PROJECT COMPLETION REPORT

OF UGC MINOR RESEARCH PROJECT

PRESENT STATUS OF THE LAKE LANJUR NEAR KHAMGAON WITH SPECIAL REFERENCE TO ZOOPLANKTON DIVERSITY

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INTRODUCTION:-

Aquatic resources are very vast. Primary productivity paves the generation of secondary productivity i.e. zooplankton. Zooplankton biomass forms the natural forage to fishes. Zooplankton is an important intermediary phase in grazing food chain in aquatic biolop. Zooplankton biomass forming the community discloses the functional mechanism of aquatic ecosystem for which zooplankton diversity is to be known. Zooplankton diversity pattern has been studied by several workers. Das and Shrivastava (1956), Davis (1954), Avath ramani (1980) Fernandes (1980), kofold (1908).

Present study reported the hydro-biological studies comprising physico-chemical analysis of water samples, identification, diversity pattern of zooplankton biomass, from lake lanjur.

FIELD SITE:-

Lanjur minor irrigation scheme comes under jurisdiction of irrigation Sub-Division, Khamgaon, Division-Buldana and Akola circle, Maharashtra. It is 9 km away from Khamgaon on Mumbai- Kolkata national highway No. 6.

The salient features of lanjur lake is as below.

Sr. No.	Particulars		Description
1.	**A)** Main River Basin	:-	Tapi Basin
2.	Place/Village	:-	Near village chikhali (kd)
3.	Latitude	:-	20^0-45'-00''
4.	Longitude	:-	76^0-30'-00''
	B) Yield & Utilization		
5.	Catchment area	:-	17 sq. km
6.	Average Annual rainfall	:-	685 mm
	C) Reservoir Storage		
7.	High Flood Level	:-	101.70 m

8.	Gross storage	:-	100.50 m
9.	Dead storage	:-	95.20 m
	D) Submergence		
10.	Area under submergence	:-	91.18 Ha
11.	Submergence ration	:-	3.22
	E) Dam		
12.	Type of Dam	:-	Earthen Dam
13.	Length	:-	1215 m
14.	Maximum Height of Dam	:-	12.55 m
	F) Spillway / Waste Weir		
15.	Types of spillway	:-	Clear over fall
	G) Outlet		
16.	No of outlet gates	:-	One
17.	Outlet sill level	:-	95.20 m
18.	Full supply discharge	:-	0.36 m^3/sec

MATERIAL AND METHODS:-

Sampling sites were selected on the basis of aquatic vegetation, human activity, cattle activity, bund area. Monthly water samples were collected in sampling bottles. Water samples were analyzed back in the laboratory for number of physico-chemical parameter following the procedures given in standard methods (APHA, 1985) and Trivedi and Goel (1986).

Plankton was collected by employing plankton net of bolting silk No. 25. Plankton upon preservation was analyzed qualitatively and quantitatively by using drop count methods. The methodology used for water analysis and zooplankton studies is based on Edmondson (1959), Pennak (1978) Tonapi (1980), APHA(1985).

ANALYSIS OF PHYSICO-CHEMICAL PARAMETERS :-

1) To record the water temperature at each sampling site the mercury thermometer (0.1^0c) was used by dipping the thermometer directly into water likewise air temperature was also recorded.

2) pH is the measure of relative acidity or alkalinity. At each sampling site pH was recorded by BDH colour chart and by deploying digital pH meter. Later on it was confirmed by electrical pH meter maintained in lab at room temp.
3) Modified Winkler's method was used to determine dissolved oxygen in mg/l
4) Free carbon dioxide dissolved in water is the chief source for assimilation in animals. It is estimated tirimetrically in laboratory.
5) In fresh water total hardness is mainly attributed to calcium and magnesium cations. It is determined by titration in mg/l.
6) Upon employing the plankton net of bolting silk No. 25 filtering the water through, the plankton transferred in bottle and preserved in 5% formalin. Few drops of glycerin were added to it.

Zooplankton were identified using key Dodson and Fery (1991) and Williamson (1991) Tonapi (1980). Quantitative analysis was done using drop count method. Depending on diversity of plankton 5 to drops were analyzed from each sample after uniform mixing.

Organisms/Litre = $A \times \frac{1}{L} \times \frac{N}{V}$

Were A = No. of organism per liter

V= Vol. of one drop in ml

N = Total volume of concentrated sample in ml.

L= Volume of original sample in liters.

Qualitative analysis of zooplankton was done using compound and research microspores. Separating each type, species and then counting them the data was maintained for all sites under the different groups such as protozoa, Rotifera, copepoda, cladocera, ostracoda etc. Group wise relative findings were recorded.

RESULTS AND DISCUSSION:-

The physico-chemical parameters exhibited seasonal variations at all the sites. The values given the table are average values of the two years for corresponding months.

Table-1

Average values of all sites for 2004-2006

Parameters	April	May	Jun	July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Max	Min
Air Temperature	30. 6 29.4	39.80 40.20	34.10 32.00	31.60 32.40	29.10 27.90	27.30 26.70	28.20 27.90	27.50 26.40	26.10 25.80	24.60 24.10	25.20 24.60	27.90 28.70	40.2	24.60
Water Temperature	25.90 26.30	28.00 27.90	28.00 27.00	26.60 27.60	26.20 27.10	23.9 24.5	25.60 24.60	24.4 23.8	22.9 23.2	21.5 20.5	24.2 23.9	24.8 23.8	28.0	20.50
P^H	7.70 8.10	8.0 7.9	8.2 7.6	8.0 7.2	8.4 7.7	8.3 8.4	8.6 8.2	8.8 8.4	9.0 8.8	8.8 8.2	8.0 7.5	7.8 7.2	9.0	7.2
DO_2 in mg/l	8.1 7.9	8.3 8.0	8.0 7.9	7.4 7.6	7.8 7.4	8.4 8.2	8.4 7.9	8.4 8.2	8.9 8.7	8.5 8.3	7.8 7.6	7.9 7.7	8.9	7.4
Frec Co_2 in mg/l	Nil 0.5	0.2 0.4	Nil Nil	0.3 0.2	0.4 0.3	0.2 Nil	0.3 0.4	0.5 0.8	2.00 1.7	1.1 1.2	0.5 0.3	0.2 Nil	2.00	0.2
Total Harlness in mg/L	108.1 103.1	102 107.1	99.5 97.5	96.6 94.5	94.2 94.6	92.4 91.5	90.2 94.6	89.1 87.4	99.8 98.2	100.7 97.9	103.7 98.6	106.3 104.9	108.1	87.4

ZOOPLANKTONIC GROUPS AND THEIR COMPOSITION:-

The qualitative samples wherein the materials from all study sites have been observed, showed an annual species diversity comprising Protozoa, Rotifera, Cladocera, Copepoda, Ostracoda.

Though little temporal variation of the zooplantonic population include the monthly variation in species, diversity and density at all study sites here an average is given.

Qualitative list of Zooplankton biomass.

Protozoa

1) Actinophrys species
2) Amoeba proteus
3) Arcella poripora
4) Capsellina biforum
5) Centropyxis arcelloides
6) Ceratium hirudinella
7) Chlamydomonas minor
8) Euglena acus
9) Euglypha ciliata
10) Paramoecium aurelia
11) Stylonophia mytilus
12) Volvox aureus

Rotifera

1) Asplanchna priodeta
2) Brachionus bidentata
3) Brachionus calyciflorus
4) Brachionus caudata
5) Brachionus falcatus
6) Cephallodella forficula
7) Filinia longiseta
8) Keratella quadrata

9) Keratella tropica
10) Keratella vulga
11) Lacane luna
12) Trichocera cylildrica

Cladocera

1) Alona species
2) Bosmina Longirostirs
3) Ceriodaphnia laticaudata
4) Chydorus sphaericus
5) Daphnia levis
6) Daphnia similis
7) Moina brachita
8) Moina sp.

copepoda

1) Cyclops sternuss
2) Cyclops viridis
3) Diaptomus breweri
4) Diaptomus minutes
5) Eucyclops agilis
6) Mesocyclops edax
7) Mesocyclops leuckarti
8) Mesocyclops sp.

Ostracoda

9) Candona simpsoni
10) Cyclocypris globosa
11) Cyclocypris ovum
12) Cypris subglobossa
13) Cyprinotus glaucus

In aquatic ecosystem zooplankton occupy a central position in foodweb forming integral part of lentic community. Significantly they constitute the

biological productivity of freshwater ecosystem. As consumer it plays a key role in recycling the organic matter. The zooplankton density was ranged from 30.2 to 816 individuals / litre. Higher density occurred in summer, while least density occurred in rainy season. This may be due to high temp. when multiplication and metabolic activities are increased resulting in their abundance. Rotifers indicate trophic status of water Body showing positive correlation between abiotic factors like pH, total hardness, $DO_{2.}$

Protozoan population is more in April and least in August attributing to high dilution water by surface runoff. Many naupliar stages of different copepod were observed throughout the investigations. Some copepods, ostracodes are reported to be intermediate or carrier host for tapeworms. The copepods form important link between autotrophs and higher trophic level in plankton, often with high biomass and high productivity. The lake water showed 35.25 % protozoon's, 40.7% rotifers, 9.13% cladocerans, 8.50% copepods and 5.98% ostracodes population. The bulk of zooplankton assemblages contributed primarily by rotifers followed by protozoon's, cladocerans, copepods and ostracodes from physical, chemical and zooplankton abundance the lake can be categoriesed as eutrophic lake. Other species variation with respect to biotic and abiotic factors help in future planning for the management of intensive fish culture. The lake is suitable for pisciculture and useful to maintain water table in sub-soils of nearby agriculture fields. However human and cattle activities in catchment area be banned.

Lake langur in one of the important lake in the area which established a definite ecosystem with its own physico-chemical and biological characteristics. These aspects are significant in monitoring water quality.

The physico-chemical characteristics of water body have direct influence over flora and fauna. Fluctuations in physico-chemical parameter often creates an adverse environment to organisms limiting to their production and reduce their ability to compete with other population within the environment.

In the present study analysis of water samples from lake Lanjud were carried out.

In an aquatic environment temperature is of the important parameter influencing water body. Rate of oxidation of organic matter is much greater during summer than in winter. The water temperature ranged between 28^0 c (May-June) and 20.5^0 c (January) compared to winter water temperature was found higher in summer and first half of monsoon. Because of less rainfall, water body being shallowed water temperature changes according to air temperature. In Vidhrabha region Khamgaon is known for higher temperature and water scarcity area. Generally water temperature was corresponding with air temperature. Though air temperature is higher.

pH is the important parameter to understand chemical condition of water body. It is measure of acidity or alkalinity. Mean pH values were found to fluctuate between 7.2 to 9.0• pH values higher than neutral (7) denote alkaline nature of lake. Aklaline nature of the water may be due to carbonates. During summer pH were lower and during winter higher pH was recorded, attributing to high photosynthetic activities. pH shows negative correlation with other parameter. Usually pH of water is influenced by geology of catchment area and buffering capacity of the water.

Dissolved oxygen is very important parameter of water quality indicating status of aquatic ecosystem. Here DO_2 content ranged between 7.4 mg/l in july and 8.9 mg/l in December.

Occurrence of Do_2 in water may be mainly due to two distinct phenomenon 1) direct diffusion form air and 2) photosynthetic evolution by autotrophs within water body. Higher dissolved oxygen was recorded during winter while lower value is found during monsoon. Nath (2001) also recorded the similar finding in Narmda estuary.

Free CO_2 content in aquatic ecosystem might be an indicator of aquatic pollution. Free carbon dioxide was very less or nil at all stations. The values range from nil to 2.p mg/l. however the mean values ranged between 0.2 to 2.0 mg/l. The absence of free CO_2 is either due to its complete utilization in photosynthetic activity by phytoplankton or inhibited by carbonates in water. This indicates that the Lanjur lake water is congenial for aquatic life. Water rich in organic content show presence of free Co_2 in morning samples accumulated due

to respiration by flora & fanna during night. Generally free CO_2 less or nil in the evening samples may be due to photosynthetic through the day time (Sahu et al.1995)

Hardness is the parameter to assess water quality. Total hardness is the sum of concentration of alkaline earth metals, cations (eg. Ca++ mg++). In freshwater hardness imparted by calcium and magnesium ions. Natural hardness of water depends upon the geo-chemical nature of the area. Hardness is governed by Ca & mg salts largely combined with carbonates and bi-carbonates with sulphates and chlorides and other anions and minerals imparting temporary and permanent hardness.

Here the hardness varied from 89.1 to 108.1 mg/l water can be classified on the basis of hardness values in the following manner :-

0-60 soft, 61-120 moderately hard, 121-180 hard, > 180 very hard (Kannan, 1991).

The maximum values recorded here during summer and minimum during winter. Rise in hardness may be due to evaporation of surface water and decaying of phytoplankton and zooplankton. Dilution of water in monsoon may be responsible for low hardness.

Investigations indicate that the lake if managed properly for zooplanktonic biomass it would be boon for pisciculture helping the nearby people as nutritive food supplement.