

Ulsoor Lake: Grey to Green

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Abstract

Bangalore, when founded by Kempegowda I, faced water scarcity, which was mitigated by the ruler by building reservoirs as tanks and lakes. With rapid urbanisation, the lakes have been encroached upon and have given way to build structures catering to the citizen's needs. According to study conducted by the Energy and Wetland Research Group, Centre for Ecological Sciences, Indian Institute of Science, the 262 wetlands that existed in Bangalore in 1962 has declined by 58% by 2007. Similarly, when the city's built up area shot up by 466% between 1973 and 2007, the number of lakes came down from 159 to 93. Lakes also sustained over the years due to the active linkages between them, which are now part of the hardscape of the city. With the increase in built environment, the city is losing out on softscapes that help rejuvenate the water table through percolation. The storm water drains established by the erstwhile rulers of Bangalore are turning grey. One of the lakes in Bangalore which is rapidly losing out on its ability to cater to the biodiversity and turning grey is Ulsoor Lake. The lake was fed by a storm water drain, a 'nala', connecting Miller's tank to the lake. With urbanisation, Miller's tank had been breached upon and the nala is feeding grey water - fed into it by the population - to the Ulsoor Lake and degenerating the microclimate. In such a condition, the function of the lake, i.e. to augment the water supply of Bangalore, is becoming redundant. It becomes necessary to intervene and revive both the nala and the lake for the same reasons. Sustainable development will ensure revenue generation in terms of tourist attraction by adding recreational facilities, at the same time reclaiming the lakefront bio diversity. These aims can be achieved due to the city's environmental resources in terms of climate and vegetation.

Keywords: Bio-Diversity, Micro Climate, Recreation, Stormwater Management, Sustainability, Ulsoor Lake Rejuvenation

1. Introduction

Bangalore, official name Bengaluru, located at 12°58'N and 77°34'E, is the capital city of the state of Karnataka in India. The city was founded by Kempegowda I, a chieftain of the erstwhile Vijayanagara Empire in 1537 A.D. This part of the original city exists to this day and is referred to as 'pete'.

In 1806, the British moved their garrison from Seringapatam to Bangalore and by 1831, when the city became the state capital, Bangalore Cantonment grew independent of its twin city, the Bangalore Pettah. The cantonment area under the British consisted of Blackpally (now known as Shivajinagar), Ulsoor, Shoolay, St.John's Hill, Fraser Town, Benson Town, Cleveland Town and

surrounding areas. The pettah was congested with a traditional Kannadiga population, while the Bangalore Cantonment, with more lung space had a colonial design with population that consisted of residents from other parts of India and Britain.

Shivajinagar or Blackpally was a barren region when Kempegowda founded modern Bangalore. The first settlers in the area were farmers from Gingee, who set up a village and cultivated white rice. It is believed that the name Black pally for the area came from the biliakki (white rice) that they grew in their fields. After the establishment of the British Cantonment to its south and east, Shivajinagar, along with Ulsoor became a native settlement servicing the needs of the Cantonment Residents. The area evolved into a thriving native bazaar and also

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became home for migrating population from other parts of India, mainly the Madras Presidency of British India.

The original Ulsoor Lake was built by the successor of Kempegowda I, Kempegowda II, to augment the water supply to the city. Ulsoor tank which currently exists was further developed by Sir Lewin Bentham Bowring, the then Commissioner of Bangalore in 1809, to provide water for the ever increasing population of the British Cantonment in Bangalore. Several tanks, namely Miller's (1873), Sankey (1882) and Hesarraghatta (1896), were constructed by the British to help supply piped water into the city.

With rapid urbanisation, several tanks and lakes, built by erstwhile rulers to augment the water supply to the city, has been breached upon. Miller's tank, for example was an area of three lakes, which now houses IT companies and hospitals.

Several remaining reservoirs of water are under the threat of pollution due to lack of monitoring and strict enforcement of legislation. The function of Ulsoor Lake, a source of water supply for the city, is facing the threat of becoming redundant due to pollution and indiscriminate disposal of garbage in the waterbody.

Though research has been conducted to determine the physical urban form of a sustainable city in terms of its shape, size, landuse, configuration and distribution of open space, Jenks et al. 2010, in the book 'Dimensions of the Sustainable City' state that the sustainability of city depends on abstract issues – environmental, social and economic¹. Environmental degradation of a locality thus affects the sustainability of a city.

2. Sustainability

The report by World Commission on Environment and Development (Brundtland Commission) defined Sustainable Development in its 1987 report as "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs²". Rapid and uncontrolled urbanisation, resulting in congestion, overcrowding and poor environmental conditions are major challenges in the current scenario for implementing principles of sustainable development.

Degradation of environment generally arises out of inadequate infrastructure to maintain the sanitary conditions in the area. In Shivajinagar, degradation of environment arises out of inadequate measures to

handle storm water, sewage and garbage. The uncontrolled increase in population (natural and migratory) has rendered the infrastructure insufficient. Relocation of the population as a part of urban redevelopment and renewal may not be a tenable possibility because of the community's strong links and associations with the area both in historical as well as functional terms. A good percentage of the population has been a resident of the area for several generations and have long established business in the vicinity of their place of residence. Due to these links to the area, families are hesitant to move out even when the surroundings and living conditions degenerate.

Hence, we need to look at specific micro scale solutions to enhance the quality of life and ensure a sustainable urban development.

2.1 Ulsoor Lake Rejuvenation

The original founders and rulers of Bangalore, natives and Britishers, built an intricate system of lakes and tanks to augment the water supply to the city, a system made conducive due to the unique topographical feature of the city – a series of slopes, ridges and valleys. Several of these has been breached upon and several others are in the danger of being overrun by garbage and sewage. The lakes were fed by storm water drains or 'nalas'. These softscapes have now either become part of the city hardscape or a poor substitute for the sewage drains.

Though the construction of Ulsoor Tank is credited to the successor of Kempegowda I- Kempegowda II - the existing tank was further developed by Sir Lewin Bentham Bowring, the then Commissioner of Bangalore in 1809, to provide water for the ever increasing population of the British Cantonment. A nala passed through Shivajinagar connecting Miller's tank to Belandur Lake and passing by Ulsoor Lake. The purpose of the nala was to feed storm water to the lakes and also ensured overflow from the tank in higher elevation was collected in the one below.

Currently, due to inadequate infrastructure to cater to the sewage generated by the population untreated sewage is being directly fed into the nala. Lack of maintenance of the lake retention walls has caused collapse of a section of the retention walls, polluting the lake with sewage. Both the nala and the lake has also become areas of disposal of garbage. These has given rise to unsanitary conditions and has affected the quality of life of the residents, at



(a)



(b)

Figure 1. (a) Garbage in Ulsoor Lake; (b) Sewage and garbage polluting 'nala' (Source: Authors).

the same time degraded the quality of the surrounding environment.

Some logical interventions to enhance environmental quality and quality of life for residents are:

- Strict enforcement of legislation [Municipal Solid Waste (Handling & Management) Rules, 2000] to curb garbage disposal into the water bodies and a solution for garbage disposal in the area.
- Treatment of the polluted storm water through the use of ECO-BIO blocks and phytoid technology.
- Segregation of storm water and sewage. The sewage should be conveyed through a closed system of pipes with manholes for inspection as per standards. The storm water may be allowed to flow in the nala.
- Regular maintenance of the retention walls of lake.

2.2. Microclimate

Urban heat island can be defined as “a reverse oasis, where air and surface temperatures are hotter in urban areas than in their rural surroundings³”. The construction materials most commonly used, like concrete, absorb and retain more of the sun’s heat. Added to this, the configuration of buildings – dense in Shivajinagar - collects and trap more of the sun’s energy. Anthropogenic heat, slower wind speed and air pollution also contribute to the formation of heat islands.

Heat island effect is observed in urban and suburban areas while the effect of solar heat is easily mitigated in rural areas due to the presence of larger concentration of vegetated surfaces with moist soil.

McMahon et al.⁴, in the book ‘Green Infrastructure: Linking Landscapes and Communities’ define Green Infrastructure as “an interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife⁴”.

Shivajinagar is a densely populated historic core of Bangalore city, with its dense urban fabric contributing to the heat island effect associated with the city. At the same time, as per a study conducted by Ramachandra et al. 2010, Ulsoor Tank was identified as one of the major natural green area and was responsible, through evapotranspiration and evaporative cooling, for maintaining a lower ambient temperature in its surroundings⁵.

Hence, development of this water body with planned vegetation and green infrastructure will mitigate the urban heat island effect and improve the microclimate of the area.

2.3 Storm Water Management

With the increase in urbanisation, the percentage of impermeable layers in the city has increased considerably leading to higher volume of storm water runoff for a brief

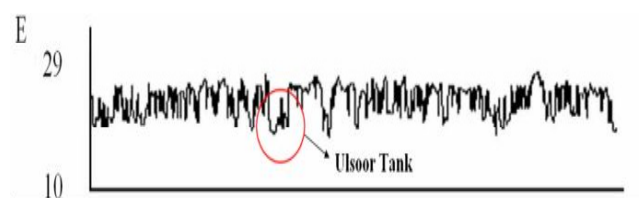


Figure 2. Diagram showing lower temperature near Ulsoor Tank in comparison to surrounding built environment (Source: Greater Bangalore: Emerging Urban Heat Island; IISc, Bangalore, 2010)..

period of time leading to a phenomenon termed as flash flood.

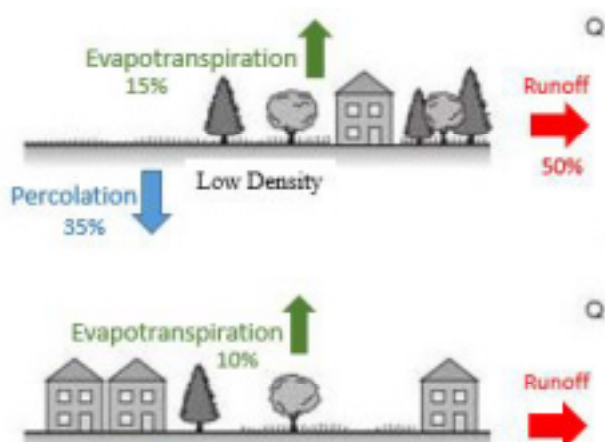
Bangalore is increasingly being subject to flash floods due to change in weather patterns, increase in percentage of impermeable layer, encroachment of water bodies, storm water drains and their catchment area. At the same time, parts of the city are facing severe water scarcity during summer.

An effective storm water management strategy is required to harness the excess runoff for future use. The erstwhile rulers of the city achieved this by building a network of waterbodies, supplemented by storm water drains.

Though the area around Ulsoor Lake is not subject to flash floods, the quantity of runoff generated during



(a)



(b)

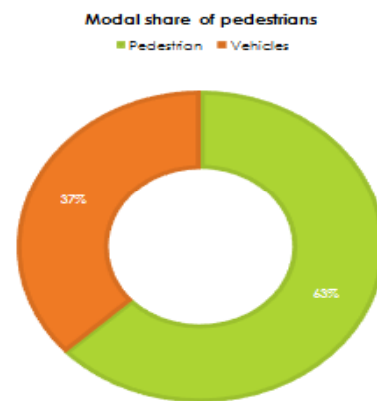
Figure 3. (a) Water tank system of Bangalore (Source: *Historic Evolution of Tank system in Bangalore City; Fathima Samana and Anitha Suseelan; 2008*); (b) Effects of urbanization on urban runoff patterns (Source: *Authors*)

a heavy shower is significant. Faulty planning by the authorities along with lacuna in implementation of legislation to stop the same, the sewage lines servicing the areas around the nala in Shivajinagar directly open into the storm water drain. As a result, during rain, the storm water gets polluted, rendering it unusable for the benefit of the population.

Specific strategy is to segregate the sewage and convey it to a closed sewage line and treat it at a STP at Ulsoor Lake. Part of treated sewage as well as storm water will drain into the Ulsoor Lake itself to maintain the water level.

2.4 Recreation

With time, the density of population of Shivajinagar has increased and correspondingly the green spaces and open spaces available for recreation has decreased. Crowding and



(a)



(b)

Figure 4. (a) Modal share of pedestrians along nala road (Source: *Primary survey conducted by authors*); (b) Pedestrian vehicular conflict (Source: *Authors*)

congestion especially along the nala results in lack of open space for the community for recreational purpose. Presence of a market alongside the nala has also given rise to conflict between vehicular mode of transportation and pedestrians.

The modal share of pedestrians being larger, the strategy is now to pedestrianize the nala road and create open spaces both for passive and active recreation along the banks of the Ulsoor Lake and along the 'nala' stretch.

2.5 Biodiversity

Health of any urban environment is measured by biodiversity i.e. the larger the number of species of flora and

fauna the healthier is the environment. Since water as a resource is available in Ulsoor Lake the strategy is to ensure that a large area along the banks is left pervious with soil to support vegetation.

The choice of vegetation is based on the fact that native plant types are selected for their better adaptability to local environmental conditions. In addition care has been taken to ensure that at least some vegetation includes keystone species that are recognised to support a large variety of birds and small animals by providing food and nesting places for them. Identified tree species for the purpose include the Rain Tree, Gulmohur, Silver Oak, etc.

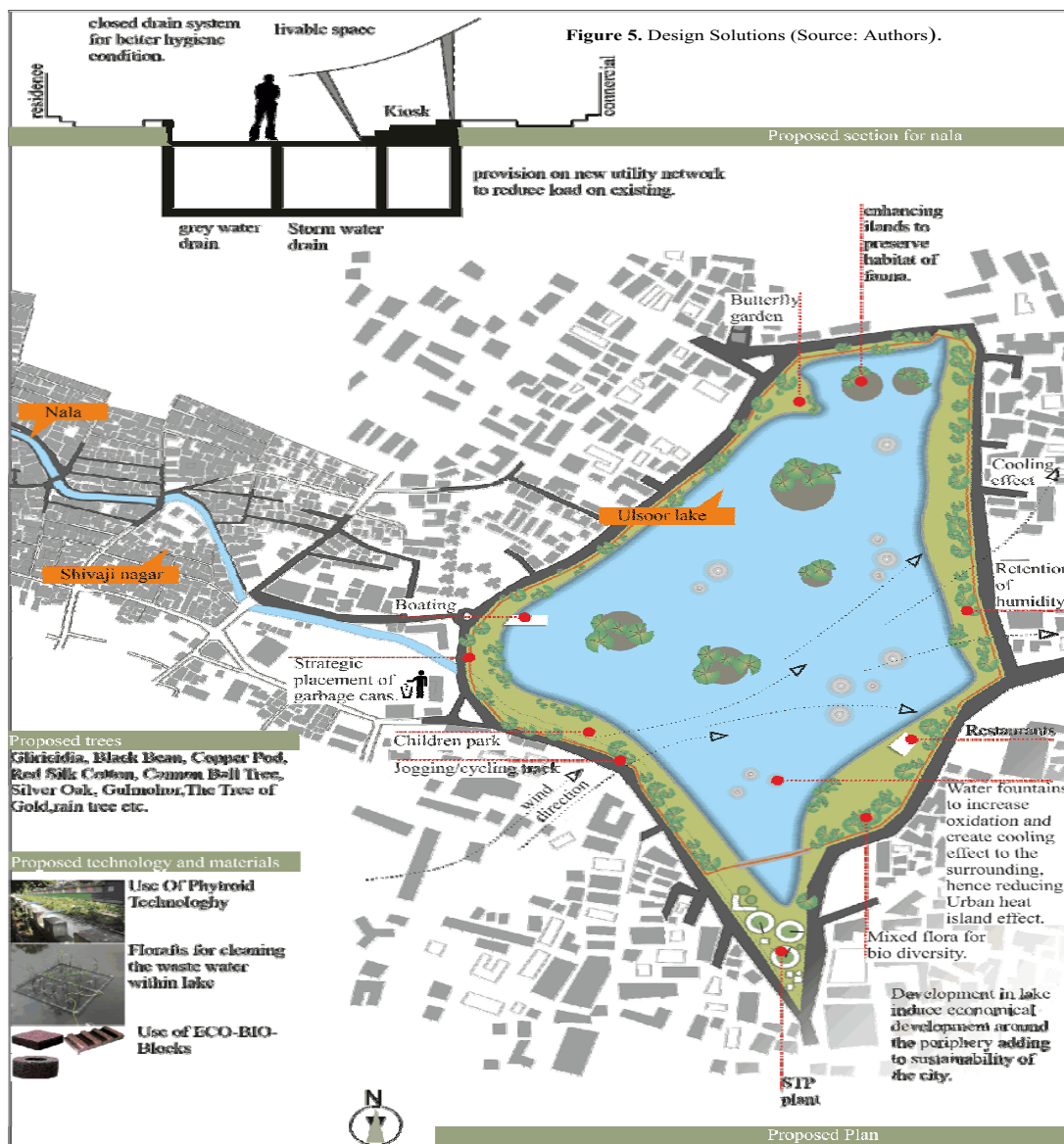


Figure 5. Design Solutions (Source: Authors).

In addition, planting in the islands within the water body will be done in such a way as to attract back migratory birds which once frequented the area. These measures ensure visual delight, visual amenity and passive recreation. They are also valuable educational resource for younger children for nature study and nature camps.

3. Conclusion

The advantage exclusive to Bangalore when compared to its surrounding regions is its environmental resources in terms of climate and vegetation. The city's climate supports a variety of vegetation and water, the scarce resource, in this specific study area is available in terms of Ulsoor Lake.

The interventions and strategies mentioned in the paper are aimed at improving the living conditions of the population residing in the immediate vicinity of the nala and Ulsoor Lake in Shivajinagar. The desired outcome also includes to help the lake area reclaim the biodiversity it was once famous for. The lake hosted several migratory species of birds in earlier times.

The additional advantage envisioned by the betterment of lake and its environs is reclaiming the tourist centric activities once associated with Ulsoor Lake and thus generate revenue.

By these simple steps, we hope to re-establish the ecological framework for environmental, social and economic health of the population and their immediate surroundings; thereby becoming a model for sustainable development.

4. Acknowledgements

We are indebted to the residents of Nala Road, Shivajinagar, Bangalore, for taking time to answer queries and questions posed by the author(s). We also take this opportunity to thank the several BBMP officials who provided us with the necessary details of the area concerned and sharing with us the official data required. Special thanks to our college, BMS College of Engineering and our department, Department of Architecture for this opportunity to work on the paper. Last, but not least, we are forever grateful to the Almighty for his blessings and Prof. Vaseem Anjum Sheriff for her guidance and support in writing the paper.

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