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Effect of Topographically Different Strata of Reservoir on Seasonal Composition of Ichthyo-Fauna in Tungabhadra Reservoir

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ABSTRACT

The sustainability of fish diversity and its abundance is based on the quality of water existing in that locality. All the hydrological parameters as well as plankton diversity influences the production of fish species. Stocking of economically viable native species of fishes in the reservoirs may convert the reservoirs more productive and is important measure from aquabiotic conservation point of view. The present investigation carried out at Tungabhadra reservoir from Jun 2017 to May 2018. Physico-chemical characters and fish diversity was estimated at topographically different sites. Results revealed optimum ranges of hydrological parameters showing alkaline pH, high Dissolved Oxygen and nutrient richness in all the three selected stations. There was positive relationship between hydrological parameters and the abundance of fin-fishes. Fish composition was dominated by Cyprinids. The rate of abundance was major carps > minor carps > cat fishes > trash fishes.

Key words: Carps, Conservation, Cyprinids, Topography, Hydrology, Ichthyofauna, Tungabhadra reservoir.

INTRODUCTION

Health of any aquacultural ecosystems depends on the inter-relationships between living and non-living components prevailing in the locality. The present investigation was carried out in Tungabhadra basin at 15°15' 19" N and 76° 21' 10" E from Jun 2017 to May 2018 for estimating Physico-chemical characters and fish diversity. Fisheries sector plays a predominant role not only in terms of food value but also generates income and employment to the public. Inevitably, the country has to depend heavily on the inland capture fisheries resources, among which the reservoirs constitute the mainstay. However the fish yield from the reservoir fishery is frustratingly low (Sinha, 2001). Proper scientific management incorporating traditional knowledge of fishermen and regular yearly documentation would encourage the future enhancement of fishery potentiality as well as the reservoir productivity.

MATERIALS AND METHODS

i) Study Area

Tungabhadra reservoir is tributary of Krishna basin terminating into Bay of Bengal. Three topographically different sampling stations (S1, S2 and S3) were chosen for collection of samples from June 2017 to May 2018 for assessing seasonal fluctuations.

ii) Sampling And Laboratory Procedures

Water samples were collected in one liter plastic bottles and transported to the laboratory for analysis. Air and water temperature were measured at the sampling site itself in the early morning and recorded. The pH of water body was also recorded at the sites using pH meter. Further analysis of water parameters such as free Carbon dioxide, Dissolved Oxygen (DO), Total alkalinity (TA), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Phosphates, Sulphates, Nitrates, Total hardness, Electrical Conductivity, Fluoride, Chloride, Turbidity, Iron, Magnesium, Calcium including BOD and COD were carried out as per the standard methods (APHA, 1992) and average values are presented in the Table.

iii) Fish Sampling

Fish samples were collected from the three fish landing centers located near sampling stations. Fish species were caught using *alavi* (a giant-seine net) cast net and drag nets. The collected fish were preserved in 4% formaldehyde solution. The sample fishes were identified based on the key characters (Jayram and Talwar, 1991; Jhingran 1999). The data collected was documented and interpreted.

RESULTS AND DISCUSSION

In the hydrobiological investigation relatively high load of suspended solids and fluctuating hardness indicated that the reservoir is prone to pollution. Similar observations were

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made by Manjappa (2005) in the Tungabhadra river. High NTU in the water indicated pollution in the water bodies of Bangalore region (Kiran and Ramachandra, 1999). Temperature influences the chemical and biological properties of water (Hosetti and Arvind kumar, 2001). Throughout the year the reservoir showed relatively optimum temperature in all the stations. Due to the natural buffering capacity of water, reservoir seldom shows pH fluctuations (RFI). Alkaline pH was recorded in majority of Indian reservoirs (Reservoir Fisheries of India). Similar alkaline pH was recorded throughout the year in all the stations. Catchment area having agriculture and industrial activities had high pH in the reservoir of Lebanon (Korfali and Juardi, 2003). The dissolved oxygen was sufficiently high in all the stations caused due to turbulence, phytoplankton activity, splashing as well as wind action. The nutrient status of this reservoir is found to be high due to the increased levels of nitrates (1.5 mg/L to 3 mg/L) and phosphates (1 mg/L to 4 mg/L). Ramakrishnaiah (1994) reported the similar nutrient status. High turbidity (10–20 NTU) indicated higher rate of siltation and organic load which reduces the primary productivity of the entire reservoir. The Chemical Oxygen Demand (COD) measures the oxygen equivalent of the organic and inorganic matter in a water sample that is susceptible to oxidation. COD as a result of pollution is largely determined by the various organic and inorganic materials (Calcium, Magnesium, Potassium, Sodium etc). The COD values ranged from 40 mg/L to 540 mg/L depicted in the Table 1.

In the present investigation on fish diversity showed a maximum of 69.41% during post-monsoon, 61.36% during pre-monsoon and minimum of 38.23% during monsoon season in all the study stations. Similar observations were made by Huliyal and Kaliwal (2005) in Almatti Reservoir. The freshwater fishes represented in the Tungabhadra reservoir belonged to 8 families, dominated by species of Cyprinidae family. The fish families represented are Ambassidae, Bagridae, Clupeidae, Cyprinidae, Mastacembellidae, Notopteridae, Schilbeidae and Siluridae.

Percentage composition of Cyprinid fishes during post monsoon was dominant in S1, S2 and S3 stations. Present findings were similar in Tungabhadra reservoir during 2010 (Nagabhushan and Hosetti, 2010). Quantitatively Cyprinids were in dominant numbers in Linganamakki Reservoir (Srikanth and Ramachandran, 2005) whereas during post monsoon Cyprinidae, Ambassidae, Mastacembellidae, Notopteridae, Schilbeidae and Siluridae members showed their appearance in all three stations with the dominant numbers of Cyprinids. Percentage composition of fish is given in Fig 1-10. In a large reservoir which harbors more than 60 fish species of which at least 40 contribute to commercial fishes (Jhingran, 1991). In Tungabhadra reservoir altogether 35 fin fishes were represented in the selected three stations. Amongst them *Cirrhinus cirrhosa, Puntius dobsoni, Puntius sarana, Puntius ticto, Barilius bendelensis, Danio aequipinnatus, catla catla, Labeo fimbriatus, Labeo calbasu, Cyprinus carpeo commun, Silonia childrenii, Pseudotropius taakree, Wallago attu,*

Table 1: Physico-chemical characters of water quality of Tungabhadra reservoir Hospet from June 2017 May 2018.

	JUN'17	JUL'17	AUG'17	SEP'17	OCT'17	NOV'17	DEC'17	JAN'18	FEB'18	MAR'18	APR'18	MAY'18
Air temp (°C)	31	30	29	29.8	30.5	30	31	30.5	31.5	31.5	30.5	31
Water temp (°C)	29.5	28.9	27	28	29	29	29.5	28	30	30	28.5	30
Turbidity (NTU)	16	10	15	20	18	10	12	15	12	18	15	16
TDS (mg/L)	200	190	260	210	180	220	150	110	180	300	260	250
TSS (mg/L)	60	30	120	140	50	80	20	50	20	70	70	90
Ele. Cond (µmhos/cm)	290	280	390	410	200	260	250	210	200	350	290	260
Total alkal (mg/L)	40	30	90	100	90	70	70	145	90	80	75	95
COD (mg/L)	80	40	100	130	510	400	340	40	100	110	110	90
BOD (mg/L)	2.0	2.0	3.0	4.0	3.0	3.0	4.0	2.0	3.0	3.0	4.0	3.0
D O (mg/L)	4.5	5.2	6.0	4.0	6.5	5.0	6.2	6.0	6.2	5.0	5.5	6.0
Sulphate (mg/L)	20	30	60	60	50	40	30	30	20	40	60	50
Nitrate (mg/L)	2.5	2.2	2.1	2.6	2.0	3.0	2.9	2.0	2.0	2.5	2.6	1.8
Phosphate (mg/L)	1.0	3.0	4.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	2.0	1.0
Calcium (mg/L)	25	23	35	40	30	32	20	27	20	35	40	32
Magnesium (mg/L)	7.5	3.8	15	14	8	8.5	9	3	11.5	8.6	13	12
Iron (mg/L)	2.5	3.0	3.5	4.0	3.0	2.5	1.5	1.5	2.0	1.5	2.0	2.0
Fluoride (mg/L)	1.0	0.5	0.5	0.4	0.5	0.5	0.4	0.9	0.5	0.4	0.5	0.4
Carbon dioxide (mg/L)	1.2	1.8	2.0	1.5	1.6	1.5	1.4	1.2	1.7	1.6	1.6	1.7
pH	8.1	8.0	7.9	8.3	8.3	8.4	8.0	8.5	8.3	8.3	8.4	8.5
Chloride (mg/L)	38	40	40	36	32	30	30	29	22	29	40	42
Hardness (mg/L)	50	45	130	120	70	80	65	85	70	90	95	110

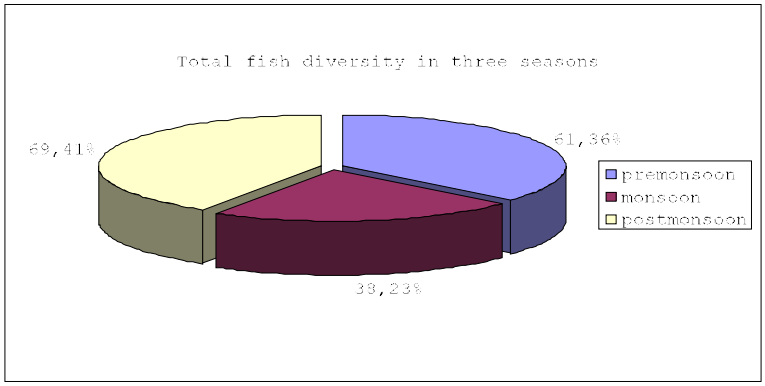


Fig 1: Total fish diversity in three seasons.

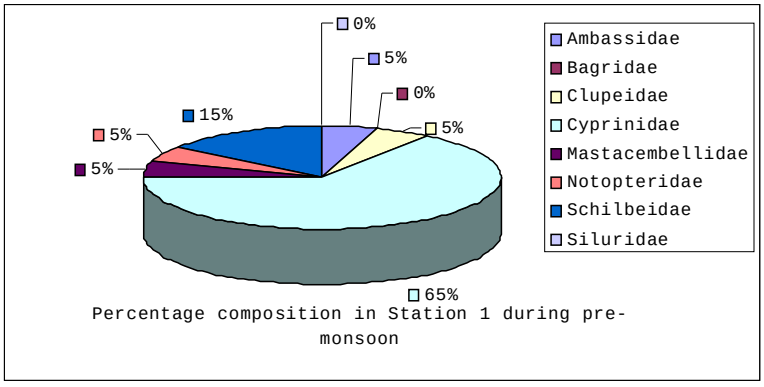


Fig 2: Percentage composition of fish families in S1 during pre-monsoon.

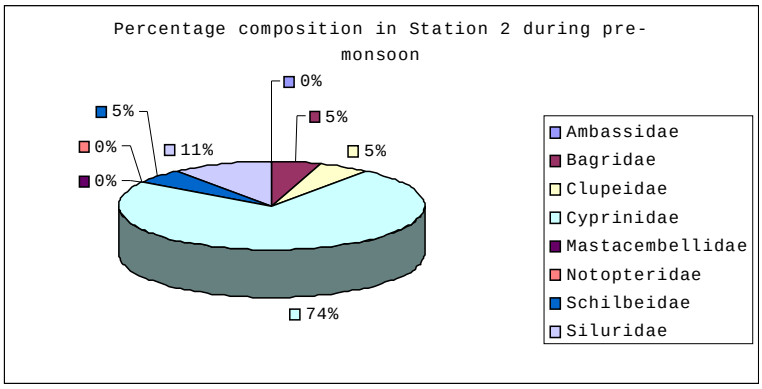


Fig 3: Percentage composition of fish families in S2 during pre-monsoon.

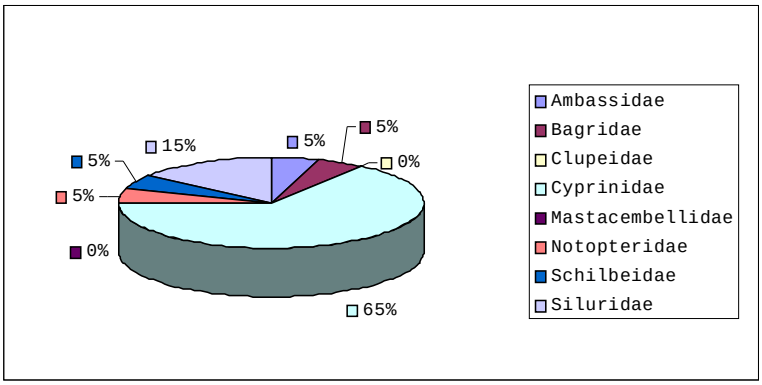


Fig 4: Percentage composition of fish families in S3 during pre-monsoon.

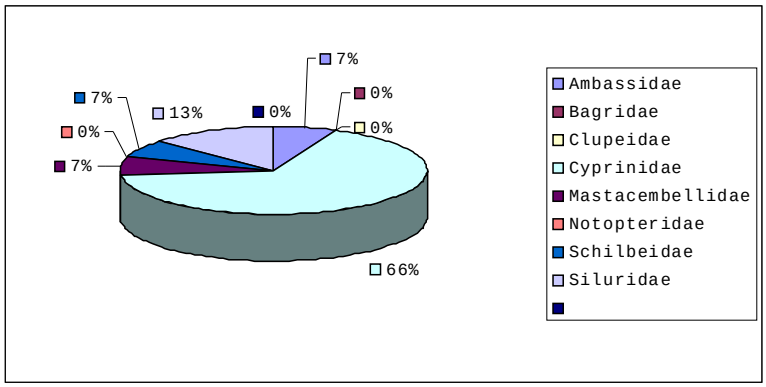


Fig 5: Percentage composition of fish families in S1 during monsoon.

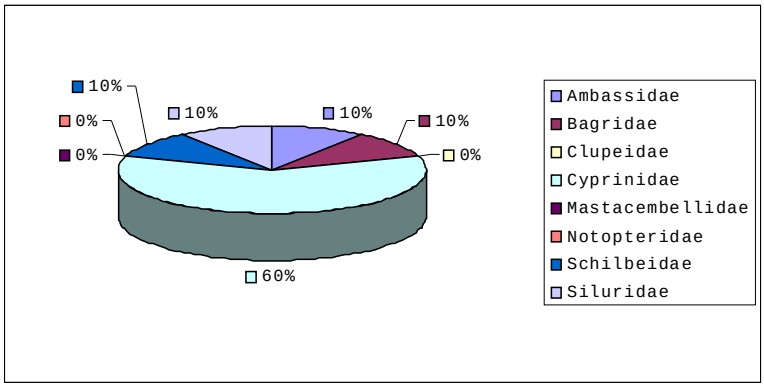


Fig 6: Percentage composition of fish families in S2 during monsoon.

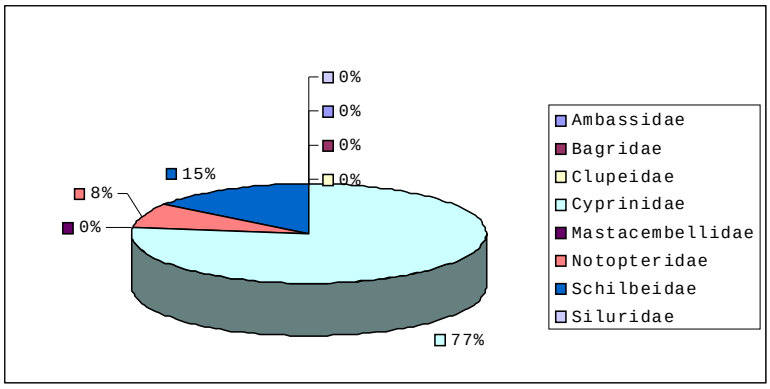


Fig 7: Percentage composition of fish families in S3 during monsoon.

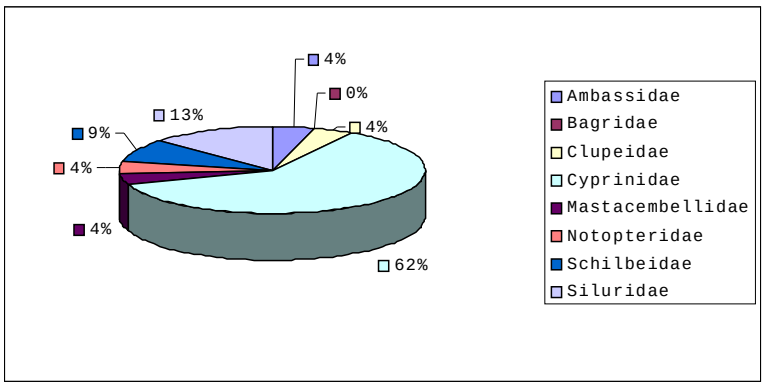


Fig 8: Percentage composition of fish families in S1 during post-monsoon.

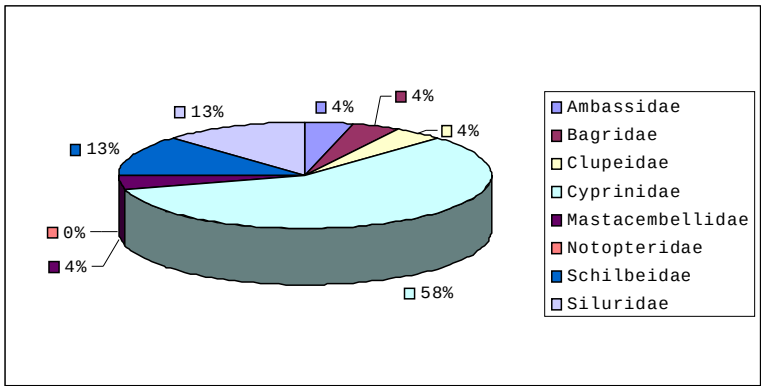


Fig 9: Percentage composition of fish families in S2 during post-monsoon.

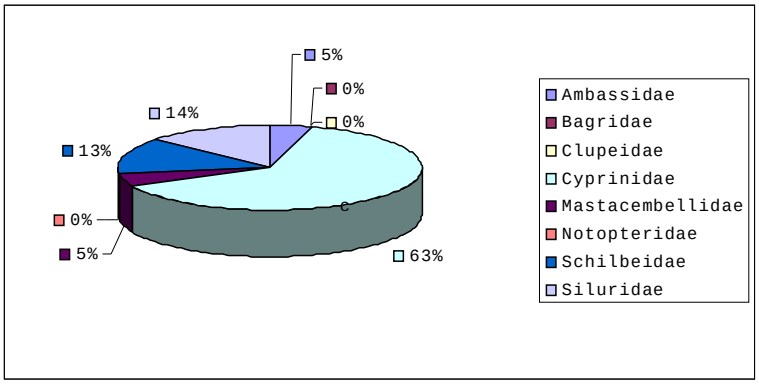


Fig 10: Percentage composition of fish families in S3 during post-monsoon.

Mastacebelus armatus, Ambassis nama, Bagarius bagarius, Osteobrama virgosii and *Aorichthys seenghala* were found in all the landing centres.

CONCLUSION

Tungabhadra Reservoir was found to be having rich fishery potential in its natural hydrological conditions since its impoundment with lesser fluctuations. The topography of the reservoir had not merely affected the diversity of fish fauna, but introduction of Indo-Gangetic major carps could utilize the vacant niches created by trash fishes so as to obtain better yield. Fishing holidays or strict regulation of gill net operations is advisable during June-August months where majority of commercially important fishes breed**.** Further better management and proper usage of fishing gears would bring good harvest of fin fishes. The present data may serve as baseline information for future studies as it will allow fisheries specialists and administrators to evaluate the impact of future culture enhancements on reservoir fisheries production and its yield.

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