Analysis of Certain Selected Parameters of the Waters of Kala Talao, Kalyan, Maharashtra, India.

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Abstract

Kala Talao is a historic lake in Kalyan, Maharashtra, built by the Adil Shah of Bijapur & located about a kilometer to the north of Kalyan Railway Station. It is commonly referred as "Shenale" that coordinates 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. Water is the Biospheres most pivotal resource as the entire life is directly or indirectly dependent upon it. Water parameters signify its quality and the assessment helps to prevent any further deterioration & also insurance that it is aesthetically adequate for a variety of purposes. Recent studies reflect that water & its reservoirs have to be effectively conserved, reconstituted, treated & managed by scientific and technological measures so as to serve the planet.

Our present studies are carried out to examine and assess the status & quality of water. The water samples are periodically collected from 2 sites since last 2-3 years. Few of the parameters are immediately processed for details while the remaining samples are analyzed at centers/ laboratories with scientific & technological precision. Our studies suggest that the waters are contaminated & need urgent treatment and restoration.

Keywords: Talao, Shenale, parameters, Biosphere

Introduction:

Water is a universal solvent and helps to serve many beneficial uses that require a high degree of purity/ potability, hygiene etc. The quality of water has never been static and varies from place to place, time to time and is largely regulated by the biotic and abiotic agencies which come across or interact directly or indirectly (Dwivedi & Dwivedi, 2010). Regular monitoring of physico-chemical characteristics is very important since a relationship can be established between the various parameters that gives us the status of the area. Water parameters signify its quality and the assessment helps to prevent any further determination.

Kala Talao (lake) in Kalyan, Maharashtra, India is presently managed and maintained by KDMC and is utilized by the public for various leisure and cultural activities including rituals etc. Several NGOs are monitoring and spreading general awareness regarding conservation and management of existing water bodies by holding rallies, events, programs etc. and as such very recently the "JAL POOJA" was performed here by the Jagatguru Shankaracharya.

Results and Discussion:

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

1. pH:
   - pH is the term used universally to express the intensity of acid or alkaline condition of a solution.
   - The mean average pH value is 4.22 in season I; 4.25 in season II and was not found within the limits prescribed by WHO.
   - The pH values fluctuated in between 4-5.
2. DO in mg/lit:
   - DO (Dissolved oxygen) is an important parameter in water quality assessment and reflects the physical and biological processes prevailing in water.
   - DO is of significant importance to the respiration activities of the aquatic organisms (Jaya raju et.al,1994).
   - The mean average DO values of sample analysed is 12.81mg/ltr in season I; 4.23 mg/lit in season II. DO value found in Season 1 is more & less in Season 2 as compared to Indian and International Standard .
3. Hardness in mg/lit:
   - Hardness is the property of water which prevents the lather formation with soap and increases boiling point of water (Trivedi R. K. and Goel. P.K,1986).
   - Hardness of water mainly depends upon the amount of calcium or magnesium salts or both (Murhekar GopalkrushnaH, 2011).
   - The mean average hardness value of sample analyzed is 60.12 mg/lit in season I; 94.18 mg/ltr in season II. In Season I &II values are found less than the limit prescribed by Indian & International Standard.
4. Sulphates in mg/lit:
   - Sulphates occur naturally in water as a result of leaching from gypsum and other common minerals (Manivaskam N, 2005).

- Discharge of domestic sewage tends to increase its concentration.
- The source of sulphate could probably be from the mineral rocks anthropogenically added and also due to the rain (Mckee and Wolf, 1976).
- The mean average Sulphate concentration of sample analyzed is 393.75mg/lit in season I; 237.5 in season II .
- The Sulphate values fluctuated in between 200-400mg/lit. In Season I & Season II Values found are more than Indian &International Limit.

5. Phosphates in mg/ml:

- Phosphate is 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 deterioting the quality of water (Kolo, 1996).
- The phosphate may occur in water as a result of domestic sewage.
- The mean average phosphate concentration of sample analyzed is 25 mg/ml in season I; 100 mg/ml in season II. Phosphate values found in Both the Season I &II are shows higher range as compared to Indian & International Standard.

6. 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 (Gupta et al.2003).
- The mean average BOD concentration of sample analyzed is 11.48 mg/lit/hr in season I;18.06 mg/lit/hr in season II.
- The BOD values Fluctuated between 11 to 19 mg/lit/hr. In Season I &II Values are found more as compared to Indian & International Std.

7. COD:

- COD is the amount of oxygen consumed during the chemical oxidation of organic matter using strong oxidizing agent like acidified potassium dichromate (R.R.Sangapal et al.2011).
- The mean average COD concentration of sample analyzed is 8.5mg/lit in season I; 53 mg/lit in season II .In Season BOD values are within limit as per Indian Standard but In Season II it is more than Indian &International Standard.

8. CO_2 :

- Free CO_2 dissolved in water is the only source of carbon that can be used in photosynthetic activity of aquatic autotrophs.
- CO_2 once fixed by autotrophs can be further utilized by organisms at other tropical levels. In absence of free CO_2, the carbonates are converted into 2 carbonates releasing CO_2 which is utilized by autotrophs, thus making the water alkaline.
- The mean average free CO_2 concentration of sample analyzed is 0.23mg/lit in season I; 0.2 mg/lit in season II.
- The CO_2 values fluctuated in between 0.2 to 0.3 mg/lit. In both the season values found are very less as compared to Indian & International Standard.

9. Nitrate-nitrite:

Nitrite is the partially oxidized form of nitrogen found in very low concentration in natural waters. It has no mineral source in water but occurs as an intermediate formed during de-nitrification and nitrification reactions. Presence of even a minute quantity of nitrite in water is indicative of organic pollution and prevailing low O_2 concentration. At high concentration it may cause blue-baby disease. Mean average nitrite concentration of sample analyzed is 11 mg/lit in season I; 11 mg/lit in season II. The nitrite values fluctuated in between 10-12mg/lit. Both Season I&II shows less values as compared to Indian And International Std.

Nitrate:

- 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 (Murhekar Gopalkrushna H., 2011).
- Nitrate is the highest oxidized form of nitrogen and in water most important source is biological oxidation of nitrogenous organic matter of both autochthonous and allochthonous origin.
- 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 100mg/lit in season I; 100 mg/lit in season II.
- The nitrate values remains constant in both the season But it is more as compared to Indian & International Standard.

10. 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 (N.Manivaskam, 1980).
- The alkalinity is due to the presence of carbonates, bicarbonates and hydroxides of calcium, sodium and potassium.
- The alkalinity of natural water is primarily due to salts of weak acids, although weak or strong bases may also contribute.

- The mean average alkalinity of sample analyzed is 393.75 mg/lit in season I; 238 mg/lit in season II. Alkalinity Values are more in both the Season As compared to Indian & International Std.

11. Chlorides:

- Chlorides are found in practically all natural waters.
- This is the most common inorganic anion present in water (Sangapal R.R.*et al*.2011).
- The chloride concentration serves as an indicator of pollution due to sewage since people are accustomed to higher chloride in water and are subjected to laxative effects.
- The mean average chlorides of sample analyzed is 261.63 mg/lit in season I; 92.3 mg/lit in season II. In Season I values are more & less in Season II as compared to Indian & International Standard.

12.Acidity:

- Acidity is the major of 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 (Tekade P.V. *et.al* 2011).
- The mean average acidity of sample analyzed is 9.38mg/lit in season 1; 6.25 mg/lit in season II.

13. Total Dissolved Solid (TDS)-:

- 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 0.183 in season I; 0.356 in season II. In both the Season TDS Values are found less than limit prescribed by Indian & International Standard.

14. Electrical Conductance (EC)-:

- Electrical conductivity is a measure of water capability to transmit electric current and also it is a tool to assess the purity of water.
- Electrical Conductivity found is 0.378 m± in season I; 0.52 m± in season II. In Season I & II values for E.C. are more as compared to Indian & International Standard.

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Observations:

AREA	pH	EC	TDS	DO	BOD	COD
Site1	3.89	0.404	0.071	14.16	12.19	15
Site2	4.56	0.351	0.295	11.74	10.77	2
Indian	8-8.5	0.075	500	8.5-9	5	8.5-11
International	7-8.5	0.03	500	5.5	8.5-10	14

Table 1 Tabulated form of Analysis of Water sample Year 2011(Season-1)

AREA	Total Hardness	Acidity	Alkalinity	Sulphate	Phosphate	Nitrate
Site1	64.13	6.25	250	23.33	25	120
Site2	56.11	12.50	537.50	30	25	80
Indian	300	-----	103	150	0.05	50
International	100	-----	200	200	0.05	45

Table 2 Tabulated form of Analysis of Water sample Year 2011(Season-1)

AREA	Nitrite	CO_2	CHLORIDES
Site1	**16**	**0.26**	**262.70**
Site2	**6**	**0.20**	**260.57**
Indian	**50**	**6**	**250**
International	**45**	**6**	**200**

Table 3 Tabulated form of Analysis of Water sample Year 2011(Season-1)

AREA	pH	EC	TDS	Do	BOD	COD
Site1	**3.70**	**0.59**	**0.68**	**4.36**	**18.06**	**57.50**
Site2	**4.81**	**0.45**	**0.032**	**6.10**	**18.06**	**48.50**
Indian	**8-8.5**	**0.075**	**500**	**8.5-9**	**5**	**8.5-11**
International	**7-8.5**	**0.03**	**500**	**5.5**	**8.5-10**	**14**

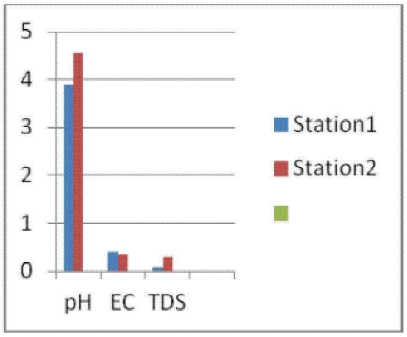
Table 4 Tabulated form of Analysis of Water sample Year 2012(Season-2)

AREA	Total Hardness	Acidity	Alkalinity	Sulphate	Phosphate	Nitrate
Site1	**92.18**	**6.25**	**250**	**7.78**	**87.50**	**120**
Site2	**96.19**	**6.25**	**225**	**11.11**	**112.50**	**80**
Indian	**300**	-----	**103**	**150**	**0.05**	**50**
International	**100**	-----	**200**	**200**	**0.05**	**45**

Table 5 Tabulated form of Analysis of Water sample Year 2012(Season-2)

AREA	Nitrite	CO_2	CHLORIDES
Site1	**16**	**0.20**	**113.60**
Site2	**6**	**0.20**	**71**
Indian	**50**	**6**	**250**
International	**45**	**6**	**200**

Table 6 Tabulated form of Analysis of Water sample Year 2012(Season-2)



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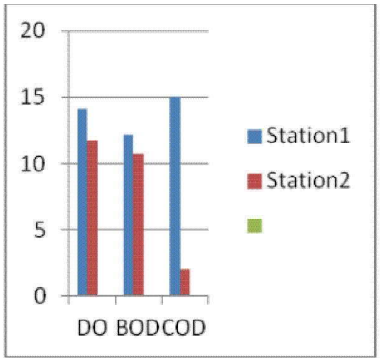

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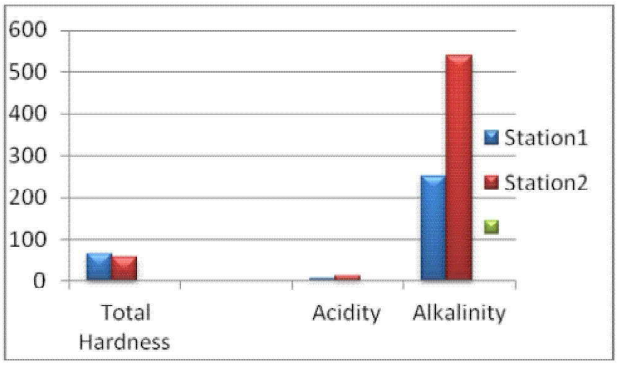

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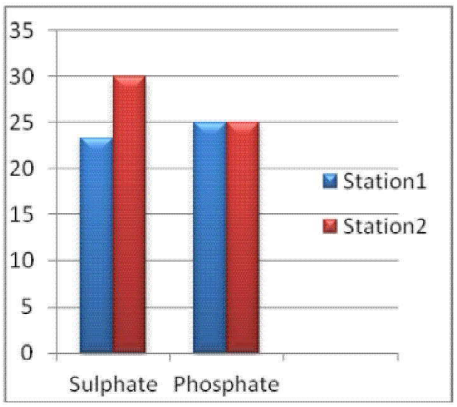

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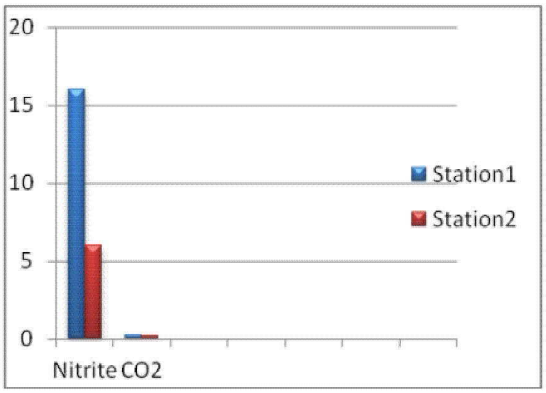

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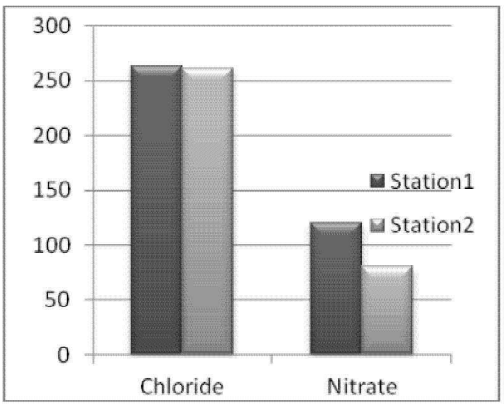

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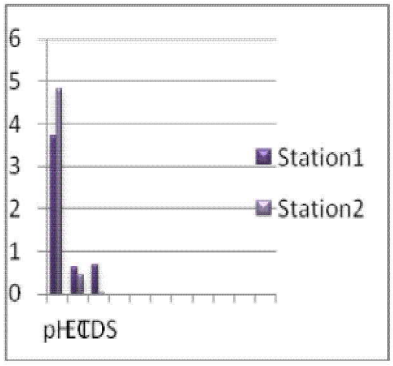

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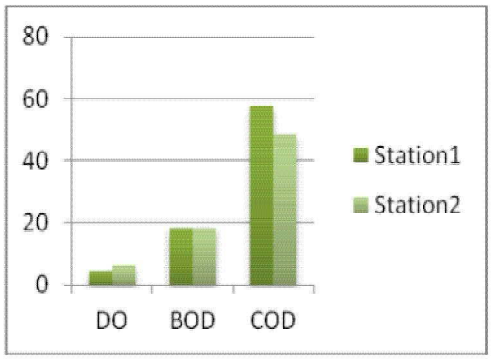

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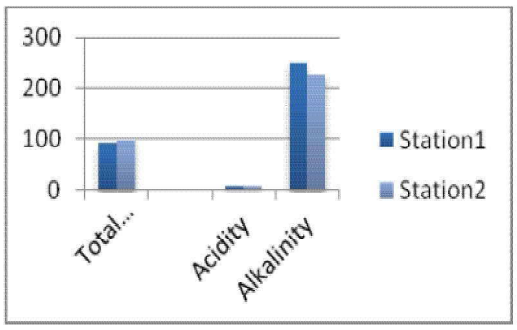

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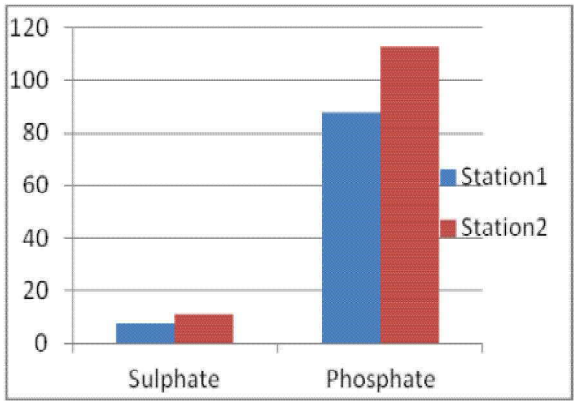

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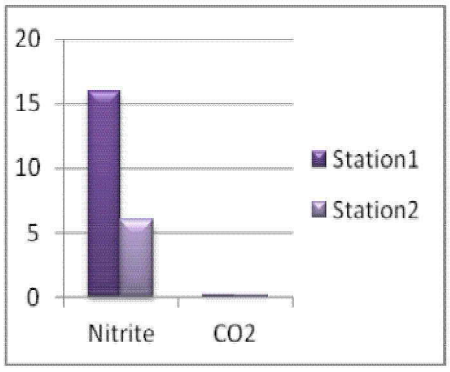

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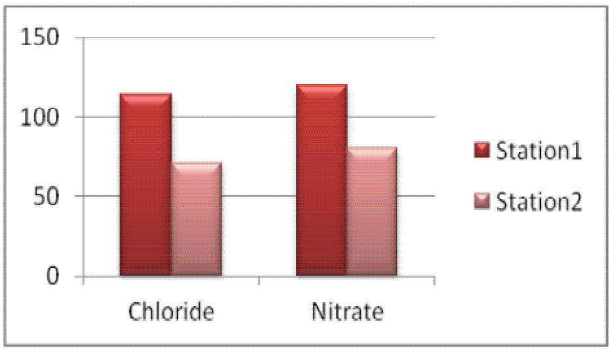

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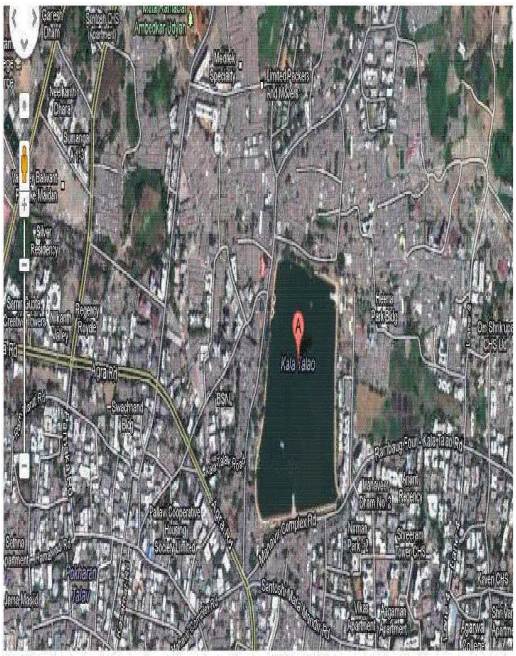
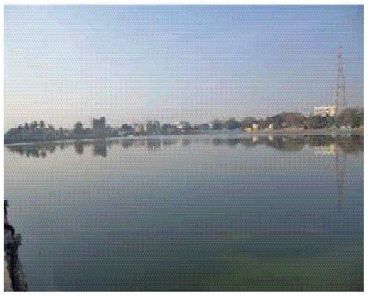


Google image of mapping of KalaTalao,Kalyan.



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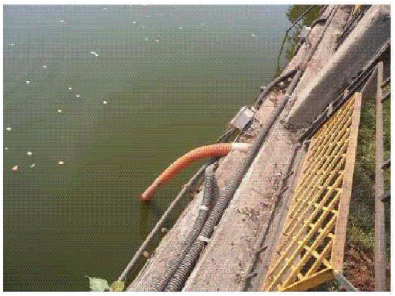

Utilization of Water

Pollution of Talao due to sewage