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## TRACING THE IMPACT OF BANGALORE'S URBANISATION ON ITS WETLANDS WITH A CASE STUDY OF SAMPANGI LAKE

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### ABSTRACT

Urbanisation is an inevitable phenomenon introducing drastic transitions in the natural landscape. As the demography is altered, it directly and indirectly impairs the city's natural resources inclusive of the water-bodies. The present research envisages the makeover of Bangalore and its wetlands due to inadvertent urbanisation. In 1537, when the city was founded, significant prominence was given to water-bodies during the planning process. However, the city currently strikes a sorry note, as its evolution into a metropolitan has triggered rampant new land-uses. This revolution, triggered by various government initiatives, privatisation and encroachments led to significant deterioration in the water-bodies, both quantitatively and qualitatively. The current study closely follows Bangalore's urbanisation pattern from 1537AD and enlists the determinants that brought about the loss of its several wetlands. The research concludes with the analysis of the transformation pattern for Sampangi Lake with the aid of historical and current land-use maps, till its disappearance in the current scenario.

**KEYWORDS:** Urbanisation, Determinants, Sampangi Lake, Quantitatively, Land-Use, Wetlands.

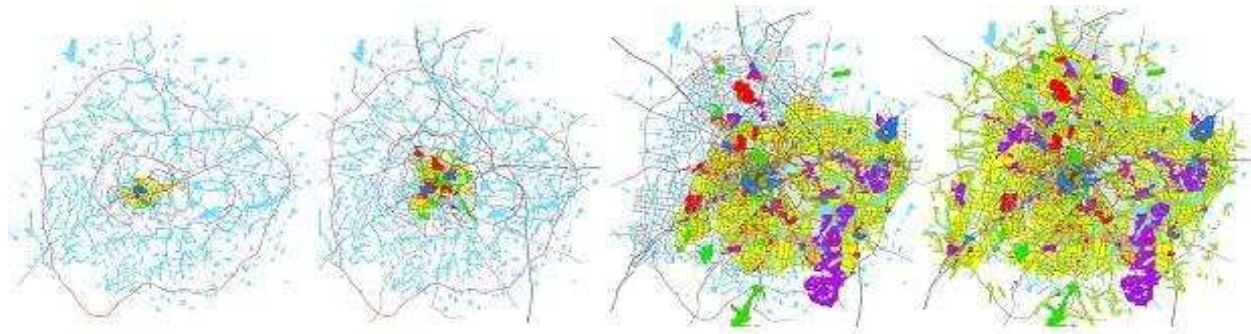
### INTRODUCTION

Urbanisation brings about high rate of population growth in cities due to steep development in industrial, residential and commercial sectors. However, this also transcribes into decline of the natural resources. In this context, the urbanisation pattern for Bangalore has been studied with its relationship to wetlands. Currently, most of Bangalore's lakes have fallen prey to urbanisation, with encroachment in the catchment area, further worsening the inter-connectivity of water-bodies.

### METHODOLOGY

The current study attempts to identify the determinants that have brought about the changes with respect to water-bodies of Bangalore. The city's historical and current land-use maps were prepared using AutoCAD ver. 2010, and the transformations were linked with the depreciation of water-bodies. The transformations were examined alongside the stages of urbanisation from the times of the city's 'founder' - Kempe Gowda, to the various phases of development through Tipu Sultan's regime, the British rule, Pre-independence struggle, Post-independence bloom, the era of Industrial revolution and the current decades of IT & BT revolution. The study further highlights the literature findings with a case study, by attempting to trace the transformation pattern of Sampangi Lake.

## RESULTS AND DISCUSSIONS



**Figure 1: 1537-1799**

**Figure 2: 1800-1947**

**Figure 3: 1960-1980**

**Figure 4: 1980-2010**

### Findings: Historical Urbanisation Trend

As per the gazetteer, the city was founded by an agricultural chieftain Kempe Gowda-I in 1537 AD. The farsighted founder dotted the city with numerous tanks in and around its limits (figure 1), to ensure that its citizens would always have abundant water to drink, irrigate their lands and for secondary purposes. The settlements happened along the ridges, and a series of tanks were built in accordance with the natural valley systems. Centuries later, Nawab Hyder Ali and Tipu Sultan, planned Bangalore as a vacation town with the Summer Palace and Lal-bagh. This complimented the 'Pettah' area to the north of the Fort, a mixed development with commercial and residential land-use (Uday, 2004).

During the British rule, the city had more tanks (Maya, 1997) with its urban fabric reflecting a city with two centres (the old city and cantonment) leading to a radical shift in economic, political & social structure of the city, accompanied by British colonial control. The Fort area (Pettah/City Market) developed parallel with the Cantonment area (General Bazaar/commercial street and its surrounding areas), conjoined by the Majestic area between them. Urban land-use was prone to change with many social and economic forces shaping them. Towards the end of the century, several extensions were added such as Seshadripuram, Chamarajpet, Malleshwaram, Basavanagudi, Richmond Town, Richards Town, Frazer Town, Cox Town, Gandhinagar etc. 1940 onwards, increasing land demands resulted in laying of recreational spaces over the dry tank-beds of parts of Ulsoor and Domlur tank, Dharmambuddhi, Shule and Sampangi tank. Koramangala tank was completely breached to accommodate a vegetable garden (Shadia, nd). The above citations clearly indicate that the lakes have faced the consequences of Bangalore's urbanisation. The same is represented in the figure 2, where the water-cover is slowly displaced by other land-uses in the phased development of the city.

### Findings: Current Urbanisation Trend

This Bangalore's new phase of urbanisation witnessed its dawn with India gaining independence, and the merger of the cantonment and the old city (Malini, 1988). Post 1957, the government embarked on state led industrialisation, emphasizing on heavy industrial growth. This encouraged migration of people into the city, increasing the population and thereby the demand for land. Industrialization led to alternate employment, and reduced the dependency on tanks, resulting in negligence and encroachment of tanks, leading to the scarcity of water. In 1963, the 'Outline Development Plan' (ODP) proposed to conserve Sankey tank, Hebbal Lake, Nagawara Lake, Challaghatta Lake, Bellandur Lake, Madiwala Lake, Sarakki Lake and Kempambuddhi Lake, which was not approved until 1972. During this decade long lapse, Bangalore showed early signs of accelerated expansion with encroachment of seasonally dry tank beds for alternate uses. Several tanks were replaced by residential layouts, like Jugganahalli tank by Rajajinagar, Sonnenehalli tank by Neelasandra, Kadirenahalli tank by Banashankari extension, Ketamaranahalli tank by Mahalakshmpuram, Chinnigara kere by Ejipura,

etc. Also many other lakes were lost for the provision of infrastructure to the growing city's demands. Like Sunkal tank and Dharmabuddhi tank by bus terminals at Shantinagar and Majestic, Millers tank by offices and hospital, Shule tank and Akkithimmanahalli tank by Hockey stadiums, Challaghatta tank by Golf course, etc.

This problem was further compounded in the late 1970's as the city developed industrial estates at Peenya, Whitefield, Bommasandra, Veerasandra, Kumbalagodu, Jigani, Hoskote and Attibele. Consequently, more tank beds were encroached upon for establishing industries and their townships (figure 3). The number of lakes in the 1960's was around 280 and with the advent of industrial revolution; the count was reduced to 200 by 1985.

As the city gained an international popularity in 1990's as 'Silicon Valley', Bangalore's inorganic growth constantly caused its urban areas to merge with the peripheral rural fringes, engulfing the existing water-bodies and settlements, as urban villages. In 1971, the Bangalore urban agglomeration was only 177.3km<sup>2</sup>, which within three decades had tripled in size to an area of 530.9km<sup>2</sup>. During this period, about 421ha of water-cover area was lost due to development. There was also enormous reduction in lake area from 1971 [227.7 sq.km.] to 2001 [105.42 sq.km.], with about 18.3sq.km. getting transformed into built-up area. By 1993, the number of lakes in Bangalore had come down to merely 80. This transformation came as a serious concern, as urbanisation had impacted not only the quantity in terms of its count but also the quality of water-bodies severely. The presence of sewage and degrees of eutrophication recorded in 1996 identified about 28% of the lakes as sewage receptacles. The spread of the city had also blocked the storm-water drains which were the prominent feeders of lakes. Compared to total number of lakes present in 1990-2000, 70% of the lakes had already vanished by 2010 (figure 4). Most of the tanks introduced by Kempe Gowda had been transformed beyond recognition, like Karanji tank to Basavanagudi, Dharmabuddhi tank to Majestic Bus Terminal, part of Halsoor tank to defense land, Sampangi tank to Kanteerava Stadium and Siddikatte tank to K. R. Market, etc. (Indu, 2007)

As a response to the waning number of lakes, the government of Karnataka as a corrective measure set up 'Lake Development Authority, (LDA)' to be exclusively responsible for management of lakes. However, even years after the creation of the body, the situation continued to be indifferent, with LDA leasing out lakes to commercial, profit centric bodies, in the name of development and maintenance without any consideration for the ecological values of the lake (Rohan, nd). It is obvious from the above citations, that with Bangalore's growth, its lakes have faced most of the consequences of urbanisation, in the name of development. The present study further investigates and traces the disappearance of Sampangi Lake as a cause of inadvertent modification due to aforesaid urbanisation process.

## INTERPRETATION

Having reviewed the transformation of Bangalore over the past few centuries, the current segment tries to analyse separately the water network and transportation network of the city in pursuit of establishing the missing link between urbanisation and lakes. For the city of Bangalore as observed from the map (figure 5), the water network converges at South-west, North-east and South-east. The "High Grounds" forms the apex of the city, from where the land slopes down towards Vrishabhavathi, Hebbal and Bellandur, forming a number of lakes along its course. In contrast to this, currently the transportation network of Bangalore city (figure 6) clearly depicts a radial pattern, converging at the centre. Figure 7 depicts the superimposed image. A closer analysis reveals that, with sprawl and growing suburbs the roads were spanned across the lake beds as bunds, for better connectivity. This resulted in partial engulfment of the lakes with impervious built edges. Further certain portions of the lake were dried again to provide a green buffer, which eventually was again utilised for distinct land-uses. In conjunction to this, the storm-water drains, feeding the lakes, were also coupled as sewage lines and choked and encroached upon, thereby stagnating the lakes and eventually degenerating them. This led to the isolation

of wetlands from the urban fabric. As most lakes were seasonal, encroachments hastened during dry spells. All along, the fading of lakes could as well be attributed to the disruptions in the superficial and subsurface flow generated as a result of frequent excavations, repairs during the laying and maintenance of roads

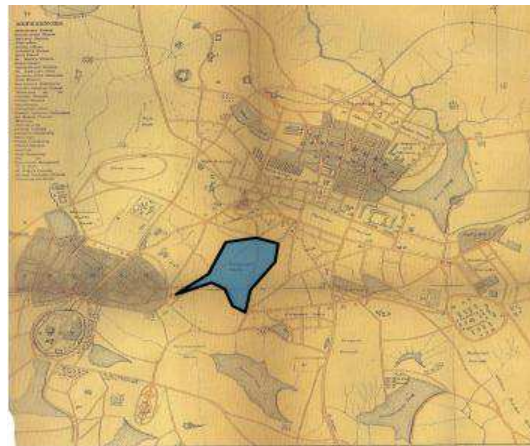


**Figure 5: Water Network**

**Figure 6: Transportation Network**

**Figure 7: Superimposed Networks.**

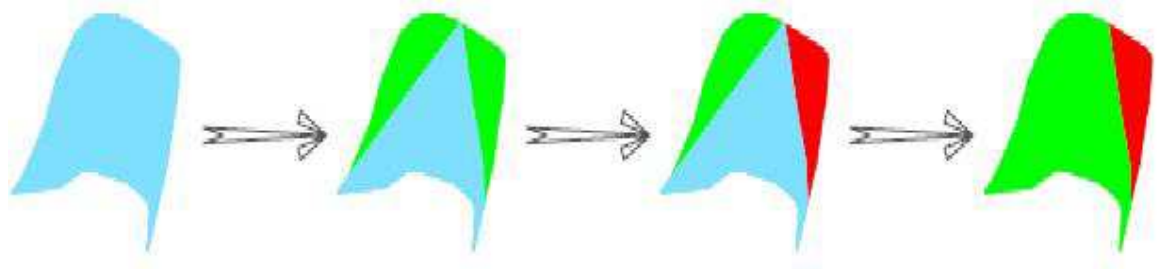
The above unraveled pattern can be distinctly observed in the case of Sampangi tank (figure 8) as well. The lake was initially encroached upon for Kanteerva (Corporation) Stadium (figure 9), as a policy decision by the government. The highlighted portion within figure 9 depicts the historical extent/area in 1877.



**Figure 8: Sampangi Lake (Outlined/Shaded area represents Historical area in 1877.**

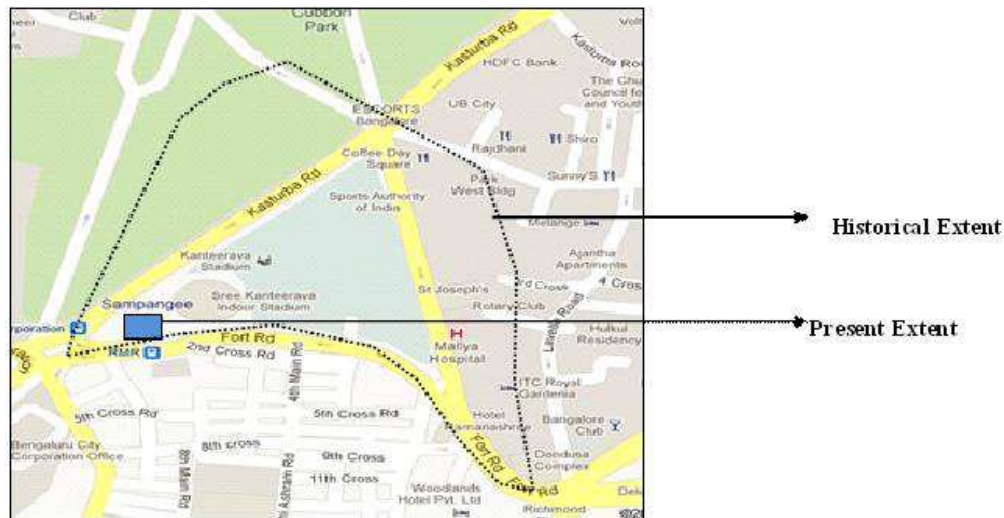


**Figure 9: Sampan Sampangi Tank bed for Stadium Construction. (Ref. [www.cscsarchive.org](http://www.cscsarchive.org)).**



**Figure 10: Transformation of Sampangi Lake.**

Initially two intersecting roads, Kasturba Road and Vittal Mallya Road cut across the lake as tank bunds. The excluded portions were made a green buffer (figure 10), one being a part of Cubbon park whereas the other accommodates St. Joseph’s institutes, Mallya Hospital, etc. These eventually fell to the demands of peaking urbanisation. The encroached area now constitutes public and semi-public land-use. The remaining central triangular portion was taken over by the government, to provide Kanteerava Sports Stadium along with an indoor stadium to make provision for the national games, as a policy decision. The present status of Sampangi tank can be viewed from the extracted Google map (Figure 11). The rectangular framework indicates the present area of the lake; while with the dotted lines indicate the historical extent. The overlapping illustration clearly indicates how the lake area has diminished with the passing time and so called urban developments



**Figure 11: Historical extent overlapped on the existing land-uses in Sampangi Lake precinct.**

**RECOMMENDATIONS**

- Strictly adhere to a green buffer zone around lakes.
- Avoid built-up spaces around lakes.
- No cutting across water-bodies for bunds.
- Plan city adhering to the ridges and natural valleys and demarcate these as sensitive zones

## CONCLUSIONS

The piecemeal growth in the Bangalore city is a resultant of an urban sprawl, which had its immediate effect of building-up over dry lakebeds, and as the lakes were seasonal, the feeders were gradually disjointed. Bangalore, due to urbanisation has witnessed a profound impact on its inherent features such as landscape, water-bodies, etc. Severe encroachment has resulted in the shrinkage of its wetlands, thereby reducing the water yield and water holding capacity from the catchment. Even lake restoration measures by govt. authorities treat water-bodies as an isolated element and not as a part of the larger system. Hence, there is a need to propose and implement policies and guidelines for development and treat the water-network as a continuous system.

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