

Hydrobiological Studies of An Irrigation Tank With Reference to the Culture of Large Murrel, *Channa marulius* (Hamilton) and Striped Murrel *Channa striatus* (Bloch)

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The importance of selection of species for culture according to the ecological niches and fish food organisms is highlighted with respect to the Fox Sagar, an irrigation tank. The tank was infested with submerged vegetation as well as minnows and weed fishes which rendered the tank unsuitable for the culture of Indian major carps. Therefore, the tank was stocked with 8000 fingerlings of *Channa marulius* and *C. striatus* during 1981 by the local fishermen co-operative society. Only partial harvest was possible during 1982 because of high water level. The final harvest was done by the members of the society, using conventional traps, dragnets and castnet in April-May, 1983. The yield obtained was 3640 kg during the culture period of about 20 months.

Air breathing predatory carnivorous fishes, especially the murels (also called snake-heads), form an important group of economic species. Species of *Channa* known as Koramatta in Andhra Pradesh are preferred to major carps and regarded as excellent table fish in the Telengana region of Andhra Pradesh. Hence, they are often in great demand, fetching higher prices. Nevertheless, no worthwhile attempt at the culture of *Channa* spp. was done in this State so far. Hydrobiology of irrigation tanks suitable for murrel culture also is little known. A knowledge of the seasonal and annual variations in the various environmental factors that directly affect inland water bodies would facilitate specific utilisation of freshwater resources. The present paper deals with the hydrobiological investigations of an irrigation tank in relation to the culture to *Channa marulius* and *Channa striatus*. The selection of these species was a need based selection to take advantage of the abundant and unexploited minnow and other weed fish population on which murels normally feed.

Materials and Methods

The tank which is locally known as Fox Sagar is located about 25 km away from the

Hyderabad city. It was originally a natural depression where water accumulated during the Southwest monsoon. However, agricultural lands were developed around the tank and a bundh subsequently raised along the southern side, together with a sluice for the regulation of water. The mean depth and area were 3 m and 20 ha respectively. Five sampling stations were selected according to the topography and morphometry of the tank. Physico-chemical parameters were determined according to standard methods (APHA, 1975). The plankton were collected by filtering 50 liters of water through a plankton net made of bolting silk. A detailed faunistic study has also been conducted. Since the tank was infested with weed fishes and minnows upon which the murels thrive well, about 8000 fingerlings of *C. marulius* and *C. striatus* were stocked in August-September, 1981. *Channa* spp. are in great demand and fetch minimum Rs. 25/- per kg in the city markets. As the water level was considerably high during May, 1982, the tank could not be harvested completely. However, total harvesting was done in May, 1983 when the water level decreased. Netting operations were done by 23 fishermen using drag nets, cast nets, plunge baskets etc.

Results and Discussion

Fig.1 depicts the physico-chemical parameters of the tank during 1982. Hydrobiology of south Indian inland waters has been studied in some detail over the past three decades (Ganapathi, 1957, 1962, 1973 and Srinivasan, 1958, 1964). The annual and seasonal variations observed in the physico-chemical parameters of Fox Sagar are common to tropical waters. The water temperature varied between 22°C in December and 34°C in May. Anderson (1970) also reported a correlation between air and water temperature. Variations in temperature between different seasons of the year

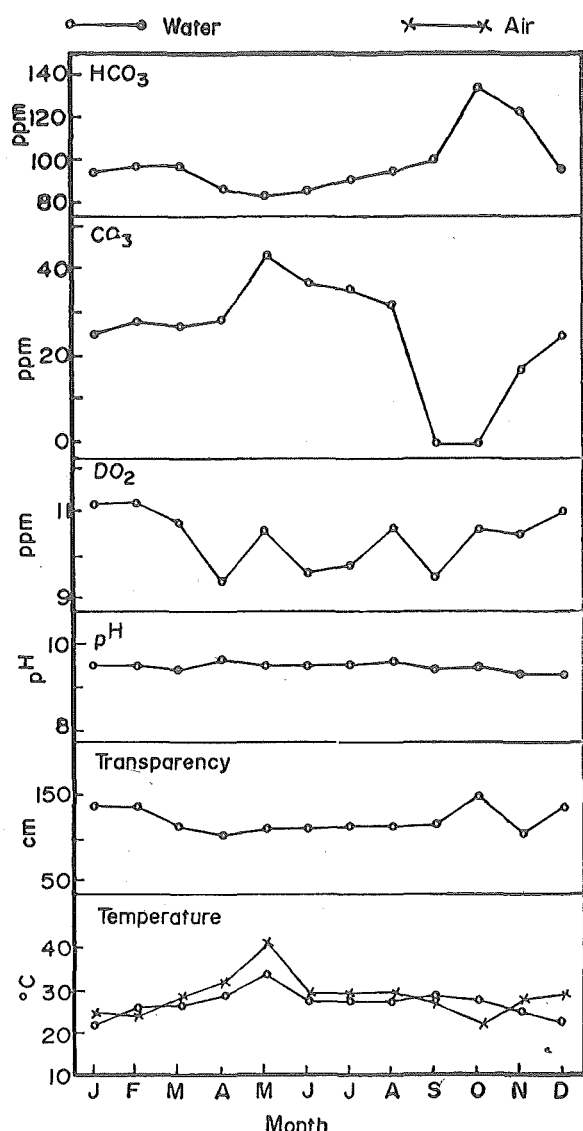


Fig. 1. Physio-chemical parameters of the tank during 1982.

were due to the difference in the thermal regime of the climate as stated by Farnier (1950). Transparency was always in the vicinity of 100 cm which is considered low for inland water bodies. This was mainly due to the enormous growth of submerged vegetation in the tank besides suspended clay particles and silt. The pH exhibited almost a uniform record of 9.5 throughout the year 1982. Vyas & Kumar (1968) reported the alkaline nature of the water throughout the year in the Indirasagar Tank, Udaipur. The maximum dissolved O₂ was 11 p.p.m. while the minimum was 9.4. The variations of dissolved oxygen in the tank, is due to wind induced turbulence and metabolic activities of the biotic community. These processes are in turn influenced by temperature and light intensity. Free CO₂ was recorded only in September and October. The maximum CO₃ was 44 p.p.m. in May while average HCO₃ for 1982 was 95 p.p.m. Since the carbonates were low compared to bicarbonates, the alkalinity in the tank was not a function of hydroxide and carbonate ions; evidently the total alkalinity was due primarily to bicarbonates. Jana (1974) reported that total alkalinity in a pond in Shantinketan due to bicarbonates.

Plankton

The phytoplankton population was represented by Myxophyceae, Chlorophyceae and Bacillariophyceae. Among Myxophyceae, the dominant species were *Cylindropsenum* and *Spirulina*. Chlorophyceae was represented mainly by *Eudorina* sp, *Merismopædia* sp. *Pediastrum* sp. and *Melosira* sp. The dominant species of Bacillariophyceae was *Synedra*. *Brachionus calyciflorus*, *Keratella tropica* and *Filinia opoliensis* were the dominant species among Rotatoria. The density of copepods was low in the tank throughout the period of investigation. This could be attributed partly to the presence of minnows and weed fishes, and mainly to the variations of light, dissolved oxygen and temperature which affect the movements of planktonic copepods. According to Tash & Armistage (1960), the daily changes in the pattern of migrations of planktonic crustacea are probably the result of different combinations of various modifying factors.

Aquatic vegetation

Submerged vegetation was abundant and mainly comprised of *Ceratophyllum*, *Hydrilla* and *Najas*. These three types of aquatic macrophytes are common in the static inland waters (George, 1976). *Ceratophyllum* was found throughout the year and with heavy infestations.

Production of murels

All species of air breathing fishes have high demand all over the country especially in Karnataka, Hyderabad, Tamilnadu, Kerala, Punjab, Madhya Pradesh, Bihar and Assam, and therefore there is an urgent need for their production (Jhingran, 1975). The tank has a fairly good natural population of forage fishes such as *Puntius*, *P. stigma*, *Mastacembalus* sp. *Chela bacila*, *Rasbora daniconius*, *Esomus danricus*, *Amblypharyngodon mola*, *Mystus* sp. and *Glossogobius gyuris*. Hence, about three thousand and five thousand fingerlings of *C. marulius* and *C. striatus* respectively measuring about 35mm-40mm in length were collected from the local paddles, burrow pits, paddy fields and streams and stocked in the tank in August-September, 1981. Partial harvest was done in May, 1982. The average growth of *C. marulius* was 300 mm in 8 months whereas the mean growth rate of *C. striatus* was 240 mm in 8 months. The maximum size attained by *C. marulius* was 460 mm and 780 g and by *C. striatus* 340 mm and 520 g. According to Devaraj (1973) and Chacko & Kuriyan (1947) *C. marulius* attains a length of 386 mm in an year. In ponds, *C. striatus* attained 250-270 mm in 13½ months and 233.7-317.0 mm in 9½ months under favourable conditions in Kerala. Mookerjee *et al.* (1948) reported the growth of *C. striatus* to be 320 mm in two years in West Bengal. In lotic habitats, *C. striatus* attained a length of 252.0 mm in the first year and 3200 mm in the second year in Uttar Pradesh, (Khan, 1926), Murugesan (1978) observed the maximum growth of *C. marulius* to be 528 mm and 910 g and of *C. striatus* 410 mm and 670 g after 7 to 8½ months study in a swampy pond in Karnataka.

During the present study *C. marulius* attained a maximum size of 610 mm and 1320 g and *C. striatus* 510 mm and 930 g after 19-20

months (April-May 1983). The actual total production figures cannot be given because fishing in the tank is free throughout the year, and as a result, fish was being exploited continuously throughout the year. In May, 1982, the level in the tank was a fairly high level and as such the yield obtained as a result of partial harvesting was about 1,500kg. However, in April-May, 1983, the total landing of fish was 2140 kg. The catch composition was 32% *C. marulius*, 52% *C. striatus* while the rest comprised of magurs and other weed fishes.

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