Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

Pelagia Research Library

Advances in Applied Science Research, 2014, 5(2):59-65

Pelagia Research Library

ISSN: 0976-8610
CODEN (USA): AASRFC

Physico-chemical characteristics of freshwater of Ramanna Tank (Cheruvu), Nellore district, India

K. Sreenivasulu*[1], Kaizar Hossain[2] and T. Daoodharam[3]

[1]*Department of Environmental Science, S. V. University, Tirupati, Andhra Pradesh, India*
[2]*Department of Civil Engineering, PACE Institute of Technology & Sciences, Ongole, Andhra Pradesh, India*
[3]*Department of Environmental Sciences, S. V. University, Tirupati, India*

ABSTRACT

Ramanna Tank (cheruvu), Second largest tank in Nellore District. This famous Ramanna Tank located between ulavapalla, Singa peta and kowru Gunta Villages. This is main water resources for various villages (ulavapalla, Singapeta, thippa) for farming Every Year around 30 tonnes of fish is caught by fishermen from this tank. The Physico chemical characteristic of Ramanna tank has been studied for monsoon, Premonsoon, post mansoon in the year.

Key words: Water Quality, Degradation and Ramanna Tank

INTRODUCTION

Water is an indispensible resource given by the nature to us like a boon and one of most needed factors for the existence of living organisms. The importance of fresh water resources in maintaining a healthy and prosperous nation in a healthy environment is amply understood from the very existence of the civilizations on this earth, out of the total global water 3% in the form of fresh water, which is suitable for human consumption. Fresh water is considered as universal solvent having many chemicals dissolved in it. The tremendous increase in works population resulting in spurt in Urbanization industrialization agriculture and irrigation has put tremendous pressure on these water resources. The proverb that " Fresh water is a gift of god which would continue to be available in perpetuity and in abundance " is under challenge. Environmental factors such as temperature, pH and proper supply of O_2, CO_2, and essential elements like, Nitrate, Phosphate and chloride, Influence plankton diversity **[1] & [2]**. Therefore while realizing the need of chemicals it should be ensured that they do not spoil our Environmental global chemical pollution which has been a matter of a great concern with increase in public awareness towards the Environmental problem.

The physico chemical characteristics of water is playing significant role to assess the quality of water for its best usage. Quality of notable water is as important as its quantity. Various physico chemical and biological factors are governing the quality of water. Richness in the productivity of aquatic eco system is due to the presence of nutrients. Phytoplankton's constitutes the basis of nutrient cycle of an eco system. They play an important role in maintaing the equilibrium, between living organisms and abiotic factors. As water is precious, it is becoming more unfit to mention due to direct or indirect inference of human activity.

The increasing industrialization, urbanization and developmental activities, to cope up the population explosion have brought inevitable water crisis. The health of tanks, lakes, ponds and their biotical diverting are directly related to

health of almost every component of the eco system in freshwater bodies, nutrients play a major role as their excesses lead to trophication. Exclusive macrophytic vegetation is indicative of the eutrophication status of any water body. Monitoring of water quality is the first step that can lead to management and conservation of aquatic eco systems. It is also true that the management of any aquatic eco system is aimed to the conservation of its habitat by suitably maintaining the physic-chemical quality of water within acceptable levels. Hence, in the present study's an attempt has been made to study the physic-chemical parameters of Ramanna tank situated in Nellore. Conclusions on the structural and functional aspects of the tanks and to suggest ways and means for its conservation.

MATERIALS AND METHODS

Sampling procedure and laboratory Analysis

Water samples were collected from sampling stations (April 2011 to 2012, Monthly samples of sub-surface water in triplicate were collected during first week of each month in the early hours of the day (7 a.m. to 9 am). Iodine treated double stop pard polyethethlene bottles were used for collection of water, Bottles were kept in ice bucket and brought to the laboratory for analysis as per A P H A 2005 Procedure

Study area

Ramanna tank cheruvu 2nd largest in Nellore district is geographically located at latitude 14^0 42'0" and longitude 14^0 42' 0" This famous Ramanna tank is located between ulavapalla,singa peta, Thippa). This tank is a multipurpose tank used for different activities like drinking water supply, irrigation, fisheries etc. Every year around 30 tonnes of fish is caught by fishermen from this tank.

RESULTS AND DISCUSSION

Ecological status of any water body depends upon the healthy interaction of abiotic and biotic components lentic water bodies, which are characterized by a continual movement of dissolved substances and suspended material result in dynamic interaction between components of eco system. Physico-chemical analysis is of immense importance to assess the quality of water for use in, drilling, bathing, fishing and industrial process, etc. The physico –chemical characteristics of the four lentic water bodies have been analyzed and discussed as per their monthly and seasonal variations, their relationship.etc. (Table-1,2 & Fig.-1)

Temperature : The temperature of water is one of the important physical parameter, which directly influences some chemical reactions in aquatic ecosystems and it is also an important parameter for fish substance and other organisms, the surface waters go in heat meanly by absorption of solar radiation and conduction from the atmosphere, despite temperature also influences the taste of water.

The present study of the atmosphere temperature in the selected tank fluctuated between yearly average of 25.47^0C (in monsoon), 31.93^0C (pre-monsoon) and 26.41^0C (in post monsoon) However slight lower temperature value were recorded during monsoon compared to other season and the correlation matrix polled were showed as 1.00.

The significant correlation between ambient temperature and water temperature was also observed by power and pulle (2005) **[3]**.

pH: pH is an indicator of acid base equilibrium achieved by various dissolved compounds in water i.c if free H^+ are more it is expressed acidic (i.c pH < 7). The pH of the pond water is influenced by the monsoon, temperature and soil conditions **[4]**.

The present study of the pH in the selected tank fluctuated between yearly average of (7.77) (in monsoon), (7.08) pre-monsoon and (7.72) (in post monsoon). However slightly lower temperature value where recorded during pre monsoon compare to other season and the correction matrix pooled were showed as table-2

The statistical data revealed that pH exhibited significant positive (correlation matrix pooled) and with physico-chemical characteristics such as total alkalinity, phosphates nitrates and sulphates (correlation matrix pooled 0.05)

Electrical conductivity : Pure water is a poor conductor of electricity, conductivity (specific conductance) of a substance or isolation is the measure of its capacity to conduct electric current . Most of the salts in water are present in the ionic forms, capable of conducting electric current).

The present study of the electrical conductivities in the selected tank fluctuated between yearly average of 106.76 µmhos/cm in monsoon, 146.68 µmhos/cm in Pre-monsoon and 108.38 µmhos/cm in post monsoon. However slightly monsoon compare other season value where recorded during monsoon compare other season and the correlation matrix pooled were should as similarly, similar result was reported in extension of higher values of EC which may be attributed to the agriculture run off entering these tanks, similar results were reported by pati et al . (1986) and sankaran unni (1985) **[5] & [6]** who also concluded that conductivity was influenced by agriculture run off.

Total dissolved solids : The composition of salts present in natural water body mainly depends upon the nature of bedrocks and soil developed from it . The commonly occurring natural salts are carbonated, bicarbonate, chlorides, sulphates, phosphate and nitrates of calcium, magnesium, sodium, potassium etc. Excessive dissolved solids in drinking water may lead to objectionable taste, and correlation or encrustation in water distribution system. At concentrations approximately in water distribution system. At concentrations approximately greater than 1000 mg/1, the taste of water becomes increasingly unpalatable.

The present study of the total dissolved solids in the selected tank fluctuated between yearly average of 71.69 mg/l in monsoon, 93.77 mg/l in pre-monsoon and 72.46 mg/l in post monsoon. However slightly lower T D S value where recorded during monsoon compared to other season and the correlation matrix pooled were showed as .This is in conformity's with the findings of sreenivasan (1969), Ashok varma and yashodara Sharma (2002) **[7] &[8].**

Turbidity: Turbidity in natural water bodies is mainly caused by sand, silt, clay, phytoplankton, micro organisms, and organic materials suspended or dissolved in it turbidity affects light scattering, absorption properties and aesthetic appearance in water bodies.

The present study of the turbidity in the selected tank fluctuated between yearly average of 28.45 NTU in monsoon, 19.03 NTU pre monsoon and 21.75 NTU in post monsoon. However, slightly lower turbidity value where recorded during pre monsoon compared to other season and the correlation matrix pooled were showed as table-2.

This is in conformity with the findings or Meera and sultana (2004) & Mathivanam et al. (2005) **[9] & [10].**

Dissolved oxygen : The dissolved oxygen (DO) is one of the most important factors in any aquatic eco systems . All living organisms are dependent of Oxygen in one form or the other to maintain their biological process that produce energy for their growth and reproduction dissolved oxygen also plays a major role in dissolution and precipitation of inorganic substances in water. The main sources of dissolved oxygen are dissolution from atmosphere and the photo synthesis. The former depends on factors like temperature . salinity and density of phytoplankton.

The present study the turbidity in the selected tank fluctuated between yearly average of 4.55 mg/l in monsoon, 4.85 mg/l in pre monsoon and 7.06 mg/l in post monsoon. However, slightly lower dissolved oxygen value where recorded during monsoon compared to other season, and the correction Matrix polled were showed as table-2. Swarnalatha and Narasinga Rao (1993) have pointed that polluted water bodies contain less amount of dissolved oxygen, while in the study are a witnessed similar results in vaddingare kere tank due to rapid depletion in water level and increased load of organic compounds **[11].**

Biological oxygen Demand :

1. The biological oxygen demand (BOD) denotes the pollution strength of the water body it is a measure to know the organic load in the water. The presence study of the B O D in the selected tank fluctuated between yearly average of 2.05 mg/l in monsoon, 2.92 mg/l pre monsoon, and 2.57 mg/l in post monsoon. However, slightly lower biological oxygen demand value where recorded during monsoon compare to other season and the correlation matrix pooled were showed as table-2.
2. As per the BIS standard 3mg/l of B O B is permissible in drinking water , considering this only Erannan Kere tank showed biological oxygen demand less than 3md/l, However all the other bodies exhibited BOD values more than 3mg/l, Hence these water bodies are considered to have comparatively more amount of organic matter.

BOD was recorded during the month of August and October and relatively high during April and May. This may be attributed to the highest biological activity at high temperature. Similar opinion was expressed by Ponday et al 1993 and Maruthi et al 2012 a,b & C **[12-15].**

Nitrate is the highly oxidized form of nitrogen compounds that usually in natural water nitrate is the end product of decomposition of organic nitrogenous matter. The source of nitrates are drainage from line stock feeds, chemical fertilizers from cultivated land, as well as from domestic and industrial sources, Natural waters in their un-polluted state contain only minute quantities of nitrates, perhaps high concentration of nitrates in drinking is harmful for infants because it causes methenoglobinemia but nitrate is also an essential nutrient for plants and planktons, which they convert in to cell protein.

The presence study of the nitrate in the saluted tank fluctuated between yearly average of 0.25mg/l in monsoon, 0.0002 mg/l in pre-monsoon and 0.98 mg/l in post monsoon. However slightly lower temperature value where recorded during monsoon compared to other season and the correlation matrix pooled were shown as table-2.

Venkateswarlu (1969) also recorded comparatively higher values of nitrates during monsoon and post-monsoon, and lower concentration during pre-monsoon season, which is due to the nutrient demand of the growing planktons during pre-monsoon, a greater portion of nutrients could be absorbed by rapidly growing species making the water body nutrient poor, this seemed to be the reason why low concentrations' of nitrates and phosphates coin wide with high phytoplankton density during summer **[16] & [17]**.

Total Hardness:-
Traditionally water hardness is measured as the capacity of water to react with soap. Hard water require more amount of soap to produce leather than soft water, the hardness of water is predominantly caused by divalent cations such as calcium, magnesium and alkaline earth metals such as iron, manganese, strontium etc.

The present study of the total hardness selected tank fluctuated between yearly average of 168.66 mg/l in monsoon, 219.50 mg/l pre-monsoon and 165 mg/l in post-monsoon. However slightly lower temperature value were recorded during post-monsoon compare to other season and the correlation matrix pooled were shown as table-2.

Seasonal fluctuations of total hardness were recorded low during monsoon season and maximum during post-monsoon and pre monsoon seasons, however total hardness exhibited a bimodal annual charge with low values in monsoon season, Sunkad and Patil and Dilip Rathor et al , (2006) also obtained similar results, where as khabade and mule (2003)reported maximum hardness during summer season **[18-20].**

Sodium:-
The sources of sodium in natural waters are weathering of rocks and mineral assemblages in the surrounding areas, the principal one being rock salt – sodium chloride, sodium is a cationic composition of water.

The presence study of the sodium in the selected tank fluctuated between yearly average of 16.16 mg/l in monsoon, 29.95 mg/l premonsoon and 7.87 mg/l in postmonsoon. However slightly lower temperature value where recorded during post monsoon compare to other season and the correction matrix pooled were shown as table-2.

Season wise the concentration of sodium was high during post-monsoon and low during monsoon season, Bala Krishna Reddy (1989) also observed similar trend **[21].**

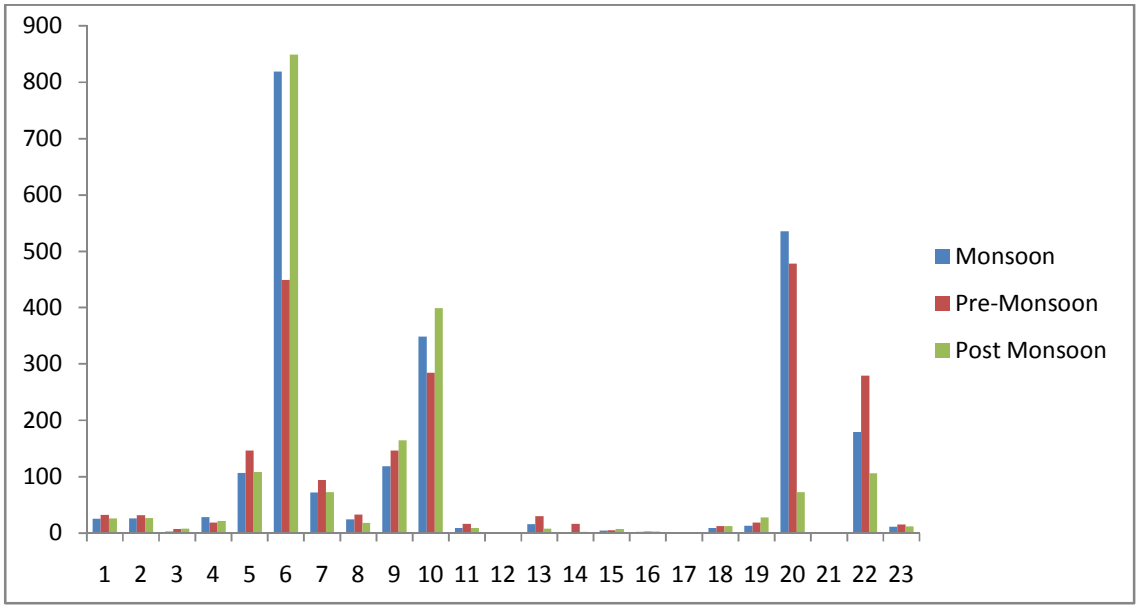
Potassium:-
Potassium is also a commonly occurring cationic natural salt and is the seventh most abundant element in order of its abundance and found lower than sodium.

The present study of the potassium in the selected tank fluctuated between yearly average of 1.56 (in monsoon). (16.76) pre-monsoon and 2.36 in post monsoon However slightly lower temperature value where recorded during monsoon .Compare to other season and the correlation matrix pooled were showned as table-2.seasonally the concentration of potassium was low during monsoon and high during pre-monsoon season similar changes also observed by Khabade and Mule 2003**[20].**

Table: 1 Physico-Chemical Parameters at various season of Ramanna tank

Parameters	Monsoon	Pre-monsoon	Post-monsoon
Air Temp	25.47	31.93	26.25
Water Temp	25.82	31.38	26.50
P^h	2.59	7.08	7.72
Turbidity	28.4	19.03	21.75
E.C	106.76	146.68	108.31
T.S	819	449.66	849
T.D.S	71.69	93.77	72.46
Chloride	24.19	33.24	18.01
Total Hardness	119	146.57	165
Total Alkalinity	349.16	284.5	399
Total Acidity	9.22	16.86	8.79
Nitrate	0.25	0.0002	0.98
Sodium	16.16	29.95	7.87
Potassium	1.56	16.76	2.36
D O	4.55	4.85	7.06
B O D	2.05	2.92	2.57
Phosphate	0.11	0.36	0.26
Calcium	8.68	12.74	12.53
Magnesium	13.63	19.01	27.9
C O D	535.66	478.33	72.66
Iron	0.1	0.31	0.01
Sulphate	179.77	279.01	106.3
Free 10_2	11.21	15.71	11.56

Fig.1 Graphical representation of Physico-Chemical Parameters at various season of Ramanna tank



.

Table-2 Correlation Matrix pooled Physico-Chemical Parameters V/S Physico-Chemical Parameters of Ramanna tank

	AT	WT	PH	EC	TDS	TUR	DO	BOD	FREE (CO2)	CL	CA	MG	TH	T.ALK	T.AGI	PO_4	NO_3	$S0_4$	NA	K
AT	1.00																			
WT	0.98	1.00																		
PH	-0.58	-0.54	1.00																	
EC	0.88	0.85	-0.56	1.00																
TDS	0.83	0.83	-0.52	0.98	1.00															
TUR	-0.64	-0.58	0.23	-0.59	-0.59	1.00														
DO	-0.62	-0.19	0.44	-0.25	-0.22	-0.17	1.00													
BOD	0.76	0.73	-0.09	0.54	0.56	-0.01	-0.11	1.00												
Free Co_2	0.68	0.66	-0.60	0.40	0.71	-0.53	-0.17	0.43	1.00											
CL	0.57	0.63	-0.14	0.80	0.79	-0.20	-0.55	0.24	0.85	1.00										
CA	0.60	0.80	-0.24	0.05	0.08	-0.66	0.57	0.53	0.39	0.27	1.00									
MG	0.05	-0.01	0.13	-0.12	-0.11	-0.50	0.89	0.42	-0.08	-0.40	0.65	1.00								
TH	0.65	0.56	-0.26	0.37	0.39	-0.38	0.06	0.24	0.50	0.18	0.81	0.75	1.00							
T.ALK	0.77	0.75	0.37	0.64	0.63	-0.83	0.46	0.88	0.55	0.23	0.93	0.63	0.77	1.00						
T.ALI	0.39	0.34	-0.53	0.32	0.33	-0.38	-0.21	0.42	0.35	0.08	0.71	-0.09	0.20	-0.35	1.00					
PO_4	0.97	0.96	0.13	0.74	0.75	-0.48	0.35	0.83	0.57	0.34	0.75	0.44	0.86	0.56	0.38	1.00				
NO_3	-0.59	-0.60	0.52	-0.63	-0.61	-0.06	0.91	-0.05	-0.41	-0.72	0.20	0.81	-0.26	0.05	-0.40	0.64	1.00			
SO_4	0.83	0.82	0.57	0.81	0.79	-0.30	0.47	0.38	0.62	-0.47	0.12	-0.09	0.61	0.30	-0.33	0.64	-0.29	1.00		
NA	0.87	0.85	-0.56	0.86	0.79	-0.35	-0.64	0.43	0.61	0.71	0.15	0.50	0.65	0.37	0.35	0.62	-0.91	-0.44	1.00	
K	0.99	0.50	-0.65	0.15	0.90	-0.64	-0.31	0.63	0.71	0.67	0.52	0.55	0.91	0.72	0.25	-0.62	-0.66	0.88	0.90	1.00

CONCLUSION

The physic-chemical characteristics of these water body was found to be well in the permissible limit of BIS (1998, except P^H , DO, BOD and turbidity in some seasons, which may be due to anthropogenic activities in the area, and input of nutrients and other organic and in-organic substances through run off water from agricultural fields.

Acknowledgement
We except second author we are thankful to Management S.V. University for giving opportunity to work in to the wept laboratory and all facilities to complete the research work.

REFERENCES

[1] Suresh Kumar **(2002)**.An introduction to Algae. Published by Campus Books international, New Delhi :243-245
[2] Ahmed S H and A.K.Singh **(1993)** *India. J.Ecobil*., 5:111-120.
[3] Pawar, SK,and J.S.Pulle **(2005)** *India.J.Auqa Boil*.Vol.20 (2) :123-128.
[4] Saksena,D N, D.M. Gaidhane and H.Singh **(2006)**. *J.Environ,Biol*, 27 (1) : 49-53.
[5] Patil , M K .Usha Namboodiri and K.S.Unni **(1986)** changes after sediment removal in a sewage pond. Physical chemical characteristics . All India seminar on water quality around urban eco system : (Ed) K.S.Unni:222.
[6] Unni, K.S, **(1985)**. *Int, Rev. Gensanteh Hydrobiol*, 70 :845-856.
[7] Sreenivasan, A, **(1969)** *Environmental Health*, 11: 392-401.
[8] Ashok Verma and Yashodhara Sharma **(2002)**. Hydro biological studies on freshwater ponds. In wetland conservation and Management . Pointers publishers, Jaipur,India, 254-265.
[9] Meera Srivastava and Sulaxna Garg (**2004**). *J. Ecobiol*, 16 (6) :407-412 .
[10] Mathivaran, V ,A. Kayalvizhi and selvisabhanayakam **(2005)**. *J. Current Science* 7(1): 253-258 .
[11] Swarnalatha , N.and A. Narasing Rao **(1993)**. *Indian J. Microbial E col*. 3: 41-48.
[12] Pandey, D.K, J.P.N.Rai, R.C. Dhiman and Rajesh Kumar **(1993).** *I JEP*, 13 (2) :132-135.
[13] Y.AVASN Maruthi Kaizar Hossain and Abhishak Goswami **(2012a)** *Der Chemica Sinica*, 2012, 3(5):1071-1074.
[14] Y. AVASN Maruthi, Kaizar Hossain, D. Hari Priya and B. Tejaswi **(2012b)**. *Advances in Applied Science Research*, 3 (1):605-610
[15] Y. AVASN Maruthi, D. Apta Chaitanya, Kaizar Hossain, A Sravani and S Jagadish **(2012c)**. *Euro. J. Exp. Bio.*, 2 (1):13-16
[16] Venkateswarlu, V. **(1969)**. *Hydrobiol*. 33 (3-4) : 352-363.
[17] Pandey, J.and Anuya Varma **(2004)**. *J. Environ.Biol*, 25 (1) : 81-87.
[18] Sunkad, B.N. and H.S. Patil **(2004)**. *J. Enviraon, Biol*, 25 (1) 99-102.
[19] Dilip. K.Rathor, P.Sharma, G.Barupal.S. Tyagi and Krishna chandrasonle **(2006)** *Indian. J.Environ, Eco plan* , 12 (1) : 223-230.

[20] Khabade, S.A and M.B.Mule **(2003)** I. *J. Environ prot* , 23 (9) : 1003-1007.
[21] Balakrishna Reddy, G. **(1989)**. Ecological studies on river Kagna near Tandur (Andhra Pradesh) with special reference to water quality and pollution. Ph.D, Thesis, osmania university , Hyderabad.