WATER QUALITY INDEX OF WATER BODIES OF VADODARA

Abstract for Ph.D. Submission

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DOCTOR OF PHILOSOPHY

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Abstract

First chapter gives a detailed introduction about the lakes, human interaction with lake/pond bodies, sources of pollution, different types of water quality indices, the methods used in development of water quality indices, gaps in the WQI used worldwide and how in future modification are required are specific used of water bodies.

Chapter 2 includes Literature review on trend assessment carried on various lake/pond water bodies, different tools and methods adapted for trend assessment as one part of the study. Second part includes Literature review of various indices applied to water bodies specific to lakes/pond water bodies, evaluating methods and parameters used, and weightage factor assigned in each index.

Chapter 3 is divided into 2 parts. Part 3(a) covers details of the study area and the ponds / lakes selected for study.

Water bodies chosen for study purpose are within the Vadodara Municipal limits which include Harni Lake, Dhobi Lake, Gotri Lake, Sama Lake, Bapod Lake, Danteshwar Lake, Gorwa Lake, Motnath Lake and Kamala Lake. The use of term "Lake" for these relatively small water bodies has been taken from the Vadodara Mahanagar Seva Sadan City Plans.

Part 3(b) describes methodology adopted for assessment of the selected lake bodies and description of the 16 indices used in this study.

The analysis of physico-chemical characteristics of samples collected from each target water body at predetermined sampling locations, four times in a year by grab and composite sampling method, were followed to study the trend variation in quality of water bodies. APHA 23rd Edition 2017 methods were followed for analysis of physico- chemical characteristics of water body.

- NSF Index
- NEERI Index

- Overall Water Pollution Index
- DOE index
- Dinnius Index
- Prati Index
- Universal Index
- Integrated Index
- New water quality index
- Dhamija and Jain
- Weighted Arithmetic Mean method
- Numerrow Pollution Index
- NSF 9 Parameters
- Bascaron index
- Objective Bascaron Index
- Eco- Heart Index

Chapter 4 : There are 6 sections in the result and discussion chapters:

1. Trend analysis result: The chapter includes analysed data for 24 parameters from September 18 to December 21 for nine lakes.

2. Index Interpretation: The chapter includes the use of 15 different indices for the interpretation of water data for all nine lakes.

3. Modification of index: The chapter includes suggested modifications in some indices which can help in better interpretation of the data.

4. Eco-Heart index: The chapter includes the concept of the Eco-heart index which can be used on ground level for easy interpretation of the actual status of a water body in the form of a heart shape.

5. Statistical analysis: The chapter includes the use of descriptive tools and Principal Component Analysis for 24 parameters for all nine lakes.

6. New suggested index: The chapter includes details and the concept of a new suggested index for knowing the overall status of water bodies.

Chapter 5 summarizes the important conclusions of our study with future scope of the study.

From the obtained results it is observed that there is no specific trend pattern for both the water bodies. The main reason for such uneven pattern is a load of anthropogenic stress received by water bodies, mainly during festive seasons value goes high but here no such uniform pattern is observed as values

are found high in June, December, and march also. Anthropogenic activities such as the dumping of biodegradable or non-biodegradable wastes such as plastics bags, plastic bottles, food waste from the nearby eateries, flowers, and photo frames are commonly observed in both the water bodies. Other activities like washing utensils, clothes, fishing, and sewage discharge are also observed on regular basis adding to the pollution load in the water body. Direct and indirect anthropogenic sources are directly contributing to the contamination of the body leading to no specific trend pattern and solely depends on the human load received by water bodies.The study shows that there is no mechanism for achieving 100% impartiality or correctness in producing a WQI, specifically for parameter selection, generation of sub-index values, generation of parameter weights, and selection of index aggregation method. As a result, issues like rigidity, eclipse, and ambiguity will always be a barrier in constructing a WQI. A single universal index should not be used in all situations. An existing index requires updating with new parameters based on factors such as geography, historical and current data, and other factors. When the parameter's value rises, the weighting of a parameter needs to be changed; the index value maybe affected if the weighting is too low. Climate parameters should be chosen concerning the pollution load to calculate the index. Continuous usage of the indices produces long-term data helpful in managing and making decisions about water quality. People should be involved in programmes for a certain amount of time to make them value water bodies and understand their importance. They also need to know what kinds of human activities can pollute water bodies and how to prevent pollution in the field.