

multi-dimensional approach with involvement of governments, financial institutions, commercial banks and last but not the least, the family members of women.

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A view on murrel (snakeheads) fisheries in India

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Channa striatus.

Murrels (family Channidae), also known as snakeheads, are the third most important group of freshwater fishes in India after carps and catfishes. Murrels are the most common and dominant group of air breathing freshwater fishes and are highly regarded as food fish in India. On the roof of the pharynx, murrels have a pair of cavities which have folded linings, richly supplied with blood vessels for taking in air. These organs enable these fishes to survive out of water for a few hours or migrate from one pool to another.

In addition to their value as food, murrel are important in biological control of mosquito larvae and aquatic insect populations in stagnant water pools, helping to protect human beings. They are also well known game fishes as they are easily attracted by lures and caught by the fish by anglers, providing both entertainment for the public and income for those involved in organising such sports.

Species

38 species have been reported globally so far. The Asian genus *Channa*, which presently contains 35 species, is widely distributed in India, Sri Lanka, Myanmar, Thailand, China, Laos, Cambodia, Vietnam, Malaysia, Indonesia, Philippines, Taiwan Province of China, Korea and Southern Russia. In India, fifteen species of *Channa* have been reported and are recognised on the basis of coloration, morphometric characteristics, scale patterns, fins etc. (Table 1).

Table 1: Snakehead species reported in India

Scientific name	Common name
<i>Channa amphibeus</i>	Borna snakehead
<i>Channa andrao</i>	Dwarf snakehead
<i>Channa aurantimaculata</i>	Orange-spotted snakehead
<i>Channa barca</i>	Barca snakehead
<i>Channa bleheri</i>	Rainbow snakehead
<i>Channa diplogramma</i>	Malabar snakehead
<i>Channa gachua</i>	Dwarf snakehead
<i>Channa marulius</i>	Great snakehead
<i>Channa melanostigma</i>	-
<i>Channa micropeltes</i>	Indonesian snakehead
<i>Channa orientalis</i>	Walking snakehead
<i>Channa pardalis</i>	Gorgeous snakehead
<i>Channa punctata</i>	Spotted snakehead
<i>Channa stewartii</i>	Assamese snakehead
<i>Channa striatus</i>	Striped snakehead

Among the genus *Channa*, *C. striatus*, *C. marulius* and *C. punctatus* enjoy a good deal of popularity as food fish in many parts of India. Besides the high quality of their flesh in terms of taste and texture, they also have good market value due to the low fat, fewer intramuscular spines, medicinal qualities and availability as live fish.

The various species of snakeheads differ greatly in size. Dwarf snakeheads, such as *C. gachua*, do not surpass 25 cm in length. Most other snakeheads reach between 30 and 90 cm. About five species (*C. argus*, *C. barca*, *C. marulius*, *C. micropeltes* and *C. striatus*) can reach 100 cm or more.

Murrels being typical “live fishes” and having soft flesh devoid of fat are considered to have medicinal value and provide nutritious food, particularly to the sick. Murrel fingerlings are used as medicine every year in the month of June on the eve



Channa marulius.



Murrel juveniles.

of *Mrigasirakarathi* day for dispensation to asthma patients that gather from all over the country in Hyderabad City since long back.

Cultivable species

However, the high demand and high market value and their capacity to withstand in adverse water conditions make them suitable candidate species for aquaculture. Out of the different species of murrels found in India *C. marulius*, *C. striatus* and *C. punctatus* are important from a culture and economic point of view. These are also cultured by most of the farmers along with major carps in many states of the India.

Farming practices

Murrels are predatory in habit and feed on variety of fauna present in the water. The murrel breeds all around the year from rain-fed ditches and shallow water bodies with rich aquatic weed vegetation. Juveniles of these species, under parental care, move in shoals in search of food along the marginal areas of the breeding environment. While moving they make characteristic ripples at the water surface which can be easily noticed from a distance. The entire shoal can be collected easily when it is moving in the marginal weed-free areas using a fine meshed net.

Murrel juveniles and fingerlings are available in rivers, reservoirs, perennial tanks and other derelict water bodies. The present demand for murrel seed is, by and large, met from wild collection. Maximum seed availability is from May to August. The commercial culture of murrels is still not common in India due to inadequate seed availability.

Seed stocking

Murrels permit high stocking density, as they are hardy fishes and tolerate overcrowding due to the additional support of air breathing organs. Presently many farmers are stocking about 5,000 to 8,000 fingerlings / ha. Fishermen usually collect murrel seed from the wild and sell it to farmers. Fish farmers stock these murrel seed along with carp in their culture tanks and allow them to grow for 6-9 months or even more. In exclusive carps culture ponds, farmers stock 300-500 murrel fingerlings per hectare to control, weed fishes particularly tilapia. This gives additional income to the farmers in India.



Healthy murrel juveniles commonly used for stocking in culture tanks.



Hand picking of murrels after total dewatering of culture tank.



Murrel juveniles collected from wild source.

EUS infection

Murrels are easily susceptible to epizootic ulcerative syndrome (EUS), resulting in large scale mortalities. Murrels of all sizes are affected. However, the incidence of infection is greater in the younger ones. Affected murrels with mild lesions may not show any clinical signs, whereas those with marked ulcerative lesions exhibit distinct abnormal swimming behaviour with frequent surfacing.

EUS is characterised by the occurrence of large haemorrhagic or necrotic ulcerative lesions on the base of fins and other parts of the body, which later become larger inflamed areas with acute degeneration of epidermal tissues. Initially, the disease appears as red coloured lesions, haemorrhagic in nature. These red lesions spread and enlarge gradually becoming deeper and assuming the form of ulcers. With further advancement, scales fall off; ulcers become deep necrotising or lesions. The fish starts rotting while still alive and eventually dies.

Harvesting

Although murrels are caught in gill nets, drag nets and cast nets; the gear mainly intended to catch murrels are long line and various types of traps. It is also a common practice to drain or pump water out from pools and ditches where murrels are known to live, for hand picking.



Murrel caught with hook and line from the canal.



Murrels marketing.

Marketing

Murrels are marketed in live condition as they can be kept out of water for several hours in moist conditions. These fish fetch a very high price ranging from Rs. 300- 600 (US \$ 5-10) per kg in different markets. In general the prices of murrels are much greater than those of carps and catfishes. Heavy demand for murrels exists in the states of Telangana, Andhra Pradesh, Karnataka, Tamil Nadu, Assam, Bihar, Jharkhand, Uttar Pradesh, Haryana, Punjab and Madhya Pradesh. Some like them for their delicious taste, while others prefer them because of their nutritional and medicinal value. The demand also arises because they are sold live in the market, and can be purchased in a fresh condition.

Production trends

Production of murrels under traditional composite culture systems ranges from 50 to 150 Kg/ha in 8-10 months. On an average, marketable sizes of murrels can be obtained in 8-9 months. The yield is slightly more under semi-intensive culture along with carps. They have scope for development in the country as alternate species but non-availability or adequate seed is the main constraint to increasing production at present.

Financial support

The National Fisheries Development Board (NFDB) was established in Hyderabad in 2006 for the development of Indian fisheries, and is also planning to provide financial assistance for the development of breeding, feeding and culture technology of murrels particularly *C. striatus* in India.

Conclusion

Against the availability of vast freshwater resources, only a limited area is used for murrel farming in different states in India. Many reservoirs and projects constructed on these rivers and their tributaries have left many hectares of land water logged in the vicinity of the canals of the projects and otherwise unfit for agriculture. This vast water logged area is available for fisheries development. As such still there are ample resources for the growth of inland fisheries activities including murrel farming.

The various state governments in India are fully aware of the potential of murrel farming; the technology is a constraint for breeding and feeding of murrel farming in commercial way. There is a good domestic market available for murrels, as

returns by adopting murrels as a variety in their fish culture practices. With the proper utilisation of the available resource and the technology, the states can augment the murrel production, and the fish farming community can reap better returns for their products.

C. striatus is the most cultivable species among snakeheads in India. The Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar has developed induced breeding, seed rearing and culture techniques of this species recently.

In tropical countries like India, where there is significant area of water logged land and derelict or under-utilised water bodies, air-breathing fishes like murrels may have a significant advantage for aquaculture as they can very well thrive in this environment. More studies need to be initiated in murrel breeding and nutrition to undergo a commercial large scale production the country due to its significant food value and demand in many parts of India.

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Well grown murrel from culture tank.