

# Bio Mapping of Abbigere Lake water Quality - Catchment area of Arkavathi River –An Analysis

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## 1. Introduction:

Water is a basic need and a finite life supporting system. It is an important natural resource to touch all aspects of human civilization from agricultural and industrial development to the cultural and religious values embedded in society (Koichiro Matsuura, 2008). It is also an important medium in which all biochemical reactions, within a living organism and the other component of the environment like air, water forest, soil etc. occurs. The availability of water determines the natural composition and abundance of vegetation and other forms of terrestrial life.

“With growing demand for water and depletion of the available water, assured supply of good quality water is becoming a growing concern. As the water resources are not evenly distributed, across different continents, some countries have surplus water while many other countries are already facing scarcity of water. Skewed growth of population in different continents is further adding to this crisis. Among various continents, Asia has 36% of the available fresh water reserves, with over 60% of the world population, where water is a scarce commodity”.

The physical water accounts explain the entire system of flow of water in physical terms between the environment and the economy and within the economy. Water as natural resource belongs to the environmental sphere. Once it is abstracted and used, it is considered as product and enters into economic sphere. The product can be delivered to either other industries or consumers. Where water is no longer useful due to pollution, it is called residual. The residuals will flow slowly within the economy, but ultimately all residuals will return to the environment.

To protect this precious resource, one needs a stringent enforcement system, for its conservation, pollution control and to maintain wholesomeness. The Environmental laws set standards for controlling or preventing environmental pollution including water.

“The urban water bodies are strongly influenced by long term discharge of untreated domestic and industrial wastewaters, storm water runoff, chemical spills and solid waste dumping. All these have released different pollutants, which have a great ecological impact on the water quality in the affected watershed regions. In this case, a high degree of industrialization, urbanization, and other anthropogenic activities in Bangalore region has led to the contamination of various micro-watersheds including those within the Arkavathi Basin. This tremendous pressure of urbanization and urban sprawling is severely devouring the rural environment destroying the watershed regions. The degree of destruction varies between districts and taluks of Bangalore. With high population density,

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shortage of monsoon rainfalls, and increasing water depletion, many fresh water bodies in the basin are now polluted and disappearing. Relaxation in enforcement options have only exacerbated in an unwanted destruction of the Arkavathi basin”.

## 2. Abbigere Lake – Part of Catchment area of Arkavathi River Basin

“The River Arkavathi originates in the Nandi Hills of Chikkaballapur district and joins the River Kaveri at Kanakapura. The Vrishabhavathi and the Suvarnamukhi are the tributaries, which drain part of Bangalore and Anekal Taluk respectively into the Arkavathi River. The river catchment area receives a mean annual rainfall of 859.6 mm. Earlier, the Arkavathi River was one of the two rivers which partially met the water supply needs of Bangalore; the other being the Kaveri”. The reservoirs created by building dams on the Arkavathi are the "Hesaraghatta" and the “Chamarajasagara” at Thippagondanahalli (TG Halli), built during the years 1894 and 1933 respectively.

The Abbigere Lake is situated at Sy.No.75, Abbigere village, Yeshwanthapura hobli, Bangalore North. The total extent of the lake is 25 acres and 14 guntas (According to BDA land records). The lake is situated in BBMP ward no.12-Shettihalli area and comes under the custody of Bangalore Development Authority, North Subdivision. The Catchment area for Arkavathi river from Abbigere lake to Chikkabanavara lake and then leads to Arkavathi river is shown in Figure 1.

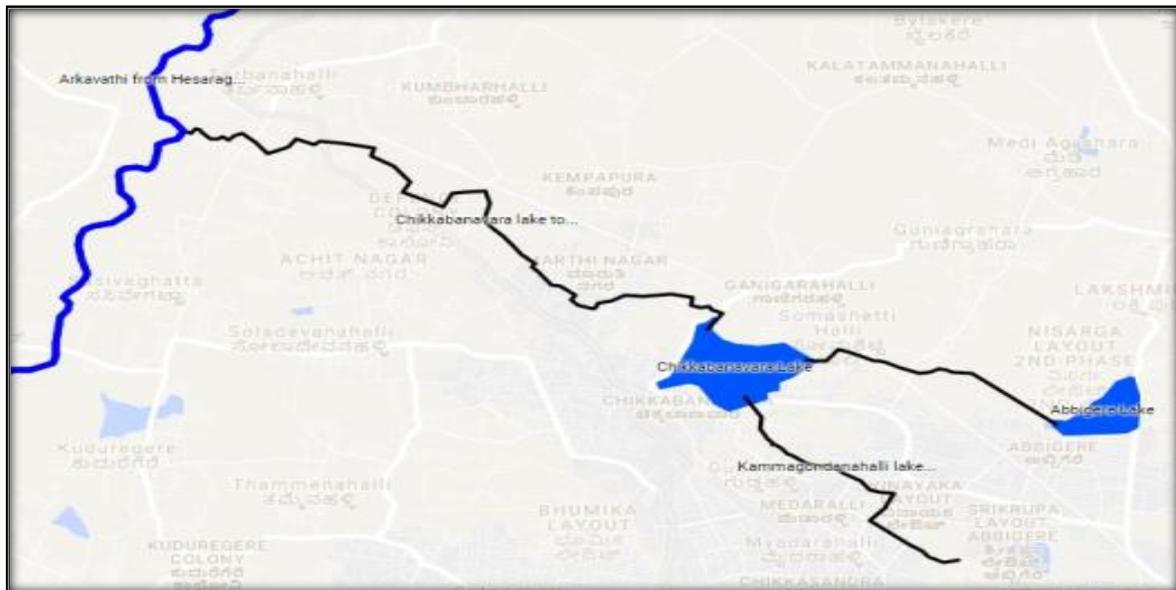


Figure-1 Catchment area for Arkavathi river from Abbigere lake to Chikkabanavara lake and then leads to Arkavathi river.

The Abbigere lake has in-flow in the form of rain water / storm water /sewage at the Eastern side of the lake. The lake also receives water from the natural stream, which is the outflow of Singapura lake

and also passing through nearby areas of Singapura, Veeranjinappa layout, Sriniketh layout, Varadarajnaragar, Achappa layout of Singapura, Northern part of Abbigere and Nisarga Layout. The Map as per the recent City Development Plan is shown in Figure-2 and Google map showing Abbigere lake with sy. Nos. is shown in Figure-3.



Figure-2, CDP Map of Abbigere Lake

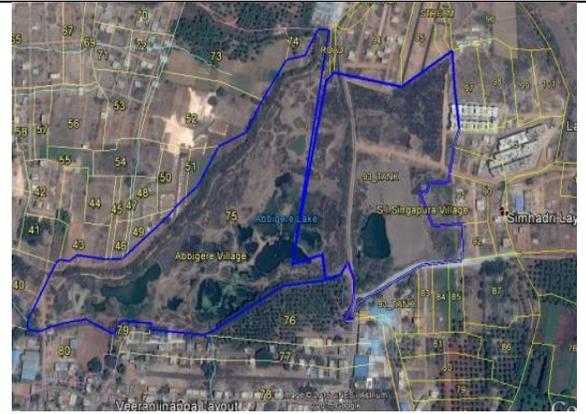


Figure-3, Google map showing Abbigere lake with sy. Nos.

### 3. Causes of Pollution of Abbigere Lake

The Abbigere lake is surrounded by Veeranjinappa layout, Sriniketh layout, Varadarajnaragar, Achappa layout of Singapura, Northern part of Abbigere, Nisarga Layout and coming under BBMP ward no.12. The sewage generated from above residential areas is partly connected to UGD and major portion of the sewage joins to storm water drain and finally reaches Abbigere lake. The lake is surrounded by

- a. North: Vacant land and residential houses of Abbigere village.
- b. South: Coconut garden and Veeranjinappa residential layout, Someshwara layout
- c. East: Vidyaranya pura, Simhadri layout
- d. West: Nisarga layout and Abbigere village

There is a small private industrial cluster existing within mixed residential area, namely, Gurunanjudaiah industrial area wherein there are no major effluent generating industries operating in the said industrial area. However, the industries like CNC machining, engineering fabrication, plastic moulding are existing. There is two small electroplating units operating in the area and handing over the effluent to CETP.

The BWSSB has partially provided underground drainage facility in Abbigere village and few of the houses in these villages have sanitary pits (soak pit). The BBMP have not taken any measures to prevent the entry of sewage into the lake and also to prevent the dumping of solid wastes around the lake.

In view of the above, the lake is filled with weeds and other plants thereby reducing the depth and catchment area of the tank. The physical status of the lake is given in Figure-4, 5, 6 & 7 below;



Figure-4. Status showing Eastern side of the Abbigere lake



Figure-5. Status showing development of weeds and bushes towards North side of Abbigere lake



Figure-6. Status showing development of weeds and bushes towards Southern side of Abbigere lake



Figure-7. Status of Solid Waste dumping at Abbigere lake

The main causes of pollution of Abbigere Lake includes discharge of domestic sewage, illegal encroachment on wetlands, Illegal mud-lifting on the basin floor, use of huge quantities of detergents in the surrounding household/apartments/garment washing industries, etc. The main causes of excess pollution can be listed as follows;

- Excess sediment/silt inputs caused by destructive form of land use and other land clearance activities mainly for housing, quarrying and farming.
- Excess non-point source nutrient inputs have contributed for algal outbreaks and growth of aquatic weeds.



## 5. Conclusion

“Water body is an important feature of urban landscape. A large number of water bodies recently have been lost due to anthropogenic activities and the remaining water bodies are under stress due to risk of degradation. In Bangalore, many water bodies are suffering from pollution and encroachment problems from industrial, urban and agricultural development”.

“Water bodies like tanks and ponds are constructed to harvest rainwater for local use. Such water bodies serve many environmental functions including flood and soil erosion control and are useful for irrigation, drinking water supply and groundwater recharge. These water bodies were maintained by local communities earlier. The shifting of maintenance responsibility from local community to the government agencies led to the menace of encroachment and abuse. The encroachment in urban and peri-urban areas is more prominent. The urban population growth demands more land for housing and other infrastructure. The scarce and costly land resources stress the water bodies ultimately. Even the government bodies find the water bodies as an easy source for extra land for development. In this situation, the existing urban and peri-urban water bodies are to be preserved and rehabilitated”.

Hence an attempt is made to biomap the water quality of Urban lake in Bangalore and the causes for degradation of water quality of the lake. The inventory of this lake has indicated that the discharge of domestic sewage from the surrounding legal/ illegal housing colonies, illegal encroachment on wetlands, Illegal mud-lifting on the basin floor, use of huge quantities of detergents in the surrounding household/apartments/garment washing industries, etc, has deteriorated the water quality of the lake. The analysis reveals high concentration of total coli form, BOD, Nitrate, Total Dissolved Solids, Chlorides. As per the analysis reports of sampling carried out, the quality of lake water conforms to “E” class as per CPCB Classification (Irrigation, Industrial cooling and Controlled waste disposal). It was identified that the lake behaves like an anaerobic-aerobic lagoon.

Hence it is necessary to evolve a separate policy for conservation of urban water bodies. The following three issues can be considered in the policy making, viz. (a) evaluation of hydraulic and hydrologic properties of urban water body; (b) evaluation of potential of socio-environmental services by the water bodies, and (c) developing a relative importance index for prioritizing or ranking the water bodies are discussed in detail.