

**ASSESSMENT OF WATER QUALITY WITH REFERENCE TO FISH PRODUCTION IN
CHENUGONIPALLY PEDDA CHERUVU, MAHABUBNAGAR DIST, TELANGANA.**

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ABSTRACT: Freshwater habitats such as ponds and reservoirs hold great promise preliminarily as source of drinking water, irrigation and secondarily for fish production. The Chenugonipally pedda cheruvu located at Gadwal, Mahaboobnagar district of Telangana state, covers an area of 16 hectares and the water is a source of drinking water domestic use for rural and urban population. In the present study the water sample were collected from three different stations bimonthly over a period of two years (2011-2012 & 2012-2013). The sample were analyzed for P^H, Turbidity, Total Dissolved Solids, Dissolved Oxygen, Biological Oxygen Demand, Chemical Oxygen Demand, Total Alkalinity, Bicarbonates, Total Hardness, Calcium, Magnesium, Chlorides, Nitrates and Phosphates. The results were for pH(7.6-8.6) Turbidity(9.1-20 NTU) TDS (84-108.3 mg/lit) D.O(3.1-5.6 mg/lit) BOD (3.6-5.6 mg/lit) COD (4.6-8.5 mg/lit) TA (80-100.3 mg/lit) HCO₃⁻ (90.6-115.0 mg/lit) TH (93.6-115.6 mg/lit) Ca⁺ (43-70.3 mg/lit) Mg⁺² (28.6-70.1 mg/lit) Cl (56.3-79.3 mg/lit) NO₃⁻ (0.1-0.7 mg/lit) and PO⁴ (0.2-0.7 mg/lit) at different sites. The main aim to determine the water quality, fish productivity, assess nature or man's impact on the Physico-chemical properties of the water body with a view to effective utilization, better management, conservation and suitable exploitation of the natural water resources. This paper advocates fish composition, conservation and ecological studies and provides vital information for future reference. The occurrence, density and effects of feral population on commercially important cultured carp species in the tank.

Key words: Chenugonipally pedda cheruvu, water quality, Physico-chemical properties, Feral population, Fish productivity, Mahabubnagar district.

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INTRODUCTION

The pedda cheruvu tank of Chenugonipally village, Gadwal mandal which is about 96 km away from Mahabubnagar district. This tank receives water from the jurala project canal and also receives sewage water directly from the Gadwal town. Fresh water habitats are located in different parts of the country especially in rural areas, and are mainly used as a source of drinking water, irrigation and for fish production by the local fishermen communities. Fish is most important source of rich protein diet, bio-product of fresh water ecosystems contributing as an essential and beneficial food item to mankind. Water body is surrounded by agricultural land, inhabited by various aquatic life forms for all practical purpose.

Strictly speaking chemically pure water does not exist for any appreciable length of time in nature, several studies have been conducted to understand the Physico-chemical properties of lakes, ponds and reservoirs by Jain et al 1996, Srinivasan et al 1997, Srinivasa goud and Kotaiah 2000, Thorat and Masarrat sultana 2000, Gupta, S.C et al 2001, Yogesh Shastri and Pendse 2001, Mohanraj et al 2002, Srivastava et al 2003, Chaturbuj moundiotiya et al 2004, Nandan, S.H et al 2005, Narayan, R et al 2007, Purushottam, J puri et al 2010, T. Rajagopal et al 2010, V.R.Solanki 2014.

In such studies the characteristics of water bodies were taken into consideration with reference to physical, chemical and biological properties. The health of the water bodies and their biological diversity are directly related to health of almost every component of the ecosystem.

The interaction of both the physical and chemical properties of water plays a significant role in the composition, distribution and abundance of aquatic organisms. Apart from, it also gives an insight into the relationships between the organisms, their environment and can be used in determining water quality properties and fish productivity of the water body.

Fishes are affected by pollutants both directly and indirectly in various ways. Destruction of spawning grounds can be serious in respect of Indian major carps and other fishes which require special environment for breeding [Much More and Dziegielewski 1983; Chessman and Robinson, 1987; Muddi et al 2006].

The findings of water quality helps to understand how feral population increased in the tank, the feral population omnivorous predatory fishes which feeds on a variety of food items and zooplanktons. The abundance of feral population increased drastically. This could indicate a great threat to cultured carp species production.

The proper balance of physical-chemical and biological properties of water in ponds, lakes and reservoirs is an essential ingredient for successful production of fish and other aquatic resources. The presence or absence of chemical elements in a water body might be a limiting factor in the productivity of such water body. Scientific management of such water bodies will assist to enhance the concept of sustainable utilization. Beside the evaluation of ecological status, present fishing status and potential for fish production will help in implementation of developmental activities for the improvement of fish growth and production.

MATERIALS AND METHODS

Description of Study area

Chenugonipally Pedda cheruvu is located at Gadwal with the Longitude and Latitude of 16°14'59.75" N -77° 48' 15.12" E (Table-1) of Mahaboobnagar district of Telangana. The water spread area of this tank is 16 hectares (Figure-1 & 2), it is perennial water body which is bounded by agricultural paddy crops and used for fish culture. The water body being with mostly water, few nutrients and little aquatic life. Over time the water body accumulates nutrients through an enriched process, and stimulates the growth of aquatic life.

Experiment

The water samples were collected from Chenugonipally pedda cheruvu bimonthly from June to May for two years [2011-2012 and 2012-2013] from three different sites (S1, S2 & S3) depend on the nature of disturbance, sewage, pollution load and human activities in the water body. All the results obtained throughout the experiment were depicted in table no 3 & 4.

Procedure

Physico-chemical analysis of the Chenugonipally pedda cheruvu such as water temperature, pH and Dissolved oxygen were determined on the spots. For BOD analysis the water samples were brought to Laboratory in dark bottles to avoid unpredictable changes in different physico-chemical parameters and incubated for 3 days at 27° C. Other parameters like Turbidity, TDS, COD, Alkalinity, Bicarbonates, Total hardness, Calcium, Magnesium, Chlorides, Nitrates and Phosphates were analyzed by using standard procedures of APHA 2009.

RESULTS AND DISCUSSION

All the water samples were clear, colorless and odorless. P^H is considered as an important ecological factor and is the result with interaction of various substances in water and also numerous biological phenomena. In the present study, the average pH values range between 7.6 to 8.6 was determined, because it would achieve the maximum environmental and aesthetic benefits. pH was recorded always towards alkaline side without much marked fluctuations in the water tank. According to Venkateshwarlu's classification of the tanks under study are categorized as alkaliphilous (i.e. P^H range from 7.5-9.0). Similar results were observed by George (1997), Khare (2002), Pandu and Sahu (2002) and Singh and Rai (2003). pH plays a vital role in growth of flora and fauna and also indicator for whether water is safe or not for fish culture. Turbidity is correlated with the nature of bottom, wave action and anthropogenic activities in the water body. Turbidity values ranged between 9.0-20 NTU and Total dissolved solids ranged from 84 to 108.3 mg/lit. TDS elevates the density of water, influence osmoregulation of fresh water organisms. Dissolved oxygen is important and critical characteristics of water quality assessment. Its presence is essential to maintain the higher form of biological life and keep the proper balance of various populations, making the water body healthy. It determines the nature of an entire aquatic system to a great extent. In the present investigation, DO concentration varied from 3.1 to 5.13 mg/lit. Water of all the sites considered as negligible polluted and it suitable for most of the beneficial purposes such as drinking, irrigation and fish culture.

BOD values show between 3.6 to 5.6 mg/lit which is within permissible range, increased organic matter results in the excess oxidation of organic matter to carbon dioxide and water creates an atmosphere of oxygen depletion and results in high BOD levels. Similarly higher contents of organic load as well as the high proliferation of microorganisms are the causative factors for maximum BOD levels. There was a significant variation within the months but variation between stations were not significant. Chemical oxygen demand values from 4.6 to 8.5 mg/lit. The maximum permissible values of COD is 10 mg/lit for drinking water. COD variations which were changed with the seasons and also with the release of chemical substances from agricultural waste and sewage. COD is a reliable parameter for judging the extent of pollution in water. COD is a rapid test which measure the Oxygen required for the oxidation of all the substances present in water, include those are not biologically decomposable.

Total Alkalinity of water refers to the quality and kinds of components present such as bicarbonate, carbonate and hydroxide. The solubility of TA values in our observations fluctuated from 80 to 100.3 mg/lit. Bicarbonates concentration affects the alkalinity of water, bicarbonates along with free CO₂ and carbonic acid form inorganic carbon of the fresh water carbonic system. Their interaction with water molecules result in the displacement of H⁺ and OH⁻ ions. Bicarbonates values varied from 90.6 to 115 mg/lit during present study. Total Hardness of water body varied from 93.6 to 115.6 mg/lit. The sources of hardness are mainly due to the addition of calcium and magnesium through surface run-off from agricultural and other catchment areas. Calcium is directly related to hardness. Calcium concentration ranged between 43 to 70.3 mg/lit. Magnesium is often associated with calcium in all kinds of water, but its concentration remains generally lower than the calcium. Magnesium content in the investigated water samples was ranging from 28.6 to 69.0 mg/lit. The salts of sodium, potassium, and calcium contribute chloride in water., the chloride status in water is indicative of pollution, especially of animal origin the values ranging between 56.3 to 79.3 mg/lit. These values are attributed due to large amount of organic matter, mass bathing activities, urination and waste of animals. Nitrate concentration depends on the activity of nitrifying bacteria which in turn get influenced by the pressure of dissolved oxygen. The nitrate content showed range of 0.01 to 0.07 mg/lit. Phosphates occur in surface water as a result of domestic sewage, detergents, and agricultural effluents with fertilizers. The phosphate content in the study area ranged from 0.02 to 0.07mg/lit.

The capture composition of fishes are identified as commercially important and grouped as carps, tilapia, cat fishes and miscellaneous fishes. The carp species are Catla catla, Labeo rohita, Cirrhinus mrigala, and other miscellaneous fishes were present as murrels, etroplus, mystus sp etc. Tilapia and cat fish population increased significantly in pedda cheruvu tank. As Tilapia produces eight times in year and it develops own ecology for its survival and repopulating by competing with other fishes so cat fish population increases.

Table-1: Salient Features of Peddacheruvu Tank in Mahabubnagar District.

S. No.	Attribute	Value
1	Location of the tank	Longitude : 77.8° E Latitude : 16.23° N
2	Water Spread Area at FTL	16 Ha.
3	Water level (Avg.)	3-5 feet
4	Water Source	Jurala canal + Sewage water
5	Seasonality of tank	Perennial
6	Purpose	Irrigation

Table -2: Average Values of Physico-Chemical Parameters during 2011 – 2012.

Parameter Month	pH	Turbidity	TDS	DO	BOD	COD	TA	HCO ³⁻	TH	Ca ⁺²	Mg ⁺²	Cl ⁻	NO ³⁻	PO ⁴⁻
JUN	7.9	16.3	84.3	5.0	3.6	4.6	84.6	99.3	93.6	50.0	43.6	61.0	0.2	0.2
JUL	8.1	20.0	87.6	5.3	3.9	5.3	86.0	103.0	97.0	55.0	42.3	64.0	0.5	0.6
AUG	8.6	18.0	90.6	5.1	4.5	5.9	90.0	107.0	101.3	60.0	41.3	69.0	0.6	0.5
SEP	8.4	19.3	91.3	5.6	4.8	5.6	91.0	101.3	108.6	61.0	47.6	75.3	0.3	0.4
OCT	8.0	18.0	92.0	5.1	5.0	6.0	93.6	99.3	112.3	65.6	47.0	76.3	0.3	0.4
NOV	7.9	13.3	92.3	4.8	5.3	6.5	98.3	101.6	115.6	60.6	55.0	76.0	0.2	0.4
DEC	8.1	9.1	93.0	4.5	4.8	7.2	100.3	97.6	110.0	59.3	51.0	73.0	0.3	0.4
JAN	7.6	11.6	91.0	4.1	4.9	8.1	95.6	95.6	103.6	66.6	37.0	79.3	0.5	0.4
FEB	7.7	12.3	90.0	4.0	5.6	8.5	92.0	94.0	99.0	70.3	28.6	75.0	0.2	0.2
MAR	7.7	14.0	84.6	3.5	4.8	8.2	85.6	90.6	94.0	62.3	31.3	72.3	0.1	0.2
APR	8.0	12.0	88.0	4.1	4.4	5.4	85.0	96.0	105.0	69.0	48.0	70.0	0.2	0.2
MAY	8.3	13.0	92.5	4.8	4.2	5.8	91.2	100.0	111.0	66.0	52.0	72.0	0.3	0.2

(All the values are in mg/litit except Temp, pH, Turbidity)

Table 3: Average Results of Physico-Chemical Parameters during 2012- 2013.

Parameter Month	pH	Turbidity	TDS	DO	BOD	COD	TA	HCO ³⁻	TH	Ca ⁺²	Mg ⁺²	Cl ⁻	NO ³⁻	PO ⁴⁻
JUN	7.6	17.3	84.0	3.1	3.8	4.8	80.0	94.0	96.0	43.0	53.0	56.3	0.4	0.7
JUL	7.8	18.0	88.0	3.3	4.3	5.3	82.3	99.6	98.3	45.6	52.3	59.3	0.5	0.7
AUG	7.9	19.0	90.6	3.8	4.9	5.9	84.6	104.6	98.3	49.3	49.6	62.6	0.5	0.6
SEP	7.9	19.6	94.3	4.2	4.5	6.1	89.0	106.0	101.0	53.0	50.0	63.0	0.4	0.4
OCT	8.6	15.6	97.6	4.6	4.6	6.8	87.0	105.3	104.3	53.6	53.6	62.6	0.7	0.4
NOV	8.3	12.3	100.3	4.3	4.2	6.5	92.3	107.0	103.6	58.0	59.0	59.3	0.5	0.3
DEC	8.0	12.6	102.3	4.7	4.9	7.4	94.3	110.3	106.6	64.6	64.6	66.3	0.4	0.3
JAN	7.9	9.6	108.3	3.6	5.0	8.0	97.6	112.0	105.0	69.0	70.1	71.6	0.4	0.4
FEB	7.8	9.0	106.3	3.8	5.3	7.6	96.0	112.6	110.6	67.0	67.0	70.3	0.2	0.5
MAR	7.9	9.6	105.0	3.3	5.2	6.9	95.6	110.6	109.3	66.6	66.6	69.3	0.3	0.3
APR	7.7	12.0	101.0	3.5	5.1	6.3	85.0	110.0	103.0	60.0	55.0	61.0	0.2	0.3
MAY	8.0	15.0	99.0	3.7	4.9	7.0	92.0	115.0	101.0	63.0	60.0	68.0	0.4	0.2

(All the values are in mg/litit except Temp, pH, Turbidity)

Table-4: Fish Production Trends in Cenuonipally Peddache ruvu tank.

Year	Total fish production in tonnes	Carp production in tonnes	Carp Production %
2011-2012 (Apr-Mar)	38.21	36.11	94.45
2012-2013 (Apr-Mar)	45.13	41.16	91.20

(Note: 1 tone = 1000 Kg.)



Figure-1: Picture view of the Chenugonipally Peddacheruvu.



Figure-2: Chenugonipally pedda cheruvu image (google image).

CONCLUSION

The present study provides a considerable insight into properties of water in the Chenugonipally pedda cheruvu. The data confines slight changes have been observed in different seasons at different sites. This indicates that the nature of this tank shifts mesotrophic to oligotrophic. The study could also help in understanding of the structure and function of a particular water body in relation to its inhabitants. The scientific management envisage a rapid degradation of water quality unless concrete steps are taken immediately to abate pollution.

The data collected from local fisheries department about the fish production trends in pedda cheruvu tank (table-4). Last two years reveals that aggravating the threats to the indigenous fish diversity including environmental problem. The declining trends of Indian major carps and increasing appearance of predatory fishes indicates the water body polluted with sewage and human activities, bringing changes in physico-chemical characteristics. The same trend is continued in water tank, the exotic cat fish may subsequently wiping out the indigenous species.

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REFERENCES

- Chaturbhuj, M., Sisodia, R., Kulshreshtha, M. and Bhatia, A.L. (2004). A Case study of the Jamwa ramgarh wetland with special reference to physico-chemical properties of water and its environs, Department of Zoology, University respected y of Rajasthan, Jaipur, India Sethi Colony, Jaipur, Rajasthan, India., Journal of Hydrobiology.,pp 16.
- Elizebeth K.M and Premnath Naik L, (2005). Efforts of polluted water on human health Poll.Res.24(2),337-340,.
- Eze.V.C. Ogbaran I.O, (2010). Microbiological and physic-chemical characteristic of fish pond water in ughelli, delta state, Nigeria, Inter.J current research.,(8), 082-087.
- Ganai H.A parveen S and Khan A. (2010). Study of some physico-chemical parameters in medical pond, Aligarh, The Ekol,10(1-2).
- Gupta, S.C., Rathore, G.S. and Mathur, G.C.D. (2001). Hydro-chemistry of Udaipur lakes. Indian Journal of Environment and Health, 43(1), pp. 38-44.
- Jain S.M, Sharma M and Thakur R. (1996). Seasonal variations in physico-chemical parameters of Halai reservoir of Vidisha District. Ind. J. Ecl. 8(3), 181-188.
- Julie S Raneer and S. Vasanth, (2010)., Physico-chemical analisis of bore water samples of annaiyur area in Madurai district, Tamilnadu,India,J.Curr.Sci.15(2);403-408.
- Kiran B.R. (2010). Physico-chemical characteristics of fish ponds of Bhadra project at Karnataka, Rasayan, J.Chem., 3(4) 671-676.
- Solanki V.R., Murthy S. S., Amarjit Kour and S. Sabita Raja. (2007). Variation in dissolved oxygen and biochemical oxygen demand in two fresh water lakes of Bodhan, Andhra Pradesh, India, Env. Poll.Tech., 6(4) 623-628.
- Sreenivasan A, Pillai VK and Franklin T. (1997). Limnological study of a shallow water body (Kolovol lake) in Tamilnadu. Ind.Hydrobi. 2(2), 61-69.
- Srivastava GS and Kotaiah B. (2000). Seasonal variation of water quality in a tropical Kalyani reservoir, near Tirupati. Ind J. Env. Pro. 20(6), 452-455.
- Yogesh Shastri and Pendse, D.C. (2001). Hydro biological study of Dahikhura reservoir. J. Env. Bio. 22(1), pp. 67-70.

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