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Different Species of Zooplanktons in Rajasthan

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ABSTRACT

Pandey and Verma (2004) studied the influence of catchment on chemical and biological characteristics of Baghdara lake and Udai Sagar lake in Southern Rajasthan. The two lakes were of constrasting features with Baghdara lake receiving runoff from undisturbed woodlands ad Udai Sagar lake receiving runoff from urbanized regions. The physicochemical and biological analysis of both the lakes reveals that Udai Sagar lake was polluted and reaching eutrophic condition, whereas Baghdara lake was unpolluted. The study also shows that the dredging of sediment containing phosphorus as a restoration measure for eutrophic lakes was effective.

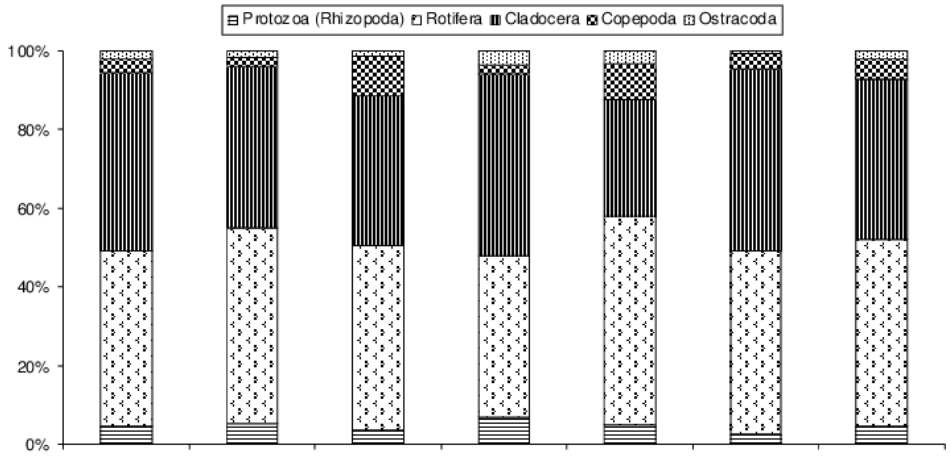
INTRODUCTION:-

A total 31 species of zooplankton notice in the Nandashwer dam Rajasthan are protozoa (10 genera), Cladocera (10 genera), Copepoda (3 genera), Ostracoda (3 genera) and Rotifera (7 genera). Dominant zooplankton were Cladoceran > Rotifera > Protozoa > Copepoda > Ostracoda. Zooplankton plays an important role in determination of water quality which occurs in all types of aquatic ecosystems, they play a vital role in energy transfer in an aquatic ecosystem. Zooplankton is one of the most important biotic elements affecting all the functional factors and plays a crucial role in the aquatic ecosystems food chain, nitrogen recovery and energy transfer ecosystem (Park et al., 2007). The population of Zooplanktons is characteristics indicator of water quality (Bhadane, RS.,2016) In addition, the population of zooplanktons is able to represent the existence and future state of every both the lentic and lotic aquatic bodies among all freshwater aquatic biota (Kumar et al., 2011).[1,2,3]

Zooplankton are animals suspended in water with limited of locomotion .They graze heavily on algae, bacteria and suspended detritus. The Zooplanktons are microscopic free living organisms which occupy a central position between the autotrophs and other heterotrophs and form an important link in aquatic food webs. They constitute an important component of secondary production in aquatic ecosystems and play a vital role in the energy allocation in different trophic levels. [1,2,3]The knowledge of their seasonal qualitative and qualitative estimation has been considered essential for proper manipulation of the factors influencing biological productivity of the water body in Jodhpur. The Rotifera was represented by *Brachionus Calyciflorus, B. diversicornis, B .quadridentatus, B .falcatus, B.caudatus, Plationuspatulus, Keratellatropica, Lecanedecipience, L.cornuta, L.ohioensis, L. monostyla, Horellabrehmi, Asplanchnabrightwelli, Trichocerca spp., Testudinellaspp. The Cladocera was represented by Diaphanosomasarsi, D.senegal, D.excisum, Ceriodaphnia Cornuta, C. laticaudata, C.quadragula, C.pulchella, Bosminalongirostris, Moinamicrura, Macrothrixgeoldii, M.laticornis, Chydorussphaericus, Echiniscatriserialis, E.odiosa, Pluroxusaduncus, Alonarectangularectangula, Alonarectangularichardi, Alonadavidipunctata, Alonella spp., Camptocerus spp., Simocephalus spp.* The Copepoda was represented by *Cyclopspp, Mesocyclop spp. Eucyclop spp.* and *Diaptomusspp*. The Ostracoda was represented by only one species of *Cypris.*

DISCUSSION

In case of Jaisamand lake in Rajasthan (Udaipur):-



The zooplankton at Chundasagar village pond and kodemdesar village pond located near Bikaner city in the region of Indian desert. A year round study (September 2010-August 2011) was carried out . Monthly samples of zooplankton were collected

and analysed for the entire 12 months period. Only 3 groups of zooplankton namely protozoa (5 genera), Rotifera (9 genera) and Crustacea (7 genera) were collected from these 2 water bodies.

Zooplankton as a cosmopolitan community is vital ecological indicator for assessment of water quality and biodiversity, as they are strongly affected by environmental conditions and respond quickly to changes in water quality. Zooplankton constitutes a vital intermediate link between phytoplankton and fish in the food chain. Seasonal changes in zooplankton species are related to the Physico-chemical parameters of aquatic ecosystem.[4,5,6] These parameter analysis helps to evaluate the impact of anthropogenic activities on water bodies. A study of seasonal dynamics of zooplankton diversity with reference to physico-chemical conditions (water quality) of three water bodies (Hiratalai, Swaroop Sagar and RCA nursery pond) in Udaipur, Rajasthan was conducted during winter (January), summer (May) and late monsoon (September). Lakes and ponds are an important source of freshwater for the mankind. They prove to be of great ecological value for the surrounding environment as these water bodies pose a direct and indirect effect on the weather conditions, habitat, community and underground water levels of the catchment areas. Lakes and ponds have known to be filtering surface water as it percolates down to the water tables. These harbor a diverse variety of micro-organisms and macro-organisms forming the lake community a dynamic ecosystem. Phyto planktons and zooplanktons constitute the micro community in the lakes and ponds[7,8,9]

RESULTS

The zooplankton populations undergo natural seasonal fluctuations which can be expressed by various quantitative parameters such as population density, biomass and biochemical compounds. Seasonal changes in zooplankton species are related to the physico-chemical parameters of aquatic ecosystem (Basawarajeshwari & Ramakrishna Reddy, 2015). But due to anthropogenic interferences in these aquatic bodies like sewage disposal, agricultural runoffs, industrial discharges and other such polluting activities, there is a severe effect on the physico-chemical parameters of water. These parameters have a significant effect on the composition of lake communities as has been seen in this study also. Every parameter emphasizes a certain characteristic, which should be known in order to evaluate the role of zooplankton in that particular ecosystem. In India, considerable work has been done on ecology and seasonal distribution of zooplankton than other tropical and subtropical countries. Because of their heterotrophic activity, zooplanktons play an important role in the cycling of organic materials in aquatic ecosystems and are used as bioindicators of environmental quality. [10,11,12]

Table 1: Comparative water quality status of selected water bodies of Udaipur

Parameter	Swaroop Sagar				Hiratalai				Nursery Pond			
	Sept.	Jan.	May	Avg.	Sept.	Jan.	May	Avg.	Sept.	Jan.	May	Avg.
AT	28.2	21.9	37.2	29.1	29.3	20.6	32.1	27.3	28.2	19.9	34.1	27.4
WT	26.0	20.4	32.8	26.4	27.5	18.8	30.5	25.6	26.4	18.5	32.5	25.8
VIS	23.5	39.7	26.0	29.4	29.5	37.0	34.0	33.5	62.8	69.9	60.3	64.3
pH	8.6	8.8	8.1	8.56	8.9	7.3	7.7	7.96	7.6	8.2	7.8	7.86
EC	0.152	0.138	0.135	0.140	0.118	0.107	0.080	0.100	0.049	0.046	0.050	0.040
DO	6.48	8.30	5.00	6.59	7.08	8.60	5.82	7.16	6.62	7.10	5.60	6.44
TA	220.0	218.0	156.0	198.0	126.0	187.0	168.0	160.3	134.0	174.0	163.0	157.0
NIT	1.30	1.05	1.42	1.25	0.28	0.20	0.21	0.23	0.31	0.29	0.27	0.29
PHP	0.170	0.150	0.720	0.346	0.060	0.070	0.090	0.073	0.005	0.013	0.007	0.008

AT = Air temp. (ºC), WT= Water temp. (ºC), VIS= Visibility (cm), EC = Electric conductivity (mMho), DO = Dissolved oxygen (mg/l), TA= Total Alkalinity (mg/l), NIT= Nitrate (mg/l), PHP= Phosphate (mg/l)

Table 3: Comparative Zooplanktonic biomass (No./l) in selected water bodies of Udaipur

ZOO	Swaroop Sagar			Hiratalai			Nursery Pond		
	MON	WIN	SUM	MON	WIN	SUM	MON	WIN	SUM
CLA	106	123	82	13	35	15	9	12	6
COP	19	34	9	15	34	23	4	9	11
ROT	117	103	70	46	29	13	7	5	15

ZOO = Zooplanktons, CLA= Cladocerans, COP= Copepods, ROT= Rotifers, SS= Swaroop Sagar,

HT= Hiratalai, NP= Nursery Pond, MON= Monsoon, WIN= Winter and SUM= Summer

Table 2: Zooplanktonic taxa recorded from three water bodies of Udaipur

Zooplankton	Swaroop Sagar			Hiratalai			Nursery Pond		
	Sept. 03	Jan. 04	May 04	Sept. 03	Jan. 04	May 04	Sept. 03	Jan. 04	May 04
CLADOCERA									
Daphnia sp.	+	+	+	+	+	+	+	+	+
Ceriodaphnia sp.	+	+	+	-	+	-	-	-	-
Moina sp.	+	-	+	-	+	-	+	+	-
Simocephalussp.	+	-	-	-	-	-	-	+	-
Bosmina sp.	-	+	-	+	+	-	-	-	+
COPEPODA									
Cyclops sp.	+	+	+	+	+	+	+	+	+
Mesocyclops sp.	+	-	-	-	-	+	-	+	-
Nauplii	+	+	+	+	+	+	+	+	+
ROTIFERA									
Brachionus sp.									
B. calyciflorus	-	+	+	-	-	-	+	+	+
B. rubens	+	-	+	+	-	-	-	-	-
Asplanchasp.	-	-	-	+	-	-	-	-	-
Keratellatropica	+	-	-	+	-	-	-	-	-

Table 4: Interrelationship (Karl Pearson's coefficient) between various environmental parameters in different water bodies and zooplankton abundance

Parameter	Swaroop Sagar			Hiratalai			Nursery Pond		
	Cladocerans	Copepods	Rotifers	Cladocerans	Copepods	Rotifers	Cladocerans	Copepods	Rotifers
AT	-1.00	-0.98	-0.71	-0.95	-0.78	-0.22	-1.00	0.18	0.91
WT	-1.00	-0.99	-0.67	-0.95	-0.78	-0.23	-1.00	0.21	0.92
VIS	0.72	0.85	0.02	0.85	0.98	-0.61	0.96	-0.01	-0.82
pH	0.99	0.94	0.80	-0.75	-0.93	0.73	0.65	0.54	-0.37
EC	0.26	0.05	0.87	0.16	-0.19	0.97	-0.96	0.00	0.82
DO	0.99	1.00	0.59	0.85	0.62	0.44	0.98	-0.47	-0.99
TA	0.90	0.79	0.94	0.79	0.95	-0.69	0.27	0.85	0.06
NIT	-0.96	-1.00	-0.47	-0.66	-0.88	0.81	0.50	-0.97	-0.76
PHP	-0.92	-0.82	-0.92	-0.11	0.24	-0.98	0.72	0.47	-0.45

Cladoceran diversity showed an overall positive correlation with dissolved oxygen and total alkalinity of the water. Rotifer diversity was affected by electric conductivity more than cladocerans and copepods. Copepod diversity is more affected by changing nitrate levels in water than phosphate levels. In Nursery Pond, the overall zooplankton diversity showed more fluctuation with changing physico chemical parameters whereas diversity of larger water bodies of Swaroop sagar and Hiratalai was relatively less affected with the changing environmental factors.[13,14,15]

CONCLUSION

Zooplankton are the animal (or heterotrophic) component of the planktonic community (the "zoo-" prefix comes from Ancient Greek,having to consume other organisms to thrive. Plankton are aquatic organisms that are unable to swim effectively against currents. Consequently, they drift or are carried along by currents in the ocean, or by currents in seas, lakes or rivers.

Zooplankton can be contrasted with phytoplankton, which are the plant (or autotrophic) component of the plankton community (the "phyto-" prefix comes from Ancient Greek: φῠτόν, romanized: phutón, lit. 'plant'). Zooplankton are heterotrophic (other-feeding), whereas phytoplankton are autotrophic (self-feeding), often generating energy through photosynthesis. In other words, zooplankton cannot manufacture their own food. Rather, they must eat other organisms instead. In particular, they eat phytoplankton, which are generally smaller than zooplankton. Most zooplankton are microscopic but some (such as jellyfish) are macroscopic, meaning they can be seen with the naked eye[16,17,18]

Many protozoans (single-celled protists that prey on other microscopic life) are zooplankton, including zooflagellates, foraminiferans, radiolarians, some dinoflagellates and marine microanimals. Macroscopic zooplankton include pelagic cnidarians, ctenophores, molluscs, arthropods and tunicates, as well as planktonic arrow worms and bristle worms.

The distinction between autotrophy and heterotrophy often breaks down in very small organisms. Recent studies of marine microplankton have indicated over half of microscopic plankton are mixotrophs. A mixotroph is an organism that can behave sometimes as though it were a plant and sometimes as though it were an animal, using a mix of autotrophy and heterotrophy. Many marine microzooplankton are mixotrophic, which means they could also be classified as phytoplankton.[19,20]

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