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Study of Physicochemical characteristics of water quality in Katraj lake, Pune.

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ABSTRACT

The physicochemical parameters of Katraj lake water namely P^H, turbidity,total dissolved solids, alkalinity and hardness, phosphate content, chloride content, chemical Oxygen demand(COD) and sulphate content have been derived for the half yearly period February 2011- to July 2011. The purpose was to assess the quality of water from the sources in premonsoon and monsoon season. The value obtained for these parameters are P^H :6.60-8.12, turbidity: 6-32NTU, total dissolved solids: 140-600mg/lit , alkalinity:160-310mg/lit and hardness 46.8-103.4ppm, phosphate $0.18\text{-}X10^{-5}$- $0.78x10^{-5}$ mg/lit, chloride content: 16.12-354.85mg/lit, Chemical oxygen deand (COD)1.72-6.0mg/lit and sulphate content 82.66-246.9mg/lit respectively. It has been observed that there is marked difference in the values for the pre-monsoon month(February-May) and monsoon months (June-July).

Keyword: Pre-monsoon, Katraj lake, Post monsoon, COD, pH.

1. Introduction

"Water is the most abundant molecule on the earth surface comprising of about 70% of the earth surface as liquid and solid state in addition to being found in the atmosphere as vapour. There is dynamic equilibrium between the liquid and vapour state at standard temperature and pressure . At room temperature, it is nearly colorless, tasteless and odourless liquid,many substances dissolved in water and it is commonly referred to as the universal solvent. Water plays a very important role in our lives for it is very important role in our lives for it is very useful for our lives for it is very useful for our bodies as well as keeping ourselves clean . It is an essential requirement for the growth of flora and fauna in various ecosysytems. The chemical and physiological process of organisms involve utilization of water in some form or the other water plays an essential role in several life activities. The prime sources of water for drinking, irrigation and other domestic purposes are the water bodies such as river and lakes (Solanki et al 2006). The most unfortunate part which is disturbing all of us is the disposal of sewage, industrial wastes and human activities which keep on polluting these water bodies(Khathavkar et al.2004). It has become our prime responsibility to maintain the quality of water from such water samples from rivers and lakes creates an excellent platform to the study of various physicochemical parameters of water namely P^H. turbidity, total dissolved solids,alkalinity and hardness,phosphate content,chemical oxygen demand(COD) and sulphate content(Eswarlal Sedamkar and Angadi,S.B 2003).

The physicochemical characteristics of water bodies have been studies by many researchers from time to time (Mathew Koshy and T.Vasudevan Nayer.1999). The present investigation reveals the physicochemical characteristics of Katraj lake, which is being polluted . Katraj lake is one of the oldest lake of Pune city. An 18^{th} century intricate water supply system,built during reign of the Peshwas[10] has been rediscovered in Pune, generating a great deal of

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interest among historians as well as engineers of Pune Municipal Corporation water supply department. This water supply system, constructed in 1750 by Balaji Peshwa, comprises of huge ducts and underground tunnels originating from Katrj lake of the city to the historic shaniwarwada fort, the ancient seat of Peshwas. The underground water supply system is considered an engineering marvel as it coud supply water to practically the whole of Pune then without the need for motors and pipelines which are used at present. The area of Katraj lake has natural slope on one side and mountain barriers on the other side, form a basin for water storage. Presently the lake from its three sides is covered by the zoo and a snake park. The lake has natural inlets from different areas such as Gujar hills and suburbs. Katraj lake is a rain fed reservoir which was a source of drinking water for nearby areas. Presently it is utilized for pesiculture and recreational activities. It covers an area about 8000 to 10000 square meter, has different depth levels varying from 15 to 30 feet. It is located at the southern region of the Pune city at altitudes of 18^{o}-25'N and 18^{o}-27' and 73^{o}.63' longitude.

2. Material and methods

The samples were collected in one litre polythene cane and thoroughly washed thrice with water to be analysed. The samples were collected on the 10^{th} day of every month around 10.00a.m. between February 2011 to July 2011, 20cm below water surface and 3cm from the shore from a fixed point . The P^{H} of samples were recorded on P^{H} meter and turbidity was obtained by Nephelometer and turbidimeter-132 according to standard procedure (APHA,1995,Bhave and Borse,2001). The total dissolved solids was obtained by gravimetric methods.The alkalinity was determined by volumetric method. The hardness was determined by complexometric method (Vogel,5^{th} edition,1995). The phosphate content of the sample was obtained by colorimetric method. The sulphate content was estimated by gravimetric method(Vogel,5^{th} edition,1995).The chloride content and chemical oxygen demand(COD) values were determined by titrimetric method (APHA,1995). For convenience the monthly samples of water are given the following abbreviated symbols namely S_1-February2011, S_2-March2011, S_3-April2011, S_4-May2011, S_5-June2011 and S_6-July2011. This indicates that four samples S_1-S_4were taken in the pre-monsoon and the remaining two S_5-S_6 in the monsoon period.

3. Result and discussion

The average results of the physicochemical parameters for water samples are presented in Table.1

3.1 P^{H}

P^{H} is a term used universally to express the intensity of acid or alkaline condition of a solution. The pH value of water samples varied between 6.45 to 8.12 shown in the figure1 and it was in the maximum permissible limit.. The P^{H} of sample had minimum value of 6.60(S_3) and maximum value of 8.12(S_2) . The marked difference in the P^{H} values of S_2 and S_3 clearly indicates that the lake is being polluted due to industrial affluents (acidic).

3.2 Turbidity

The turbidity values of the samples range between 6-32 NTU with a maximum value of 32NTU for S_5 (Table1). The obtained value of turbidity exceeds the Indian Standard and WHO standards. The reason for this is that Katraj lake is a rain fed reservoir and has natural inlets from different areas such as Gujar Hills and suburbs. The water from these inlets must