Naveen Shodh Sansar (An International Refereed / Peer Review Research Journal)
RNI No.- MPHIN/2013/60638, ISSN 2320-8767, E- ISSN 2394-3793, Scientific Journal Impact Factor (SJIF)- 7.671
January to March 2024, E-Journal, Vol. I, Issue XLV

Study of Ecological Status of Abheda Pond, Kota (Rajasthan)

Sushma Agrawal* Veena Chourasia**

***Assistant Professor (Zoology) Maa Bharti P.G. College, Kota (Raj.) INDIA**
**** Associate Professor (Zoology) Govt. College, Kota (Raj.) INDIA**

Abstract - In the present study ecological status of Abheda pond Kota was accessed. The ecological status was considered using the three parameter – Physico-chemical parameters of water, its sediment and diversity of macrozoobenthic community. Four sampling stations were selected for the collection of samples. The parameters studied under physico-chemical studies were- Temperature, pH, Electrical Conductivity, Total alkalinity, Total hardness, Calcium hardness, Chloride, Sodium, Potassium,Nitrate, Phosphate and Dissolved Oxygen. The result indicated that Abheda pond is eutrophic in nature. The Biological study showed total 21 taxa of macrozoobenthos, belonging three phyla namely Arthropoda, Mollusca, and Annelida. Themacrozoobenthic fauna are mostimportant as they the indicators of overall ecological health of a water body.
Keywords: Eutrophic, Macrozoobenthos, Physico-chemical parameters, Sediment, Waterbody.

Introduction - The term ecological status of water body is used exclusively for health of surface water such as river, lakes, transitional and costal water.Healthy water bodies are important for the economy and human well-being. Ecological status of a water body is determinedbythree paramters(elements)-physico-chemical properties of water,sediments and diversity of macrozoobenthic fauna among them macrozoobenthic fauna are the most important element to decide the ecological status of particular water body whereas physico-chemical properties of water and sediments are the supportive. It shows the influence of pollution and habitat degradation taking into consideration the three quality elements. The principal physical and chemical condition operative in natural water make up the basic platform through various combinations and intensities, upon which the occurrence, distribution and the success of aquatic organism depend. The physico-chemical properties of water and sediment in a water body affect the distribution, density and diversity of macrozoobenthic community too; they are best indicators of its biological status.

Many investigators such as Khanna D.R. and Bhutani R. (2003), Saxena et al (2008), Narasimo K.et al(2011),Parkh and Mankodi (2012),Nupur et al (2013),Lonkar et al(2015),Sasikala et al(2016)were studied physico-chemical parameters of water ,sediments and their influence on macrozoobenthic community.

Study Area: Abheda Pond is an artificial pond, it was dug during the 'Riyasat Kal' to quench the thirst of wild animals, like any other pond it has no wave action, has shallow depth, and negligible temperature variation along its depth.It is about 8KM from Kota district and lies between 25º12'-11" North latitude and 75º-53'-15" East longitude. It sustains enormous floral and faunal diversity which are related to its geographical location, hydro biological regimes, substrate conditions and anthropogenic influences.

Methodology: Water,sediment and macrozoobenthic sample were collected from all the four sites of Abheda pond at monthly intervals approximately at a fixed time of the day. Collected sample were brought to the laboratory for further analysis. Water and sediment samples were analyzed by standard methods mention by APHA (1998) and Trivedi and Goel (1986) whereas collected and preserved sample of macrozoobenthos was identified using standard keys of Needham and Needham (1962), Edmonson (1959), Penark (1978), Tonapi (1980) and Adoni (1985).

Observations

The results of the study of Abheda pond are given in the tables below.

Table 1-physico-chemical analysis of water at different study sites of Abheda pond

S.	Parameters	Mini mum	Maxi mum	Mean
1	Air temperature (ºC)	22 ºC	42 ºC	32.125 ºC
2	Water temperature (ºC)	20ºC	32 ºC	28.15 º C
3	pH	7.9	9	8.26
4	Electrical Conductivity (µmhos/cm)	90	210	168.43
5	Total alkalinity (mg/l)	44	138	86.57

6	Total hardness (mg/l)	29	98	69.08
7	Calcium hardness (mg/l)	26	64	47.95
8	Chloride (mg/l)	10	42	22.39
9	Nitrate (mg/l)	3.5	10.5	7.41
10	Phosphate (mg/l)	0.1	0.2	0.12
11	Dissolved Oxygen (mg/l)	3.07	6.5	4.33

Table 2- Physico-chemical analysis of sediment at different study sites of Abheda pond

S.	Parameters	Minimum	Maximum	Mean
1	pH	6.5	8.15	7.5
2	Electrical Conductivity (µmohs/cm)	225	500	358
3	Total Alkalinity (mg/l)	42	88	68
4	Calcium (mg/l)	23.3	40	28.84
5	Chloride (mg/l)	8	38	20.9
6	Sodium (mg/l)	1.85	2.9	2.16
7	Potassium (mg/l)	1.2	1.75	1.5
8	Nitrate (mg/l)	0.8	1.8	1.22
9	Phosphate (mg/l)	0.35	1.08	0.73

Table 3 (see in next page)

Result and Discussion: The result ofphysico-chemical investigation showed that the air and water temperature of the pond ranged between 22°Cto 42°C maximum in summer and while lowest in winter The pH values of water and sediment were stable and alkaline whereas Electrical Conductivity, Total Alkalinity and Total hardness values were indesirable limit. Abheda pond was found to be rich in calcium andNitratewhich favours growth and survival of macrozoobenthos though the value of DOwhereas phosphate was found in the desirable limit in the present study. The Nitrate and Phosphate concentration in sediment had been affected by the anthropogenic activity in and around Abheda pond, Sodium and Potassium were found under considerable range.

A total 21 species of macrozoobenthos were recorded during the study which belong to three major phyla Arthropoda, Mollusca, and Annelida. Arthropoda was the most dominant group, comprising of 12 species, followed by Mollusca with 8 species and Annelida with one species.In this study the presence of pollution indicator species such as *Tubifex tubifex* of Annelida, *Chironomus sp*. and *Eristalis tenax* of Arthropoda and *Lymnaea sp.* of Mollusca directly points to the shifting of status of the pond from non-polluted to polluted.

Conclusion: The study of physico-chemical elements of water,sediments and macrozoobenthic community ofAbheda Pond shows that the ecological status of the pond is good though the anthropogenic activities are on increase day by day which may lead to the poor quality of water in future so that proper management of this water body is needed.

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Table 3- Identified Macrozoobenthos at different study sites of Abheda pond

Phylum	Class	Order	Family	Organism
Annelida	Oligocheta		Naididae	*Tubifex tubifex*
Arthropoda	Insecta	Diptera	Chironomidae	*Chironomus larva*
			Syrphidae	*Eristalis tenax*
		Ephemeroptera	Ephemeridae	*Baetistri caudata*
		Coleoptera	Stayphylinidae	*Paederus melampus*
				Atheta (Dalotia) coriaria
			Hydrophillidae	*Hydrophilus triangularis*
				Enochrus sp.
				Hydrobius fusiceps
				Helochareslividus
				Berosus sp.
				Tropisternus lateralis
			Curculinoidae	*Weevil sp.*
Mollusca	Gastropoda	Architaenioglossa	Viviparidae	*Bellamya bengalensis*
		Planorboidea	Planorbidae	*Gyraulus convexiusculus*
				Indoplanor bisexustus
		Basommatophora	Lymnaeidae	*Lymnaea acuminata (Typica)*
				Lymnaea acuminata (patula)
		Littiornimorpha	Bithyniidae	*Bithyniya tenticulata*
		Architaenioglossa	Ampullariidae	*Pila globose*
	Bivalvia	Unionoida	Unionoidae	*Lamellidens marginalis*
TOTAL				21

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