

Macro Invertebrate Diversity of Adan Dam, Karnja, Washim, MS, India

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Abstract

Pollution is a major cause of environmental deterioration. Rapid growth of population, industrialization and urbanization resulted into pollution of environment. The use of macro-invertebrates as bio-indicator in the assessment of water quality realised better understanding in the field of limnology as compared to biotopes characteristics. Several Crustaceans, Insects and Molluscs are the tolerant species in the changing condition of water ecosystem. Adan Dam is enriched by nutrients, macrophytes and aquatic vegetation. Rich Zooplankton and Phytoplankton community influence the diversity of benthic fauna.

Keywords: Adan Dam, Macro Invertebrate Diversity.

1. Introduction

Any human activity in the whole of the watershed is bound to influence the water in the reservoir and downstream. Deforestation, Grazing and otherwise removal of vegetal cover in the water shed generally results in accelerated silting of the reservoir. The agricultural practices in the catchment area not only helps in silting but are also responsible for the addition of large quantities of nutrients, pesticides and organic matter brought into the lake by the runoff through the streams.

In India, the water resources are under great stress. Aquatic organism constitute a vital link in food chain in the aquatic ecosystem and its productivity directly depends oil abiotic features of the water. Hence, knowledge on abundance composition and seasonal variation of aquatic communities help in planning and successful management of water bodies.

A remarkable work on Physico-chemical characteristics with reference to flora and fauna of lentic and lotic ecosystems of this region is done by Belsare and Oommachan [1] on lower lake of Bhopal: Oommachan and Belsare [2] on lower and upper lakes of Bhopal and Rao et al. [3] on the river Khan, Indore, Madhya Pradesh.

2. Materials and Method

The Adan Dam is selected for present investigation is located near Pimpri forest Ta. Karanja lad Dist. Washim, having latitude 19.09 and altitude 78.21 . The catchment area of Dam is 798 km., gross storage 78.32 cubic m., hight 30 m. length 3870 m., submerge area 70.16 hector, maximum water level 388.55 m and minimum water level 372.55. it is surrounded by open hills towards East which drain water during raining. It also receives waste water from the neighbouring Villages. Human activities like washing of clothes and vehicles are predominant of villagers. The area of dam is bound by marginal weeds and vegetal coverage on which domestic animals graze, adding their excreta into the water. The physico-chemical parameters were analysed as per prescribed method of APHA [4].

Similarly, Macrophytes and Zoobenthos were identified with the help of Adoni [5]. The water samples collected in plastic bottles ,brought to the laboratory and analysed within 24 hrs.

3. Results and Discussion

The dam was found to be inhabited by a variety of benthic fauna all through the period of investigation. Seven different sampling stations were selected considering specific morphometric characteristics of the water body. Annual range and mean values of Macro-invertebrates are presented in Table 1, while population abundance is given in Table 2. The Macro- invertebrates recorded from the dam belonged to crustacea, insect and mollusca. The molluscan population dominated the benthic fauna. The crustaceans found in the lake were shrimps, prawns and crabs. The shrimps and prawns were abundant at station V and VI, while crabs were found to be maximum on the shore line near sampling stations I and IV. The shrimps and prawns identified were *Macrobrachium kistnensis*, *Macrobrachium malcomsoni* and *Caridina nilotica*. *Paratelpus amacanni*; *P. cunicularis* and *P. hydrodromus* were among the crabs.

Table 1: Annual range and mean values \pm S.E. of Macroinvertebrates (org/m²) from different sampling stations of Adan dam

Sr.No	Sampling Station	Range	Mean		\pm S. E
			Minimum	Maximum	
1	Station -I	012	098	044.79	+08.06
2	Station -II	018	140	050.29	+20.65
3	Station -III	058	530	182.43	+12.49
4	Station-IV	812	3780	1528.57	+20.8
5	Station -V	830	3943	1592.64	+66.49
6	Station -VI	680	2090	1131.21	+58.92
7	Station -VII	207	712	308.93	+15.51

Table 2: Population abundance of Macroinvertebrates (.org/in2) at different sampling Station

No.	Macroinvertebrates	I	II	III	IV	V	VI	VII	Total
1	Crustacean	502	159	1728	4432	7044	7622	239	21726
2	Insects	98	321	1538	5962	4889	6024	829	19661
3	Molluscs	27	224	1059	11006	10364	4711	1486	28877
		627	704	4325	21400	22297	18357	2554	70264

Table 3: Matrix showing Correlation and significance levels of Physico-chemical and Biotic parameters of Water from the lake Wadall. During 1995-96.

	WT	D.O.	Hard	PO4	T.Phy	W.L.	Moll	T.Zoo
WT	1							
D.O.	0.225	1						
Hard	0.350	0.435	1					
PO4	0.366	-0.077	0.512	1				
T.Phy	0.926*	0.326	0.212	0.256	1			
W.L.	0.716***	0.344	0.158	0.017	0.894*	1		
Moll	0.780***	0.543	0.697***	0.631	0.755**	0.619	1	
T.Zoo	0.759***	0.300	0.240	0.203	0.900*	0.973*	0.725***	1

Significance (*) P<0.01; (**) P<0.05; (***) P<0.1

Abbreviations. WT Water temperature, D.O. Dissolved Oxygen, Hard Water hardness, PO, Phosphate, T. Phy Total Phytoplankton, W.L. Worms & Larvae, Moll = Molluscs, T.Zoo Total Zooplankton.

Insects were abundant at and around the stations IV, V, and VI. Large number of insects reported from the lake include spring tailed *Lepidiapharius kashmirensis*; may fly, *Caenis perpusilla*, dragon flies like *Matrona*, *Macrogomphus*, *Lestes spp.: aquatic bugs*, *Nepid*, *Herbrus pusillus*; *Hydrometra vittata* a water measurer; the water treader *Mesovelonia orientalis*; the water striders *Limnometra fluviorum* and the *Microvelia diletta*; the back swimmers, *Anisopssardea* and *Plea pallula*; the water Scorpions, *Ranatra elongata* and *Laccotrophes maculata*; the giant water bugs, *Diplonychus rusticum* and *Lithocerus indicum*; the water boatman, *Corixa sp*; the diving beetles, *Cybister limbatus*, *Cybister rugulosus*, *Sandracottus festivois*, *Eretes sticticus*, *Hyphoporus sp*; Leaf beetle, *Donacia sp.* and also mosquitoes *Particularly Aedes, sp.* and *Culex Sp.*

Molluscs at the dam included bivalves and snails. Snails were abundant at station III, IV, and V. However bivalves were predominant at station III & IV only. Snails recorded were *Bellamyia bengalensis*; *Lymnea auricularia*; *Lymnea acuminata*, *Subulina actona*; *Gyrauluscon vexiusculus* and *Glessula tenuispira*. The bivalves reported from dam were *Lamellidens marginalis* and *Lamellidens corrianus*.

Benthic fauna are greatly influenced by abiotic and biotic components of water. Water temperature (r = 0.780) and water hardness (r = 0.697) showed positive correlation at 10% and 5% level respectively (Table 3). It was also observed that period of high temperature and dissolved oxygen content values are insignificant

(r=0.225). Inverse correlation with water temperature and dissolved oxygen was recorded at station I, IV, V, VI and VII. This might be attributed to the abundance of zooplankton and macroinvertebrates which at elevated temperature consume more oxygen due to increase metabolic activity. Khalaf and MacDonald [6] also reported a similar negative correlation of water temperature and dissolved oxygen. Water hardness favours the growth of Mollusc and zooplankton [7]. In the present study a positive correlation was observed between hardness and chloride favouring zooplanktons and in particular the molluscs. Similarly, high phosphate content (r=0.631) observed during present study can be attributed to the accumulation of excreta of zooplankton and macro-invertebrates that favours the growth of blue green algae. This is in confirmation with the earlier findings of Munawar [8] and Wetzel and Liken [9]. The dam sustained moderate growth of Macrophytes belonging to submerged, floating and marginal categories. 22 different species of macrophytes were recorded from the dam and its catchment area, Maximum species of macrophytes were recorded at and around sampling station IV, V, and VI. The Macrophytic flora was dominated by *Hydrilla*, *Vallisneria*, *Ceratophyllum* and *Chara spp.* The macrophytes stimulate growth of planktons and help recycling of organic matter. The submerged species of macrophytes at the margin also act as green manure favouring the abundance of zooplankton and benthic fauna observed in the present study. The marginal and submerged

macrophytes also provides suitable breeding and sheltering places for the macro invertebrate and fishes. The luxurious growth of submerged and marginal macrophytes at station IV, V and V1 create favourable environment for the abundance of macroinvertebrates. This is in confirmation with the findings of Pandit et al. [10].

Conflict of interest

No conflict of interest influenced in this research.

5. References

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