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Research Papers

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## “Physico-Chemical Status of the Water of Historical Lakes and Tanks in Kolhapur City”

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### Abstract

*Due to the unprecedented population growth and intensive agricultural practices ground and surface water is been exploited on increasing scales. Water bodies such as springs, streams, rivers, lakes ponds, bog etc. are playing prime role to supply the water for drinking, washing, irrigation, industrial purpose, generating electricity etc.*

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Lakes have a special role to play in Life of humankind. Lakes have supported mankind since historical period. However, the use of lake water is for drinking and agricultural pentose, but not all lakes are supporting for the same use. Because by virtue of some particular property and value every lake performs, particular function. The function depends upon location, size a various ecosystem characteristics of lake and of contras the degree of human interference in the matter of water pollution.

Kolhapur district having fine network of Drainage system with Bhogavati and Panchaganga River. The demand of water by the fast growing Kolhapur city is tremendous. The major part of this water requirement by the city partly fulfill by Panchaganga river water system. Particularly for industries, irrigation and community supply the water from the river Panchaganga is being utilized. However the lakes in Kolhapur city have a special importance and ecological effect over the city

environment. Some lakes of Kolhapur city help to ease the tremendous pressure of water demand particularly for irrigation purpose, whereas some lakes are use for recreational purposes too.

#### **Study Region:**

The Kolhapur city is the historical one. The city is well acclaimed as of Dakshin Kashi because of goddess Mahalaxmi or Ambabai, the deity of Kolhapur. Owing to several lakes and tanks in the city, Kolhapur was also well recognized as 'city of Lakes'. Kolhapur city lies in between 15°43' – 17°17'North Latitude to 73°40' –74°42' East Longitude and the average height of the Kolhapur city is 550 mats above the mean sea level with an area about 66. 82 sq. kms.

#### **Research Methodology and Data:**

The data for ongoing study is made available from the empirical, field survey and documented sources. The values of the chemical parameters have been taken in to consideration as a temporal factor for year 2005 and 2009. The

comparison therefore between these two years have been conducted. The empirical methods have been used for chemical analysis of the water samples which have been consecutively collected from the intensive field work. Study form the toposheet has also been done accordingly.

The empirical sources include physico – chemical analysis of water quality such as pH, DO, TDS, COD, TSS with other physical characteristics like odor, colour turbidity, transparency etc.

**Objective:**

While discussing the physico–chemical properties of the water the attempt has been made to study the quality of lake water to evaluate their suitability for drinking and irrigation purpose  
Physico-Chemical Properties of Water:

In the present paper the discussion of the physico-chemical properties of the water has been made to study the quality of lake water. The samples of the lake waters are duly evaluated to verify their suitability for drinking and irrigation purpose.

**Rankala Tank**

Rankala Lake is situated in south west of the city developed during 1877 – 1883. Covers an area of 5.21 sq / km. Its depth is about 9 .5 m (30 feet). This lake provides water for irrigation for about 80 hectares of land in and around the city of Kolhapur. This lake has historical importance, therefore having a proud place of Kolhapur citizens. There is constructed wall around the lake. Source of water to the lake is from two major streams flow from southern side. There are three out-lets from which water drains to irrigate about 80 hectares of land of Phulewadi, Mirabag, Dhunyachi Chavi. Being the location of this lake is in mid of the city, there are many sewage terminals pouring sewages in the lake water and therefore heavily polluting the lake. This sewage contributing organic matter, silt and other toxic material, which accelerate the pollution of the water.

The physico – chemical properties of the lake also suggest the severity of

Water pollution. COD, chemical oxygen demand is 160 ppm higher among the water of

other lakes which suggest that sewage increases inorganic matter such as nitrogen a phosphate in the great extent. The conductivity of the water of the lake, which is

0.0125 ( Table)

Being vast reservoir of water, TDS (total dissolve solid) is increased by almost 36 which is 236 ppm. It was 200 ppm in 2005. Dissolve oxygen

(DO) was 8.4 2005 showing enormous growth of hyacinths and other aquatic plants such as hydrilla. It is 6 in 2009. High content of DO is an indication of inorganic pollution. Overall analysis of the Rankala water suggested that though the pollution is in Moderate condition but continues supply of sewage is augmenting the severity of water pollution. The DO (dissolve oxygen) indicates that pollution by organic matter is much more which support the hyacinth and other aquatic plants. The Marshy land of western side also helps to increase this organic pollution. Moreover immersion of Ganesh idols during Ganesh festival is also increasing level of water pollution.

Table: 1 Physico-chemical characteristics of lakes and tanks water in Kolhapur city (2005)

| Parameters of water | Rankala Lake |      | New Palace Tank |      | Kotitirtha Lake |      | Lakshatirtha Lake |      | Hanuman Tank |      |
|---------------------|--------------|------|-----------------|------|-----------------|------|-------------------|------|--------------|------|
|                     | 2005         | 2009 | 2005            | 2009 | 2005            | 2009 | 2005              | 2009 | 2005         | 2009 |
| pH(6 to 8.5)        | 7.17         | 8.6  | 6.58            | 8.5  | 7.33            | 8.1  | 7.28              | 7.4  | 8.36         | 9.5  |
| Conductivity Mh(Ω)  | 0            | -    | 0               | -    | 0.025           | -    | 0                 | -    | 0.025        | -    |
| Do(4to6ppm)         | 8.4          | 6    | 14.8            | 5.8  | 11              | 5.8  | 11.2              | 3.4  | 12.20        | 4.4  |
| COD(4ppm)           | 160          | 39   | 54              | 35   | 76              | 65   | 180               | 35   | 180          | 333  |
| TSS(5ppm)           | Nil          | 10   | 100             | 116  | 200             | 68   | 200               | 52   | 300          | 18   |
| TDS (500ppm)        | 200          | 236  | 300             | 262  | 600             | 1028 | 200               | 638  | 700          | 848  |

Source: All tests are conducted in govt. laboratory, Kolhapur.\*The parameters of water given above are of drinking water.

**Kotitirtha Lake:**

It is said that about 5 acres of land covered by Kotitirtha lake water. Though this lake is having historical value now it is abounded by cluster type of settlement particularly Panzer pole, part of Udyam nagar, Shahu mill etc. Residences of these settlements are performing all their day- to-day work e.g. bathing, cloth and cattle washing, which finely increases pollution of lake water. A steam from the Shahu mill area supplies the water to this lake. Beside there are few natural infiltration source of water to this lake.

Chemical analysis of the water indicate severity of water pollution particularly due to organic material COD was 76 ppm less than value of water sample of other lakes. Value of same parameter is 65 ppm in 2009. Conductivity of tthe water is 0 .025 where as total dissolve solid (TDS) is increased to 1028 than that of 600 in 2005. There are suspended and settled solid material present in the water. Since the surrounding area of lake is densely, populated suspended human west is much more in the lake water. DO was 11 ppm being highly polluted by organic matters there is no specific use of lake water, it is decreased to 5.8 in year 2009.

**New Palace Lake:**

This is a private lake located in the private property of Chh .Shahu Maharaja. The rain water is main source of lake. It covers about 7.5 acre of land its depth is 30 feet. This is only lake somewhat

free from organic pollutants because the lake is developed for specific purposes of drinking water for antelope, birds breeding, and for animals. The lake is maintained by Chh. Shahaji zoo trust one can called it a mini sanctuary park. Chemical analysis of water shows that COD was 54 ppm in 2005 shows there is no inorganic polluted water, it is about 35 much lesser in year 2009. Conductivity of water is much lesser 0 .0009 Where as TDS is 300 showing sustaining organic matter.

**Lakshatirth Lake:**

This lake is situated in the eastern part of city near Lakshatirtha Vasahat. The total area under this lake is much more, but present storage of Water is very less. The lake is abundant and silts up. The source of water is rain and some infiltration. There are many sewage terminals which increase pollution of the lake water there are many spices of aquatic plants are also seen. The COD of the lake was highest 180 showing quantity of inorganic material is more conductivity of water is also more 0.0155 TDS is 200 ppm where as DO is 11 .2. in year 2009 th COD is 35 and TDS is 638 which is increased.

**Hanuman Tank:**

Hanuman tank is situated in Kasba Bavda. This is recently developed lake it covers an area of about 2 .5 acres with the depth of about 30 feet. The source of water is rainfall. It is supposed that the water has some medicinal characteristics. This also reflected in chemical analysis of the water from this tank. COD is highest indicating percentage of inorganic material. TDS was 700 showing some specific inorganic matter in the water, it is highest in year 2009 by 848. DO was 12.20 which much decreased by 4.4 in year 2009. The volume of all these parameters Shows that concentration of some in organic material is more. It is due to the very less amount of water storage.

**Conclusion:**

The foregoing study of the chemical properties of some lakes and tanks in Kolhapur city reveals that the level of water pollution is continuously increasing. The intensity of water pollution has very deteriorated in Kotitirth, Lakshatirth, and followed by Rankala. The pollution of the lake water is mainly due to draining of several terminals of sewage, cattle washing, mass bathing, cloth washing, and adding human waste. Therefore, it is necessary to take some preventive measures to reduce the water pollution of the lake and tanks. Preventive measures like, diversion of sewages, total prohibition on washing of cattle and cloths,

eradication of hyacinth and other aquatic plants, construction of wall where ever necessary.

Therefore, it has concluded that there is close relation between locations of lakes and a level of water pollution. It is studied that there is inverse proportion between quantity of water in the lakes or tanks and level of pollution. For example in case of Rankala, though the sources of pollutant are more but level of water pollution is moderate because of vast water storage such is in the case of other lakes.

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