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ECOPHYLOGICAL STUDIES OF BORI DAM, NALDURG, DISTRICT OSMANABAD, MAHARASHTRA.

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ABSTRACT

Osmanbad district is having four medium irrigation projects, namely Terna upper, Terna lower, Sina-Kolegoan Dam and Bori dam. The bori dam is on river Bori which originates near Tuljapur. The present work was a part of survey conducted for ecophysiological studies of this dam. Water and algal samples are collected during June 2014-May 2016. Data analyzed with reference to Various physicochemical parameters like pH, temperature, transparency, TDS, Dissolved oxygen(DO), Biochemical oxygen Demand (BOD), Density, conductance, water hardness, nutrient load like Chlorides, phosphate, nitrate, sulphate, Calcium and magnesium. The study reveals. The study reveals that the water of Dam is suitable for drinking, domestic, irrigation and agriculture purposes and should be conserved at any cost. In the present study, total In all 97 species under 45 genera were identified and recorded from study sites of dam.

KEYWORDS: Ecophycology, Phytoplankton, Bori dam.

INTRODUCTION :

Surface water of lakes, streams and rivers are the major sources of fresh water. Along with the major human activities, the river basins are used for discharge of industrial effluents, municipal sewage and dumping of solid waste. Nutrients like Sulphates, Phosphates and Nitrates are added through agricultural waste, which leads to eutrophication (Mitra, 1995). This resulted into complete change in biotic and abiotic components of this aquatic ecosystem.

In order to utilize a freshwater body it is very important to study the biotic and abiotic factor influencing the biological productivity of said water body. Research in this field is not doubt of indirect assistance but it will serve as a guideline to maximize the use of the productivity of water. Such investigation estimate the productivity of any water body involves mapping the shape and depth of water body observation on the physical factor like temperature, turbidity, transparency, colour of water. Chemical factor like PH Dissolved Oxygen, free Carbon dioxide, hardness of water. In biological investigating study of micro and macro flora and fauna always provides the clear picture of the ecological relationship existing in water body.

Planktonic organisms play a vital role in aquatic environment; they form an important link in the food



chain and are capable of affecting the entire aquatic life. Study of algal flora is a useful alternative for assessing the ecological quality of aquatic ecosystems, since biological communities integrate the environmental effects of water chemistry. In addition to the physical and geomorphologic characteristics of Rivers and dams [Stevenson et al., 1999]. Phytoplankton encountered in the water body reflects the average ecological, condition and therefore, they may be used as indicator of water quality [Bhatt, et al., 1999, Saha, et al., 2000]. These are very suitable organisms for the determination of the impact of toxic substances on the aquatic environment because any effect on the lower level of the food chain will also have consequence on the higher level [Joubert, 1980].

Chemical nature of water is most important factor for distribution of aquatic plants. Physical nature of water, bottom of reservoir, fluctuations in water temperature and water level affects the distribution of aquatic plants. In present investigation it is recorded that the diversity and biomass of species was maximum during winter (November to January) and poor during summer (February to June).

STUDY AREA

Osmanabad district is part of Deccan plateau ranges between 17.5 to 18.8 latitude and 72.2 to 77.3 longitudes. It is primarily rural district occupies an area of 7569 km² of which 241.4 km² is urban and has a population of 1,660,311 of which 16.96% were urban (as of 2011). The rainy season starts from mid-June and continues till the end of September. The climate is humid in October and November and dry and cool from mid-November to January. From February to June the climate is dry and becomes increasingly hot. During summer the temperature of Osmanabad district is low compared to other districts of Marathwada region. The district gets rain from the southwest monsoon. The average annual rainfall in the district is 730 mm. Temperature Max.: 42.1 °C; Min.: 8 °C. Bori dam is located at Naldurg, Taluka Tuljapur at 17.82 N 76.3 E. It is an earthen dam 3644 ft long and 74 ft in greatest height.

MATERIALS AND METHODS:

The samples were collected and analyzed fortnightly from dam at a depth of 0.4 m from the water surface. Some water quality parameters were determined in the fields and remaining in the laboratory. Seventeen physico-chemical parameters of water viz. temperature, pH, Transparency, turbidity, Alkalinity, Conductivity, TDS, DO, Hardness, BOD, Chlorides, Calcium, Magnesium, Phosphate, Sulphates and Nitrate were estimated fortnightly for a period of two years. The physico-chemical parameters of the water were analyzed according to standard methods given in Trivedi and Goel (1984) APHA (1998) and Mukherji and Nandi (2004). The algal taxa were identified with the help of standard monographs of Desikachary (1959), Prescott (1950, 1951), Pal et al. (1962), Philipose (1967), Fritsch (1979), and Sarode and Kamat (1984).

OBSERVATION AND RESULT:

Data of the monthly variations in all hydro biological characteristics have been given in Table -1. The temperature is recorded during morning hours while collecting water sample almost at same time through the year. From temperature noted it can be concluded that temperature of water is maximum during May and minimum in December.

Transparency varies as per the season. Water becomes clear, attaining maximum transparency in the winter season. Decrease in transparency after winter, indicates increase in population of organism (Munawar, 1970).

The range of pH was between 7.10 - 8.20. There was Monthly fluctuation in pH. (Table no. 1). It was noted that pH of water at within the same range. Turbidity value of water was ranged between 7 - 13.06. Turbidity value was higher in Monsoon due to the addition of silt particles. During study maximum turbidity occur in August and minimum in December.

In the present investigation, the highest value of TDS was recorded during March to June. The high value may be due to the evaporative loss of water and consequent increase in the concentration of salts present in water (Jayaramana et al. (2003). The rain causes little bit of dilution of water thus minimum TDS values are recorded (Meera shrivastava, 2004)

The conductivity value ranges between 154 in February to May as 167.2. The accumulation of dissolved salts due to high rate of evaporation in summer increases the conductivity of water.

Present study showed maximum values of DO (8.20-9.10 mg/L) during September to November and minimum (7.20 mg/L) during January to April. Increase in DO is obviously related to decrease in temperature (Trivedy,1990; Bhawe and Borse,2001). Minimum DO value create favorable condition for development of blue green algae (Firtch,1907).

High value of BOD is observed in summer may be due to higher rate of organic decomposition. Decline of BOD from rainy season followed by winter may be due to decrease in temperature, Bhatt (1999) and Mahadav(2002).

The chloride concentration serves as an indicator of sewage pollution (Trivedi and Goel,1984). In present study chloride content of water was range 15.30mg/l to 35.29 mg/l. High chloride content was noticed in July and low was in March.

Nitrate concentration is maximum during rainy season and minimum during summer season. Nitrate concentration is related with bacterial and algal concentration that converts them in to either nitrate, ammonia fixing bacteria etc.

The Phosphate concentration is maximum during summer when volume of water is less due to evaporation losses and other losses. During rainy season the concentration of Phosphate is diluted and with gradual accumulation its concentration gradually increases.

Sulphate concentration gradually decreases in summer which reach minimum level in May and increases with influx rainwater which peak in August after that it start deplete gradually both in winter and summer.

During study maximum calcium value was noted in July to September and minimum value was noted during December to February. During summer season higher values of sulphates were recorded where as in winter and rainy season less amount were detected.

Phytoplankton showed abundance in winter (November-December). It was due to the low value of temperature, Turbidity; moderate value of nutrients; and high value of DO,PH and Hardness. Phytoplankton was comprised of members of Chlorophyceae, Cyanophyceae, Bacillariophyceae, Charophyceae and Euglenophyceae. Among these Chlorophyceae was dominant.

Data on the monthly variation in hydro biological characteristics have been given in Table 1

Months/ Parameters	May	Jun	July	Aug	Sept	Oct
Water Temp.	33.00	24.50	24.20	25.20	23.60	20.40
pH	7.60	7.40	7.60	7.50	7.40	7.20
Transparency	39.00	24.00	22.00	24.00	28.00	35.00
Turbidity NTU	8.6	8.9	11.5	13.6	12.87	12.3
Alkalinity	63.10	34.80	35.80	39.60	41.50	58.0
Conductivity	167.2	140.3	144.2	140.6	132.3	132.2
TDS	225	190	82	80	84	82
DO	7.80	7.20	7.30	7.40	8.20	9.50
COD	43.82	38.40	29.10	19.3	18.10	22.11
Hardness	116.0	116.4	116.30	98.40	120.0	120.0
BOD	24	23	23	16	8	5
Chlorides	24.30	30.03	35.29	33.12	31.22	27.35
Calcium	148.20	188.40	213.59	207.30	212.14	175.10
Magnesium	110.18	135.37	149.9	147.5	153.2	134.10
Phosphate	2.04	1.93	.063	1.00	0.74	1.30
Sulphates	14.10	6.90	7.90	8.20	8.30	2.90
Nitrate	0.10	0.09	1.01	1.03	1.04	1.12

Nov	Dec	Jan	Feb	Mar	Apr
19.40	18.20	20.30	21.80	23.20	28.30
7.20	7.10	8.00	8.20	8.30	8.20
52.00	68.00	69.00	64.00	56.00	45.00
8.9	8.28	7.0	7.0	7.5	7.9
60.90	68.45	71.80	53.60	55.40	60.60
118.6	124.3	145.6	154.2	179.8	167.7
73	90	120	150	220	222
9.10	7.20	7.30	7.40	7.20	7.20
28.63	32.51	25.90	29.00	46.90	45.03
117.0	134.0	137.0	170.0	117.0	170.0
3	4	5	14	18	21
19.67	19.10	17.4	18.0	15.30	17.53
152.10	144.80	120.17	136.13	155.11	154.01
123.47	114.7	92.31	100.3	114.20	116.12
1.90	1.95	2.10	2.00	2.04	2.04
5.20	7.10	8.0	9.00	10.90	11.20
0.73	0.43	0.20	0.23	0.11	0.10

Chlorophyceae was comprised of members of Chlorococcales, desmids and Zygenematales. The dominant species were *Cladhophora sp.*, *Closterium sp.*, *Oedogonium sp.* and *Ulothrix sp.* A majority of the planktonic blue-green consists of members of the coccoid family chroococcaceae and filamentous family Oscillatoriaceae, Nostocaceae and Rivulariaceae. A majority of the planktonic algae belong to the orders Euglenales e.g *Euglena acus*, and *E. gracilis* The *Charophyceae* is represented by species of *Nitella* and *Chara*. Bacillariophyceae, represented by the species of *Cyclotella*, *Fargilaria*, *Mastigloia*, *Gyrosigma*, *Navicula*, *Pinnularia*, *Cymbella*, and *Surirella*. Maximum number of algae was observed from December to April and to some extent in May (Venkateswarlu, 1969a; Shastri et al., 2004). During and after rainy season benthic and filamentous algae were seen.

DISCUSSION:

Major phytoplankton taxa present in the dam are Chlorophyceae, Cyanophyceae, Bascillariophyceae and Euglenophyceac. Maximum number of algae was observed from December to April and to some extent in May. The plankton showed abundance during winter, and were minimum number in monsoon. Relatively low values of tempture, water current and turbidity; moderate value of nutrients; high values of D.O. ,pH and hardness, were the factors responsible for plankton abundance in winter, whereas high turbidity and dilution in the concentration of some salts during monsoon were associated with the minimum number of plankton.

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