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STUDY OF SEASONAL VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS OF ABHEDA POND, KOTA DISTRICT,RAJASTHAN

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ABSTRACT

Abheda pond is an artificial pond built in 14th century. It is about 8 km. west of Kota. In the present study the seasonal variation in the physico-chemical parameters of Abheda pond was studied. Variations in Temperature, pH, Electrical conductivity, Total alkalinity, Total hardness, Dissolved oxygen and Total dissolved solids were observed from August 2015 to July 2016.The samples were collected from four sites of ponds and results were analyzed.The range of various parameters were pH 7.13 to 8.9, electrical conductivity 122.5 to 245 mhos /cm , total alkalinity 56 mg/l, total hardness 39.75 to 90 mg/l, total dissolved solid 93.5 to 176 chloride 14 to 30.5 mg/l and dissolved oxygen 3.1 to 5.67 mg/l respectively. The study revealed that there exist seasonal fluctuations of these parameters. Temperature, pH, Electrical conductivity, Total alkalinity, Total hardness Total dissolved solids were found maximum in the summer season and minimum in the monsoon whereas dissolved oxygen was minimum in summer.

Keywords: artificial pond, physico-chemical parameters, seasonal variations.

I. INTRODUCTION

The Water Quality is the most important factor controlling the ecological quality of a pond.The quality of stagnant water is easily affected by anthropogenic activities and other activities in the catchment areas.. These ponds are used for harvesting rain water and run-off water, which contain clay and organic matter and act as sink for nutrients and minerals. The quality of water is characterized by various physico-chemical parameters and these parameters change due to many factors like source of water, type of pollution, seasonal fluctuations and adjacent human intervention. The health of aquatic ecosystem is reflected by the physico-chemical properties of water and its biological diversity. The present study will provide detailed information on limnological parameters of the water of Abheda pond at Kota District(Rajasthan).Kota is located along the bank of the Chambal River in the Southern part of Rajasthan.The cartographic coordinates are 25.18Nº-75.83 ºE. It covers an area of km,Kota has a semi arid climate with high temperature throughout the year.The average annual rainfall in the Kota District is 660.6mm^2,Most of the rainfall can be attributed to the Southwest monsoon which has its beginning around the last week of June and may last till mid Sept.Abheda pond stands about 8

k.m.from kota district. It lies between 25º12'-11" North latitude and 75º-53'-15" East longitude. Prior to the founding of the kota dynesty, the area was jungle in1346 AD, however the Maharaja Dheer Deh had it cleared and get an artificial water tank created. In the 18th century, a small palace was built on the bank of the water tank. During 1800,this water tank(pond) was home to a large number of crocodiles.

II. MATERIAL AND METHODS

To analyze the quality of water of Abheda pond, water samples were collected from four sites for period of one year Aug 2015 to July 2016.The sample were analyzed for various physic-chemical parameters like temperature was recorded by centigrade thermometer, pH was measured by pH meter and other parameters such as electrical conductivity, total alkalinity, total hardness, total dissolved solid, dissolved oxygen(DO) and chloride have been done by the procedures of(APHA,1998)[2]. The average of parameters were computed for summer (April to June), monsoon(July to Sept) and winter(Nov to Feb).The water samples were collected in a clean polythene container. The collected sample were bought to laboratory for estimation of various parameters.

Table: Monthly variation in different physico-chemical parameters in Abheda pond year 2015 to 2016

Month	Air temp	Water Temp	pH	Electrical conductivity	Total Alkalinity	Total Hardness	TDS	Dissolved Oxygen	Chloride
Aug	32	29.6	7.42	140	56	57	98	5.07	15
Sep	33	30.6	8.46	160	68	64	111.25	4.8	24.5
Oct	35	29	8.44	162.5	74	69	115	3.6	27
Nov	33	24	7.86	172.5	72	74	111.75	3.7	26.25
Dec	24	23.2	8.24	137.5	78	78	85.5	3.9	26
Jan	22	20	8.52	127.5	76.5	77.25	84.25	4.1	27.5
Feb	26	25	8.54	160	103.7	75.5	117.75	4.3	14
Mar	30.5	29	8.77	170	110	78	119	5.1	16
Apr	39	30	8.9	181.2	119	81	143	3.5	20.75
May	39	30	8.36	227.5	119.5	84	162	3.27	27
Jun	42	31	7.71	245	125	90	176	3.1	30.5
Jul	30	29	7.13	122.5	58.75	39.75	93.5	5.61	14.25

Values are mean of four sites All parameters except Temperature, pH and EC are expressed as mg/l

III. RESULT AND DISCUSSION

The examined physico-chemical parameter has shown considerable variation in different samples depending upon the area from which it was collected and the effect it had on the anthropogenic activities around it.The observed result tabulated below has been discussed as under.

Air and Water Temperature:

Temperature is a physical factor that alters the quality of the water and considered as important factor in functioning of aquatic system. During 2015 to 2016 air temp. varied between 22ºC to 42ºC while surface water

temp. ranged from 20ºC to 31ºC.The ambient temperature was always remained higher than the water temperature. In the present investigation the season wise analysis showed that the average air and water temp. in pond was maximum during summer, comparatively less during monsoon and least during winter season. Similar finding were reported by Hulyal and kaliwal(2011)[4],Kannan and Job(1980)[9].

pH:

The measurement of pH is of great importance because chemical and biochemical reaction in an aquatic body take place at a particular pH which plays an importance role in productivity of pond.The pH of abheda pond varied between 7.13 to 8.9.In the present study pH showed maximum in summer and minimum in monsoon. The pH of pond was found to be alkaline throughout the study.The annul fluctuations are small, indicating good buffering capacity. The high pH in the pond may be due to an increase utilization of CO_2 in photosynthesis. Similar results were founded by Hulyal and Kaliwal(2011)[4] and sharma et al (2017)[16].

Electrical Conductivity:

The electrical conductivity of water is due to ionization of dissolved organic and inorganic solids and become major of total dissolved solid.The E.C. value ranged between122.5 to 245□mhos/c.m.The E.C. values showed variation being maximum during summer and minimum during monsoon.The relation of E.C. with temperature could be explained on the basis of the fact that solubility of minerals and other inorganic matter increase with increase in water temp.Hence the present water body shows high electrical conductivity value during summer and low in winter.Similar result reported by Kataria et al(1995)[11].

Total Alkalinity:

Alkalinity is a measure of the presence of bicarbonate, carbonate and hydroxide constituents. A minimum level alkalinity is desirable because it is considered a buffer prevents a large variation in pH. The Alkalinity values found to range from 56 to 125 mg/l. Lower Alkalinity values recorded during monsoon and higher values recorded during summer. Higher alkalinity in summer may be attributed to increased rate of decomposition, during which co2 is liberated which react with water to form bicarbonate increasing total alkalinity in summer. similar suggestion given by Harshey et al(1987)[5]and Kaur et al(2000)[7]

Total Hardness:

The hardness of water is mainly due to the presence of various salts of Ca and Mg and it is used to classify water as hard or soft.The total hardness ranged between 39.75mg/l to 90mg/l during study.The total hardness was found higher during summer than winter and rainy season(table). Higher values of total hardness during summer season of present study can be attributed to decrease in water volume and increase in the rate of evaporation at high temperature. Similar results have recorded by Rao et al(1995)[14].On the other hand higher hardness in summer and lower in monsoon were also reported by kumar A.(1995)[10],Naik and Purhoit (1996)[12].Present finding are also in conformity with these observation.

Total Dissolved Solids:

The total dissolved solid indicate the general nature of water quality. In present study TDS ranged from 93.5mg/l to 176mg/l.Seasonaly TDS values were recorded maximum in summer followed by rainy season and less during winter month. Swarnalatha et al(1997)[17] reported maximum TDS during summer and minimum

during winter while Nag et al (2014)[13] founded minimum during monsoon and maximum during summer season.

Dissolved Oxygen:

Dissolved oxygen in water is of great limnological significance as it regulate many metabolic process of aquatic organisms. The amount of dissolved oxygen varies from 3.1mg/l to 5.67mg/l respectively. The minimum dissolved oxygen recorded during summer and maximum during monsoon.Similar result found by Sasikala et al(2016)[15]The values were observed high during rainy and winter as low temperature favoured dissolution of DO.Low DO during in present investigation was due to high temperature of water had lesser oxygen holding capacity and surplus oxygen was lost to the atmosphere.(Welch,1952)[18]

Chloride:

The most important source of chloride in natural water is the discharge of sewage. In very high concentration is gives a salty taste to the water. The chloride concentration in abheda pond ranged 14mg/l to 30.5mg/l. Maximum in summer and minimum in monsoon. In the present study the chloride content was found low but slightly higher value was noticed in summer. In present study the chloride value of ponds lies in acceptable limit.

IV. CONCLUSION

The study shows that the parameters are within the permissible limits and the ecological status of the pond is good though the anthropogenic activities are increase day by day which may lead to the poor quality of water in future so the proper management of this water body is needed.

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