



Studies on Physico-Chemical Parameters of Parola Dam in Hingoli District-Maharashtra

Research Paper—Zoology

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Introduction -

India being a large country having varied agro-climatic conditions and is bestowed with a vast expanse of inland waters in the form of nadi, canals, estuaries, lagoons, natural lakes, brackish water impoundments, mangroves, wetlands and above all, reservoirs constituting the bed rock of inland fisheries. According to (Jhingran, 1975) the total manmade reservoir area in India is about 109496.616 hectare, Out of which 40% is formed by small reservoirs and tanks. The water of Parola dam is used for irrigation and also for fishing purpose. Physico-chemical parameters of this water body greatly reflect the biological productivity. Better understanding of aquatic environment and productivity of aquatic communities are pre-requisites for sufficient utilization of these resources for human welfare. Proper scientific management of any water body will not only enhanced the state economy but also fulfill the protein calorie requirements of the people. The water of Parola dam is used for irrigation, drinking & other domestic purpose. It is necessary that the quality of drinking water should be checked at regular time intervals because due to use of contaminated drinking water population suffers from a variety of water borne disease. However, no work has been carried out on the limnology of this ecosystem that is why present study was planned.

Study area -

Parola dam is one of the minor irrigation projects in Marathwada region of Maharashtra. Its construction was started in 1964-65 and completed in 1971. The dam is situated near village Parola in taluka and Dist Hingoli on a tributary of Kayadhu river which itself is a tributary river Godavari. It is 2 miles away from Hingoli Akola road and 2 miles D/S of village Kalgaon. The three nalas arise from the hillocks from a point 4 miles upstream of the dam. The three nalas confluence in the dam. It is situated in the latitude $19^{\circ} - 47'$ and longitude $77^{\circ} - 09'$. The dam submergences the total area of 177.80 acres. The gross commanding area of dam is 1559 acres, while catchments is spread across 6.76 sq. miles.

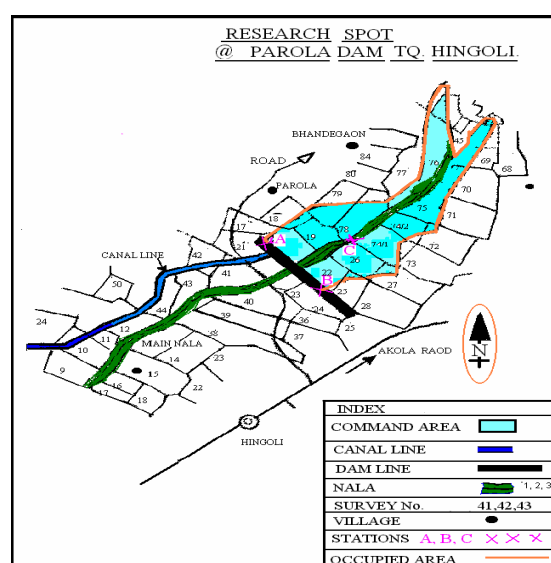


Figure 1 : The Parola dam showing three sampling stations

Materials and Methods -

For the present investigation three sampling stations were selected viz. station A is located near the gate of canal from which the water is supplied for irrigation, station B is located near the saddle portion and station C is located near the confluence of three nalas. Water samples were collected once in a month from the Parola dam for a period of one year from February 2003- January 2004 at selecting three stations described above. Samples were collected between 8 a.m.-11 a.m. and were transported to the laboratory immediately. The temperature was recorded at the time of sampling using centigrade thermometer. The transparency was measured with the help of secchi disc. P^H was measured using electronic portable P^H meter. Other parameters like DO, BOD, Alkalinity and Total Hardness etc were analyzed in the laboratory according to the methods, suggested by APHA(1989) and Trivedy and Goyal(1986).

TABLE - 1 : Physico - chemical parameters of Parola dam (Station A)

Parameters	Units	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Max	Min	Average
Water Temp.	°c	22.5	28	32.2	34.5	31	27	26	27.3	29	27	22.5	22	34.5	22	27.41
Water Transparency	Cm	59	64	69.4	76	59	41.2	33.3	30.2	38	47	51.2	56	76	30.2	52.02
Total solids	mg/l	278	293	305	328	364	385	405	414	385	330	290	265	414	265	336.83
P ^H		7.2	7.4	7.6	7.9	7.7	7.5	7.2	7.3	7.3	7.2	7.2	7	7.9	7	7.37
DO	mg/l	6.1	6.0	5.5	5.1	5.8	6.3	6.9	7.2	7.4	8.1	8.4	8.8	8.8	5.1	6.8
BOD	mg/l	6.5	15.5	18.8	20.3	17.5	16.3	15.6	14.8	14.0	13.3	7.7	4.1	20.3	4.1	13.7
Alkalinity	mg/l	93	141	174	198	170	137	130	125	120	110	99	81	198	81	131.5
Total Hardness	mg/l	135	137	139	143	147	150	153	160	145	142	125	133	160	125	142.41

TABLE - 2 : Physico - chemical parameters of Parola dam (Station B)

Parameters	Units	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Max	Min	Average
Water Temp.	°c	23.5	28.5	31.5	34	31.2	27.4	26.5	27	28.5	27.2	23.5	22.5	34	22.5	27.60
Water Transparency	Cm	57.8	63.5	70.1	76.4	57	42.3	33	28.2	41.3	48	50	52	76.4	28.2	51.62
Total solids	mg/l	284	297	309	339	364	376	395	403	379	336	305	274	403	274	338.41
P ^H		7.2	7.4	7.7	7.8	7.6	7.4	7.2	7.4	7.4	7.3	7.1	7	7.8	7	7.37
DO	mg/l	6.4	6.2	5.8	5.2	5.8	6.0	6.3	7.0	7.5	8.3	8.7	8.9	8.9	5.2	6.84
BOD	mg/l	7.0	14.9	17.5	21.8	17.4	16	14.1	13.9	14.5	10	9.2	3.9	21.8	3.9	13.35
Alkalinity	mg/l	99	142	170	189	167	135	129	123	122	115	92	83	189	83	130.5
Total Hardness	mg/l	137	139	141	144	148	151	154	158	140	144	127	135	158	127	143.16

TABLE - 3 : Physico - chemical parameters of Parola dam (Station C)

Parameters	Units	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Max	Min	Average
Water Temp.	°c	23	28	32	33.9	31	27.2	25	26.9	29	28	23	22.2	33.9	22.2	27.43
Water Transparency	Cm	58.8	64	69.5	76	57.5	46	34	23	38.2	47.2	51	54	76	23	51.60
Total solids	mg/l	296	304	316	340	365	378	387	393	363	328	285	272	393	272	335.58
P ^H		7.1	7.3	7.6	7.9	7.8	7.6	7.3	7.4	7.3	7.4	7.3	7.1	7.9	7.1	7.42
DO	mg/l	6.8	6.5	6.0	5.3	6.0	6.3	6.8	7.2	7.4	8.5	8.9	9.0	9.0	5.3	7.05
BOD	mg/l	7	15.1	18.2	24.6	19.9	17	15.3	15	14.8	12.5	7.6	4.9	24.6	4.9	14.32
Alkalinity	mg/l	96	145	175	192	172	140	136	130	125	119	95	87	192	95	134.33
Total Hardness	mg/l	139	140	142	145	149	153	157	162	145	146	126	137	162	126	145.08

Results and Discussion -

The data for various physico-chemical parameters at different stations after monthly observation (station A,B, and C), indicating their minimum, maximum and average values have been mentioned in Tables 1, 2 and 3 respectively.

Water Temperature -

The temperature is one of the important physical factors, which affects the chemical and biological reactions in water. It regulates the rate of photosynthesis in aquatic ecosystem. It was found in accordance with the seasonal changes. The water temperature fluctuated in the range of 22°C to 34.5°C reveal that Parola dam is highly productive reservoir. Reservoirs having water temperature more than 22°C are the highly productive reservoirs Sugunan (1995). It was higher in April, May and June and relatively lower in monsoon and winter, Welch (1952). The lower water temperature recorded during winter months was due to rarely rainfall and cold weather. Higher temperature during summer i.e. April & May was associated with longer photoperiod, bright sunshine, dry wind and other conditions.

Water Transparency -

The transparency of water body is affected by the factors

like planktonic growth, rainfall and water level. Transparency values were varied from 23 to 76.4 cm. Transparency was recorded to be maximum in the month of May and minimum in the month of September. Minimum transparency in the month of September could be due to the heavy sewage and silt discharge along with rain water flow inside the dam. The maximum in the month of May due to the sedimentation of suspended soil particles due to reduced flow.

Total Solids -

In the present investigation, total solids values were found to be in the range between 265 to 414 mg/l. The total solids were found to be maximum in the month of September and minimum in the month of January at all the three stations.

P^H -

It is the scale of intensity of acidity and alkalinity of water and measures the concentration of hydrogen ions. Most of the biological processes and biochemical reactions are P^H dependent. P^H is considered as an indicator of over all productivity that causes habitat diversity (Minns, 1989). P^H values ranged between 7 to 7.9. The water of Parola dam was slightly alkaline in nature at all the three stations. The

P^H value was within the tolerance limit of Indian standard 2296 (1982). P^H value fluctuated widely and was more than 7 through out the investigation, there by indicating that photosynthetic activity exceeded the respiratory activity.

DO(Dissolved oxygen) -

It is one of the important parameter in water quality assessment and reflects the physical and biological processes prevailing in the water. The dissolved oxygen values varied from 5.1 to 9 mg/l. The level of DO was very less in summers (May). This is because of the low solubility of gases at high temperature (Hynes, 1978). Further, in summers the amount of water also gets decreased and becomes more concentrated with pollutants. This also consumes more oxygen, for the oxidation of organic contents (Sharma *et.al.* 1981) Increase in DO during winter i.e. January months might be due to higher solubility of oxygen at lower temperature (Verma and Sarita Rani, 1984) and high productivity of vascular plants (Sugunan, (1995). The DO of Parola dam also exceed the limit of 5 mg/l as per European Environmental Commission (Chapman, 1997).

BOD(Biochemical Oxygen Demand) -

BOD is the direct indication of the extent of pollution in the water body. It is the amount of oxygen required by living aquatic organisms for their physiological process. BOD values were varied from 3.9 to 24.6 mg/l. BOD values exhib-

ited a trend opposite to DO values. The BOD was high in summers (May) than in winters (January). The reasons were the same as discussed above.

Alkalinity -

Alkalinity is the measure of the capacity of the water to neutralize a strong acid. The Alkalinity in the water is generally imparted by the salts of carbonates, silicates, etc. together with the hydroxyl ions in free state (Trivedi and Goyal, 1986). The concentration of Alkalinity ranged from 81 to 198 mg/l. During the present study higher alkalinity values were observed in summer followed by monsoon and winter.

Total Hardness -

The hardness of water is not pollution parameter but indicates water quality. The total hardness is mainly due to the presence of calcium and magnesium. Total Hardness values were varied from 125 to 162 mg/l. The higher values of total hardness were recorded during monsoon and lower values were during the winter season.

Conclusion -

The results revealed that there was significant seasonal variations in some physico – chemical parameters and most of the parameters where in the normal range and indicated better quality of water resources.

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