

IMPACT OF THE EXOTIC FISH, *OREOCHROMIS MOSSAMBICUS* ON THE INDIGENOUS FISHERY OF POWAI LAKE, BOMBAY

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ABSTRACT

Fishes impart the most profound influence on the floral-faunistic characteristics of an aquatic ecosystem. *O. mossambicus*, an exotic fish accidentally introduced in the Powai lake, caused considerable changes in the growth pattern of Indian major carps, ultimately reducing the productive potential of the lake from 33.0 to 11.9 kh/ha.

Powai lake is used exclusively for angling for sports. The angling pressure based on the 'creel census' from 1955 to 1976 gives a clear picture of the trends in the fishery therein. A considerable decline, ranging from 171 to 400% in the average weight of Indian major carps was recorded. Fish production from the lake came down to about 1/3 in two decades.

INTRODUCTION

Fishes impart a most profound influence on the nature of fauna and flora in an aquatic ecosystem. This fact has not always been realised by limnologists, who tend to seek physical and chemical causes for considerable environmental changes caused by the arrival of just one new organism, a single species of fish. This fact is clearly seen in Powai lake, where accidental introduction of tilapia has affected the indigenous fishes. Thus to obtain a comprehensive knowledge on the impact of this introduction on the indigenous fishery of Powai lake an investigation was conducted.

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MATERIALS AND METHODS

Powai lake (Lat. 19° 8' N and long 72° 54' E) located 27 km away in the north-east of Bombay city, came into existence in 1891, when the Bombay Municipality got a dam erected in Dhahisar streamlet to conserve rain water for supplying the city. But the lake water was found unpotable and the lake was leased out to the Angling Association of Bombay.

State Fisheries of Bomby stocked the Powai lake with fingerlings of Indian major carps (*catla catla*, *Cirrhinus mrigala*, *Labeo rohita* and *L. calbasu*) for the first time in 1937. Stocking was continued till these fishes propagated in the lake and fully established themselves by 1942. Exotic fish, *Oreochromis mossambicus* was brought from Tranvancore and released in the quarry waters in Bombay 1955. Somehow, it entered into Powai lake and has established itself at the cost of other fishes.

Creel census was recorded from the register maintained in the Bombay Angling Association. Detailed ecological studies were conducted during 1975-76.

RESULTS

Trend of fishery : The angling pressure, based on "creel census" from 1955 to 1976 gives a clear picture of the trends of the fishery in the Powai lake. To interpret the picture regarding the trend in the fishery, the whole period (1955-1976) was divided into two phases. The first phase is from 1955 to 1962 and the second phase from 1962 to 1976. In the first phase the anglers used to hook good sized fishes while in the second phase the average weight of the fishes caught was rather low, in some cases as low as a quarter and in other cases half of the weight caught in the initial phase, as is evident from the following table and Fig. 1.

SPECIES	Weight of fishes in (First phase) (kg)	Weight of fishes after the establishment of <i>Oreochromis mossambicus</i>	Weight of fishes in (2nd phase) (kg)	Loss of weight of fishes (%)
<i>Catla catla</i>	17.4 (1955)	17.2 kg (1962)	8.1 (1976)	53.4
<i>Cirrhinus mrigala</i>	4.3 (1955)	3.1 kg (1959)	1.5 (1976)	65.1
<i>Labeo rohita</i>	4.1 (1955)	3.7 kg (1959)	1.0 (1976)	75.1
<i>L. calbasu</i>	2.4 (1955)	2.1 kg (1959)	1.4 (1976)	41.7

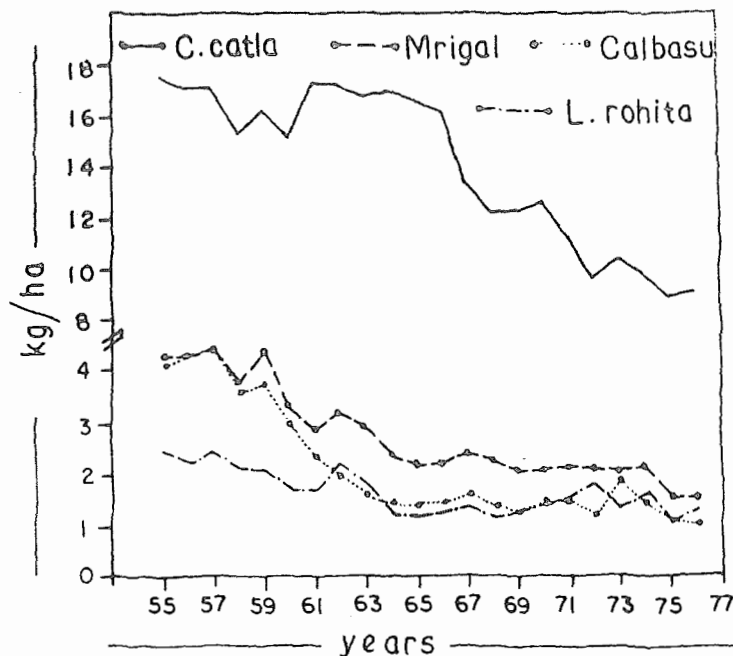


Fig.1 : Trend of Fisheries from 1955 to 1977 in Powai Lake, Bombay.

C. catla : The fish maintained its weight from 1955 to 1962 in the range of 17.4 to 17.2 kg but thereafter there was a rapid decline in the average weight. In 1976 the average weight was 8.1 kg, less than half the weight in the initial phase.

L. rohita : In the case of **L. rohita** the average weight of 4.1 kg in the year 1955 came down to 3.7 kg in 1962, and further declined to 1.0 kg in 1976, being less than a quarter of the weight of the initial year, i.e., 1955.

C. mrigala : Average weight of this fish also declined from 4.3 kg in 1955 to 3.1 kg in 1962. Afterwards there was a rapid fall in the average weight (from 3.1 to 1.5 kg during the 1962 to 1976 phase) to about a third of the initial weight.

L. calbasu : Similar trend in the decline of average weight from 1955 (2.4 kg) to 1962 (2.1 kg) to 1976 (1.4 kg) was observed, the final being about half the initial weight.

DISCUSSION

Thus it is clear from Table 1 and Fig. 1 that the average weight of Indian major carps fluctuated with very narrow margin during first phase before the period of introduction of **O. mossambicus** and its establishment in the lake. But in the second phase there was a decline in the weights of individual fishes ranging from one-third to one-fourth of the original weights. The worst affected fish was **Labeo rohita** with more than 75% of weight

loss, followed by **Cirrhinus mrigala** with 65% loss. This is also evident from the annual fish catch statistics. The catch which fluctuated between 29 and 33 kg/ha in the first phase, ultimately came down to only 11.9 kg/ha in the second half, less than 1/3 of the catch recorded in the previous phase.

Omer-Cooper (1947) studied the effect of introduction of tilapia in the springs in Libyan Desert and found great difference between the biota in these springs. He concluded that the biological factor is the most important of all the normal ecological parameters which affect the natural ecosystem of ponds and lakes.

Oreochromis was introduced in Vaigai reservoir in 1958. During the years 1963-64, out of the total fish yield tilapia formed 57%, in 1964-65 it increased to 99% and in 1967-68 almost eliminated other stocked major carps. Sreenivasan (1969) and Chacko (1969) observed that tilapia released in 1958 in Amaravati reservoir, comprised 60% of the total catch in 1964-65. Natarajan (1971) in his study concluded that this fish proliferate to the elimination of stocked prime fishes. Bulbert *et al.*, (1972) reported that the introduction of **Gambusia addinis** in artificial ponds greatly introduced the weight of indigenous fishes. The senior author while studying the fishery of Dal Lake (Kashmir) also found a similar trend. Introduction of **Cyprinus carpio** in the lake in 1955 has greatly affected the indigenous fishery. During the study period 1969-72 the catches of common carp increased from 60 to 70% (Sunder *et al.*, 1978).

Secondly, there is no predation worth the name in the Powai Lake. During the study period (1975-76), 7 t of **O. mossambicus** along with 6 t of trash fishes were netted out in 20 days, each year during May. Predators help to crop down the trash fish which compete not only for food but space also. Predators selectively remove individuals from population choosing fish of particular size (Popova, 1967). Too many predators may be harmful but on the other hand lack of predatory species may have deleterious effect on the fishery of that water body. It is suggested that tilapia and trash fishes can be controlled by repeated fishing with small mesh nets during low level of the lake water and by introduction of predatory fishes like **Lates calcarifer** and **Megalops cyprinoides**, estuarine fishes which do not breed in freshwater but help in checking the growth of trash fish and tilapia. Their introduction shall have added benefit, as it can form a good fishery in itself.

The prime aim of good management in an aquatic ecosystem is to ensure best utilization of food resources with a suitable combination of species to obtain high production of fishes. Efficient utilization of prey and predators increases the carrying capacity and proper growth of fishes. Lack of predation leads to unwanted growth of uneconomical fishes.

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