The Role of Canals in Promoting Urban Resilience: A Case Study of Kochi City

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Abstract **- Water is the most precious and essential commodity because everything originates from the water and everything is sustained by the water. Water being the basic resource for all human activities, the canal system had been structured and sustained by a pre-modern, locally controlled, human ecosystem- watershed model for centuries. The present trend neglects such water edges with space to accommodate the needs of the increasing populace including Kochi. Since canals used to be part of the Koch city structure, there is a possibility to readjust them in order to create new dynamic design models of the urban ecosystem. The paper aims to understand and analyze the present condition of the canals of Kochi which had historical resilience and adaptability of living in the indigenous and traditional process. The possibilities of reviving water transportation as an urban design particularly the backwater transportation circuit. The methodology comprises understanding the value of canals of Kochi with respect to its historic environmental function and cultural values in order to develop policies and promote urban resilience.**

Index Terms **- Kochi, Canals, encroachment, resilience, rejuvenation, backwaters, water transport networks.**

INTRODUCTION

Kochi is a major port city in the south-west coast of India and is a part of the district of Ernakulam in the State of Kerala. Kochi is actually a twin city, the main land is called Ernakulam and the island part is called Kochi. The city is located at 12 9°58'N; 76°13'E, spanning an area of 94.88 square kilometers. It is bound by Thrissur in the north, Idukki in the east, Kottayam and Alappuzha to the south. (P.Kalaiarasan 2017, 29) It has historically been the ancient trade gateway to the hills of Kerala which were revered by the traders for the spices it produced.

The western part of Kochi is a flat coastal zone and comprises 52 drainage units covering an area of 115 km and islands in the backwaters system with a total area of 56.4 km. The backwaters extending to an area of 72.6 km also comes within this zone. The eastern low hills, covers an area of 291 km, and comprises of 21 stream basins or micro catchments, each with independent watershed area. (Jayaprasad.S.D 2010, 34) The present urban sprawl of Kochi has extended to adjoining contiguous areas of Tripunithura, Eloor, Kalamassery and Thrikkakara forming the Kochi Urban Agglomeration.

METHODOLOGY

The methodology started with a reconnaissance in which existing activities, encroachment and environmental condition of the canals in Kochi has been identified. The efforts to see canal inventory, data related to present condition of the canal, details of households/encroachments and its location were collected to find out the existing problems and to understand the development strategies proposed by the government and future potential of the canal. The available sources have been analysed critically and analytically.

LITERATURE REVIEW

This paper tries to examine how water ways can promote the climate, social and economic resilience of the canals in Kochi. Further, to understand the roles and limitations of various agencies that operate in the domain of rejuvenation. Yogi Joseph, *Study on Inland Water Transportation in Kochi City Region*, Centre for Public Policy Research, Elamkulam, Kerala, (2012), has tried to explain the importance of the water transport system in detail, but the study ends with a few references to the canals of Kochi. The report published by the Chairman, Kerala State Pollution Control Board, Sh. Jeyaprasad SD, *Action Plan for Greater Kochi Area*, (2010) emphasized the need for the rejuvenation of canals. The study conducted by

Indian Council for Research on International Economic Relations in May 2018: entitled *The Role of Waterways in Promoting Urban Resilience: The Case of Kochi City* was the first serious attempt to study about the condition of canals in Kochi. *Feasibility of Development of Canals in Kochi*, National Transportation Planning and Research Centre (NATPAC), Thiruvananthapuram 2017. This study was conducted by Kerala Shipping and Inland Navigation Ltd. (KSINC).

This study gives a comprehensive report on the existing condition of canals and identifies various possibilities on how to rejuvenate the canals. There are few newspaper reports which highlights the recent developments particularly the reports on Kochi Metro Rail Ltd (KMRL),2020 and its initiatives of canal revamping project as part of the 'Integrated urban regeneration and development of waterways in Kochi' scheme. The present study does have certain limitations with regard to the availability of the sources. The number of sources to analyze the canals of Kochi during the period under discussion is only a few.

IDENTIFIED PROBLEM

Kochi has a good network of waterways formed from backwaters, rivers, and manmade cross canals, connecting the various parts of the state, which have played a predominant role in the maritime history of the region. Inland water transport is widely regarded as an economic, environment friendly and eco-friendly mode of transport in Kochi. These waterways were the main highways of trade and commerce in the past and were the lifeline of the State's economy is now dysfunctional due to neglect and indifferent attitude from the stakeholders. These waterways serve not only as navigational channels but also helps in tourism promotion and economic prosperity of the state. Unfortunately, nowadays hardly 20per cent of the waterways are in use for navigation and the remaining sections are being used as drainage channels for the city's wastewater and effluents from various land uses including encroachment and constructions. (Kalaiarasan,2017,12) The residents of Kochi expressed their concern over the severe waterlogging in the city and requested the government to take steps in preventing flooding of the city.(The Hindu, 22 October, 2019)

Further, with the increasing trend of urbanization and modernization, Kochi city is facing severe traffic problems which hamper the mobility of people and goods transportation. Hence, there is a necessity to revive this system, not only for inland navigation, but also to harness the enormous potentials in other sectors of economy. Therefore, rejuvenation and proper management of important canals and their surroundings in the city are vital for sustainable development of the region.

IMPORTANT CANALS OF KOCHI

There are about 1,100 km of waterways or canals in Cochin City alone. Out of this, about 40 km of rivers and canals are navigable by motorized crafts. National Waterway No.3 connecting Kollam and Kottappuram passes through the region. (Town and Country Planning 2010, 120) The waterway network in Cochin is more or less of a 'grid iron' pattern, with only a few missing links. There are 11 canals in Cochin, They are Edappally canal (11.23 Km), Thevara Perandoor thodu (7.5 Km), Chilavannur canal (4.4 Km), Thevara canal (1.5 Km), Market canal (1.0 Km), Mullasserry canal (1.5 Km), Manthara canal (3.5 Km), Rameswaram canal (2.0 Km), Pandarachira canal (3.5 Km), Pashni thodu (1.5 Km), Pallichal thodu (4.0 Km). (Town and Country Planning 2010, 167)

The study conducted by KSINC reveal the fact that, the vertical and horizontal clearance of cross structures, bank protection measures, road accessibility, land acquisition, resettlement and rehabilitation measures are the constrains for developing canals for inland navigation. (Kalaiarasan,2017,55) Therefore, management of important canals and their surroundings in the City are vital for sustainable development of the region. (Town and Country Planning 2010, 12) The total length of primary canals in Kochi cooperation is 77 km and length of natural man made secondary drains is 22 km which convey the storm water runoff to the back water system which were once navigable are now highly degraded because of encroachments, waste dumping, silting, weed growth, low maintenance and lack of protective measures.(Town and Country Planning 2010, 203) It is necessary that, these canals and the shorelines are protected and maintained properly for better living conditions. The man-made secondary

drain encompasses major roadside drains, which go beyond the level of area drains.

PRESENT CONDITION OF CANAL SYSTEM

A preliminary reconnaissance survey was conducted to assess the general conditions of all canals revealed that the canals in Kochi are turned into wastewater drains. The canals show high levels of pollution, clogging due to weeds, disposal of plastics and other wastes, encroachment and filling of many reaches, finally resulting in floods during the monsoon season.(Kalaiarasan,2017, 59) This also is the main reason for one of the most nagging problems in the city the mosquito menace. Indiscriminate disposal of solid wastes (including plastics, bottles etc.) into the canals at many locations and the direct discharge of untreated waste water from the houses (including slums) located on the banks pose the biggest threat to community health and smooth functioning of the canal system. Encroachment is seen in many places with huts/houses built after filling the banks of canals, resulting in reduction in width and missing links in the existing canal network. (Town and Country Planning 2010, 224)

The irregular and inadequate maintenance of drains/canals causes blockage in the canals makes the water to become stagnant thereby resulting in foul smell and mosquito breeding in many areas in the city. The result of the water quality analysis revealed a high degree of pollution in the canals. The analysed parameters such as turbidity, pH, conductivity etc. exceed the permissible limits for any class. The high levels of fecal coliform may infiltrate into the nearby wells and seriously affect the health of the residents in these areas. (Town and Country Planning 2010, 225)

The absence of protection walls leads to siltation and weed growth in most of the canals. In many places culverts and bridges across the canals have been constructed with reduced waterway causing flow obstruction. The invert levels at the exit of many of the lateral drains that discharge water into the canal are lower than the low tide level in the backwaters. Such submerged outlets prevent positive flow and even water back-up during high tides and increase siltation. Many railway crossings with culverts and bridges have inadequate vent-ways causing water back-up and preventing navigation (country boats).

REJUVENATION PROJECTS

Based on the project report prepared by National Transportation Planning and Research Centre (NATPAC), Kerala Infrastructure Investment Fund Board decided to renovate major five canals of Kochi. Edappally canal (11.5km), Thevara canal (1.405 km), Thevara-Perandoor canal (11.15 km), Chilavannoor canal (9.88 km) and Market canal (0.644 km), will be covered in the first phase.(The Hindu, March 24,2017) Kochi Metro Rail Ltd (KMRL) took up the canal revamping project as part of the 'Integrated urban regeneration and development of waterways in Kochi' scheme. (Project Report KMRL 2020, 2)The KMRL is the implementation agency of the Rs 1,364 crore project, under which, five major canals in the city, comprising a total length of 34.5 km, will be restructured. "Out of the five canals, the 11.23 km long Edappally canal will be the first to be renovated, in two phases. In the first phase, the area between Edappally and Chambakkara will be restructured, while the area between Edappally and Muttar River will be covered in the second phase. The total cost of renovating Edappally canal will be Rs 226 crore.(Indian express 2019)

The project was initially mooted by Kerala Shipping and Inland Navigation Corporation (KSINC). Since Kochi Metro Rail Limited (KMRL) was also implementing the Water Metro project, it was decided to entrust it with this one as well. The KMRL in line with the directives of the Ministry of Urban Development, Government of India, developed a project report on 'Integrated Urban Regeneration and Water Transport System for Kochi City'. (Project Report KMRL 2020, 3). The rejuvenation of the canal project comprises three phases, in the first phase planning, survey, concept design of canal sections and tendering. The second phase detail design and finally construction and supervision. (Project Report KMRL 2020,12)

The project initially rejuvenates five major canals namely Edapally Canal, Chilavannur Canal, Thevara-Perandoor Canal, Thevara Canal and Market Canal of 34 km in Kochi. The idea is to develop the urban area for inland navigation and to provide free vessel movement with a seamless multi-modal transportation connectivity system. (Project Report KMRL 2020,1)

The initiative taken by the government of Kerala for urban regeneration strategies aims to network canals

as a transit interchange corridor with the hybrid character of functional and cultural design elements for its sustenance. In the current project, the water metro routes proposed by KMRL are passing through the backwaters surrounding the mainland connecting the people residing by the sides of the canals passing through the mainland with the renovation.

The existing canal will have to be widened to a length of 16m, dredged and sidewalls will have to be constructed. The existing culverts and bridges need to be restructured so as to make the canals navigable. However, the biggest challenge in front of the implementing agency will be the rehabilitation and resettlement of families residing on the banks of the canals. (Kalaiarasan 2017,50) The public sector undertaking, Bhavana Kerala Foundation, has been entrusted with rehabilitation and resettlement proceedings. (Indian express 2019)

Kochi is one among the cities selected under the Government of India's Smart Cities Mission. (Tamang Shanti 2020, 73) The Smart Cities Mission (SCM) aims to rejuvenate the prevailing urban ecosystem through Area Based Development (ABD) Development strategies. The objective of the SCM is "to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions". The primary objective of smart city mission is to "advance sustainable and comprehensive towns and cities that give core infrastructure and give an average personal satisfaction of life to its residents, a feasible, clean, and sustainable living condition through the utilization of smart arrangements." (Tamang Shanti 2020, 67) As envisaged in Smart Kochi Mission (Smart City Challenge Stage 2 2019,7) an earnest attempt should be made to rejuvenate water bodies, leverage canals as open space, arrest sewage flows through a comprehensive sewerage and seepage program.

Firstly, Kochi is a land of canals and backwaters and required to reclaim the canal edge as a public asset and protect it. Secondly, efforts should be made to improve its spatial structure and restore the city's relationship with the canals. Thirdly, the regeneration of the urban area in and around the canals mainly aims to develop core areas of each canal and make them more productive by shifting non-conforming uses to the peripheral areas and renovating the core areas. Fourthly, the proposed plan should ensure an independent sewage treatment and disposal system to ensure a smooth flow of water and effective flood management. Finally, most of the canals are highly silted and polluted by disposing of garbage, domestic waste, construction waste, commercial waste, and weeds growth. This affects the canal ecosystem which includes the flora and fauna and causes various health hazards to invite, which invite immediate attention.

CONCLUSION

The processes to resilience of any city are a function of both its ecological and economic system. It should be understood as the ability of the locale to counter both climate and economic shocks and its capacity to constantly renew itself to withstand an ever changing set of risks. It is indeed a matter of grave concern that despite the presence of such a vast network of waterways in Kochi, we have been unable to make use of it by positively integrating it into our city mobility plans. However, poor planning and management of the industrialization and urbanization processes resulted in the neglect and widespread exploitation of this resource over the years, undermining its ability to support both ecology and connectivity.

- In the recent years, partly due to growing recognition of climate change, and indeed for both mitigation and adaptation, there has been a renewed interest in investing in waterways to enhance connectivity in the region. While cities across the globe are competing with each other on how to make best use of the water resources available to them we are failing in the proper utilization of resources in Kochi. The severe crisis in the transportation sector witnessed by our city today is an opportunity to the direction of a sustainable and environment friendly model of transportation.
- The degradation of the water system in the city has not only raised its vulnerability but has also compromised its resilience capacity. In the case of Kochi, even when the importance of its water bodies is appreciated at the policy level, the approach towards their regeneration or maintenance need further serious attention. While the present water metro project envisaged is praiseworthy, the emphasis seems to be more on the economic aspect, especially the ease of transport in the city. The limitations the city faces

also calls for an integrated approach with the involvement of all stakeholders. Above all, development of an efficient water transport infrastructure is a unique chance for Kochi to right the wrongs of the past and prepare itself better for the future.

REFERENCE

[1] Aziz, Zeba, Indro Ray, and Sandeep Paul. *The role of waterways in promoting urban resilience: The case of Kochi City*. No. 359. Working Paper, 2018.

[2] Jayaprasad.S.D, *Kerala State Pollution Control Board Action Plan for Greater Kochi area*, Kerala, 2010.

[3] Joseph, Yogi. *A study on inland water transportation in Kochi City Region*, Centre for Public Policy Research (CPPR) Working Paper Series 2012.

[4] Kalaiarasan **,**P. *Feasibility of Development of Canals in Kochi*, National Transportation Planning and Research Centre (NATPAC), Thiruvananthapuram, 2017.

[5] *Kochi's Eddappali Canal to regain its lost glory*, Indian express 11th June 2019.

[6] Mathew, Alex Paikada. *Salinity intrusion and seasonal water quality variations in the tidal canals of Cochin*, 2005.

[7] Mereena, C. S., and T. K. Prasad. *Prospects Of Inland Waterways In Urban Public Transport Of Kochi City Kerala*. *CLIO* An Annual Interdisciplinary Journal of History 6, no. 10 (2020): 578-591

[8] Project Report, *Integrated Urban Regeneration and Water Transport System in Cochin*, Kochi Metro Rail Limited, Ernakulam, 2020.

[9] Reviving Kochi's canal network feasible: study, *The Hindu*, March, 24, 2017.

[10] *Smart City Challenge Stage 2*, Government of India, 2019

[11] Tamang, Shanti. *Smart Cities Mission In India: An Overview*, 2020

[12] *The Hindu*, Kochi, October 22, 2019

[13] Varughese, E. *Development Plan for Kochi City Region 2031: Study and Analysis*, Thiruvananthapuram: Department of Town and Country Planning: Government of Kerala, 2010.

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