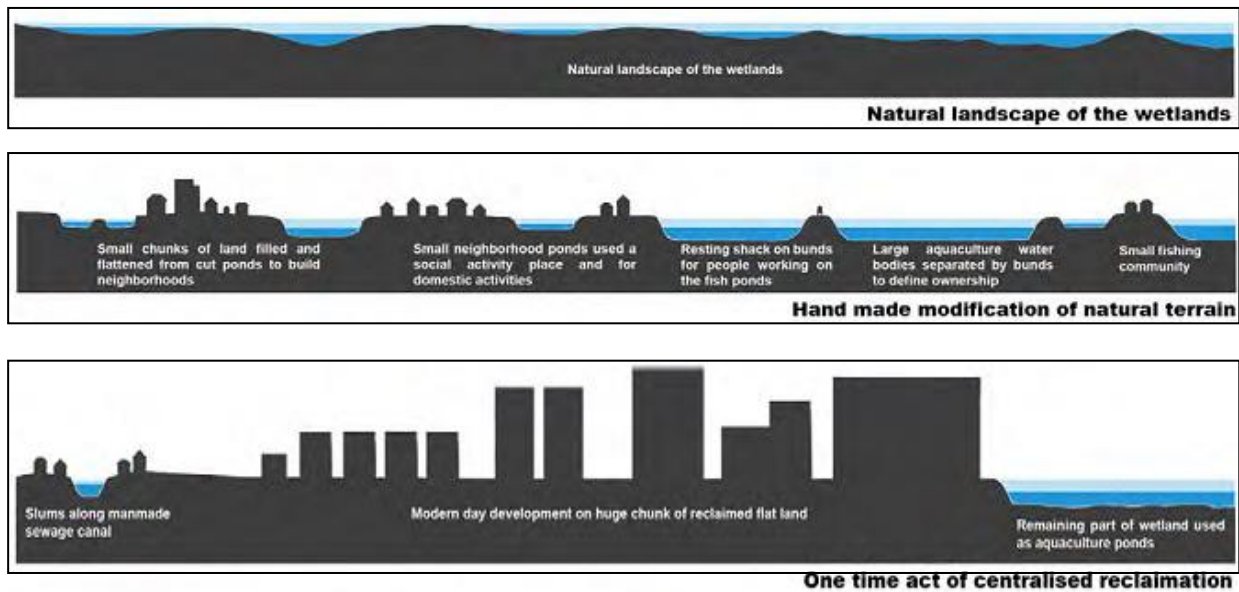


Fig -9: Gradual Changes of Wetlands – Land-Water Fabric (Source: Author)

6. WAY FORWARD: EXPLORING ALTERNATIVE STRATEGIES AT VARIOUS SCALES

It is important to explore alternative Approach to reconnect the wetland interface through re-thinking the modern day approach of developments at ecological set-ups with soft and decentralized infrastructure. Certain approach and Strategies have been evolved for its resolution, as described in Figure 10.

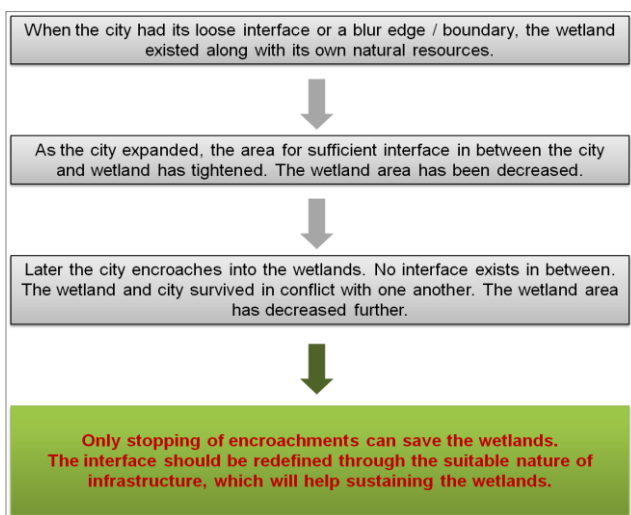


Fig -10: Strategies to Save Wetlands (Source: Author)

6.1 The Structuring Elements at Regional Scale

To redefine the interface of the wetlands and restructure the wetlands, the canal network as soft infrastructure which will

enhance the connectivity among settlements of the wetlands and will be the mode for exchange of resources in various

forms, can act as macro element. The micro elements can be the sludge trap ponds and the nearby settlements.

A network of canal can be proposed connecting various parts of the wetland with the city edge. Canal infrastructure will be formed as a substitute for heavy road-based infrastructure. The canal junctions or stops can be developed at each urban-village as an activity node. These activity nodes may act as trigger for transformation within the villages. Insertion of various institutional amenities will be done to upgrade the villages and foster resource-recovery economies. Places for economic exchange like wholesale markets can be developed along the city edge, which will initiate or generate subsidiary small scale economic activities. Finally this new set-up of eco-urbanity will ensure to maintain the optimum land-water ratio of this historic urban landscape and sustain the morphology of local settlements.

This new framework will help to regulate the new or upcoming developments from encroaching lands from the wetland area and create a distinct buffer or define interface between the Kolkata City and the preserved zone of core of wetlands, where small scale organic growth along the proposed canal network can only happen. This alternative approach will help to envision the nature of transformative developments along and around the canal network. The insertion of soft infrastructural connectivity within wetland core might help to redevelop the local settlement areas. Hardening of the canal edge and insertion of institutional activities or activity nodes will create new typology of public places for the local people. The canal edge and the sludge trap ponds, which are considered two major structuring elements for this vast landscape, might help in transforming

the habitat pattern along and around it. The road-based heavy infrastructural network, which we experience in the existing scenario, is penetrating towards wetlands at several points or nodes from the city edge and destroying the natural pattern, morphology and image of the local settlements. Whereas this alternative approach questions over the laying of road-based heavy infrastructure and proposes for canal based soft infrastructural network, which will ensure stopping the roads at the edge and create connectivity only up to the places for economic exchange with local settlements at certain nodes only. So that the interface can be redefined through the peri-urban activities, image and its eco-urbanity.

The alternative approach of setting up canal network from the edge towards the wetlands will help to maintain the ecology-economy network of the place as a whole. The city sewage is directly connected with the canal network, which passes through the wholesale market nodes and sludge traps / lotus ponds in the core area and get purified. The consideration of sludge trap and lotus ponds as structuring elements for the transformation of the place will ensure to produce crops, vegetables and fish. This production creates need for place of economic exchange like wholesale markets, which supplies the products from the resources to the city people and generates economy for local people. The network of navigable canal here acts as movement path for people and goods for their social, cultural, economic exchange of resource-recovery activities.

7. CONCLUSION

The observations, understanding of the natural set-up of the case of East Kolkata Wetlands and its detail analysis provides alternative outlook and direction for future planning. Natural systems play a major role in shaping the nature and direction of growth for cities. But because of other stronger determinants of growth, human civilization tends to negotiate and tamper with the natural systems. However, any natural system becomes an essential organ for a city on which it is dependent for many processes. Human settlement should sensitively integrate with its natural systems and thus keep extracting the benefits from it without letting it degenerate. One would then come up with a spatial pattern, which contributes to a variety and a rich urban life.

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