

Research Note

Crab as bait to lure carnivorous fishes in hook and line fishery in River Cauvery

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Hook and line fishing is one of the most primitive fishing methods used by mankind (Von Brandt, 1984) and baits are an integral part of line fishery to lure the fishes. Baits used may vary depending upon the food habit of the targeted fish species besides economic viability and availability (Manna et al., 2020a). Baits derived from plant products are often supplemented with different kind of attractants especially when herbivorous fishes like Indian Major Carps are targeted (Manna et al., 2020b). In case of carnivorous fishes, animal baits are often used, mostly in live condition. Among different baits used, live baits occupy an important place in marine capture fishery (Sternberg, 1996; Miesen & Hauge, 2004). Present reports from river Cauvery show that different species of crabs are regularly used as live bait both in freshwater as well as in brackish water stretch of the river. Though there are reports on the use of crabs to attract fishes and octopus (Rahaningmas & Mansyur, 2018; Sargeant, 2020; Leitão et al., 2021), such studies in Indian freshwater scenario is limited. Mangrove tree-climbing crabs (*Sesarma* sp.) were reported to be in use in estuarine stretch of river Ganga to attract carnivorous fishes like *Plotosus canius* (Manna et al., 2020a).

Information on 'crab-bait' based hook and line fishery was collected from Kudige, Bhavani and Pazhayar sampling stations of river Cauvery using

different participatory tools including interviewing, group discussions and field observations (Fig. 1). The sampling station of Kudige was typical hilly stretch with about 40% run and 15% rapids, just above the Harangi river confluence. Water flow was higher (10-25 cm/sec, average 18 cm/sec) due to the presence of large sized boulder in the riverbed and also higher slope of the river bed making the water relatively turbid (transparency 65 cm). Water depth was low, varied between 110-350 cm (average 227 cm), higher in monsoon season. At Bhavani, water depth (80-250 cm, av. 135 cm) and flow (10-15 cm/sec, av. 12 cm/sec) was mostly controlled by discharge from upstream Mettur dam. Bottom with huge boulders used to be exposed during non-monsoon months with less and regulated water release. The stretch was also facing severe anthropogenic pollution from cities and industrial effluents with higher soil organic carbon ($0.42 \pm 0.27\%$; up to 0.78%) at bottom. Dense submerged macrophyte infestation was noticed in near shore areas. Pazhayar is located at the river mouth of the

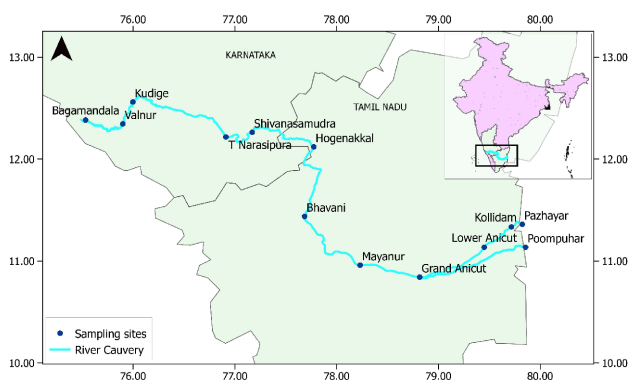


Fig. 1. Sampling stations in river Cauvery

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Kollidam river, the major tributary of river Cauvery. Lack of freshwater discharge from upstream makes it backwater instead of estuary especially during pre-monsoon months. Mangroves were located in a very small area and in patches. Details of fishing accessories like hooks (Fig. 2a), line (Fig. 2b and 2c), fishing rod and sinkers (Fig. 2d) were also considered for the study.

In upper stretch of river Cauvery, at Kudige (12.49982°N, 75.96126°E), freshwater crab *Barytelphusa cunicularis* was used as bait in hook and line fishery (Fig. 3a). It is mostly used in set long lines, where hooks are suspended from a main line with a distance of about 1 m between each other (Fig. 3b). Main target species is Mahseer (*Tor* sp.), (Fig. 3c) for which thicker monofilament (0.33 mm dia.) nylon thread (Fig. 2b) and large metallic J-hook (No. 8, length 5.1 cm, gape 1.4 cm, bend 1.6 cm, bite 1.8 cm) (Fig. 2a) are generally used. The peak operation period is September-November when crabs are easily available in paddy fields. Operation of a 'Set line' requires two persons and is practiced from a coracle during evening hours (18:00 h). The gear is left unattended inside water and hauled early morning (5:00-6:00 h). Hooks are rigged with live crab in such a way that the crab remains alive for long time, swimming in the water column to lure

Mahseer. Average size of Mahaseer caught by this method ranges from 1.0-5.0 kg. Besides Mahseer, *Channa* sp. (1.0 kg to 4.0 kg) were also observed to be caught by this method.

In middle stretch of river Cauvery at Bhavani (11.434852°N, 77.685431°E), soft flesh after removing the shell of the crab *Spiralothelphusa* sp. is used for hook and line fishery (Fig. 4a and 4b). Here, smaller sized hooks (no. 16-18; size 2.1 cm and 1.6 cm, gape 0.5 cm and 0.4 cm, bend 0.7 and 0.4 cm, bite 0.7 and 0.5 cm respectively) are used to catch *Mastacembelus armatus*. However, larger hooks of no. 8-10 (length 5.1 cm and 4.1 cm, gape 1.4 cm and 1.2 cm respectively) are used to catch large sized (0.5 kg to 1.5 kg) *Anguilla bengalensis* (Fig. 4c). Other species of crabs like *Barytelphusa* sp. are also available at Bhavani; however, the crab *Spiralothelphusa* sp. is more effective and hence preferred as bait by the fishers. This crab is locally called as 'Milk crab', because when the carapace is broken, white milk like juice (white haemolymph protein) is released. This type of hook and line fishery include a 1.5-2.0 m fishing rod made of bamboo. The line is attached with a heavy sinker or 2-3 small lead sinkers (Fig. 2d). At Bhavani, water depth remains 1-2 m during most of the year due to controlled water release from Mettur dam

Fig. 2a. Different size of hooks with number used in river Cauvery	Fig. 2b. Monofilament thick nylon rope used for large fishes	Fig. 2c. Monofilament thin line along with single hook and sinker	Fig. 2d. Fishing rod with multiple sinkers for use in higher flow area
Fig. 3a. Crab species used as bait in set line to catch Mahseer in Kudige	Fig. 3b. Schematic diagram of Set line targeting Mahseer	Fig. 3c. Large sized Mahseer, a major target using crab bait	

		
Fig. 4a. Hook & line fisher showing crab used as bait at Bhavani	Fig. 4b. The flesh portion of the crab used as bait	Fig. 4c. Large sized <i>Anguilla</i> sp., a prime target of crab bait in Bhavani
		
Fig. 5a. Hermit crab bait in Hook & line fishery at Pazhayar	Fig. 5b. Catch included <i>Plotosus cannius</i> , <i>Lutjanus</i> sp., etc	Fig. 5c. <i>Triacanthus biaculeatus</i> , caught by crab bait

exposing the rocky river bed which is often visible especially during non-monsoon months. Local fishermen generally target eel (*M. armatus*, *A. bengalensis*) residing between the rocks with the crab bait as mentioned.

At Pazhayar (11.3598008°N, 79.8258877°E), located at estuarine mouth of Kollidam river (major tributary of Cauvery river), fishing with hook and line dominates over conventional cast net and gill net. Here, hand lining is performed and the lines are attached with baited hooks, thrown in the river from either shoreline or from a boat. Hermit crab (*Clibanarius* sp.) flesh is extensively used as bait in hook and line fishery to attract carnivorous fishes other than using fish flesh (Fig. 5a). Using crab as bait has proven to catch fishes such as *Plotosus cannius*, *Triacanthus biaculeatus*, *Lutjanus argentimaculatus* and *Lutjanus johnii* (Fig. 5b & 5c). Hermit crabs residing in the shell of gastropods especially *Telescopium* sp. are collected from estuarine mud flats. Soft flesh is taken out by breaking the shell and used as bait. Large sized hooks (nos 8-10) (Fig. 2a) and thick monofilament line (diameter 0.33 mm) (Fig. 2b) are used to catch catfish, *Plotosus cannius*.

Fishing baits are selected ingeniously keeping in the food habits and feeding behaviour of the target species. This type of traditional knowledge needs to be documented as many such ITKs are slowly going into oblivion due to use of advanced fishing gear. At each of the three stations, an average of 100-150 fishers practice hook and line fishing and the random use of crab bait may cause unnecessary stress to the crab populations from conservation start point. Therefore this practice of using crab especially the smaller ones, like in Bhavani, warrants further investigation. Research efforts to produce effective alternative bait to save the natural crab population of the river when they are already cornered due to several anthropogenic activities like obstructed and reduced river flow, increased industrial and sewage pollution and low water depth are needed (Ramya Priya & Elango, 2018). At upper stretch of river Cauvery, besides crab bait, live frog and boiled Ragi ball (Sibina Mol et al., 2018) are reportedly used for targeting Mahseer. Similarly, at Bhavani, earthworm is also used targeting eels and at Pazhayar, fish flesh is used in hook and line fishery targeting carnivorous fishes. Hence scientific approach is required to compare bait efficacy in all

species targeted in Cauvery to ensure conservation of natural baits used in the river.

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