LIMNOBIOOLOGICAL STATUS AND SCOPE OF FISHERIES IN SAJHI LAKE SITUATED AT MOTIHARI BLOCK OF EAST CHAMPARAN

Nand Kishor Prasad
P.G. Department of Zoology,
B.R.A.Bihar University, Muzaffarpur.

I. INTRODUCTION

The East Champaran district (Headquarter: Motihari) is located between 26°15' to 27°01' N latitudes and 84°28° to 80°18° E longitudes. The total area of the district is 4155 sq. km. A very hot and dry summer, southwest and northeast monsoon season characterize the climate of district. The district is very rich in natural water resources having several rivers, ox-bow lakes (mauns), ponds, tanks, chaurs and canals. The district is drained by several river streams. From the northwest to southeast the drainage system of the district comprises of Gandak, Burhi Gandak (Sikrahana) and its tributaries. There are lots of ox-bow lakes and cut-off meanders. The total wetland area in the district is 12477 ha, which includes the area contributed by 755 small wetlands (<2.25 ha) which comprises about 3% of the geographical area of the district. River/streams comprise about 49% of wetland extent of the district that accounts for 6134 ha. The other major wetland types are ox-bow lakes / meanders (1281 ha), natural water logged areas (1481 ha) and lakes / ponds (862 ha) (NWA: Bihar, SAC, ISRO, Ahmadabad, 2010).

Among these water bodies of East Champaran district, there is an Ox-bow lake known as Sajhi Lake. This lake is located between 26°39'41" N latitude and 84°95'03" E longitudes. This Lake is Perennial and about 'U' Shaped with one short arm. It is situated at about 15km south east from Motihari. A State Highway "Motihari-Pakari Dayal Road" passes along Sirsa Bazar. From Sirsa a narrow Pitch Road starts to connect it with Pipra Kothi. About 2km ahead a very big village Dhekaha starts which itself. constitutes 3 Panchayats. On the west side of this Road this Lake initiates and runs towards south upto about 3km long and then turns west to be connected with Dhanauti River by a canal and sluice gate.

Champaran District has the honour to be associated with Mahatma Gandhi's Satyagrahandolan. The villages near this Lake mostly have poor farmers and laborers, which were forced to grow indigo in steed of food crop. Gandhiji visited first of all Pipra in 191 which is very nearer to this place.

This lake has an area of about 70 ha.. On west side of this Lake a mini forest having green areas & wild animals has increased its's beauty. It has been estimated that about 250-300 fishermen are actively engaged in Sajhi Lake. The main fishes are Labeo, Catla, Mrigala, Mangur, Garai, Singhi, Pateya, Pothia etc. Shell fisheries are also very common in this lake. Nets and gears are of very primitive type and generally of smaller mesh bars. Traps are extensively used. The average fish yield ranges between 40 and 200kg/ha.

II. MATERIAL AND METHOD

Material for present study was fisheries survey of Sajhi Lake Champaran with emphasis on physio chemical conditions of water, plankton position and annual fish catch composition. Michael (1984) was followed for water parameters and plankton study. Ricker (1958) was followed for observing annual fish catch composition. The observations were done for one year, i.e., from January 2011 to December 2011

III. RESULTS AND DISCUSSION

ABIOTIC FACTORS OF SAJHI LAKE

Physico-chemical factors and planktons play important roles in fish production in a water body. In the present observations water temperature ranged between 12.5-34.5°C Indian major carps usually tolerate 20°C range of temperature. Grass carps and silver prefer temperature below 30°C, whereas Indian major carps thrive well in temperature ranger 18.3-37.8°C (Jhingran, 1985). Review of literature shows that the upper lethal temperature limit of air-breathing fishes lies between 39-41°C.

There is no perennial source of water supply to these lakes except through narrow channels in rainy months. Rainfall ranged from 10.786 mm and water level ranged in such a way that rate of fall in water level was more than one meter per annum. The rate in fall of water level should be less than one meter/annum for a normal fish farm. The excessive fall in water level may, therefore, not be favourable for fishes.

Transparency values are indications of turbidity. The turbidity tolerance of different cultivable species has not been studied systematically but the Indian major carps and other culturable plain dwelling fishes tolerate the prevailing high ranges of turbidity. In the present observations as the transparency values ranged between 52-170 cm. The lakes may not be regarded highly turbid and injurious to fishes. Moreover direct injury to fish. Apparently attributed to nontoxic suspended matter has been demonstrated under laboratory conditions in tests with concentrations not commonly encountered in both natural and polluted waters (Jhingran-1985).

In the present observations dissolved oxygen (Do) values ranged between 6.20-7.50 ppm. In course of present observations Do values showed increasing trend during winter month. But after all DO values are too favourable in these lakes. According to Banerjee (1967) DO values below 5 ppm may be considered unfavourable for a productive fish pond, where as above 7 ppm suitable for a productive water body.

Free CO2 and pH in water are correlated. In the present observations pH values ranged 7.15-8.30 through the minimum values indicated acidic nature of water, it changed with the change in CO2 values. These values (alkaline) of pH are favourable for fishes in these lakes as pH values of 7-8 (Hora and Pillay, 1962), 6.5-7.5 (Banerjee, 1967) and 6.5-9.0 (Single, 1967) are most favourable for a productive pond. But the maximum values of CO2 in these lakes may not be considered quite favourable for fishes as they reduce the pH values. But at the same time free CO2 in these lakes may not be considered otherwise, as it is essential for primary productivity of phytoplankton and macrophytes.

The phosphate content ranged between 0.30-0.70 PPM mg/l. It is important for the production of phytoplankton. Zooplankters also utilize phosphorus in organic forms. Eutrophication flows in the expectation of water management in a water body (Krilova et al., 2011). In the present case there is cultural eutrophication in the form of organic pollution resulting from man's activities but it is mismanaged.

TABLE-1 : ABIOTIC PARAMETERS OF SAJHI LAKE

YEAR 2011

Month	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
TEMPERATURE	12.5	20.8	24.9	27.5	34.5	31.2	30.4	28.2	33.5	31.2	27.5	16.2
pH	7.45	7.54	7.48	7.43	7.38	7.58	7.15	8.30	8.25	7.75	7.68	7.56
DO	6.60	6.80	6.82	6.88	6.32	6.20	6.86	7.50	7.40	7.30	7.27	6.85
FCO_2	50	52	54	52	53	49	44	40	39	42	43	46
PHOSPHATE	0.35	0.39	0.41	0.48	0.52	0.60	0.61	0.62	0.70	0.63	0.40	0.30

BIOTIC FACTORS OF SAJHI LAKE

The main phytoplankton groups observed in these lakes are Chlorophyceae, Cyanophyceae, Bacillariophyceae, Euglenophyceae and Chrysophyceaea whereas main zooplanktons are Protozoans, Rotiferans, Cladocerans, Copepods and Ostracoda. They are abundant during summer months but greatly declined during rainy months. Phytoplankton dynamics is affected by connectivity: flow dynamics and resource availability in a water body (Istvanovics et. al., 2011). The zooplankton and the phytoplankton show seasonal fluctuations in the present observations. The phytoplankton (algae) are the main primary producers. Though primary productivity observations were done in these lakes, the importance of algae in the carbon values is an established fact. Zooplankton in these lakes also shows seasonal fluctuations. They are the primary consumers of algae and play an important integral role in transferring energy to other consumers (such as fishes in the present study). In the present study "Rough field Method" (Koorosh Jalilzadeh et. al., 2007) was followed to know the position of zooplankton. Its average values ranged between 0.6 to 1.9 ml per 54.4 litre of water. These values may not be considered very satisfactory because review of literatures show that a minimum of 1.5-2.0 ml zooplankton in 54.4 litre of water is essential for satisfactory stocking. Jhingran (1985), while dealing with the requirements of a normal fishfarm site under Indian conditions says, "average plankton production per m should range between 10 ml and 20ml

Though the physico-chemical characters of water and plankton position show a trend towards favourable conditions for fishes, the overall annual yield of fishes are not satisfactory, in the lakes. The high average yield of 21 kg/ acre/ year in Sajhi Lake, has been observed in the present study (data collected from Fish markets and fishermen on monthly basis). Against a potential of 50-300 kg fish/ha/year, the fish yield from these lakes shows frustrating low figures. Review of the literatures indicate that high yield of the order of 10 to 15 t of fish/ha are now possible the research farmsand in farmer's field.

In the present observations growth of the fishes appeared to be not satisfactory. Catla weighing up to 1.0-1.5 kg were common, Rohu weighing 0.6 to 1.0 kg were common while Mrigal weighing 0.3 to 0.75 kg were common.

TABLE-2 : Variation in the population of phytoplankton of SajhiLake (Month wise)
(Number per litre of water)
YEAR-2011

MONTH	CHLOROPHYCEAE	CYANOPHYCEAE	BACILLARIOPHYCEAE	EUGLENOPHYCEAE	CHRYSOPHYCEAE	TOTAL
JAN	270	877	133	18	9	1307
FEB	266	306	145	16	1	734
MAR	188	326	51	13	0	578
APR	143	304	80	16	5	548
MAY	156	558	41	15	6	776
JUN	114	459	89	21	1	684
JUL	81	474	88	22	10	675
AUG	137	362	54	20	11	584
SEP	312	1144	88	24	1	1569
OCT	186	649	96	32	0	963
NOV	166	494	155	18	0	833
DEC	179	423	111	15	9	737
TOTAL	2198	6376	1131	230	53	9988

TABLE-3 : MONTHLY VARIATION IN ZOOPLANKTON POPULATION OF SAJHA LAKE ORGANISMS/LITRE OF WATER
YEAR-2011

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
COPEPODA													
1. Cyclops	26	22	22	19	10	08	05	05	07	12	19	20	175
2. Mesocyclops	23	20	20	17	09	08	05	04	06	11	17	22	162
3. Nauplius	21	23	22	21	14	10	08	06	09	20	25	24	203
4. Neo-Diaptomus	24	25	20	20	13	12	09	08	10	13	18	23	195
5. Diaptomus	18	13	13	11	06	05	02	03	05	06	11	15	108
CLADOCERA													
1. Daphnia	20	17	16	12	10	06	04	06	11	17	21	20	160
2. Moina	12	13	12	09	05	03	02	05	08	10	12	13	104
3. Simocephalus	17	16	15	10	10	08	06	08	11	15	18	19	153
4. Bosmina	04	03	05	03	01	01	01	02	02	01	03	04	30
5. Ceriodaphnia	12	14	13	08	08	04	04	06	08	12	14	14	117
6. Alona	06	06	06	05	02	00	00	02	01	03	05	08	44
ROTIFERA													
1. Platyias	25	13	12	12	12	09	13	12	18	13	17	22	178
2. Brachionus	50	40	38	36	27	24	29	30	32	38	42	45	431
3. Asplanchna	27	22	22	18	16	13	17	18	20	15	20	23	231
4. Monostyla	25	15	15	13	10	07	08	10	12	12	15	20	162
PROTOZOA													
1. Paramoecium	18	19	17	20	18	15	12	07	10	08	10	18	172
2. Euglypha	10	09	09	07	04	05	03	04	05	04	04	10	72
OSTRACODA													
1. Stenocypris	44	33	42	56	45	51	35	38	26	75	65	62	574

Increasing trend, while Rohu slightly decreased and Mrigalshoe no change in comparison to Sajhi Lake and other lakes.

IV. SUGGESTION

Thanking all the above features collectively, it is safe to conclude that though the status of fisheries is not up to the mark in the lakes of Champaran East, there is ample scope of its development Following measures may be fruitful in enhancing the scope of fisheries in Sahji Lake:

(i) Removal of unwanted aquatic weeds.
(ii) Creation of awareness and interest in fish farmers and their training
(iii) Reclamation of channels connecting the lakes.
(iv) Aquatic stocking of the lake with fingerlings.
(v) Use of efficacious nets and gears.
(vi) Use of cow dung to increase the zooplankton position
(vii) Ban on indiscriminate fishing.

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Fig OVER ALL VIEW OF SAJHI LAKE

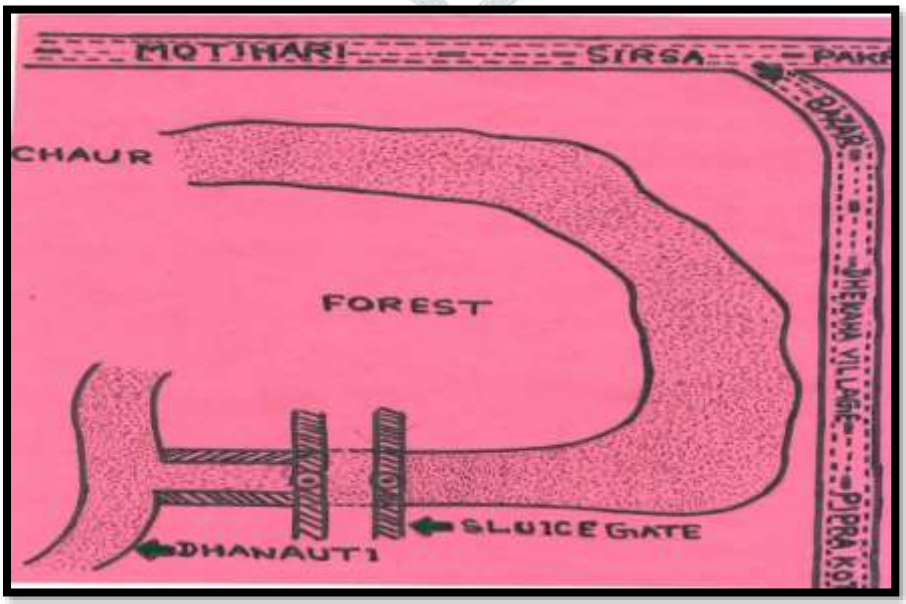

Fig LAKE MAP