

Eco-friendly approaches for Waste treatment adopted in Lalitadripuram Lake of Mysuru city.

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Abstract - Lake plays a vital role in Social, cultural and economic development of any area. Lakes are getting polluted due to various anthropogenic activities. Bioremediation is a slow and incomplete process. But it is effective when used with phytoremediation. Bioremediation is an eco-friendly technique to treat pollutants. Present paper deals with ecofriendly techniques utilized in the treatment of sewage water in Lalitadripuram Lake of Mysuru city.

keywords - Bio-remediation, Phytoremediation, eco-friendly, sustainability.

Introduction

Lake is an important water resource which attracts birds and animals. It acts as nutritional resource for various organisms. But nowadays due to various anthropogenic activities, lakes are at risk. Sources of pollution are either point or non-point source. These pollutants will have adverse effect on environment and also on organisms. Sewage is the domestic wastewater comprising 99.9% water and 0.1% solids. The domestic sewage has a high amount of organic and inorganic pollutants [1]. These contaminated and polluted systems are causing negative impacts on aquatic organisms, plants, microorganisms and life support functions [2].

There are various techniques involved in treating polluted water, but they may be costly, detrimental for environment and also may be less effective. Therefore nowadays there is a need to develop eco-friendly techniques for treating waste based on microorganisms or plants. Bio-remediation is one of the economic, environment friendly technique involved in treating pollutants. Bio-remediation is a process in which beneficial microorganisms such as yeast, bacteria or fungi are used to clean up contaminated soil and water. It is a process where organic wastes are biologically degraded under controlled conditions. Sometimes phytoremediation may also be used with bio-remediation. Phytoremediation involves plants which are capable of degrading organic waste.

Present paper will deal with bio-remediation, phytoremediation techniques used in the in-situ treatment of water of "Lalitadripuram Lake" or "Thippayana Kere" of Mysuru city of Karnataka.

Methodology

Mysuru city is a city in Mysuru district of Karnataka. It is located by 12.2958° North latitude and 76.6394° East longitude. The city is at an altitude of 763 meters above sea level.

The study area of Lalitadripuram Lake is situated in Lalitadripuram locality of Mysuru city, along the periphery of ring road [FIG-1]. Marked by the North latitude 12.2830° and East longitude 76.7068°. The above mentioned lake is under the jurisdiction of Mysuru Zoo Authority.

Periodic field trips were undertaken to survey the lake and to study the bio-remediation techniques used to treat the water entering the lake. Methods implemented were discussed with staff incharge of the lake. Previously the lake was contaminated due to various anthropogenic activities. The lake has implemented bio-remediation techniques. Since the implementation the lake is a Birds paradise.

STUDY AREA.

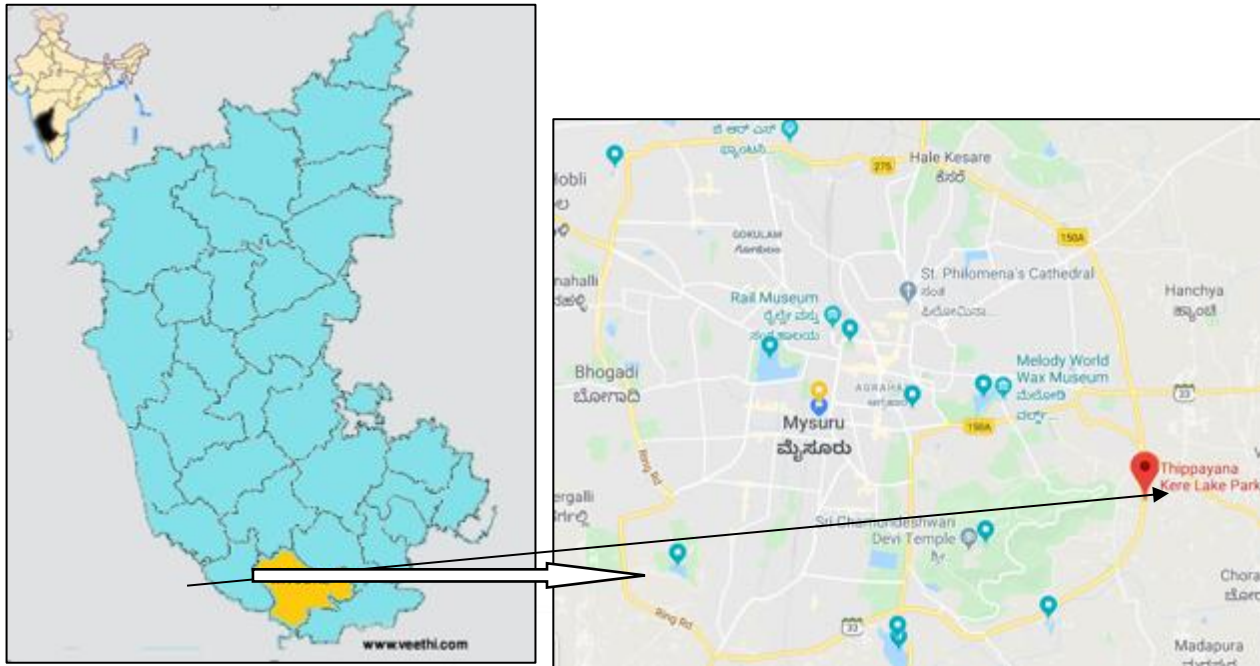


FIG-1 : MAP SHOWING STUDY AREA



SATELLITE VIEW

RESULTS AND DISCUSSIONS.

Lalitudripuram Lake is one of the major lake of Mysuru city. It is a birds' paradise. Our study shows that eco-friendly techniques utilised in this lake for sewage treatment as an example for other lake of the city. About 4 species of plants, namely –

- (1) *Typha angustifolia*,
- (2) *Alocasia macrorrhizos*,
- (3) *Canna indica*,
- (4) *Cyperus alternifolius*

are used for natural pytoremediation. These root suckers help to filter major pollutants of sewage and purifies water.

Effective Microbe culture technique is also used along with the plants. Major species of microbes used are

- (1) *Lactobacillus acidophilus*
- (2) *Saccharomyces*
- (3) *Aspergillus oryzae*
- (4) *Pseudomonas alcaligenes*
- (5) *Pseudomonas veronii*

These microbes helps to stabilize sewage and remove certain effluents.

Our studies revealed that water quality has improved a lot compared to earlier situation and there are about 66 species of birds which are relying on this lake.

Scientific Name	Local Name	Family	Uses
<i>Alocasia macrorrhizos</i> L.	Giant Taro	Araceae	They can filter wastes very effectively. They also fixate carbon, nitrogen and sulfur to the soil thus enhancing the soil quality

<i>Typha angustifolia</i> L.	Narrowleaf cattail	Typhaceae	Helps to filter water
<i>Cyperus alternifolius</i> Rottb.,	Umbrella	Cyperaceae	Reduces COD Reduces Nitrates and Phosphates
<i>Canna indica</i> L.	Indian shot	Cannaceae	Helps to filter water



Fig a. *Typha angustifolia*



Fig b. *Alocasia macrorrhizos*



Fig c. *Canna indica*



Fig d. *Cyperus alternifolius*

AERIAL VIEW OF LAKE



LAKE AT PRESENT



BIOREMEDIATION PROCESS



Waste water sent through trenches

Water left for aeration



Microbe culture tank



Microbes used for treating organic wastes

STEPS INVOLVED IN BIOREMEDIATION OF LAKE:

- (1) Waste water is made to flow in long trenches before entering the lake. Here the waste is filtered by the roots of above mentioned plants.
- (2) Water is then sent for aeration.
- (3) Microbes further break other organic molecules into simpler hydrocarbons.

Conclusion

Since plants are naturally adapted to withstand toxic concentrations of air, water, soil and some heavy metal contaminants. It is suitable to adopt these methods to remediate such pollutants. Microbes also contribute to eco-friendly technique to mitigate the pollution. In terms of sustainability, bioremediation is the best option because it leads to areal reduction of pollutants in the waste water. This paper will act as an informative tool for other lakes to implement eco-friendly techniques for waste treatment.

REFERENCES

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