



Anthropogenic Impacts on Lakes of Mysore City: A Review of Literature

S. Sowmyashree^{a++*} and P. Jayashree^{a#}

^a Department of Studies in Geography, University of Mysore, Mysuru- 570006, Karnataka, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JGEESI/2023/v27i6689

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/102055>

Review Article

Received: 19/04/2023
Accepted: 21/06/2023
Published: 27/06/2023

ABSTRACT

Mysore is the second largest city in the state of Karnataka in India. It is one of the most attractive tourism places. It is well known for its world famous palace, art galleries, gardens, temples, churches, mosques, mansions and museums. Mysore is also known for its rich culture and heritage. Mysore is located in a very unique environment. The popular and perennial river Cauvery and one of its tributaries Kabini are draining through this district. The Krishnarajasagara dam and the Kabini dam are the large reservoirs existing in this region. These dams irrigate the fertile agricultural lands out of which a huge population survives. The city of Mysore is blessed with a number of lakes which are promoting a salubrious climate for the city dwellers. At present, lakes are under threat as they are victims of population pressure and rapid urbanization. If this trend continues, man is endangering not only humans but also other creatures on earth. This paper is a review of published literature on the anthropogenic impacts on lakes of Mysore city and measures for their conservation.

Keywords: Conservation; ecosystem; human impacts; lakes.

⁺⁺Research Scholar;

[#]Professor;

^{*}Corresponding author: E-mail: ssowmyashrees16@gmail.com;

ABBREVIATIONS

UPSC	: Union Public Service Commission;
CFTRI	: Central Food Technological Research Institute;
IWQI	: Innovative Water Quality Index;
UGD	: Under Ground Drainage;
CCME	: Canadian Council of Ministers of the Environment;
WQI	: Water Quality Index;
KSPCB	: Karnataka State Pollution Control Board;
MCC	: Mysore City Corporation;
LIG	: Low Income Group.

1. INTRODUCTION

“Water is indispensable and one of the most abundant resources of nature and prime necessity for the survival of life. The availability of water both in terms of quality and quantity is essential for the existence of living world. The rapid industrialization, urbanization, modern civilization (increased population) have led to the increasing demand for water in domestic, agricultural, industrial sectors. Surface water comprises of flowing freshwater system (lotic). Such as, river, streams, canals etc. And static freshwater system (lentic). Like ponds, lakes and reservoirs etc., the lakes comprise one of the most productive ecosystems. Lake environments are comprised of physical, chemical, and organic properties contained inside these water bodies” [1]. A word lake coming from “latin” word “lacus” is a large body of water (larger and deeper than a pond) within a body of land. A lake is an area filled with water, a larger body of water surrounded by land. According to Prepp Indian Administrative Service UPSC Coaching Centre [2], Many lakes are artificial and constructed for industrial or agricultural use, for hydro-electric power generation or domestic water supply or for aesthetic, recreational purposes or other activities.

According to Lake, Encyclopaedia Britannica [3], “Lakes are bodies of water that occupy depressions on land surface. A lake is a naturally occurring, relatively large body of water localized in a basin completely surrounded by dry land. Lakes are typically much larger and deeper than ponds, which are also water-filled basins on land. Artificially controlled lakes are known as reservoirs and are usually constructed for industrial or agricultural use, for hydroelectric power generation, for supplying domestic drinking water, for ecological or recreational purposes, or for other human activities. The development of human race, lakes are facing threat from anthropogenic activities. The ecosystem services provided by lakes are

overloaded and they are being converted to other land uses, fragmented polluted and destroyed”. According to Yomna P. Zainulabdeen [4], The city also witnessed rapid urbanization and a boom in construction activities.

2. OBJECTIVE

The objective of this study is to gain information regarding the anthropogenic impacts on lakes of Mysore city.

3. STUDY AREA

Mysore city is one of the historical and heritage city and the second largest city in Karnataka state. Mysore city is geographically located between 12° 18' north latitude and 76° 39' east longitude. It is located at an altitude of 770 meters (2,526 feet). It encompasses an area of 6307 sqkm and a population of 30,01,127. Mysuru is located in the southern part of the Deccan plateau. Mysuru has a warm and cool climate throughout the climate of Mysuru is moderate. The minimum temperature in winter is around 15 degrees Celsius and in summer the maximum temperature is around 35 degrees Celsius. 86 centimeters is average annual rainfall.

4. METHODOLOGY

An extensive survey of literature was undertaken to find out the anthropogenic impacts on lakes of Mysore city. Online journals, thesis and articles were accessed through search engines like Google Scholar, Research Gate, Shodhganga etc. More than 90 studies relating to lakes of Mysore city were collected. After reviewing the collected literature, only those studies which evidently pointed out the human impacts on lakes of Mysore city were included in this study. Then the selected literature was categorized according to the type of lake each study pertained to. Attempt has been made to include as many studies as possible, however few studies may have been left out due to inadequacy of resources.

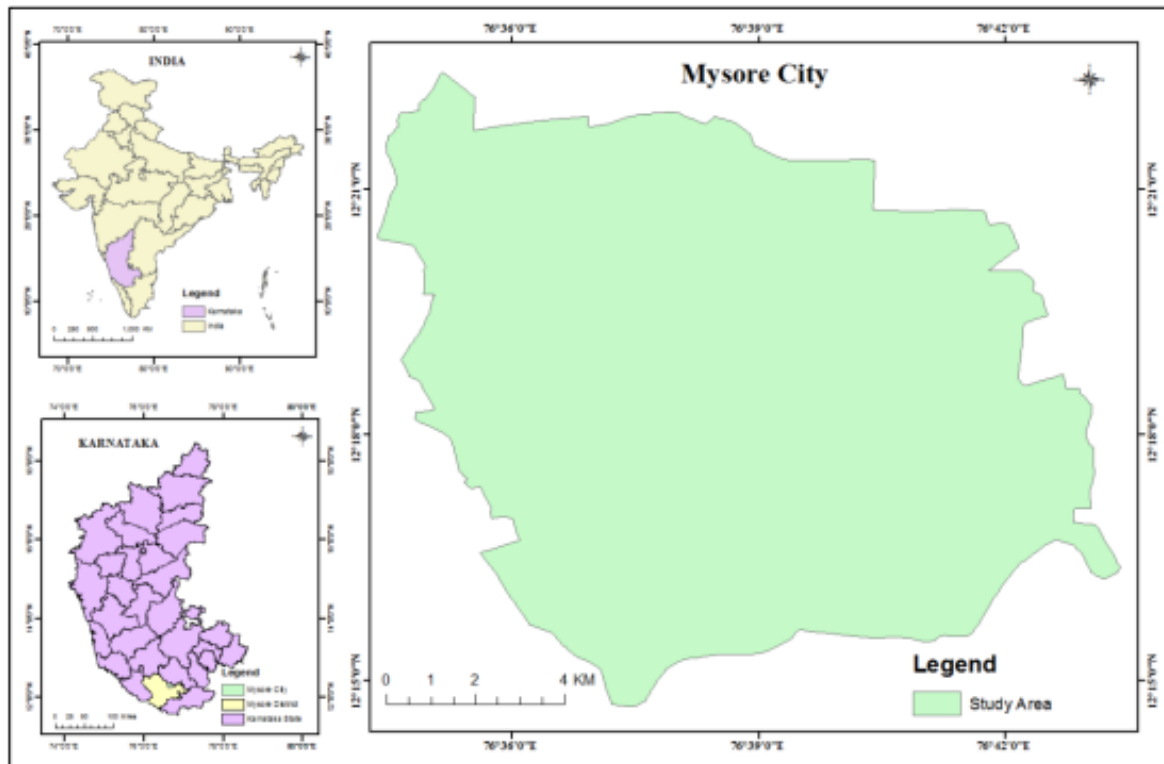


Fig. 1. Location map of Mysore city

5. RESULTS AND DISCUSSION

5.1 Kukkarahalli Lake

Kukkarahalli Lake located in the heart of the Mysore city, adjoins the Manasagangothri, Kalamandir, CFTRI (Central Food Technological Research Institute) campus separated by the Hunsur Road). It provides lung-space to the city. MummadiKrishnarajaWodeyar (1794-1868) of the Mysore dynasty created the lake in the year 1864, to provide water for irrigation to about 4000 hectare 10000 acres) of land outside the city. The total area of Kukkarahalli Lake about 104 ha. The lake also used to be a source of water supply to the city of mysore. But after many years the man intervention cause to sewage and excessive land encroachment and blockage of water flow sources almost led to the eutrophication of the lake. According to Murthy P et al "The Innovative Water Quality Index (IWQI). For Lakes of Mysore, Karnataka, India". IJCBR (International Journal of Clinical Biochemistry and Research 2014 : 1(1) 25-29 [5], "The innovative water quality index for kukkarahallilake of Mysore city, Karnataka, India they analysed only 5 water chemical parameters such as dissolved oxygen, total phosphorus,

turbidity, specific conductance and faecal coli forms. Kukkarahalli Lake had an index value between 1.7 and 2.3. poor water quality in lakes imparts the lives of many species including fish and plants. This is often due to the nutrient loads from agricultural fertilizer run off, chemical pollutants, faces and urine of fish and animals. Due to such processes sludge develops and become over abundant oxygen saturation reduces and fish mortality rates increases. Permanent blooms of cyanobacteria were recorded in Kukkarahalli Lake. Kukkarahalli Lake differ in size and shape, usage, nature of anthropogenic disturbance". Kukkarahalli Lake polluted day by day, which was demonstrated by Anima Upadhyay, M Chandrakala A Study on the Water quality parameters of Kukkarahalli Lake water, Mysore, Karnataka, India. IJLTEMAS (International Journal of Latest Technology in Engineering, Management and Applied Science) ISSN 2278-2540, Vol.(IV), Issue XII, Dec- 2015 [6], a very concentration of calcium and magnesium ions in the lake water, It shows a very high pH, Alkalinity and Total hardness that makes the water unfit for both drinking and irrigation purposes. Through the inflow of the sewage water into the lake water highly contaminated for use.



Fig. 2. Map of Kukkarahalli lake

5.2 Karanji Lake

Karanji Lake is located in the city of Mysore in the state of Karnataka, India. The lake is surrounded by a nature park consisting of a butterfly park and a walk-through aviary. There is also a museum, the Regional Museum of Natural history which is located on the banks of this lake. The total area of karanji lake is 90 hectares. Karanji lake is owned by the Mysore Zoo Authority. According to Adarsh S, Manasa M P, Dr. Shesha Prakash M N Water Quality Assessment of Lakes in Mysuru, India-A Case Study, International Journal of Engineering Research and Technology (IJERT) ISSN:2278-0181, Vol.8, Issue.06, June-2019 [1], studied to "bring out the assessment of quality of lakes in Mysore. Results shows that lake are polluted due to disposal of sewage or through the industrial effluents. being a percolation lake, it started getting polluted when sewage water made its way into the lake. This if not controlled and checked properly will lead to the destruction of a wonderful tourists attraction and nature's gift to the mankind". The karanji lake is facing serious problem of inflow of huge quantity of drainage water from the UGD. Running from the adjoining residential areas siddhartha layout and dairy industry. Physico-chemical analysis of karanji lake water mysore, karnataka, india explained by Anima upadhyay M, Chandrakala M. Lake deterioration due to improper town planning and development, dumping of garbage and sewage in the soil of the catchment area of the lake and leaky underground drainagesystem. H.K.Renushree and Dr. H.R.Uma willingness to

pay towards lake conservation-case study of Karanji lake, Mysore, Lake 2010 : [7], Wetlands Biodiversity and Climate Change.the unplanned human interventions in the form of population growth, urbanization, sewage absorbs and other negative fall-outs have affected the fragile environment of the lake.

5.3 Lingambudhi Lake

Lingambudhi Lake is a lake in the city of Mysore. The lake was built by Maharaja KrishnarajaWodeyar III in 1828. Murthy P et al The Innovative Water Quality Index (IWQI). For Lakes of Mysore, Karnataka, India. IJCBR (International Journal of Clinical Biochemistry and Research 2014 : 1(1) 25-29 They was analyzed of five water chemistry parameters. Dissolved oxygen, total phosphorous, turbidity, specific conductance and fecal coli forms were analyzed. Lingambudhi Lake had an index value between 1.9 and 2.2 and is rated between marginal and acceptable, Poor water quality in lakes supports the life of many species, including fish and plants. This is often due to nutrient loading from agricultural fertiliser runoff, chemical pollutants, fish and animal faces and urine. As a result of these processes, the sludge develops into an overabundant sludge. Permanent blooms of cyanobacteria were recorded in Lingambudhi Lake. It shows a very high pH, Alkalinity and Total hardness that makes the water unfit for both drinking and irrigation purposes. Through the inflow of the sewage water into the lake water highly contaminated for use. M. Naganandini water quality index for protection of aquatic life



Fig. 3. Map of Karanji lake



Fig. 4. Map of Lingambudhi lake

(lingambudhi lake) at mysore. Lake 2010 [8], Wetlands Biodiversity and Climate Change, studied the Canadian Council of Ministers of the Environment (CCME) Water Quality Index (WQI) rates the lake water of Lingambudhi as poor and the water quality is always threatened which deviates considerably from normal. Storm water harvesting and removal of limiting nitrates and phosphates from urban water runoff and as well, limiting the anthropogenic activities around the lake are among the promising solutions in regulating the entry of nutrients in to the lake. The Canadian Council of Ministers of the Environment (CCME) Water Quality Index (WQI)

serves as an additional tool in monitoring lake water quality.

5.4 Hebbal Lake

Hebbal Lake is a lake in the city mysore. Hebbal Lake was highly polluted by the inflow of industrial effluents, sewage, and refuse. A recovery project is under way to set up a sewage treatment plan and tackle the pollution problem. “Woken up by thousands of dead and rotting fish at Hebbal Lake, officials from the Karnataka State Pollution Control Board (KSPCB) have collected samples of water that enters into the

Lake. The heavy water with a heady mix of industrial effluents have caused the fish death, said residents and people who walk daily around the water body. Karnataka State Pollution Control Board (KSPCB) , officers and team collected water samples from around the lake and also collected samples where the largest concentration of fish death has occurred. Also samples from the place where industrial effluents enter the lake were gathered and information was collected on the sewage flow into the lake from the residential localities around the lake” [9]. “Published by Star of Mysore. Water quality is rated as poor. The water quality is almost endangered or deteriorated and the conditions often deviate from natural levels. The lake water is unsuitable to protect aquatic life. Incidence of fish kill occurred in 2011 due to contamination of water. Anthropogenic activities are found and large numbers of industries are situated around the lake. Demonstrated by Dr.M.K.Mahesh, B.R.Sushmitha, H.R.Uma assessment of water quality of hebbal lake of mysore vol.2, issues : 2, Feb 2013, ISSN NO 2277-8160 Global Research Analysis” [10].

5.5 Bogadhi Lake

Bogadhi Lake is one of the earliest lake in the city of mysore. This lake comes under the supervision of mysore city corporation (MCC). It is said that the Bogadhi lake is probably as old as lingambudhi lake (approximately 190 years old), which is located at Bogadhi road opposite to the Anthropological survey of india close to the Nirmithikendra in Vijayanagara 3rd stage. The lake has rough area coverage of 7.5 hectare and

an average distance of 4.2mi from the centre of the mysore city. This lake is an upstream lake of lingambudhi lake. The whole water collected was earlier used for the farming and irrigation purpose in and around the bogadhi village. And also bogadhi lake is the catchment area for the entire vijayanagara 3rd stage as the water from all the drains will flow into this lake. This is the major groundwater recharge piont for the vijayanagara and bogadhi. Because the lake is extremely close to the municipal solid waste collection site (transfer station). It must be adequately secured and cleaned at least twice a week. However, due to the city corporation's neglect, the plastic and other debris put on the site are seeping into the lake and clogging the inflow route.People living in and around the lake have a low literacy rate and fall into the low income group (LIG) category. In the summer season the lake dries up about 60-70% and the ground surface of the lake contaminated with plastic glass and other non-degradable wastes affecting percolation and recharge of the water from the surface to the perched water table and ground water aquifer.

5.6 Dalvoy Lake

“Dalvoy lake is one of the main waterbodies located in southern Mysore adjacent to nanjungud road. It was constructed during period of maharaja in 19thcentuary for irrigation, drinking and for other related purpose. The catchment area of dalvoy lake is 2615 acres covering shettykere, dalvoyserie, Gudumadanahally pickup and marshy pickup. Mahesh and A.Balasubramanian Analysis of Water Quality



Fig. 5. Map of Hebbal lake

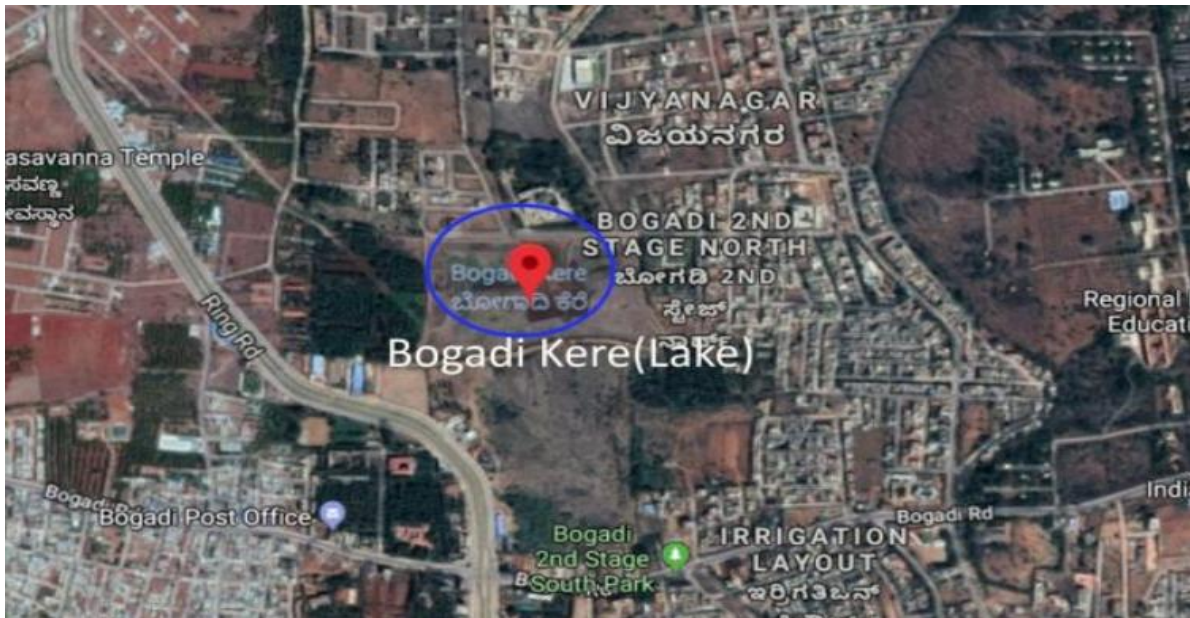


Fig. 6. Map of Bogadi Lake



Fig. 7. Map of Dalvoy lake

Index (WQI) in Dalvoy lake, Mysore city, India, Nature Environment and Pollution Technology, An International Quaterly ScientificJournal 2010 Vol 9, PP 663-673" [11]. The water quality indicators were determined for all locations and grouped according to season. The WQI of Dalvoy Lake was found to be poor, with the main reason of deterioration being a lack of sufficient sanitation, untreated inflow water with municipal sewage, and uncontrolled anthropogenic activity.

Akshatha N and Shankar B conservation measures for improving land usage and land cover in Mysore's Dalvoy Lake surrounds. They analyzed it is deteriorating as a result of land use change, growth of industries and urbanization pressures. The tropic state of dalvoy lake is under tremendous pressure due to Nitrate and phosphate loading and the impact of human activities. The pollution level of this lake can be seen from the outflowing water. As it is located

near the national highway, human influence are more to this lake. Mysore city lakes by Mahesh and A.Balasubramanian Analysis of Water Quality Index (WQI) in Dalvoy lake, Mysore city, India, Nature Environment and Pollution Technology, An International Quaterly ScientificJournal 2010 Vol 9, PP 663-673 [12-14].

6. CONCLUSION

A lake is a body of water that is surrounded by land. Lakes are extremely varied in terms of their origin, occurrence, size, shape, depth and other features. They are dynamic ecosystems. The majority of them are directly or indirectly influenced by the ever-increasing human activities and progress. A variety of natural and man-made causes can contribute to the deterioration and survival of lakes. A crucial part of development is protecting a lake from pollution or damage. Mysuru's attractiveness resides in its colorful gardens, green plantations, and the quantity of lakes located within and beyond the city, yet these lakes are deteriorating beyond the point of recovery owing to anthropogenic activities. The gradual expansion of built-up area due to population growth, urban sprawl, and transportation systems has a negative influence on biodiversity and disturbs the natural land pattern. The demise of lakes is being sounded by illegal encroachment, weed infestation, siltation, and discharge of sewage from both home and industrial sources. Groundwater circulation and recharge were being impacted by illegal dumping of home trash, sewage pipe leaks near lakes, harsh summer weather, industrial waste, and hospital waste. Significant reductions in surface water bodies have detrimental effects on groundwater and moisture content. This helps to record the probable modification of land pattern in future studies, so that the policy makers, resource managers and scientists can establish a specific portray in human-lakes interactions, ecosystem impacts and future sustainability.

ACKNOWLEDGEMENTS

The first author acknowledges the financial support provided by SC/ST Cell university of mysore in the form of junior research fellowship (JRF).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Adarsh S, Manasa MP, Shesha Prakash MN. Water Quality Assessment of Lakes in Mysuru, India-A Case Study, International Journal of Engineering Research and Technology (IJERT). 2019;8(06). ISSN:2278-0181.
2. Prepp Indian Administrative Service UPSC Coaching Centre.
3. Lake, Encyclopaedia Britannica.
4. Yomna P Zainulabdeen.
5. Murthy P, et al. The Innovative Water Quality Index (IWQI). For Lakes of Mysore, Karnataka, India. IJCBR (International Journal of Clinical Biochemistry and Research. 2014:1(1) 25-29.
6. Anima Upadhyay, Chandrakala M. A Study on the Water quality parameters of Kukkarahalli Lake water, Mysore, Karnataka, India. IJLTEMAS (International Journal of Latest Technology in Engineering, Management and Applied Science). 2015;IV(XII). ISSN 2278-2540.
7. Renushree HK, Uma HR. Willingness to pay towards lake conservation-case study of Karanji lake, Mysore, Lake: Wetlands Biodiversity and Climate Change; 2010.
8. Naganandiniwater M. Quality index for protection of aquatic life (lingambudhi lake) at mysore. Lake: Wetlands Biodiversity and Climate Change; 2010.
9. Star of Mysore. Tonnes of Fish Die at Hebbal Lake: Effluents Flow Unabated; Turns Fresh Water Green; 2022.
10. Mahesh MK, Sushmitha BR, Uma HR. Assessment of water quality of hebbal lake of mysore Global Research Analysis. 2013;2(2). ISSN NO 2277-8160.
11. The Hindu KSPCB Inspected Bogadi Lake and Sought MUDA Action in; January 2019, Nov-9.
12. Mahesh, Balasubramanian A. Analysis of Water Quality Index (WQI) in Dalvoy lake, Mysore city, India, Nature Environment and Pollution Technology, An International Quaterly Scientific Journal. 2010;9:663-673.
13. Anima Upadhyay, Chandrakala M. Water Quality Assessment of Dalvoy lake water, Mysore, Karnataka, India, International Journal of Science, Environment and Technology. 2016;5(5): 3254-3261.

14. Akshatha N, Shankar B. Conservation measures for improving Land use and Land cover in Dalvoy lake Environs of Mysore city. International Journal of Recent Technology and Engineering (IJRTE). 2021;10(1). ISSN: 2277-3878.

© 2023 Sowmyashree and Jayashree; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<https://www.sdiarticle5.com/review-history/102055>