

**ORIGINAL ARTICLE****Assessment of Water Quality in Pochampad Dam, Nizamabad District, Telangana****A. Shailaja and M. Aruna**

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Received: 1st July 2017, Revised: 19th September 2017, Accepted: 22nd September 2017**ABSTRACT**

The present study is aimed to find out the water quality assessment in the Pochampad dam of Balkonda mandal in Nizamabad district. The fieldwork was spread over for a period of two years continuously from June 2013 to May 2015, to assess the quality of water. For this purpose 3 sampling stations have been selected in the dam. Water samples were collected from all the stations at monthly intervals and analyzed for the various physico-chemical factors by following standard methods (APHA, 2005). Qualitative as well as quantitative estimations of planktonic algae were taken into consideration under phycological parameters.

Key words: Phytoplankton, Physico-chemical parameters, Pochampad dam and Water quality.

INTRODUCTION

Water quality affects the abundance, species composition stability, productivity and physiological condition of indigenous populations of aquatic organisms. Therefore the nature and health of the aquatic communities is an expression of the quality of water (Tiwari, 2005). The relationship between the physico-chemical parameters and plankton production of water bodies are of great importance in management strategies of aquatic ecosystems (Das, 2002 and Pandey and Kashyap, 1995). Reservoirs, ponds, rivers and ground waters are used for domestic and agricultural purposes. The quality of water may be described according to their physico-chemical and plankton characteristics (Manikya Reddy and Venkateswarlu, 1987). The phytoplankton in a reservoir is an important biological indicator of the water quality (Patil, *et al.*, 2013). Phytoplankton, which include blue-green algae, green algae, diatoms, desmids, euglenoids are important among aquatic flora. They are ecologically significant as they form the basic link in the food chain of all aquatic floras (Ravikumar, *et al.*, 2006).

MATERIAL AND METHODS

The dam is located in the Nizamabad district of Telangana after the confluence of Manjira River with Godavari. Sriramsagar is an irrigation project across the River Godavari in Telangana to serve irrigational needs in Karimnagar, Warangal, Adilabad, Nalgonda, and Khammam districts. It also provides drinking water to Warangal city. For this purpose three sampling stations were selected for the collection of water and algal samples. Water samples from surface were collected at all the sampling sites of the dam in polythene cans at monthly intervals for a period of two years. All the samples were transported in an ice-box to the laboratory. After returning to the laboratory the samples were analyzed for carbonates, bicarbonates, chlorides, dissolved oxygen, organic matter, total hardness, calcium, magnesium, phosphates, sulphates, silicates, nitrates and nitrites by following standard procedures (APHA, 2005). pH and temperature were recorded in the field itself. One liter of surface water samples were collected from different sites of the dam was kept in the sedimentation column after adding 2-3ml of 4% formaldehyde solution. For frequency measurement of different species of algae at each station, the drop method of Pearsall, *et al.*, 1946 and as described by Venkateswarlu (1969) was followed.

RESULTS AND DISCUSSION

The variations in physico-chemical parameters of Pochampad dam are presented in Table 1. pH is an important quality parameter which influences the survival and nourishment of biological life. In

the present investigation at all the stations, pH was found above 8, showing alkaline nature of water.

Carbonates ranged between 8.40 and 58.48 mg/L with an average of 38.59 mg/L, while bicarbonates were present with an average range of 218.24 to 278.58 mg/L. Chlorides reached a maximum of 141.44 mg/L. Dissolved oxygen was always above 8.5 mg/L. Organic matter reached a maximum of 1.62 mg/L. Silicates were recorded in the range of 1.60 to 3.80 mg/L. Nitrates and nitrites were found in low concentration in the range of 0.70-2.80 mg/L and 0.02-0.06 mg/L respectively. The phosphates were recorded as traces throughout the period of investigation. Total hardness ranged from 118.00-246.00 mg/L. Calcium and magnesium were in the range of 32.28-74.49 mg/L and 14.74-38.62mg/L respectively. Sulphates ranged between 20.00-36.00mg/L.

The physico-chemical parameters exhibited certain inter-relationships. pH and carbonates are directly related and both are inversely proportional to bicarbonates. Dissolved oxygen shows an inverse correlation with organic matter and water temperature. Similar observations were made by Singh, *et al.*, (2007) and Pejaver and Gurav, (2008). The hardness of water seems to be due to bicarbonates of calcium and magnesium. The dam water is well aerated. High concentration of dissolved oxygen was noticed throughout the period of investigation and it never reached less than 8.0 mg/L. and it always higher than the organic matter. The concentrations of nitrates are very low and they have shown a direct relationship with dissolved oxygen.

The average values of the important physico-chemical variables of the dam studied along with the standards stipulated by WHO (2012), ISI (2004) and Rawals (1978) quality criteria are given in Table 1. From comparison it is clear that the water in Pochampad dam can be termed 'less contaminated' because all the factors are within the tolerance limits.

Table 1: Comparison of the present data with ISI, WHO and RAWAL'S standards
[All the parameters are expressed in mg/L except pH and Temperature (°C)]

S.No	Physico-Chemical Factors	Station-I	Station-II	Station- III	ISI 2012	WHO 2004	Rawals data 1978	
							Permissible Limit	Excessive Limit
1	Tem	23.4 ⁰	24.41 ⁰	23.2 ⁰				
2	pH	8.4	8.37	8.5	6.5-8.5	7.0-8.5	6.5-8.5	6.5-8.9
3	CO ₃ ²⁻	31.38	29.26	38.59				
4	HCO ₃ ⁻	255.8	251.52	244.71				
5	Cl ⁻	135.57	141.44	140.06	-	200	250	600
6	DO	8.78	9.57	10.03	6	3	3	-
7	BOD	4.9	3.33	3.37				
8	OM	1.3	1.62	1.24				
9	COD	29.7	24.79	24.16				
10	TH	158.7	209.12	168.25	300	100	150	500
11	Ca ²⁺	54.86	44.08	43.19	200	75	75	200
12	Mg ²⁺	25.32	24.36	31.14	100	30.15	50	150
13	SO ₄ ²⁻	26.47	27.08	28.33				
14	PO ₄ ³⁻	0.05	0.05	0.06	-	-	2	5
15	SiO ₂	3.34	3.01	2.97				
16	NO ₃ ⁻	2.2	1.47	1.45	20	10	10	-
17	NO ₂ ⁻	0.02	0.03	0.03				

Mainly four groups of planktonic algae were recorded in the dam. They are Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae. Of these Bacillariophyceae dominated over the other groups representing about 47% of the total algae, followed by Chlorophyceae, Cyanophyceae and Euglenophyceae at all the three stations of the dam. The dam water has harbored low number of algae coupled with more species diversity (Table 2). The study clearly indicates that all the organisms recorded in the dam belong to fresh water forms.

The dam was characterised by the frequent occurrence of *Synedra ulna*, *Synedra tabulata*, *Achnanthes microcephala*, *Coconeis placentula*, *Amphora ovalis*, *Navicula rhynchocephala*, *Mastogloea Smithii*, *Cyclotella meneghiniana*, *Nitzschia denticula*, *Navicula cryptocephala*,

Rhopalodia gibba and *Pinnularia biceps*, *Pediastrum boryanum*, *Coelastrum cambricuni*, *Oocystis elliptica*, *Tetraedron regulare*, *Scenedesmus acutiformis*, *Gomphonema montanum* and *Cymbella affinis*. *C. cymbiformis*, and Cyanophyceae species such as *Merismopedia glauca*, *Coelosphaerium kuetzingianum*, *Gomphosphaeria aponina*, *Anabaena*, *Oscillatoria* and *Chroococcus turgidus* were present, which indicates the unpolluted nature of the water and can be used as good indicators of water quality.

Table 2: Diversity of some important Phytoplankton in Pochampad dam

Group	Algal Species
Bacillariophyceae	<i>Synedra tabulata</i> , <i>Synedra ulna</i> var. <i>aequalis</i> , <i>Achnanthes</i> , <i>microcephala</i> , <i>Coconeis placentula</i> , <i>Amphora ovalis</i> , <i>Mastogloia Smithii</i> , <i>Cyclotella meneghiniana</i> , <i>Nitzschia denticula</i> , <i>Rhopalodia gibba</i> , <i>Gomphonema montanum</i> , <i>Cymbella affinis</i> , <i>C. cymbiformis</i> and <i>Navicula rhynchocephala</i> .
Chlorophyceae	<i>Pediastrum boryanum</i> , <i>Coelastrum cambricuni</i> , <i>Oocystis elliptica</i> , <i>Tetraedron regulare</i> , <i>Scenedesmus acutiformis</i> , <i>S. armatus</i> , <i>Selenastrum gracile</i> , <i>Scenedesmus bijuga</i> , <i>S. perforatus</i> , <i>S. acuminatus</i> , <i>S. acutiformis</i> , <i>Ankistrodesmus falcatus</i> and <i>Actinastrum hanizschii</i>
Cyanophyceae	<i>Merismopedia glauca</i> , <i>M. punctata</i> , <i>Coelosphaerium kuetzingianum</i> , <i>Gomphosphaeria aponina</i> , <i>Anabaena cercinalis</i> , <i>Oscillatoria princeps</i> and <i>Chroococcus turgidus</i>

CONCLUSION

In the dam both physico-chemical and biological parameters have been taken into account for assessing the quality of water. Among the biological parameters the algal data has been used as an important tool in lake study. All the species observed at all the stations belong to unpolluted water organisms (Table 2). Both physico-chemical and phyecological data analyzed in the pochampad dam, indicate that the dam investigated is at present free from pollution and the quality of water is good. Hence, it can be safely used for different purposes such as drinking, domestic, agriculture and recreation purposes.

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