International Journal of Aquatic Science
ISSN: 2008-8019
Vol 12, Issue 02, 2021

Water quality assessment in Shivasagar Lake, Vikarabad, Telangana.

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Abstract: Shivasagar Lake is also called as Sir Vikar-ul-Umra Lake or Shiva Reddy peta cheruvu is situated in Shivareddypeta village near Vikarabad town in Ranga Reddy district which is located at 17º19' 20" North and 77º 56' 27" East. This lake is located in Shivareddypeta village about 70 KM from Hyderabad. It spreads an area of around 93Hectares of land and it is 50-100 meters deep. On the basis of physico-chemical and biological parameters an attempt has been made assess the quality of water and pollution in the lake. The results of the present study have revealed that all the physico-chemical parameters were within the ranges stipulated by WHO, ISI permissible standards and suitability of Shiv Sagar Lake water for drinking purpose indicates that water is safe from any contamination. In the present investigation mainly to study the water quality, both physical and chemical parameters.

Keywords: Shivasagar Lake, Pollution, Physico-chemical parameters and Algae.

1. INTRODUCTION:

Water is the most valuable blessing to humankind. Life on earth is not conceivable without water (Annie sheron, 2009). It is the spirit of nature. Water is an asset utilized for different exercises, for example, drinking, water system, angle creation, mechanical cooling, control age and numerous others. Lakes and streams assume an essential job in progress of the humanity (Mahananda et al, 2005). For a considerable length of time, people have been getting a charge out of the administrations given by water ways and streams and has changed the idea of these by controlling their stream, over-misusing their living and non-living assets or more all by utilizing them for transfer of squanders. Lakes and streams assume an essential job in progress of the humanity (Kumar and Rai 2005). Lakes, rivers, waterways, streams and wetlands go under classification of surface water. These water bodies get their water supply from precipitation; overflow from snow liquefying and as base spill out of ground water frameworks (Pagriya, 2012 and Veerandra et al, 2006).

Water streams assume an essential job in absorbing city and modern emanating and additionally overflow from horticultural land and the encompassing zone in watershed (Banatwala et al, 2004). Water quality, which is affected by different characteristic

procedures and anthropogenic exercises, is overall breaking down and as of now an issue of research (Yeole and Patil, 2005). Water contamination has been one of the principle subjects in the natural issues in India (Deeksha Dave, 2011). Water quality, which is affected by different characteristic procedures and anthropogenic exercises, is overall breaking down and as of now an issue of research (Mishra et al., 2008 and Mustapha, 2003).

2. MATERIAL AND METHODS:

Vikarabad or Vicarabad was founded and named after the fifth Amir of Paigah H.E. Nawab Sir Vikar ul Umra Bahadur, prime minister of Hyderabad and Berar is a town and a Municipality in Ranga Reddy District in the Indian state of Andhra Pradesh. The city is well connected on railroad and has Vikarabad Junction. It is the main drinking water resource for the people of Vikarabad town and its surrounding villages and also provides water for irrigation for the nearby fields. As the town has grown rapidly, the urban sprawls have encroached into vacant lands and water bodies due to the increase in pressure on land for housing and other activities. This lake is located in Shivareddypeta village about 70 KM from Hyderabad. It spreads an area of around 93Hectares of land and it is 50-100 meters deep.

Three sampling stations Station I, Station II, and Station III were identified in the present study area (Shivasagar Lake). Distance between station I and station II is 500 meters, distance between station II and Station III is 500 meters and station I to Station III is 1000 meters (1 Km). The three sites are on three different sides of the lake. Water samples from the surface were collected from three sampling stations of the lake every month in polythene cans for a period of two years from June 2014 to May 2016. The samples after returning to laboratory were analyzed on the same day for various physico-chemical parameters. (APHA 1995). One liter of the sample was kept in sedimentation columns after adding 4% Formaldehyde solution. The samples were kept in dark undisturbed for about fifteen days for complete settling of the organisms (Pearsall, 1946 and Venkateswarlu, 1969b).

3. RESULTS AND DISCUSSION:

Physico-chemical parameters

The results of various physico - chemical factors were compared with WHO and ISI Standards (Table - 1).

In the present investigation the water temperature ranged from 21.00°C to 25.05°C at Station- 1 and averaged to 23.06°C. At Station-2 it ranged from 22.00°C to 25.00°C and averaged 23.38°C. At Station-3 it ranged from 22.00°C to 25.05°C and averaged to 23.29°C.

pH is an Indicator of Hydrogen ion concentration and it expresses the intensity of acidity and alkalinity. Any change in pH of water is accompanied by changes in other physico-chemical aspects. The pH of Station I ranged from 8.0 to 8.6 and averaged to8.30. The pH of Station II ranged from 8.0 to 8.8 and averaged to 8.36. The pH of Station III ranged from 8.0 to 8.8 and averaged to 8.37.

Carbonates of Station I ranged from 6.24 mg/L to 56.2 mg/L and averaged to 24.07 mg/L. carbonates of Station II ranged from 6.46 mg/L to 56.24 mg/L and averaged to 27.65 mg/L. carbonates of Station III ranged from 10.24 mg/L to 58.24 mg/L and averaged to 30.40 mg/L. Bi-carbonates of Station I ranged from 213.26 mg/L to 288.56 mg/L and averaged to

250.49 mg/L. Bi-carbonates of Station II ranged from 214.56 mg/L to 278.46 mg/L and averaged to 248.04 mg/L. Bi-carbonates of Station III ranged from 214.62 mg/L to 278.62 mg/L and averaged to 249.60 mg/L.

Chlorides constitute the major inorganic anions in water and waste water. In the present investigation, The Chlorides of Station I ranged from 116.86 mg/L to 162.24 mg/L and averaged to 135.22 mg/L. The Chlorides of Station II ranged from 114.24 mg/L to 152.25 mg/L and averaged to 137.01 mg/L. The Chlorides of Station III ranged from 114.66 mg/L to158.46 mg/L and averaged to 137.08 mg/L.

Organic matter of Station I ranged from 0.9 mg/L to 1.9 mg/L and averaged to 1.30 mg/L. The Organic matter of Station II ranged from 0.9 mg/L to 2.6 mg/L and averaged to 1.47 mg/L. The Organic matter of Station III ranged from 0.8 mg/L to 1.8 mg/L and averaged to 1.39 mg/L.

Total Hardness of Station I ranged from 136 mg/L to 182 mg/L and averaged to 159.33 mg/L. The Total Hardness of Station II ranged from 190 mg/L to 260 mg/L and averaged to 131.03 mg/L. The Total Hardness of Station III ranged from 144 mg/L to 198 mg/L and averaged to 171.15 mg/L.The Calcium of Station I ranged from 24.24 mg/L to 64.55 mg/L and averaged to 46.45 mg/L. The Calcium of Station II ranged from 36.54 mg/L to 56.88 mg/L and averaged to 45.86 mg/L. The Calcium of Station III ranged from 36.66 mg/L to 48.92 mg/L and averaged to 42.11 mg/L. Magnesium of Station I ranged from 11.54 mg/L to 28.78 mg/L and averaged to 21.54 mg/L. The Magnesium of Station II ranged from 22.11 mg/L to 39.86 mg/L and averaged to 31.12 mg/L. Magnesium of Station III ranged from 21.52 mg/L to 32.26 mg/L and averaged to 26.23 mg/L.

Total Solids of Station I ranged from 400 mg/L to 490 mg/L and averaged to 448.2 mg/L. The Total Solids of Station II ranged from 440 mg/L to 590 mg/L and averaged to 511.96 mg/L. Total Solids of Station III ranged from 510 mg/L to 590 mg/L and averaged to 548.86 mg/L. Total Dissolved Solids of Station I ranged from 220 mg/L to 290 mg/L and averaged to 257.5 mg/L. The Total Dissolved Solids of Station- II ranged from 220 mg/L to 380 mg/L averaged to 299.26 mg/L. The Total Dissolved Solids of Station III ranged from 310 mg/L to 390 mg/L and averaged to 354.76 mg/L.

Sulphate of Station I ranged from 22 mg/L to 55 mg/L and averaged to 34.77 mg/L. The Sulphate of Station II ranged from 20 mg/L to 46 mg/L and averaged to 33.90 mg/L. The Sulphate of Station III ranged from 30 mg/L to 42 mg/L and averaged to 35.93 mg/L. The Phosphates of Station I ranged from 0.28 mg/L to 0.46 mg/L and averaged to 0.34 mg/L. The Phosphates of Station II ranged from 0.24 mg/L to 0.94 mg/L and averaged to 0.64 mg/L. The Phosphates of Station III ranged from 0.52 mg/L to 0.96 mg/L and averaged to 0.72 mg/L.

Silicates of Station I ranged from 2.1 mg/L to 3.2 mg/L and averaged to 2.80 mg/L. The Silicates of Station II ranged from 1.44 mg/L to 1.86 mg/L and averaged to 1.66 mg/L. The Silicates of Station III ranged from 0.54 mg/L to 0.86 mg/L and averaged to 0.68 mg/L. The Nitrate of Station I ranged from 0.20 mg/L to 0.90 mg/L and averaged to 0.56 mg/L. The Nitrate of Station II ranged from 0.42 mg/L to 0.94 mg/L and averaged to 0.70 mg/L. The Nitrate of Station III ranged from 0.66 mg/L to 0.96 mg/L and averaged to 0.78 mg/L

Phytoplankton

Total four classes of algae were identified viz., Chlorophyceae, Bacillariophyceae and Cyanophyceae, Euglenophyceae. Members of chlorophyceae dominated among the remaining three classes (Table: 2). The percent composition of different groups of algae and their sequence are as follows:

Chlorophyceae> Bacillariophyceae> Cyanophyceae >Euglenophyceae

CHLOROPHYCEAE

Closterium moniliferum, Cosmarium botrytis, Cosmarium granatum, Spirogyra indica, Oocystis gigas, Cosmarium nymannianum, Cosmarium puntatulum, Pediastrum duplex, Pediastrum simplex, Pediastrum subgranulatum, Scenedesmus dimorphus, Scenedesmus major, Scenedesmus oahuensis, Scenedesmus quadricauda.

BACILLARIOPHYCEAE

Navicula cryptocephala, Gamphonema gracile, Navicula transitans, Pinnularia viridis, Cymbella tumida, Gomphonema intricate, Navicula amphirynchus, Navicula lanceolata

CYANOPHYCEAE

Osillatario farmosa, Oscillatoria limosa, Gleotrichia rasiborskii

EUGLINOPHYCEAE

Phacus longicaudata, Trachelomonas.

Various factors like temperature, dissolved oxygen, phosphates, nitrates and total solids showed significant influence on the growth of green algae at all the stations. Temperature, bicarbonates, sulphates, phosphates and high concentration of organic matter with low dissolved oxygen favoured the growth of Bacillariophyceae and Cyanophyceae members (Murugesan and Sivasubramanian, 2008). Some of the factors like pH, high organic matter and phosphates influenced positively on the growth of Euglenophycean members.

4. CONCLUSION:

The Shiv Sagar Lake water is clean, unpolluted and well aerated. The concentration of dissolved oxygen was always higher than organic matter. There is no alarming deterioration in the quality of water. Based on the phycological parameters all the organisms recorded in the lake belong to fresh water forms (Venkatesharaju et al, 2010). Hence water is clean and safe for domestic and agricultural purposes.

Temperature, bicarbonates, sulphates, phosphates, organic matter, dissolved oxygen favoured the growth of Cyanophycean members.Temperature, dissolved oxygen, nitrates, bicarbonates and total solids showed significant influence on the growth of green algae at Shiv Sagar Lake. High temperature, low pH, low dissolved oxygen, high organic matter, phosphates and sodium influenced positively on the growth of Euglenophycean members.

In Shiv Sagar Lake, the physico chemical parameters and species evaluation coincided and revealed the status of the water quality. Based on the physico and chemical parameters the organisms recorded in the lake belong to fresh water forms. The investigations carried on these water bodies have shown a very significant distribution of algal flora. From the present study it may be concluded that the Shiv Sagar Lake investigated from Chevella town which is

distantly place is unpolluted.

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Table - 1
COMPARISON OF THE PRESENT DATA WITH ISI AND WHO AND STANDARDS

Parameters	Station-I	Station-II	Station-III	ISI 1991	WHO 1971
pH	8.30	8.3	8.3	6.5 - 8.5	6.5-8.5
CO_3^{2-}	24.07	27.65	30.40	.	.
HCO_3^-	250.49	248.04	249.60	.	.
Cl^-	135.22	137.01	137.08	.	250 mg/L
DO	8.31	9.43	9.57	6 mg/L	3 mg/L
OM	1.30	1.47	1.39	.	.
TH	159.33	131.3	171.15	300 mg/L	300 mg/L
Ca^{2+}	46.45	45.86	42.11	200 mg/L	75 mg/L
Mg^{2+}	21.54	31.12	26.23	75 mg/L	30 mg/L
PO_4^{3-}	3.40	0.64	0.72	.	.
NO_3^-	0.56	0.70	0.78	45 mg/L	.
SO_4^{2-}	34.77	33.9	35.93	200 mg/L	150 mg/L

Table - 2
Percentage of Phytoplankton

GROUP	AVERAGE	PERCENTAGE
Chlorophyceae	129.0	40.90
Bacillariophyceae	102.4	32.44
Cyanophyceae	82.6	26.18
Euglenophycae	1.5	0.46

Table - 3
Common and Dominant Species of Phytoplankton

Groups	**Species**
Chlorophyceae	*Closterium moniliferum, Cosmarium botrytis, Cosmarium granatum, Spirogyra indica, Oocystis gigas, Cosmarium nymannianum, Cosmarium puntatulum, Pediastrum duplex, Pediastrumsimplex, Pediastrum subgranulatum, Scenedesmus dimorphus, Scenedesmus major, Scenedesmus oahuensis, Scenedesmus quadricauda.*
Bacillariophyceae	*Navicula cryptocephala, Gamphonema gracile, Navicula transitans, Pinnularia viridis, Cymbella tumida, Gomphonema intricate, Navicula amphirynchus, Navicula lanceolata.*
Cyanophyceae	*Osillotoria farmosa, Oscillatoria limosa, Gleotrichia rasiborskii*
Euglenophyceae	*Phacus longicaudata, Trachelomonas*