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**SUMMARY AND
CONCLUSIONS**

The present investigation deals with “Ecological Studies in Some Lentic Water Bodies of Kolhapur City (Maharashtra).” An attempt has been made for knowing the present status of lake water of Rankala Rajaram and Kotitirth. Water samples have been collected from various selected sampling sites. With the help of physicochemical analysis, for different seasons of lake water, some important aspects have come into focus for deciding the causes of present situation. Subject matter of this dissertation has been divided into VII chapters.

Chapter- I is a general introduction in which necessity of present work, in the light of recent studies, made in various countries regarding ecological studies of lentic water habitats.

Chapter – II gives the information regarding the history, topography and the physical features of the area under study.

Chapter – III deals with the review of previous work in the lentic water habitats. It gives the information about the ecological studies in terms of physico-chemical analysis as well as pollution status, done by different workers.

Chapter – IV describes the material and the methods used in the present work.

Chapter – V is results and discussion. It deals with detailed observations and discussion about the investigation carried out, based on tabular and graphical representation.

Chapter – VI includes summary and conclusions.

Chapter – VII is a bibliography which contains the references cited to the literature.

On the basis of above summarized work following conclusions are drawn into following lines.

Most of the physicochemical parameters manifest a great deal of seasonal fluctuations.

- **Physical Parameters**

- Slight variations were recorded at the three waterbodies during different seasons, indicate that it is not influenced by the interference, but changes with the changing environmental climate.
- pH was always found to be alkaline throughout. pH values fluctuate from time to time and season to season. Highly alkaline pH was found in Kotitirth lake. Mainly because of increase in load of alkaline salts, mixing of sewage, industrial effluents and degradation of organic and inorganic matter into water body.
- High values of Electrical Conductivity (EC) were found in Kotitirth lake during summer season, while low conductivity was

found in Rankala lake during winter season. In the Rajaram lake in the month of September 2003, the value of EC is found to be highest due to reduction in water level.

- In both years high values of Total Solids (TS) were recorded during May to September at all the sites, in three lakes. The highest level of solids were found at Rajaram lake at site A during summer season and it clears that direct mixing of sewage and surface groundwater into the lake.
- During both the years, Total Dissolved Solids (TDS) were found to be increased, in all the three lakes, at all the sites. This fluctuation in solids in different season may be due to mixing of sewage and surface groundwater run off which add more and more solids into the lake.
- The observations of Total Suspended Solids (TSS) revealed that no major fluctuations during both the years respectively. However low values of TSS were observed in monsoon season, and high values in summer season.
- Difference in colours has been observed in all the three water bodies indicates the percentage of influence by manmade activities and mixing of waste water.

- **Chemical Parameters**

- Increase in DO level in summer season may found because of mixing of sewage and by wind-wave action. The absence of oxygen is a striking feature of Kotitirth lake in the year 2003, might be due to invasion of an aquatic weed *Salvinia molesta* Mitchell, which has occupied total surface area of the lake.
- Increase in the BOD values in summer season at all the sites of all lakes, may be due to transformation of waste, with the help of wind flow, water flow and current, wave action and boating activities, as well as death of phytoplankton.
- The free carbondioxide of most of reservoirs has been found to be low, due to it's faster utilization by the phytoplankton, while complete absence of free CO₂ can be correlated with higher pH values.
- In summer season high values of chlorides were observed at site A of Kotitirth lake and site D of Rankala, which are highly influenced with domestic sewage and human activities. Low values of chlorides were found in monsoon season, may be due to dilution by rain water in all the three lakes.
- Due to reduction in the level of calcium and magnesium, there is reduction in the level of hardness in monsoon season in all the

lakes. But in the summer season increase in hardness may be due to fully loaded human activities.

- The human activities like mattresses cloth washing before 'Navratra' festival help to increase alkalinity in lake water due to use of various types of soaps, detergents and other washable drugs, while it decreases in monsoon due to addition of rain water, in the same.
- The phosphorus level was found to be higher in monsoon season which may be indication of pollution. High and continuous discharge of domestic sewage, detergents, washing and cleaning of cloths, vehicles, cattle washing, bathing, and swimming might be resulting into pollution. Decline in the level of phosphorus in summer season may be due to drying ways of domestic sewage, discharge and unavailability of usable sites.
- Quite high concentration of nitrate in the lakes may be due to sewage and high concentration of nutrients, owing to the evaporation of lake water. It may be because of pollutants mixing in all the sites of the lake.
- The elements like Sodium, Potassium and Calcium are higher in concentrations, in monsoon season in all the three lakes, while low levels of them are found in ~~monsoon~~^{summer} season.

- All the trace elements are present in lakes water in very small amounts, it may be due to a reflection of the different geological location of the lakes within the various rock information. Detection of heavy metals in the waters, source of it in the lake water may be the inflow of the nutrients by various types of sewage.
- In Rankala lake water heavy metals might have been absorbed by *Eichhornia crassipers*, while in Kotitirth lake these are absorbed by *Salvinia*. Thus the growth of *Salvinia* is found to be beneficial for eutrophic lake, as it removes heavy metals as well as phosphates from the water and thus the lake can be revived back to mesotrophic. After the completely occupation of the surface area, DO is found to be absent which may be harmful to aquatic biota. So there should be frequent mechanical removal of aquatic weeds.
- If the activity of Ganesh idol immersion will be continued, in large scales, the quality of the lake water will get hampered.
- Traditional cloth washing will result into heavy load of pollution.

PRESENT STATUS

The quality of lake water is highly contaminated at every lake, but in Kotitirth lake, water is found to be highly contaminated in comparison to Rajaram and Rankala lake water.

The lakes are constructed to get the sufficient amount of water for the people. But with the high load of population and large increase of needs of people, they are attracted towards the lakes water for their fulfilment or cloth washing, solid waste dumping, bathing and cleaning purposes. Due to that interference, day by day these lakes water is going on changing their water quality and purity.

As a consequence of uncontrolled human activities these water bodies get enriched with plant nutrients, which sets in motion, a chain of happenings, leading to eutrophication and deterioration of water quality. It's natural quality is so altered as to impair it's usefulness or render it offensive to the senses sight, taste or smell. Today the increasing human population and sewage linked eutrophication are posing great danger to scarce freshwater resources.

- **Suggestions**

After knowing the water pollution problem, there is urgent need to develop and search out new techniques for proper utilization of water resources by human societies. Following suggestions are helpful and urgent for conservation and protection of these lakes.

- To stop the mixing of sewage into lake from the site, which is unprotected.
- To introduce waste discharge permit system.
- To construct protective walls along the open sites.

- To collect the information regarding effluents nature through vigorous monitoring and inspection programme.
- To prevent the human activities like washing of cattles, cloths and vehicles.
- To put attractive dust bins along the shore lines, to put plastic container, polythene bags and papers.
- To maintain water quality by removing periodically the aquatic weeds like *Eichhornia* and *Salvinia*.
- To restrict the activities like Ganesh idol immersion and traditional cloth washing as well as to prohibit the materials like garlands, flowers, sweets, haladi and kumkum, banana leaves, coconuts etc.
- To develop control measures for rapid industrialization, urbanization and growth of population.
- To create awareness among the people regarding our valuable environment and importance of water.
- To manage precious resources, through regulation, licencing and policing.
- To allow optimum utilization of water.

Protection and quality of freshwater resources. To identify freshwater resources. To safeguard the most precious source of life on our planet.