Historic Evolution of Tank system in Bangalore City

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Historical Evolution of Tank System in Bangalore City

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Abstract

Many of the present cities have previously emerged as settlements, along water bodies. The relation between settlements and water is unique and important. This paradigm of water considered as a source, which sustains life, nurtures occupations and supports religious beliefs is inherent in traditional cities.

Presently, there is shift in paradigm, with urbanization & globalization; the ill-effects of negating water have caused urban ecological imbalance, pollution, unhygienic conditions, floods during rain, etc. & the trends of development and increased land demands have caused encroachment of tank beds, sewage disposal into tanks and nalas……

The paper addresses a historical perspective of the system of tanks or kalyanis existed in the city of Bangalore for over four centuries, focusing on the Arkavathi and Pinakini River Basins, the Water Network System in Bangalore City & the Planning principles and land use allocation, considering topography.

This paper highlights the water network as a structuring element, which also renders Bangalore an identity. An understanding of tank system would help us conserve this unique asset of our city.

1. Introduction

Historical settlements along water developed into port cities, trade centers, administrative capitals, recreational centers, religious/ pilgrim towns, etc. But in Bangalore, there is no natural perennial source of surface water. Bangalore city is characterized by hills, plains, valleys & undulating terrain, which is typical of the Deccan Plateau. The city depended on a system of tanks that were constructed identifying the natural valleys and identifying the natural topography. The construction of tank system was based on the principle of cascading.

The tanks were initially constructed to cater to the agricultural and domestic needs of the settlements. Hence, most of tanks and their connectors (nalas) have institutional land uses abutting them. But in the present times, the demand for land has engulfed tank beds and the unplanned developments have converted nalas into sewage corridors. The tank system, which was a man-made feature, has acquired diverse roles in the urban landscape, and is an integral part of the cityscape since four centuries.

An understanding of the tank system as a whole and its influence on the city may help to invoke a sense of responsibility and pride in possession of this sensitive layer of the city.

2. Water and its relation to settlements

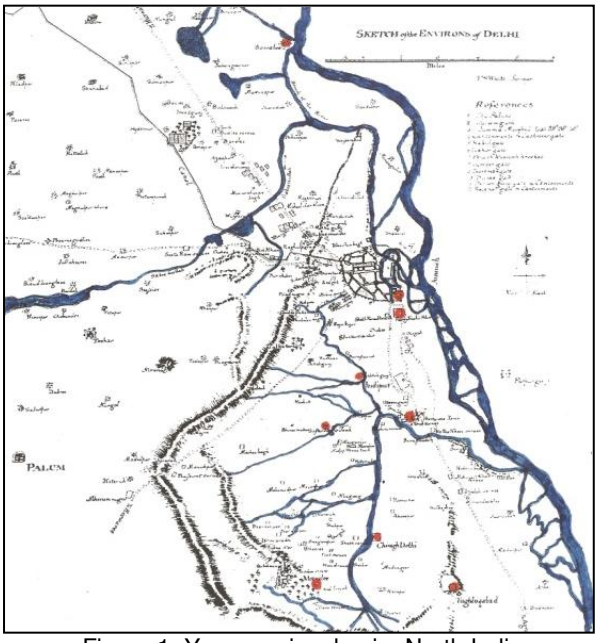

Figure 1. Yamuna river basin, North India.

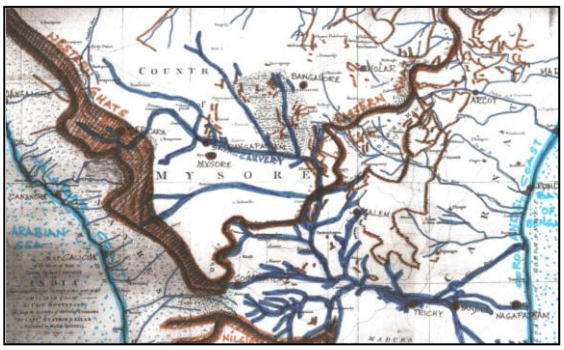

Figure 2. Cauvery river basin, South India.

Historically, settlements and civilizations happened along water bodies. These settlements grew into cities which flourished as port-cities along sea coasts, agricultural cities along the fertile plains and deltas of river basins, etc. Some settlements have taken advantage of the natural features – topography and climatic conditions of the area, and evolved a system of tanks or lakes, considering the watersheds and catchments; like the lake cities or cities of lakes. Most of the primary occupations in these cities were a response to the nature of the water body present. The coastal cities flourished as trade cities, and have become the major ports and harbors, in the present times; for example – Madras, Bombay, Mangalore, Cochin, etc. The cities which have evolved along the fertile river beds, flourished as agricultural lands and went ahead to become capitals of the provincial rulers; for example – Delhi and Agra along Yamuna, Srirangapatna and Tanjore along Kaveri, etc. Certain other cities became religious or pilgrimage centers; for example – Mathura, Varnasi, Kumbakonam, etc. The lake cities have either evolved on the banks of a single lake, like Nainital, Srinagar, etc. or have system lakes like Udaipur, Jodhpur, Jalgaon, Bangalore, etc.

2. The context of Bangalore City

Figure 3. South Indian Peninsula.

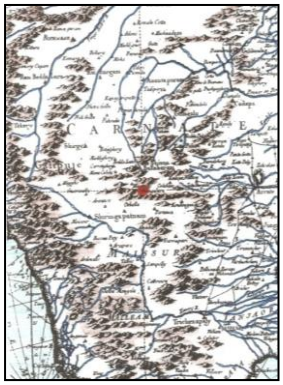

Figure 4. Location of Bangalore.

Bangalore is located in the Deccan plateau, in the South Indian peninsula. The Deccan Plateau is bound by the Vindhyas to the North, Ghats to the East and the West & Nilgiri hills to the South.

At the regional level, Nandi Hills formed the apex of the ridge, from where water would flow in different directions. The main ridge-line running in North-west and South-east direction divides the city into two river basins – Arkavathi river basin and Pinakini river basin. The Arkavathi river basin is to the west with steep slope and undulating terrain. But the Pinakini river basin is to the east with gentle slopes and valleys.

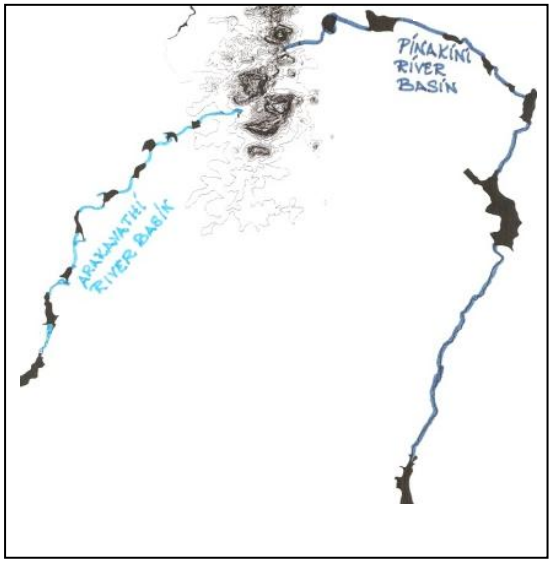

Figure 5. The ridge line dividing the Bangalore region into Arkavathi and Pinakini river basin.

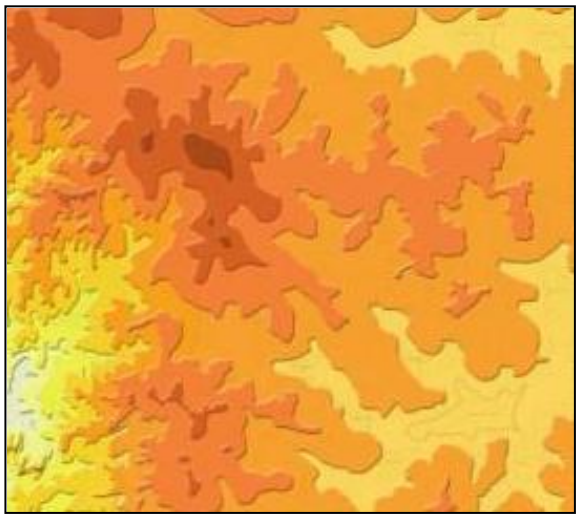

Figure 6. The contour map of Bangalore city.

The contour map of the city shows a radial pattern, from the High-Grounds at the apex. The water is drained off into the low-lying plains –

Vrishabhavathi (south-west), Hebbal (north east) and Challaghatta (south-east).

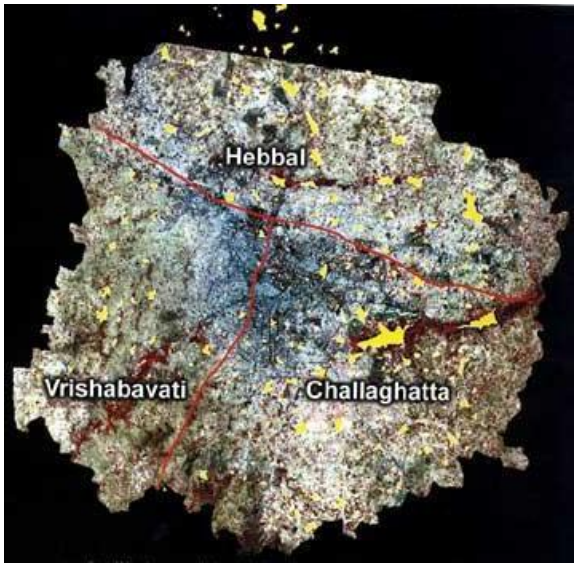

Figure 7. The valley systems of Bangalore.

3. The tank system of Bangalore City

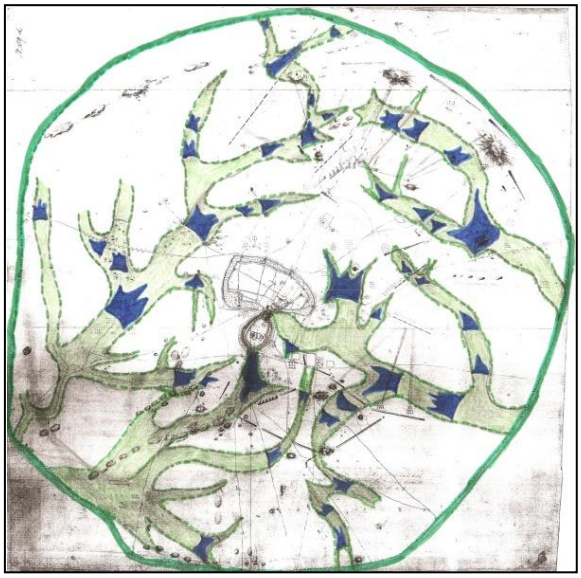

Figure 8. The drainage pattern of Bangalore.

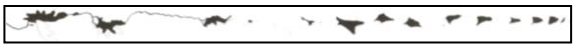

Figure 9. The cascading system of tanks.

Historically, there existed a system of water tanks, constructed identifying the natural valley systems in the region. These tanks were fed by the valleys (nalas), which carried surface run-off during rains. The tanks stored run-off water during monsoons, to be used during lean period. The tank system worked on the principle of cascading. The tanks formed chains, situated in the same catchment area, which depended on surplus water from the tanks at higher elevation and the run-off from their catchment.

Figure 10. Principle of cascading.

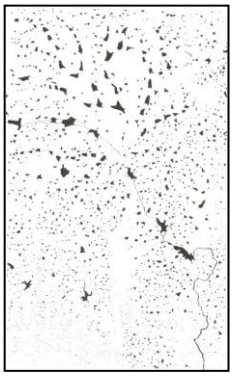

Figure 11. Region of thousand tanks.

The tanks within the city formed the part of the larger region, referred to as "Region of Thousand Tanks". Every settlement had a tank for the water requirements of its inhabitants. The tanks catered to the agricultural and domestic needs. The water collection systems were located at lower plains and the settlements occupied higher lands.

4. The evolution of tanks system

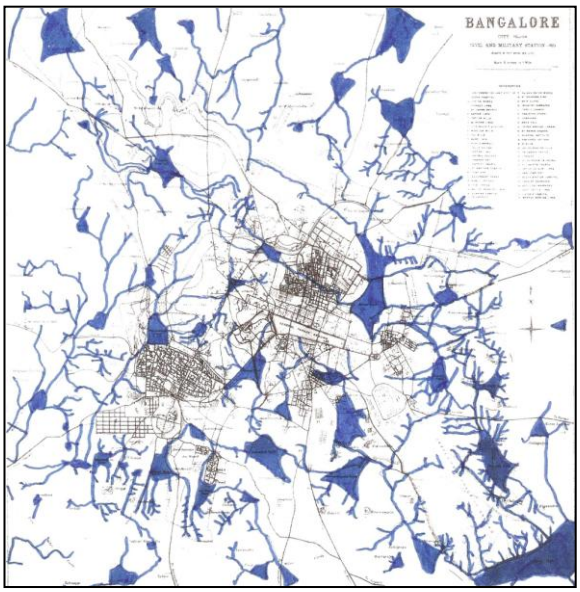

Figure 12. The tank system of Bangalore.

Chronologically, the evolution of tank system in the city of Bangalore can be classified as:

4.1. The pre-colonial period

From 1537 onwards, Kempambuddhi tank was built in Basavanagudi area, Dharmambuddhi tank in Majestic area, Halsoor tank in Shivajinagar area, Sampangi tank in Corporation area and Siddikatte tank near City Market area, by Kempegowda-I and Kempegowda-II, for agricultural and domestic needs of the settlement along these tanks.

In 1759, Haider Ali and Tipu Sultan expanded an existing mango-orchard into Lal-Bagh, which comprised of a garden and a lake.

The settlements happened along the ridge, and series of tanks were built in accordance with the natural valley systems.

4.2. The colonial period

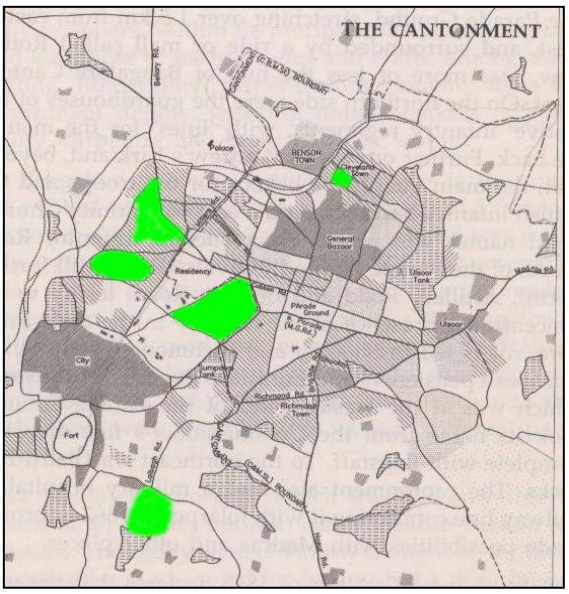

Figure 13. Map of city level parks

In 1809, the Ulsoor tank and its adjacent area was developed to cater to the cantonment settlement, which was established close to the lake precinct. The large area made a buffer zone between the cantonment and the old city.

In 1831, the British capital shifted from Mysore to Bangalore, emphasizing on Bangalore's image of a "Garden City", with salubrious climate.

The establishment of the cantonment, its residential quarters and a commercial center, triggered city's growth east-ward, in the Pinakini river basin. Cubbon Park, Golf Course and Race Course were built in the high grounds region, which formed the apex of the ridge, in the city.

In 1870's, when Bangalore had a severe scarcity of water, **Karanji System** of supplying water existed in the fort area. In this system, a "water-bearer" with tanned skin-container supplied life-saving water, drawn from kalyanis/ tanks.

By 1873, a string of three tanks in a huge area known as 'The Millers Tanks' were erected, as the primary source of piped water to the Cantonment area, along with the Ulsoor tank. The influx of people from various regions accelerated the ever-increasing demand for water and the authorities had to look for new source of water supply. Sankey Tank was constructed in 1882, at Sadashivanagar was erected by Col. Richard Sankey to supply water to the Civil and Military Station in Bangalore. This was connected with Millers Tank and onwards to Dharmambudhi Tank through contour channels. When Sankey Tank overflowed, water would flow into Millers Tank and then to Dharmambudhi. This linking of lakes continued to save the city, during heavy downpour. This system of tanks was known as **Inter-linking system of tanks.**

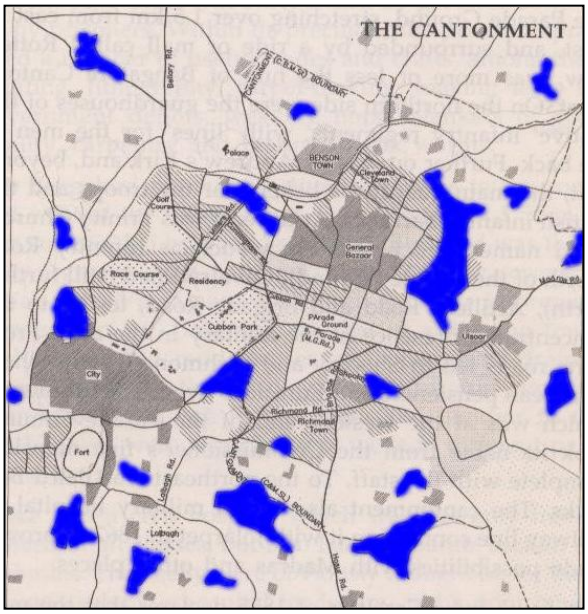

Figure 14. Map of lakes in cantonment

In 1896, Hesaraghatta reservoir was constructed across Arkavathi River, 20kms to the north-west of Bangalore, to supply piped water with meters.

The transportation network, with roads along lakes, isolated the tanks as traffic islands. The supply of piped water from reservoir led to the neglect of water bodies, in the city. The sewer lines and storm water drains ran along the natural valleys, which resulted in mixing of the two. So, the seasonal storm water drains became perennial sewage channels, with sewers directly opening into them.

4.3. The pre-independence period

In 1925, Hessarghatta reservoir dried up completely. Efforts were made to restore water supply

to the city form Yelemallappa Chetty Tank, Byatha and Kakol tanks. Hence, Tippegondanahalli dam was constructed across the Arkavathi River in 1933, to bring treated water to the city.

To cater to the growing city and its increasing density, recreational spaces were laid on dry tank-beds of part of Ulsoor and Domlur tank, Dharmambuddi, Shule & Sampangi tank. Koramangala tank was breached to be used as a vegetable garden.

4.4. The post-independence period

In 1950s, the growth of Bangalore city was triggered by the establishment of five satellite towns, as industrial townships – H. A. L., H. M. T., I. T. I., Banaswadi and north of Tannery Road. With industrialization, there was a sudden influx of people from different parts of the country, which led to the scarcity of water again. Hence, Bangalore Water Supply Sewerage Board (BWSSB) was set up in 1974. The BWSSB depended on Cauvery, as a source to tap water for the city.

The Master Plan 1965, proposed to conserve Sankey tank, Hebbal tank, Nagawara tank, Challaghatta tank, Bellandur tank, Madiwala tank, Sarakki tank and Kempambuddhi tank.

Industrialization led to alternate employments and reduced the dependency on tanks, unlike agriculture. It encouraged migration of people into the city, increasing population and the demand for land. This led to the negligence and encroachment of tanks.

5. The planning parameters

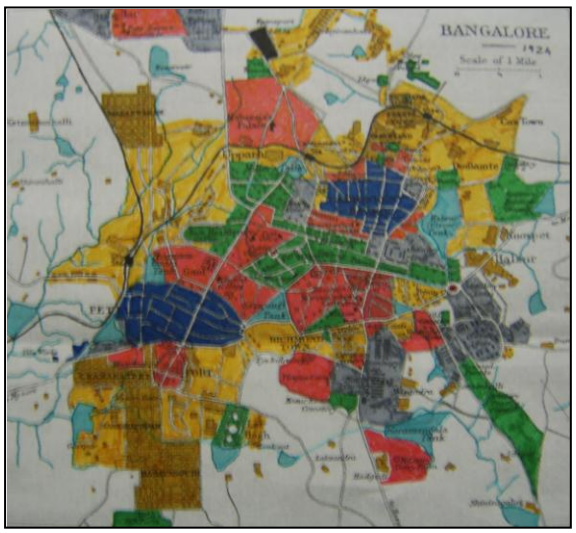

Figure 15. Land use map of Bangalore, 1924AD

Initially, land uses along valleys and ridges, sought to protect the watershed zones, like location of institutions, parks, gardens, etc. But later the tank beds were encroached upon to house transportation terminals, residential layouts, educational institutes, sports stadiums and complexes, hospitals, public offices, industries, community halls, markets, regional parks, textile mills, slum rehabilitation, exhibition and demonstration grounds, etc.

Table 1. Encroachment of tanks in Bangalore.

Tank name	Location	Present land-use
Dharmam buddhi tank	Gandhinagar	City Bus Station
Karanji tank	Chamarajpet, Basavangudi, Gandhi Bazaar	Residential layouts, National High School
Sampangi tank	Corporation area	Kanteerava sports stadium
Millers tank	Vasanthnagar, Shivajinagar	Ambedkar Bhavan, marriage halls, IT companies, office buildings, Jain hospital, Public organizations.
Siddikatte tank	Kalasipalyam	Krishna Rajendra Market
Mathikere tank	Yeshwantpur	Regional park (J. P. Park)
Binnypet tank	Mysore Road, Binnypet	Residential layouts
Juganhalli tank	Rajajinagar	Residential layouts
Challaghatta tank	Koramangala	K. G. A. Golf Course
Koramangala tank	Koramangala	Sports complex

But now, there have been measures taken by the governing authorities to conserve this sensitive layer, which structures the city.

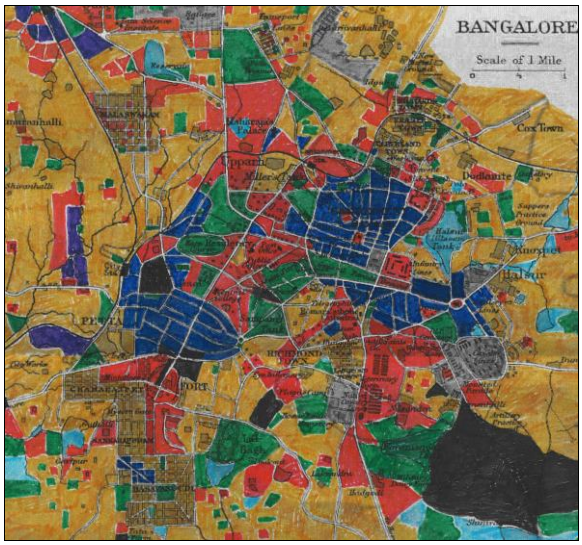

Figure 16. Present land-use map of Bangalore.

6. The importance of tank system

Ecologically, these tanks have become wetland ecosystems, which sustain and attract many species of birds, insects, fishes, etc. Disturbing & manipulating of the water network may result in the ecological imbalance in the urban areas.

Hydrologically, the tank systems check flash floods, due to heavy rains in low lying areas. They reduce soil erosion, by trapping sediments and by regulating run-off. Breaching of tanks at higher elevation has resulted in flash-floods in low-lying areas, like Madiwala, Koramangala, Wilson Garden, etc.

Climatologically, they influence the micro-climate of their surroundings. They reduce surface radiation, regulate humidity, maintain soil moisture, reduce surface temperature and cool the atmosphere. The encroachment of tanks has resulted in reduction of water-spread area, thereby change in climatic conditions and increase in temperatures.

Recreationally, the tanks and its adjacent areas are used as parks, gardens, water-sports, boating, bird-watching clubs, etc.

Religiously, the tanks are embanked by institutions. There is presence of shrines along the edges of tanks. Tanks are used for immersion during festivals, etc.

Socio-economically, the tanks can be used to generate employment, through various activities, like cultivation, fisheries, recreation, hawking along lake promenades, etc, which in turn generates economy.

Educationally, the tanks can be used for the biological study of ecosystems and their flora and fauna, for water supply, sewage treatment and related activities, botanical and horticultural activities in adjacent parks and gardens, etc.

Infra-structurally, tanks can be used as alternate sources of water, even during the present times. The tanks can be recharge points for the under-ground water-table. The setting-up of water treatment plants and sewage effluent treatment plant along tanks for re-use the water for landscaping, etc.

Structurally, the tanks and their connectors, essentially form the first layer, that is water network of the city. This layer is super-imposed by other layers, like road network, rail network, commercial network, industrial network, open space/ landscape network, etc.

7. Present trends in development

With the change in lifestyles and occupations, after industrialization the relationship between settlements and water has changed. With alternate sources of water in the city, the dependency on these tanks has declined. With globalization and urbanization the present trends of development have resulted in negation of this sensitive water network, which structures the city. The growing cities have encroached upon tank-beds and nalas for provision of housing, infra-structure, services, etc. But the existence of these tanks, forming the softscape of the city, from past four centuries, has a deep impact on the environment & climatic conditions of the city. Now, the tank system is an inseparable part of the urban landscape.

8. Inference

The lack of understanding of the water network is the main reason for its present state. The network lost its importance with changes in life style and trends in development. But now, the importance of this network has been understood, where the efforts of restoration and de-silting of tanks are seen. But, for the proper working of the system, a holistic approach should be adopted in trying to understand and analyze its working and initiate its revival.

There is a dependency of the city on this network. But, if it were emphasized with various roles it performs and the development attitude changes, then the sense of responsibility will induce pride and ownership among citizens, about the uniqueness of our city.

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