

## **Recent studies on the certain specific parameters of Kala Talao (Lake) Kalyan, Maharashtra, India**

**Deshbhratar Shantaj M.<sup>1</sup>, Hile Vijay K.<sup>2</sup>, Raut Sonali R.<sup>1</sup>, Mahaley Jyotsna A.<sup>3</sup>, Singh  
Ankita J.<sup>4</sup> and Mehta Gayatri U.<sup>4</sup>**

<sup>1</sup>Zoology Dept., Bhavan's Somani College, Chowpatty, Mumbai

<sup>2</sup>Botany Dept., Bhavan's H. Somani College, Chowpatty, Mumbai

<sup>3</sup>Zoology Department, Vartak College, Vasai Road(W)

<sup>4</sup>Shri Chandulal Nanavati Vinay Mandir, Vileparle (W) Mumbai

---

### **ABSTRACT**

*Kala Talao (lake) in Kalyan, Maharashtra, India, commonly referred as 'Shenale' is presently managed & maintained by KDMC and is utilized by the public for various recreational activities and cultural events including rituals etc. Several NGO's are monitoring and spreading general awareness regarding conservation & management of existing water bodies by holding rallies, events, programs etc. and with this regard the "JalPooja" was very recently organized by the Hon. Jagatguru Shankaracharya. Hydrological parameters & its variations are useful in finding the sources of pollution & its effective management. Further these parameters also govern the distribution of animals/ organisms and hence essential in understanding the correlation with environment. The current investigations are carried out to assess and examine the varied parameters, status & quality of water and also recent comprehensive published data on the Physico-Chemical Parameters of Kala Talao is not available. The samples of Kala Talao water are regularly collected at intervals of 3-4 months from 2 sites since last 2-3 academic years. Certain parameters are processed immediately at the site and/or within 4-6 hrs, while the rest of parameters were assessed at research center/ laboratories. The results indicate that the sample waters are fairly contaminated and require immediate restoration with effective treatment & management.*

**Keywords:** Parameters; Talao; KDMC; Shenale; JalPooja

---

### **INTRODUCTION**

Water is the most pivotal component on earth as it is the basic need /medium for origin of life. The most basic and important benefit of fresh water is related to the health of people, ecosystem and societies [34]. The quality of water has never been static; varies from place to place & time to time and is largely regulated by biotic & abiotic agencies that interact directly or indirectly [35][37]. Different authorities /agencies have prescribed standards for varied categories of water and they are periodically revised to take advantage of new treatment techniques [16]. Regular monitoring of Physico- chemical characteristics are very important since a relationship can be established between the various parameters that gives us the status of the area [21]. Further Physico-Chemical characteristics are highly important with regard to the occurrence and abundance of species [23]. Water parameter signifies the quality and its assessment helps to prevent any further deterioration and also ensure that it is aesthetically adequate [9][12]. Eutrophication has become a widely recognized problem of water quality deterioration [18]. Also due to increased human population, use of fertilizers in the agriculture and manmade activities, the natural resources are infused with heavy and varied pollution in aquatic environment leading to depletion of its biotic flora and fauna [19].

Kalyan, a part of Kalyan-Dombivili Municipal Corporation(KDMC) established in 1983 is amongst the largest urban local body in Mumbai Metropolitan Region (MMR) with an area of about 209 sq.kms. The city has good

water sources in and around it which includes the Ulhas River in its vicinity, lakes in the central areas and eco-friendly waste- water treatment plants. Kala Talao is a historic lake in Kalyan, built by Adil Shah of Bijapur & located about a kilometer to the north of Kalyan Railway station. It co-ordinates at 19°14' 46" N & 73°7' 52" E and covers around 24 acres with varying depths ranging from 6-14 feet. There are around 75 wells all over Kalyan and the water levels of these remain more or less constant throughout the year due to the numerous natural spring wells in the Talao.

## MATERIALS AND METHODS

**Collection of water sample:** Water sample is collected randomly at regular intervals of 3-4 months from 2 sites of Kala Talao (Lake). The samples were collected in plastic cans of 5liters capacity without entrapping any air bubbles. The samples were kept in refrigerator and maintained at 4°C. Recent scientific instruments and procedures with high efficiency and efficacy were adopted for all practical purposes.

**Analysis of Water Sample:** Analysis of water were carried out for various water quality parameters such as pH, DO, BOD, COD, CO<sub>2</sub>, EC, TDS, nitrate-nitrite, chlorides, sulphates, phosphates, alkalinity, acidity, total hardness etc. using standard methods (APHA,1985). All the reagents used for the analysis were of AR grade and double distilled water was used for preparation of solutions.

## RESULTS AND DISCUSSION

The mean average parameters of water of the above-mentioned sites are calculated and described as follows:

**1. Electrical Conductance (EC):-**Electrical conductivity is a measure of water capability to transmit electric current and also is a tool to assess the purity of water [31]. The electrical conductivity (EC) depends directly on the presence of total solids (TS) comprising of both suspended and dissolved solids. The mean average Electrical Conductivity found is 0.36mS in Year 2010, 0.378mS in Year 2011; 0.52 mS in Year 2012.

Table 1 Tabulated form of Mean Average Values for the Year 2010

Area	Site 1	Site 2	Indian Standards	International Standards
pH	3.64	4.25	8-8.5	7-8.5
EC	0.389	0.327	0.075	0.03
TDS	0.352	0.075	500	500
DO	13.45	11.78	8.5-9	5.5
BOD	11.5	10.2	5	8.5-10
COD	45	16.89	8.5-11	14
Total Hardness	54.23	66.11	300	100
Nitrite	14	4	50	45
Nitrate	100	67	50	45
Acidity	6.25	10.25	-----	-----
Alkalinity	456.1	389	103	200
CO <sub>2</sub>	0.26	0.26	6	6
Sulphate	187.58	124.19	150	200
Phosphate	125	167	0.05	0.05
Chloride	275.5	267.72	250	200

**2. Total Dissolved Solid (TDS):-** TDS is the term used to describe the organic salt and small amount of matter present in solution of water [24]. Salts like carbonates bi-carbonates, chlorides, sulphates, phosphates and nitrates of calcium, magnesium, sodium, potassium, iron and manganese etc. are dissolved in natural waters. The high content of dissolved solids increases the density of water and influences osmoregulation of freshwater organism. They reduce solubility of gases and utility of water for drinking, irrigational and industrial purposes. The mean average value of TDS is 0.22 in Year 2010, 0.183 in Year 2011; 0.356 in Year 2012. In all the years TDS values are found less than limit prescribed by Indian & International Standards.

**3. Acidity:** Acidity is due to the effects of combination of compounds and conditions in water. It is the power of water to neutralize hydroxyl ions and is expressed in terms of calcium carbonate [29]. The mean average acidity of sample analyzed is 8.25mg/lit in Year 2010, 9.38mg/lit in Year 2011; 6.25 mg/lit in Year 2012.

**4. pH:**pH is the term used universally to express the intensity of acid or alkaline condition of a solution. pH is one of the very significant chemical characteristic of all waters, which explains certain significant biotic and abiotic ecological characteristics of aquatic systems in general [30]. The mean average pH value is 3.94 in Year 2010, 4.22

in Year 2011; **4.25** in Year 2012 and was not found within the limits prescribed by WHO. The pH values fluctuated in between **4-5**.

Table 2 Tabulated form of Mean Average Values for the Year 2011

Area	Site 1	Site 2	Indian Standards	International Standards
pH	3.89	4.56	8-8.5	7-8.5
EC	0.404	0.351	0.075	0.03
TDS	0.071	0.295	500	500
DO	14.16	11.74	8.5-9	5.5
BOD	12.19	10.77	5	8.5-10
COD	15	2	8.5-11	14
Total Hardness	64.13	56.11	300	100
Nitrite	16	6	50	45
Nitrate	120	80	50	45
Acidity	6.25	12.5	-----	-----
Alkalinity	250	537.5	103	200
CO <sub>2</sub>	0.26	0.2	6	6
Sulphate	195	198.75	150	200
Phosphate	25	25	0.05	0.05
Chloride	262.7	260.57	250	200

Table 3 Tabulated form of Mean Average Values for the Year 2012

Area	Site 1	Site 2	Indian Standards	International Standards
pH	3.7	4.81	8-8.5	7-8.5
EC	0.59	0.45	0.075	0.03
TDS	0.68	0.032	500	500
DO	4.36	6.1	8.5-9	5.5
BOD	18.06	18.06	5	8.5-10
COD	57.5	48.5	8.5-11	14
Total Hardness	92.18	96.19	300	100
Nitrite	16	6	50	45
Nitrate	120	80	50	45
Acidity	6.25	10.25	-----	-----
Alkalinity	250	225	103	200
CO <sub>2</sub>	0.20	0.20	6	6
Sulphate	126.50	111	150	200
Phosphate	87.50	112.50	0.05	0.05
Chloride	113.60	71	250	200

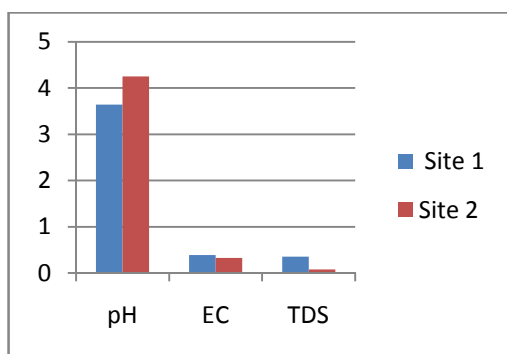


Figure 1.1(Table 1)

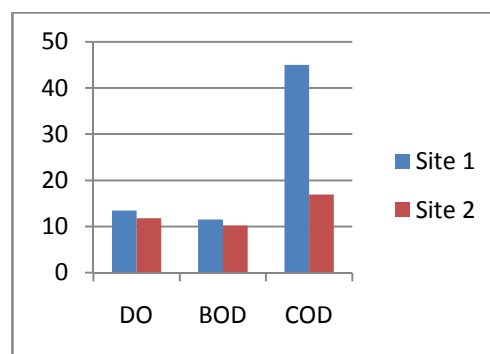


Figure 1.2(Table 1)

**5. Hardness in mg/lit:** Hardness is the property of water which prevents the lather formation with soap and also increases the boiling point of water [7]. Hardness of water mainly depends upon the amount of calcium or magnesium salts or both [25]. The mean average hardness value of sample analyzed is **60.17 mg/lit** in Year 2010, **60.12 mg/lit** in Year 2011 **94.18 mg/ltr** in Year 2012.

**6. Chlorides:**Chlorides are found in practically all natural waters. This is the most common inorganic anion present in water [28]. The chloride concentration serves as an indicator of pollution due to sewage. The people accustomed to higher chloride in water are subjected to laxative effects. The mean average chlorides of sample analyzed is **271.61 mg/lit** in Year 2010, **261.63 mg/lit** in Year 2011; **92.3 mg/lit** in Year 2012.

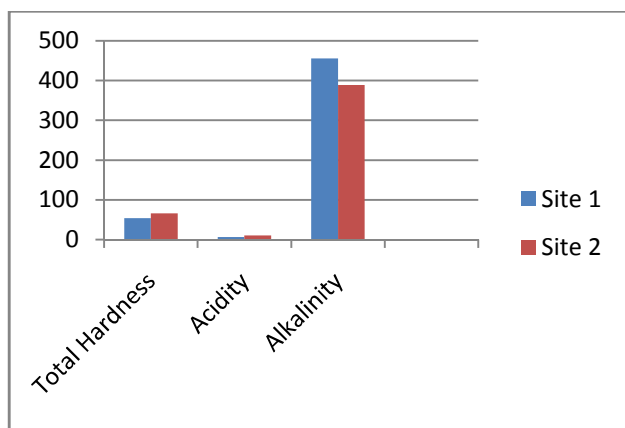


Figure 1.3(Table 1)

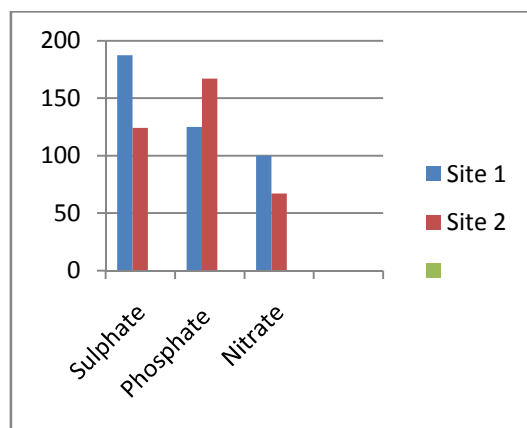


Figure 1.4(Table 1)

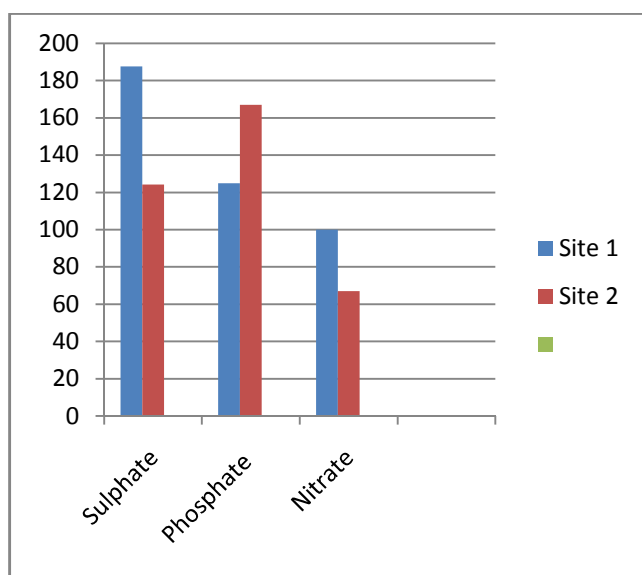


Figure 1.5(Table 1)

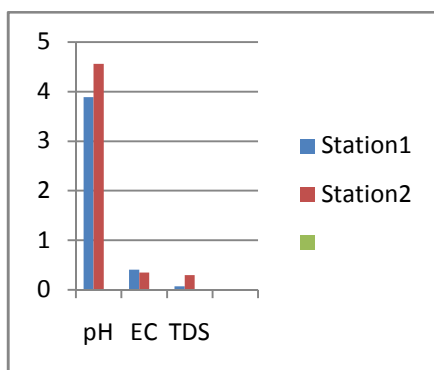


Figure 2.1 (Table-2)

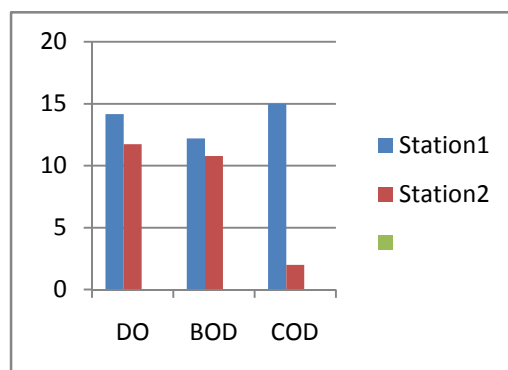


Figure 2.2 (Table-2)

**7. Alkalinity:** The alkalinity of water is a measure of its capacity to neutralize a strong acid. Alkalinity is the factor responsible for determining the amenability of water to biological treatment [15]. Alkalinity of surface water is primarily the function of carbonate, hydroxide content and also includes the contributions from borates, phosphates, silicates and other bases [27]. The mean average alkalinity of sample analyzed is **422.55 mg/lit** in Year 2010, **393.75 mg/lit** in Year 2011; **238 mg/lit** in Year 2012.

**8. DO in mg/lit:** DO (Dissolved oxygen) is one of the most important parameter in assessing the quality of water and reflects the physical and biological process prevailing in the water [32]. The DO, an important Physico-chemical

parameter of water quality, has special significance for aquatic organisms in natural waters. DO is of significant importance to the respiration activities of the aquatic organisms [9]. The mean average DO values of sample analyzed is 12.62 mg/ltr in Year 2010, **12.81mg/ltr** in Year 2011; **4.23 mg/ltr** in Year 2012.

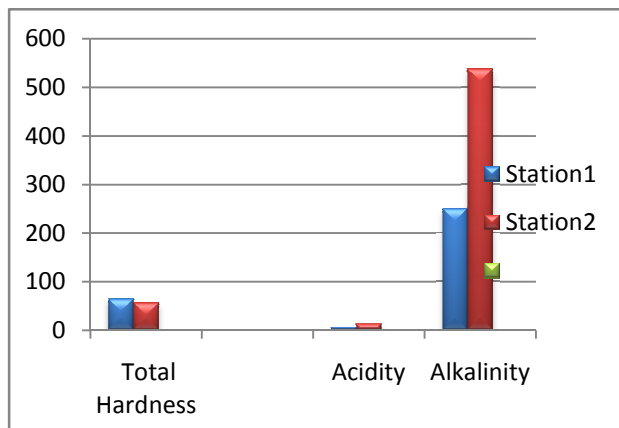


Figure 2.3 (Table-2)

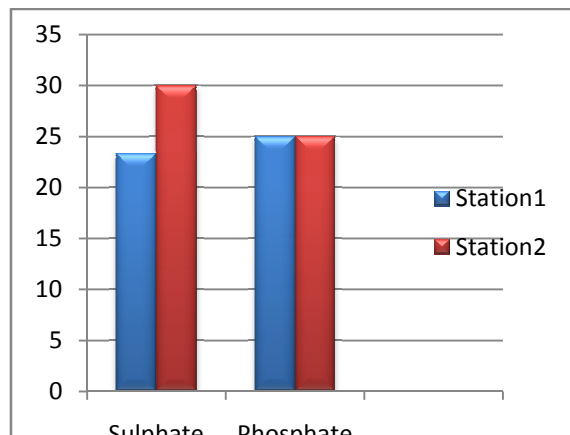


Figure 2.4 (Table-2)

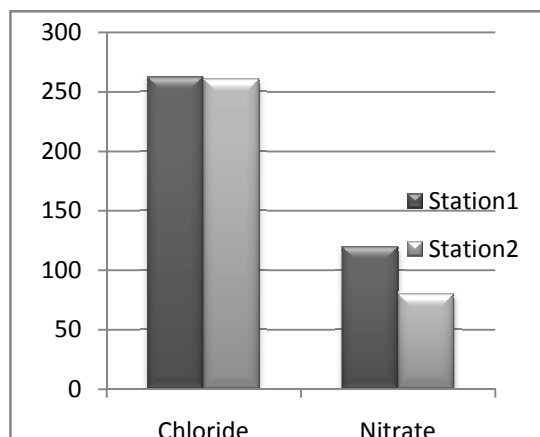
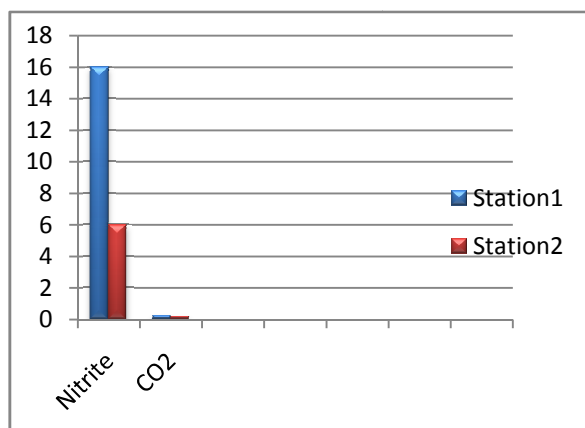


Figure 2.5 (Table-2) Figure 2.6 (Table-2)

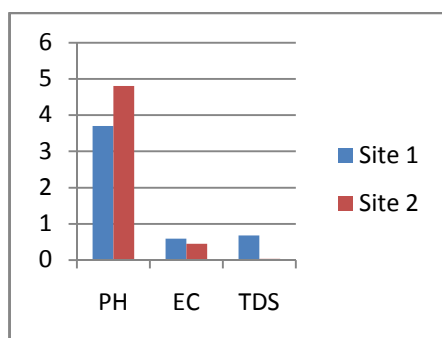


Figure3.1 (Table-3)

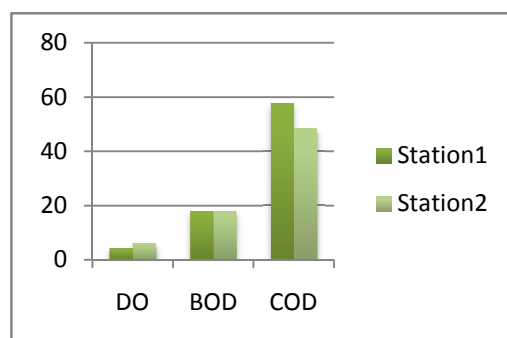


Figure3.2 (Table-3)

**9. BOD:**BOD is the measure of oxygen required by microorganisms to breakdown organic matter. The aim of BOD test is to determine the amount of biochemically oxidizable carbonaceous matter [14].The mean average BOD concentration of sample analyzed is 10.85 mg/lit/hr in Year 2010,**11.48 mg/lit/hr** in Year 2011; **18.06 mg/lit/hr** in Year 2012.

**10. COD:**COD is the amount of oxygen consumed during the chemical oxidation of organic matter using strong oxidizing agent like acidified potassium dichromate [28].The Chemical Oxygen Demand is widely used as a means of measuring the pollution strength of domestic waste waters. High COD values indicate Organic pollution. The

mean average COD concentration of sample analyzed is 30.95mg/lit in Year 2010, **8.5mg/lit** in Year 2011; **53 mg/lit** in Year 2012 .

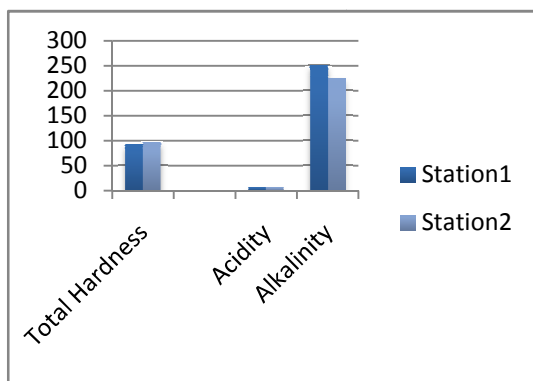


Figure 3.3 (Table-3)

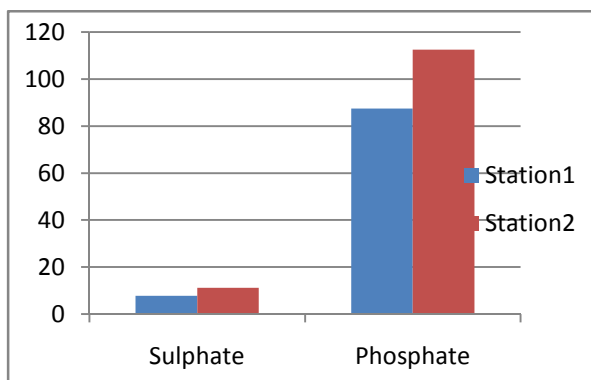


Figure3.4 (Table-3)

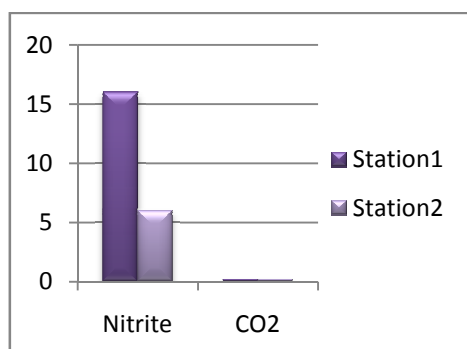


Figure 3.5 (Table-3)

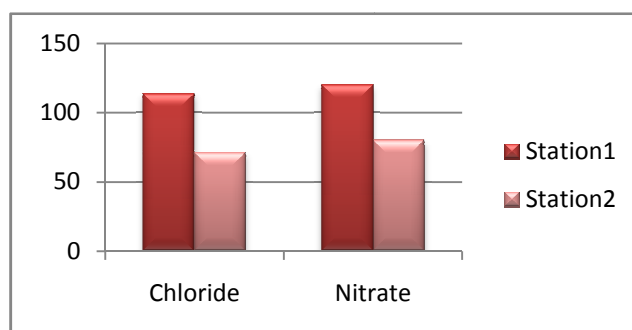


Figure3.6 (Table-3)

**11. Phosphates in mg/ml:** Phosphates is a nutrient that triggers eutrophication and is required by algae & other hydrophytic plants, animals in small quantities. Eutrophication could also lead to unpleasant odour of the water when algae die/ decompose thus deteriorating the quality of water [11].The phosphate may occur in water as a result of domestic sewage. The mean average phosphate concentration of sample analyzed is **146 mg/ml** in Year 2010, **25 mg/ml** in Year 2011; **100 mg/ml** in Year 2012.

**12. Sulphates in mg/lit:**Sulphates occur naturally in water as a result of leaching from gypsum and other common minerals [15]. Discharge of domestic sewage tends to increase its concentration. Sulphate helps in determination of water quality [33].The source of sulphate could probably be from the mineral rocks anthropogenically added and also due to the rain [3]. The mean average Sulphate concentration of sample analyzed is **311.77 mg/lit** in Year 2010, **393.75mg/lit** in Year 2011; **237.5** in Year 2012.

**13. CO<sub>2</sub>:**Free CO<sub>2</sub> is one of the raw materials for photosynthetic phenomenon in green plants [32]. CO<sub>2</sub> once fixed by autotrophs can be further utilized by organisms at other tropical levels. In the absence of free CO<sub>2</sub>, the carbonates are converted into 2 carbonates releasing CO<sub>2</sub> which is utilized by autotrophs, thus making the water alkaline. The mean average free CO<sub>2</sub> concentration of sample analyzed is **0.26mg/lit** in Year 2010, **0.23mg/lit** in Year 2011; **0.2 mg/lit** in Year 2012.

**14. Nitrate-nitrite:** Nitrite is the partially oxidized form of nitrogen found in very low concentration in natural waters. Presence of even a minute quantity of nitrite in water is indicative of organic pollution and prevailing low O<sub>2</sub> concentration. At high concentration it may cause blue-baby disease [21]. Mean average nitrite concentration of sample analyzed is **9 mg/lit** in Year 2010,**11 mg/lit** in Year 2011; **11 mg/lit** in Year 2012.

**15. Nitrate:** Nitrate is generally found in waters due to bacterial action of ammonia and organic nitrogen. Beneficial effect of nitrate on crop production has been reported specially in brackish water. Ground water can be contaminated by sewage and other wastes rich in nitrates [25]. The high concentration of nitrate in water is indicative of pollution but subsequently an important plant nutrient. The mean average nitrate concentration of sample analyzed is **83.50 mg/lit** in Year 2010, **100mg/lit** in Year 2011; **100 mg/lit** in Year 2012.

## CONCLUSION

Water is very precious for every living organism on this earth and therefore its judicious use is imperative. Discharge of urban, industrial and agricultural wastes have increased the quantum of various chemicals that enter the receiving water, which considerably alter their Physico-chemical characteristics. Recent studies indicate that water and its resources have to be effectively conserved, reconstituted, treated and managed by scientific measures so as to serve the biosphere. The parameters of Kala Talao indicate that by adopting and implementing technological measures, including chemical, biological and mechanical etc., it can be reconstituted and the waters can be utilized for a variety of purposes including introduction of organisms for propagation.

## Acknowledgement

We take this opportunity to thank Mr. Suraj Gajbhiye, Sandip Maind and Vilas Dagale for their voluntary support & assistance at all times.

## REFERENCES

- [1] Gonzalves, E.A. and Joshi, D.B. (1946): *J. Bomb. Nat. His. Soc.* 46:154-176.
- [2] Venkateswarlu, V., (1969): *Hydrobiologia*, 33; 117-143.
- [3] McKee J E and H W Wolf (1976) water quality criteria publication no 3-A, California State Water Resources control board.
- [4] Mishra G.P. and Yadav A.K. (1978): *Hydrobiologia*. 59(3):275-278.
- [5] Wilcock R.J., Stevenson C.D. and Roberts C.A. (1981): *Water Research*. vol 15, Part 3, , p 321.
- [6] APHA. (1985): Standard methods for the examination of water and waste water (10th Ed.) Washington, DC.; American Public Health Association.
- [7] Trivedi R K and Goel P K (1986): Chemical and biological methods for water pollution studies environmental publications, Karad..
- [8] S Minett (1992): 'Artificial Respiration for Lakes'. Water Technology International, IIT, Fluid Technology Corporation, Flygt AB, Sweden, , p 56.
- [9] Jayaraj P B, Prasad Rao G. D. V. and Sharma S V (1994): *India. Aqua. Biol.* 9:19-22.
- [10] Quadros Goldin (1995): Study of hydrological parameters of Thane creek; M.Sc. Thesis, University of Mumbai.
- [11] Kolo R J. (1996): The assessment of Physico-chemical parameters of Shiroro Lake and its major tributaries.: Eyo A.A. (Ed) proc. of the annual conf. of Fishers Soc. of Nigeria. pp 262-268.
- [12] Mehta Vijay (1999): Eco-Physiology And Conservation Of Kala Talav, Ph.D. Thesis, University of Mumbai.
- [13] Quadros Goldin (2001): Study of intertidal fauna of Thane creek; Ph.D. Thesis, University of Mumbai.
- [14] Gupta S.M., Bhatnagar and R. Jain. (2003): *Asian j. chem.* 15:727.
- [15] Manivaskam N. (2005): Physicochemical examination of water sewage and industrial effluent, 5<sup>th</sup> Ed. Pragati Prakashan Meerut, ..
- [16] Patil Ramet. al (2007): Soil testing and analysis of plant water and pesticide residues; New India Publishing Agency ISBN-10/13: 8189422707/9788189422707
- [17] Shanta Satyanarayan, Chaudhari P. R. and Sharda Dhadse, (2008): Limnological Study on Lonar Lake: A Unique Brackish Crater Lake in India, Proceedings of Taal (2007): The 12th World Lake Conference: 2061-2066.
- [18] Jalilzadeh Koorosh, Sadanand M, Yamakanamardi and Atlaiff K. (2009), *J. Aqua. Biol.*, 24(2)
- [19] Neera Srivastava, Harit Garima and Rama Srivastava, (2009): A Study of Physicochemical Characteristics of Lakes Around Jaipur, India, 30(5): 889-894.
- [20] Manjare S. A., Vhanalakar S. A. and Muley D. V. (2010): Analysis of Water Quality Using Physico-Chemical Parameters Tamdalg Tank in Kolhapur District, Maharashtra, Vol 1, Issue 2: 115-119.
- [21] Dwivedi and Dwivedi (2010) : River pollution and solution NCBA Calcutta.
- [22] Manjare S. A., Vhanalakar S. A. and Muley D. V. (2010): Analysis of Water Quality Using Physico-Chemical Parameters Tamdalg Tank in Kolhapur District, Maharashtra, Vol 1, Issue 2: 115-119.
- [23] Kiran B.R. (2010): *RASAYAN J. Chem.* Vol.3, No. (2010), 671-676.
- [24] Hiremath S. C., Yadawe M.S. , Pujeri U.S., Hiremath D.M., Pujar A.S. (2011): *Current World Environment*, Vol 6 (2), 265-269, 0973-4929, Online ISSN 2320-8031.
- [25] Murhekar Gopalkrushna H. (2011): *Research Journal of Chemical Sciences*, Vol. 1(4), 117-124.
- [26] Patil J.V., Ekhande A.P. and Patade G. S. (2011): *Annals of Biological Research*, 2(4): 44-56.
- [27] Shinde S.E, Pathan T.S., Raut K.S. and Sonawane D.L (2011): *Middle-East Journal of Scientific Research* 8 (3): 544-554, 2011 ISSN 1990-9233 © IDOSI Publications,
- [28] Sangapal R.R., Kulkarni U.D. and Nandurkar Y.M. (2011): Assessment of the physico-chemical properties to study the pollution potential of Ujjanireservoir, Solapur District, India. vol 6 no 3.
- [29] Tekade P.V., Mohabansi N.P. and Patil V.B. (2011): *RASAYAN J. Chem* vol.4, No2, 461-465.



- [30] Amte G.K& Gore Tejali A. (2012); Physico-Chemical Status And Primary Productivity Of Gauripada Lake-Kalyan City, Maharashtra, India Pollution Research 31(4): 671-674 copyright @EM International ISSN 0257-8050.
- [31] Hile V.K., RautSonali R, DeshbhratarShantaj M. (2012): Analysis Of Certain Selected Parameters Of Kala Talao, Kalyan, Maharashtra, India. Proceeding of International Conference SWRDM -2012, Shivaji University, Kolhapur, ISBN : 978-81-926964-0-9
- [32] Nafeesa Begum, T.VasanthaNaik and H.A. Sayeshwara (2012) : *Pollution Research*.31(4):579-591(2012)copyright @EM International ISSN 0257-8050.
- [33] PradhanVidya, Mohsin Mohammad, Gaikwad B H (2012); *International Journal of Research in Environmental Science and Technology* 2(4): 101-103 ISSN 2249-969
- [34] JagtapTejaswini P. (2013): *Bionano Frontier*, Vol 6 Issue -2 , 0974-0678, 315-317.
- [35] RautSonali R, DeshbhratarShantaj M, Hile Vijay K, Singh Ankita J(2013) : *India Research journal of Recent Sciences* vol.2(ISC-2012),1-6(2013)ISSN 2277-2502
- [36] ShrivastavaSwati ,Kanungo V.K.(2013) : *International Journal Of Herbal Medicine* 1(4): 35-43.
- [37] DeshbhratarShantaj M, Hile Vijay K, RautSonali R, MahaleyJyotsna A, Singh Ankita J, Mehta Gayatri U (2014) ; *International Journal of Life Sciences*, 2014, Vol.2 (2) ISSN: 2370- 7817