FISHERY OF THE CAUVERY RIVER SYSTEM TAMILNADU, INDIA

by

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Abstract

The river Cauvery has a rich indigenous fishery of *Cirrhinus cirrhosa*, *Labeo kontius*, *L. fimbriatus*, *Puntius carnaticus*, *C. reba*, *Pangasius pangasius*, *Mystus aor*, *Silonia silondia*, *Wallago attu*, etc. *Puntius dubius* disappeared after the river was dammed at Mettur but the introduced Gangetic carps like *Catla catla*, *Labeo rohita*, *C. mrigala*, *L. calbasu*, etc., have established themselves in the river and contribute a sizable number of fingerling and marketable fish.

The total landings of the river are around 16 000 t year^{-1}. The tanks fed by Cauvery in Tanjore yield another 5 000 t year^{-1}. Stretches of the river are auctioned or leased to fishermen's cooperatives. Only lessees or licencees can exploit the fish.

Hydrological conditions all along the river are ideal for the growth and breeding of fishes. The dissolved oxygen had never been less than 5.8 mg l^{-1} and the pH never less than 7.0.

The coracle is the most common craft used. Cast nets, "uduvalai", and drag nets ("Varu Velai") are the most abundant gear. Regulations stipulate that fish of sizes less than 20 cm shall be put back or handed over to the department for stocking inland waters. Conservancy measures include establishment of sanctuaries, prohibition of fishing near dam outlets, restrictions of size, declaration of close seasons, etc. The Cauvery yields annually, 60 million fingerlings which are stocked in inland waters.

Factory effluents are discharged after treatment into the river or channels but normally no serious adverse effects have been noted.

CONTENTS

1. INTRODUCTION

The Cauvery is the largest river system in Tamilnadu. By the creation of a large number of dams, barrages, and distributaries, its waters are up to 95 percent utilized. The river has a varied population of important indigenous species of fish which form the basis for a fairly rich fishery. It is also used by anadromous migratory fish such as the shad, *Hilsa ilisha*. Introductions from the gangetic system have also been made and this river is one of the best natural sources of spawn and fingerlings of major carps. The river system feeds a large number of tanks in Tanjore and Trichy districts and the natural stocking of these produces a good harvest of fish.

2. DESCRIPTION OF THE CAUVERY RIVER SYSTEM

The river Cauvery has its origin in the western Ghat (Brahmagiri hills) near Mercara, Coorg, at an elevation of 1 400 m A.S.L. (4 400'). After traversing over 850 km of a tortuous, twisting course it finally empties itself into the Bay of Bengal at Kaveripatnam, 15 km north of Tranquebar in Tamilnadu. The total drainage area is 89 600 km^2. A peculiar feature of this river is that for irrigation purposes it is more intensively dammed than any other river in India. In Karnataka State, the river is dammed at Krishnarajasagar to impound water for irrigation and for power generation downstream at Sivasamudran. Before this, the Kabini River with a good catchment joins the Cauvery. The river enters Tamilnadu State above the Hogainakkal falls which are about 25 m high, and which forms the northern boundary of the Stanley Reservoir (Mettur Dam). Below Mettur Dam, the Cauvery is joined by its major tributary, the Bhavani which itself is impounded 68 km above the confluence. The impounded water of Mettur is released according to needs of the power house and irrigation downstream. Two more tributaries join the enlarged Cauvery—the Noyyal and the Amaravathy, the latter after being impounded at Amaravathynagar. The first anicut (barrage) near Trichy is the Upper Anicut which bifurcates the Cauvery into two rivers—the Cauvery and Coleroon. The latter acts as the flood carrier. Again, 17 km below Trichy, the Grand Anicut system splits the river into distributaries, the G.A. Canal, the Vennar, and the Cauvery. Here again the Cauvery is connected with the Coleroon through regulators by a canal called the Ullar Bypass. This allows the fish from the Coleroon to enter the Cauvery. The anadromous *Hilsa* can find its way into Cauvery if waterflow conditions are favourable. There are scores of distributaries and canals taking off from the various regulators. The habit of fishes to congregate at the regulators for ascent against the current is taken advantage of for the collection of fingerlings and stock fish. After the Grand Anicut, the Coleroon takes a north eastern direction and is again blocked at Lower Anicut, near Lalpet, where the Anicut Veeranam Tank receives the water from the Coleroon through a channel. This is a very shallow but expansive lake with an area of 3 840 hm^2 at high water level.

3. WATER USES

Multiple use makes the Cauvery system the most economically important water source in the state. The more important uses of the river are:

1. Irrigation
2. Hydroelectric power generation
3. Fisheries
4. Industrial water supply
5. Public (drinking) water supply
6. Bathing and washing
7. Industrial waste and sewage disposal
8. Recreation

4. THE FISHES OF THE CAUVERY SYSTEM

The river complex is noted for its rich fishery and diversity of species. *Puntius dubius*, *P. carnaticus*, *Labeo kontius*, *Cirrhina cirrhosa* and *Lissocheilus hexagonolepis* are indigenous (Chacko and Srinivasan, 1955). A total of 23 families and 80 species of fish have been listed in this river by Chacko *et al.* (1955), who mentions that the carps *P. dubius*, *P. carnaticus*, *Tor tor*, *L. hexagonolepis*, *Labeo kontius*, *L. ariza*, *C. cirrhosa*, *Osteocheilus brevidorsalis* and *O. nashi* as well as *Glyptothorax madraspatensis*, *Mystus aor*, *M. Seenghala* and *Pangasius pangasius* are special

to this river. Actually many of these do not occur now. *Puntius dubius*, *B. hexagonolepis*, *P. carnaticus*, *Tor tor* are typical of upper reaches and are rarely noted below Mettur Dam or below Bhavanisagar dam, whereas *C. cirrhosa* and *Labeo kontius* occur in the flood plains (Tanjore District). *Labeo fimbriatus* seems to be indigenous to this river, as also *L. paral*. *Labeo bata* has been noticed in the Bhavani River (reservoir) (Chacko and Dinamani, 1949) and also in the Cauvery river (Mettur Dam). The catfishes of the Cauvery system are *Wallago attu*, *Macrones aor* which are most dominant (occurring also in Bhavani) and *Silonia silondia*, *Pangasius pangasius* occurring to a lesser extent. Eels *Anguilla* sp. and *Mastacembelus armatus*, are present in the system especially at Mettur.

Introductions have been made. As early as 1923, fingerlings of *Catla* from the Godavari were transplanted to the Cauvery at Hogainakkal, below the waterfalls. The beneficial impact of this move was felt a decade later when the Mettur Dam was constructed. The gangetic carps *Labeo rohita*, *L. calbasu* and *Cirrhina mrigala* after transplantation into the Cauvery system have become well established and have also proved to be beneficial. Introductions of *Lates calcarifer*, *Mugil cephalus*, *Gambusia affinis* and *Chanos chanos* have not been successful. Gourami was introduced in 1940 but specimens are rarely caught. *Trichogaster fasciatus* was also stocked. The introduced cichlid *Etroplus suratensis*, has established itself and numbers are now caught. *Puntius sarana* contributes to the river fishery. *Notopterus notopterus* is more common in the Coleroon than in the Cauvery proper.

5. PRESENT STATUS OF THE FISHERIES

The anadromous *Hilsa* has ceased to form the basis of a major fishery but it occurs off and on in the Coleroon up to the limit of the Lower Anicut. The following species are now caught in all the distributaries of the Cauvery: *Cirrhina reba*, *C. latea*, *C. cirrhosa*, *C. mrigala*, *Labeo fimbriatus*, *L. kontius*, *Puntius* sp., *Wallago attu*, *Catla*, *rohu* and *C. calbasu*. The major part of the catch from the Cauvery system is obtained in Tanjore District—15 000 t year^{-1}. Coimbatore District contributes about 700 - 750 t year^{-1}. Trichy and Salem-Dharmapuri contribute only 60 and 15 t respectively (excluding catches of reservoirs). The Coleroon river in South Arcot yields about 800 t year^{-1}. Thus the river Cauvery and its distributaries yield a little over 16 600 t fish per year valued at Rs. 33.2 million.

In addition to the yield of edible fish, the Cauvery river is an important source of fish seed for stocking other inland waters. The yearly collection of fingerlings (over 7.5 cm) and stock size fish (over 15.0 cm) at regulator sites in Thanjavoor District alone, is around 40 to 50 million. The number of fingerlings collected in Trichy district on the Cauvery system is around 0.6 to 1.2 million a year. Here the much valued murrels *Channa* sp. alone account for about 0.2 million per year. The Cauvery in Salem District yields from 0.5 to 3 million fingerlings—an average of 1.6 million per year.

The river is also a source of spawn. Investigations made by Natarajan (1967 unpubl.) and Shetty *et al.* (1971) indicate that Kulithalai is a good centre where *Catla formed* 52.9 percent and *Labeo* sp. 16.7 percent of the total spawn collected, which is indeed a very high proportion of the major carps. Other fishes of economic importance encountered were *Pangasius pangasius*, *Labeo calbasu*, *Wallago attu*, and *Channa striatus*. Similarly the same worker found that the spawn collected at Moolathurai in the river Bhavani in 1965 consisted mostly of *Catla*, *L. calbasu* and *L. mrigala*. In the river Coleroon, (Shetti *et al.*, 1971[a]) found that major carps formed only up to 22 percent of spawn collected and these were mainly *L. calbasu* and *L. fimbriatus*. David *et al.*, (1967) also recorded good spawning at Kulithalai, Hogainakkal etc., on the Cauvery.

An important feature worth noting is that the transplanted species like *L. rohita*, *L. calbasu*, *L. mrigala* and *Catla* are occurring increasingly in the Cauvery system indicating their successful establishment.

6. HYDROLOGICAL FEATURES

The survey of the various distributaries of the Cauvery and the Coleroon was made at sites of fish collections (Table I). The highest temperature reached in the evening was 37.0°C. The lowest was 26.0°C.

Free carbon-dioxide was mostly absent and low when present (0 to 3.5 ppm). Carbonates ranged from 3 to 21 ppm and were present on most occasions. Bicarbonates ranged from 134.2 to 245.0 ppm. Lower values were noted in the upper reaches and higher values in the lower reaches. Total hardness followed the same

pattern. The pH value was within a narrow range — 8.1 to 8.7, mostly around 8.5 due to strong buffering. The most important parameter, the dissolved oxygen, was always above 50 percent saturation and mostly over 80 percent saturation. On a few occasions supersaturation was noted. Nitrate was not detected, but phosphate was found occasionally. A moderately high silicate content (4-16 ppm) was observed. Chloride content was fairly low – 16 to 34 ppm. The water quality was suitable for fishes throughout the year. Natural spawning of Indian fish species has been recorded at temperature ranges of 23.5 - 34.5°C, ph 7.0 - 8.5, D.O. 5.3 - 7.2, alkalinity of 50 - 110 ppm by David *et al.*, (1967).

7. METHODS OF EXPLOITATION

In the swift flowing waters of the rivers the ingenious but simple coracle is the chosen craft. This is a large basin shaped device made of a frame of split bamboo covered with raw buffalo hide. It is highly manoeuvrable in currents and it can carry up to two persons together with 200 kg fish. They cost around Rs. 200/- each at the present price. These 'Coracles' are now being made of fibre glass and cost about Rs. 1 500/- each. In some areas small 'catamarans', logs fastened together to form a floating craft, are also used. Dugout canoes are used to a limited extent in the lower reaches of the rivers.

The gear used includes drag nets, cast nets, gill nets (Rangoon nets, Uduvalai) dip nets "Ootha'. Hooks and lines are also used to capture the predatory Wallago, murrels and catfishes. Bamboo devices called 'Saars' and 'Pari' are also used to capture fish.

8. FISHING POLICY

Most of the river system (including tributaries and distributaries) is leased out annually to fishermen cooperatives. The cost of the lease is determined by open auction of reaches of the river, or on the fishery potential determined by tne Fisheries Department. The previous three years' average rental is taken into account when leasing the river 'lots' to fishermen's cooperative societies. In succeeding years, the rent is raised by 10 percent while giving it to the fishermen's cooperative without open auction. In the Vadavar (channel) and the Coleroon, licences are issued by the Fisheries Department for fishing. All fishing is governed by rules framed by the Government under the title "Tamilnadu Inland Fisheries Lease and Licence Rules 1972". According to these rules, fishing in rivers and tanks and reservoirs, connected to river systems, is prohibited without a valid licence or lease. The conditions of licence are also laid down for each reservoir and fees are also prescribed for operating specified gear and craft. Fishing in rivers below the dams up to a distance of 2.4 km is totally prohibited, treating this area as sanctuary.

The kind, number, dimensions and mesh size of nets permitted to be used is specified in these rules. Capture of certain rare species like the Gourami is prohibited as is the catching of major carps below 15 cm length.

9. CONSERVATION MEASURES

In order to protect the brood fish and stock fish conservancy measures are enforced. Dynamiting and poisoning are totally prohibited and fishery guards are posted to protect fish at vulnerable pools where breeders take shelter (for instance, the Bhavani, Jedarpalayam, Lower Anicut, etc.). Fishing immediately near regulators or weirs is prohibited and fish of sizes less than 15 cm, if caught, should be released alive into the rivers. Restrictions on mesh size allow young fish to escape. Sanctuaries are declared in some places to prevent breeders being captured, e.g., Hogainakkal. Closed seasons are declared at certain periods to protect the brood stock. The 'Ullar' bypass, which connects the Cauvery and the Coleroon below the Grand Anicut is maintained as a sanctuary to facilitate migration of fish from one river to the other.

10. IMPACT OF DAMS AND WEIRS

Construction of barrages, weirs and dams have resulted in ecological changes in the Cauvery system. The anadromous *Hilsa* used to ascend the Anicuts during floods but the construction of the Stanley Dam at Mettur formed an impassable barrier (Devanesan, 1942; Chacko, 1952, 1954). The various weirs and dams reduce the velocity of water and regulate the flow and allow some retention time which results in better plankton production and better growth of fish. Some species like *Hilsa* and the native *Puntius dubius*, *Tor khudree*,

Acrossocheilus hexagonolepis, etc., have nearly disappeared from the river system. Judicious anticipatory management measures have overcome the loss of some of these indigenous fisheries. Transplantation of *Catla* in the twenties and of rohu, mrigal and calbasu in the forties, has more than made up for the disappearance of local species. In fact they have established themselves so well that they are regularly occurring in the seed collections and form a good source for stockable material for inland waters. *Cirrhinus cirrhosa* is dwindling lately from the reservoirs but in the rivers fingerlings are available. The deep pools ("madugus") harbour the breeders and when they breed the spawn are washed down to swamps, puddles and paddy fields where fry are collected later. The river fishery is therefore maintained by a self-stocking process, if the necessary conservancy measures are enforced.

11. POLLUTION

The following factories are located in the Cauvery basin—a viscose rayon and pulp factory, a distillery, small bleacheries and sugar factory on Bhavani; a pulp and paper factory on the Cauvery near Erode; and a distillery on the Cauvery distributary near Trichy. Regular discharges of untreated effluents do not occur. Most of the factories have in-built treatment plants and the wastes are discharged after suitable treatment as recommended by the Public Health and Fisheries authorities. In fact they are expected to adopt ISI standards for disposal of wastes in inland waters. On some occasions, the distilleries have posed problems. Flash discharge of untreated effluents of the Trichy distilleries cause fish mortality in the channels up to the Grand Anicut. Fish mortality due to discharge of distillery wastes in the river Bhavani was also reported recently. However, the Fisheries Department maintains strict vigilance and control over possible sources of pollution. Pollution due to urbanization is very insignificant.

12. FUTURE DEVELOPMENT

Up to now the river fishery has only been a capture fishery and the catch could be enhanced by culture practices. Where adequate depth is available, fish culture in cages or enclosures could be tried. Paddy-cum-fish culture has not been a success because of conflicting interests and because of cultivation of short duration rice crops. However, if 10 to 20 percent of the area of paddy plots could be converted to fish ponds it would be possible to raise sizeable fish crops. Ranganathan (unpubl.) has stated that over 5 000 tailend ponds in Thanjavoor District yield over 1 000 kg hm^{-2} without stocking, feeding or fertilizing. The yield can be multiplied by adopting modern fish culture technology.

Since fish are migratory it is necessary to extinguish private proprietory rights ("Patta") in parts of the river system to enable an integrated development. Leasing policy must be changed so that a lessee could develop a fishery and exploit it rationally. A continuous lease for five years is reasonable. Otherwise the lessees scoop out all the fish before the annual lease expires. A serious constraint in the development of inland fisheries is the multiple control over leases. Multiple control prevents any rational development of fisheries and leads to delay as well as confusion. For instance, in most cases the Revenue Department and in a few cases the Works Department, auction water bodies.

Tanks connected to river systems should be improved so that they could be filled up before the river supply is stopped, enabling the tanks to retain water till the summer. Some of these tanks could even act as bundh-type tanks to be flooded by river water following the monsoon floods. Large, shallow tanks, like Veeranam tank, are overrun by emergent and floating weeds. If these could be eradicated the fishery potential will increase, since such river-fed tanks replenish the fish stock of the system.

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TABLE 1

PHYSICO-CHEMICAL FEATURES OF THE CAUVERY SYSTEM (RANGE)

Centres / Parameters	*Upper Anicut*	*Grand Anicut*	*Koraiyar Regulator*	*Vettikad Regulator*	*Lower Anicut*	*Cauvery R at Erode*
Temperature °C	27.8-37.0	27.5-36.4	27.8-36.8	27.4-33.4	26.0-33.8	26.4
Free CO_2 ppm	nil	nil.-2.5	nil.-3.5	nil	nil.-1.2	nil
Carbonate as CO_3	3.0-18.0	nil.-18.0	nil.-24	3 - 18	nil.-21	12
Bicarbonate (as HCO_3) ppm	152.5-179.9	140.3-195.2	152.0-245.0	152.0-201.3	164.7-195.2	134.2
pH	8.5	8.5-8.7	8.1-8.7	8.2-8.7	8.5-8.7	8.4
Dissolved oxygen (mg l^{-1})	5.9-15.9	7.0-9.0	4.3-9.8	6.8-9.6	6.8-12.9	6.0
Silicate ppm	4.0-16.0	5.2-10.2	7.2-12.8	6.0-16.0	Tr.-16.0	3.7
Phosphate ppm	nil.-0.06	nil.-Tr.	nil.-Tr.	nil.-Tr.	nil.-Tr.	0.004-nil.
Total hardness (as $CaCO_3$) ppm ...	110-118	110-120	118-150	116-138	112-130	...
Chloride ppm	16-18	16-23	18-34	18-25	20-24	22