Assesment of Diurnal Variation of Physico Chemical Status of Khanpura Lake, Ajmer

Mamta Tiwari and M.M. Ranga

***Abstract*— The present investigation was carried out to evaluate the magnitude of diurnal variation of physicochemical parameters of the water of Khanpura lake, Ajmer and to assess its suitability for human being and cattle consumptions. The lake receives domestic waste from Khanpura village and its adjoining areas. People living near the lake use it for irrigation purpose while cattle use water for drinking and bathing. They frequently suffer from water borne disease. The lake water contains high values of TDS, BOD, COD, alkalinity, hardness and chloride which are beyond safe limits indicating severe degradation of water quality.**

The present investigation reveals a specific pattern in diurnal changes of physicochemical parameters. Several measures are also suggested for the removal of pollutants. The study was carried out in each season and per day at an interval of four hours. A suitable correlation was also established between degradation index and environmental protection cost which may be used as regulating measures for preserving perennial and seasonal wetlands of Ajmer. This paper is an attempt to understand the impact of climate change on water resources and identifies general and specific impacts related to different physicochemical parameters.

***Index Terms*— Diurnal variation, physicochemical status, water quality, degradation index.**

I. INTRODUCTION

Ajmer, a centrally located city in the state of Rajasthan is thickly populated both in intensity and density. The rapid growing population and economic development are leading to the environmental degradation and climate change in Ajmer because population has greatly increased the pressure on its natural resources. Water shortage, soil erosion, deforestation air and water pollution affects many areas.

Small climate change can cause large water resources problems. Increased temperature will impact on agriculture production. Higher temperature reduces the total duration of crop cycle including early flowering. Thus shorter the grain fill period, shorter would be the crop cycle and the lower the yield per unit area.

Water is needed in all aspects of life. Higher temperature and decreased precipitation would lead to decreased water supplies and increased water demands. They might causes deterioration in the quality of fresh water bodies,Welch (1982). The most important aspect of climate change is its effect on hydrological cycle and on water management cycle.

Pollution of water resources has also led to steady decline in fisheries and affected the irrigated croplands. Regular monitoring of water bodies with required number of parameters viz a viz the quality of water not only prevents outbreak of diseases and occurrence of other hazards but also checks the water from further deterioration. Several studies have been conducted to understand the physicochemical properties of water reservoir during the last decade.

The water of Khanpura Lake is used for drinking of cattle and for irrigation. Due to multifold pressure of urbanization, urban sewage discharge, agricultural practices, construction of housing colonies, a major part of Khanpura lake is greatly affected.

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II. METHOD AND MATERIALS

The samples were collected from January to December. The overlying water samples were collected using a pre-cleaned plastic buckets and were kept in polythene bottles which were disinfected earlier by soaking it with 2% HNO_3. BOD, COD, dissolved oxygen and alkalinity were estimated by standard methods Trivedy and Goel (1986). The chemicals used for analysis were all of analytical R. grade. The physicochemical parameters were estimated according to the methods in APHA (1989) and Trivedy and Goel (1986).

III. RESULTS

Diurnal variations in physicochemical were carried out during the present investigation for the analysis samples were collected at the internal of four hours starting from 6a.m. to 2a.m. The temperature of was maximum during summer days ranging between 14^0C (in the month of March at 2a.m) to 31^0C (in the month of May at 2 pm) and in the winter days ranging between 6^0C (in the month of January at 2a.m.) to 23^0C (in the month of February at 2p.m.).

Transparency of water is 45cm to 84cm. In general the transparency values were minimum during monsoon season followed by summer season and winter season. Turbidity range between 19 NTU (in the month of January) to 235 NTU (in the month of August)

The pH of lake water is directly proportional to the temperature of water. The increase in pH of water observed from January to June, but during the rainy season the minimum values were noted. In general maximum pH values were noted at 2p.m. and 6pm while minimum values were observed at 2a.m. and 6a.m.

The total solids value varied from 280 mg/L (in the months of January at 2 a.m.) to 787 mg/L (in the month of July at 2 p.m.). Similar trends were observed for a total dissolved solid which was ranged between 179 mg/L to 622 mg/L. It also express a gradual decrease from September to December and again there was increase from January to attain maximum value in July. Total suspended solids ranged between 90 mg/L to 171 mg/L. It may be concluded that all the sites for proposed area has maximum value of total solids in the month of July. Alkalinity was maximum in summer (691.6 mg/L)

and minimum (105.66 mg/L) in winter. The maximum value attains in the month of June.

Total hardness ranged between 95 mg/L (in the month of August at 2a.m.) to 407 mg/L (in the month of June at 2 p.m). Both calcium and magnesium hardness were shown similar trends by the proposed sites. The dissolved oxygen value are ranged between 3.00 mg/L (in the month of May at 2 p.m) to 8.68 mg/L (in the month of December at 6 p.m.). BOD exhibited a range between 80 mg/L to 405 mg/L. Chloride, fluoride sulphate, nitrate were also higher than the standard values. Khanpura Lake receives domestic sewage, industrial discharge and filth apart from rain water flowing into it which influence life with in it.

IV. Discussion

On the basis of pH value, Khanpura lake may be classified under third category i.e. alkaline water (Parashar et.al., 2006). Decrease in pH in monsoon is possibly due to inflow of rain water, which brings down the level of carbon-dioxide and carbonates. The observation agrees with the trends noted in study conducted in other fresh water bodies, Mathur (1992) and Sharma (2009). The transparency of surface areas is an important limiting factor in the development and the distribution of flora and fauna. This aspects has received considerable attention specially it is related to productivity and flow of energy within the community, Reid (1976).

In the area of investigation maximum TDS were observed in summer months owing to the loss of water due to heat and concentration of salt present in water. Similar results have also been reported by Paka and Narsing Rao (1997).

Variation in total alkalinity showed significant positive correlation with pH which is consonance to the findings of Sharma (1999) and Abraham (2002). Hardness observed maximum in summer season and minimum in monsoon season. It is in good agreement with Thorat and Sultana (2000) and Zambare (2004). Low values of dissolved oxygen during summer season might be explained on the basis that large amount of dissolved oxygen was utilized during the oxidation of organic matter in summer season. The comparison of BOD with dissolved oxygen in the present study indicated that there is an inverse relationship between both parameters. Similar relationship has also been reported by Das (2001).

V. CONCLUSION

It is clear from the present findings that the aquatic environment of Khanpura lake has undergone extreme degradation. Proper remedial measures should be taken immediately in order to restore it from further deterioration. There must be an alternative waste disposal system away from this lake and the disposal of solid and liquid waste must be stopped.

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Table No.1
Diurnal Monthly Variation in Physico-Chemical Parameters

Time		Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
pH	6.00 A.M.	8.4	8.4	8.5	8.5	8.7	8.9	7.7	7.8	8.0	8.2	8.3	8.3
	10.00 A.M.	8.4	8.5	8.5	8.5	8.8	8.9	7.7	7.8	8.1	8.3	8.4	8.4
	2.00 P.M.	8.5	8.5	8.6	8.6	8.8	9.0	7.8	7.9	8.1	8.3	8.5	8.4
	6.00 P.M.	8.5	8.5	8.6	8.6	8.8	9.0	7.8	7.9	8.1	8.2	8.5	8.4
	10.00 P.M.	8.4	8.4	8.5	8.5	8.7	8.9	7.7	7.8	8.0	8.2	8.4	8.3
	2.00 A.M.	8.4	8.4	8.5	8.5	8.7	8.9	7.7	7.8	8.0	8.1	8.2	8.3
Turbidity	6.00 A.M.	21.0	36.0	41.0	66.0	100.0	141	192	227	206	201	142	54
	10.00 A.M.	26.0	40.0	45.0	70.0	105	145	195	230	210	205	145	60
	2.00 P.M.	27.0	43.0	48.0	75.0	109	150	199	235	214	211	149	65
	6.00 P.M.	25.0	39.0	42.0	70.0	101	146	195	231	209	206	144	61
	10.00 P.M.	23.0	36.0	38.0	61.0	95	136	187	220	201	197	136	59
	2.00 A.M.	19.0	31.0	37.0	58.0	92	132	184	217	200	194	131	56
Transparency	6.00 A.M.	83.0	81.0	722.0	66.0	63	63	52	51	49	51	59	72
	10.00 A.M.	80.0	78.0	70.0	64.0	60	60	50	48	46	48	56	70
	2.00 P.M.	79.0	76.0	69.0	63.0	68	69	49	46	45	48	55	70
	6.00 P.M.	80.0	78.0	70.0	64.0	60	60	50	48	46	48	56	70
	10.00 P.M.	82.0	79.0	72.0	65.0	62	62	52	49	48	50	57	72
	2.00 A.M.	84.0	72.0	73.0	68.0	63	64	53	51	50	52	61	74
Dissolved Organic Matter	6.00 A.M.	147.0	196.0	209.0	228.0	264	286	362	362	98	107	129	146
	10.00 A.M.	161.0	203.0	216.0	237.0	276	295	370	378	108	116	142	160
	2.00 P.M.	163.0	205.0	219.0	239.0	278	297	374	380	112	118	145	165
	6.00 P.M.	153.0	201.0	213.0	231.0	272	292	365	372	105	113	140	156
	10.00 P.M.	151.0	200.0	209.0	230.0	270	290	362	368	103	110	136	150
	2.00 A.M.	146.0	195.0	206.0	227.0	263	285	361	361	97	106	128	145
Fluoride	6.00 A.M.	0.3	0.4	0.4	0.4	0.6	0.7	0.6	0.5	0.4	0.4	0.4	0.3
	10.00 A.M.	0.4	0.4	0.5	0.5	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4
	2.00 P.M.	0.4	0.4	0.5	0.5	0.7	0.8	0.7	0.6	0.6	0.6	0.5	0.4
	6.00 P.M.	0.4	0.4	0.5	0.5	0.6	0.7	0.6	0.6	0.5	0.5	0.5	0.4
	10.00 P.M.	0.3	0.4	0.4	0.4	0.6	0.7	0.6	0.5	0.5	0.5	0.4	0.3
	2.00 A.M.	0.3	0.3	0.4	0.4	0.6	0.7	0.6	0.5	0.4	0.4	0.4	0.3
Sulphate	6.00 A.M.	73.0	74.0	82.0	99.0	107	115	104	108	97	83	73.0	72
	10.00 A.M.	82.0	86.0	95.0	101.0	114	120	117	110	104	99	86.0	82
	2.00 P.M.	85.0	89.0	98.0	107.0	118	128	121	115	107	105	89	85
	6.00 P.M.	80.0	83.0	92.0	105.0	114	119	112	112	102	95	84.0	83
	10.00 P.M.	77.0	80.0	86.0	103.0	112	117	106	110	100	91	78	76
	2.00 A.M.	72.0	73.0	80.0	98.0	105	114	102	107	96	82	72	71
Nitrate	6.00 A.M.	3.3	2.8	1.8	1.1	0.9	0.9	4.1	4.9	5.0	4.5	4.1	3.8
	10.00 A.M.	9.5	2.9	2.0	1.2	1.1	1.0	4.2	5.0	5.1	4.6	4.2	3.9
	2.00 P.M.	3.5	2.9	1.0	1.2	1.2	1.1	4.2	5.0	5.2	4.6	4.2	3.9
	6.00 P.M.	3.4	2.9	1.9	1.2	1.0	0.9	4.1	4.9	5.2	4.5	4.2	3.8
	10.00 P.M.	3.4	2.9	1.8	1.2	1.0	0.9	4.1	4.9	5.1	4.5	4.1	3.8
	2.00 A.M.	3.3	2.8	1.8	1.1	0.9	0.9	4.1	4.9	5.0	4.5	4.1	3.8