

Rare landings of large-sized Bronze croaker in West Bengal that warrants sustainable management

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The Bronze croaker *Otolithoides biauritus* (Cantor, 1849) is found in shallow coastal waters and estuaries, with adults capable of entering rivers, while sub-adults primarily inhabit marine environments. The maximum recorded length of *Otolithoides biauritus* is 160 cm, though it is commonly observed up to 100 cm being targeted across its range using various fishing methods, including trawls, bag nets, purse seines, and longlines, and is also caught as bycatch. The species is assessed as Data Deficient globally on the IUCN Red List of Threatened Species (Chao *et al.*, 2020). Fish swim bladders, called as fish maw after being processed, are highly prized seafood delicacies in East Asian markets and ranked one among the "big four" traditional delicacies which includes sea cucumber, shark fin, and abalone. Limited information on the marketing channels and value chain analysis of commercially important finfish and shellfish species which hinders our understanding of how market structures influence the exploitation and sustainability of marine resources was addressed in the present study focused on *Otolithoides biauritus*, a high-value yet poorly studied sciaenid species. The emphasis on catch trends, size composition, value chain mapping, and constraints in exploitation and trade aims to provide baseline information to support sustainable fisheries management, conservation strategies, and policy interventions.

Fishery

Otolithoides biauritus, locally known as 'nede bhola' or 'lathi bhola' along the West Bengal coast, is a valuable resource with no specialized or targeted

fishery in the region. It is occasionally caught in coastal waters as by-catch in trawls, gillnets and bagnets. The estimated landings of this species along the West Bengal coast from 2007 to 2024 show a declining trend (Fig.1).

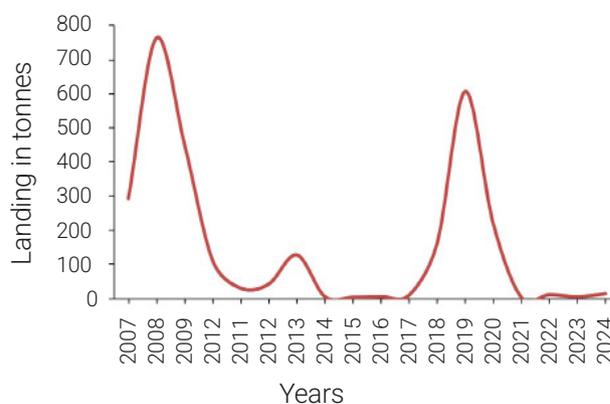


Fig. 1. Catch trends of large-sized Bronze croaker in West Bengal during 2007-2024

The highest estimated landings of 763 tonnes (t) were recorded in 2008, followed by a steady decline until 2017. A subsequent increase was observed, reaching 607 tons in 2019. However, the catch has recently decreased significantly, dropping to 14.5t in 2024. Among the various fishing gears used along the coast, trawl nets accounted for the largest share of the catch (40%), followed by gillnets (24%) and other combination gears (36%). Regular surveys conducted along the West Bengal coast from 2021 to 2024 revealed that the majority of landings comprised small-sized juveniles. The recorded specimens measured between 17.2 and 146.0 cm in total length (mean: 67.2 cm TL) and weighed from 0.050 to 12.0 kg (mean: 3.0 kg) during this period (Fig. 2 and 3).



Fig. 2. Adult and juvenile specimen of *Otolithoides biauritus* measuring 143.6 cm TL (A) and 39.8 cm TL (B)

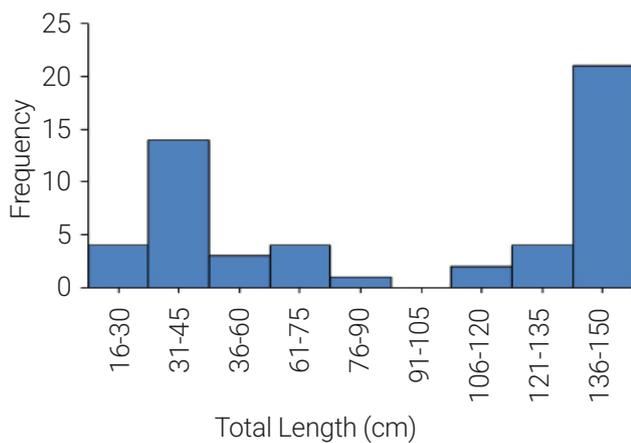


Fig. 3. Length-frequency distribution of *Otolithoides biauritus* along West Bengal coast during 2021-2024

On December 6th, 2024, 17 large specimens of *O. biauritus* were landed at the Digha Mohana Landing Centre, West Bengal (21°36'58.3272"N, 87°29'56.8644"E). These specimens measured 138–149 cm in total length (mean: 144 cm TL) and weighed 12.3–15.5 kg (mean: 13.8 kg). The total catch of 235 kg was auctioned at ₹ 730 per kg, yielding a total revenue of ₹1,71,331.



Fig. 4. Large-sized Bronze croaker *Otolithoides biauritus* landed at Digha Mohana Landing Centre, West Bengal

The fish were caught using a monofilament gillnet with a mesh size of 185 mm, operated from an inboard plank-built boat (OAL: 11.3 meters, engine capacity: 68 hp) by a nine-member crew. Fishing took place 8 km from the Subarnarekha River mouth, between the Kirtania and Talasari areas of the Odisha coast, at a depth of 9 meters. The species was captured as by-catch while targeting large threadfin species, namely *Eleutheronema tetradactylum* and *Leptomelanosoma indicum*. The typical two-day fishing trip began at around 8 am and ended early the following morning at approximately 4 am. Gillnets were set at a depth of 9–10 meters for a soaking time of 4 hours, with two hauls conducted per trip. Each trip required approximately 50 liters of diesel and 200 kg of ice. After the auction, wholesalers/supplier gutted the fish, filleted the meat, and transported it to the Howrah fish market at a rate of ₹300-400 per kg. Fresh air bladders were sold to processing plants or companies at ₹17,000–20,000 per kg, depending on the size and sex of the specimens. The air bladder of male individuals is larger, thicker, and of superior quality, fetching a higher price compared to

that of females. The processed air bladders are exported mostly to Southeast Asian countries and primarily China, at a price of ₹40,000–50,000 per kg

Marketing and Value Chain Mapping

The price trends of large-sized Bronze croaker in West Bengal (Small, medium and large- ₹/ kg) during the year 2024 were observed as 1-3 kg @ ₹150-200/kg, 3-5 kg @ ₹350-400/kg, 5-10 kg @ ₹600-650/kg and >10 kg @ ₹800-1500/kg. The marketing and value chain mapping of *Otolithoides biauritus* in West Bengal is given from the different channels the landings go through from Digha Mohana and indicates a price range of ₹300-400 at the level of wholesaler to ₹700-800 at the retailer level of marketing, per kg of meat. For the air bladder, the price range was ₹17,000/- to 20,000/- per kg of fresh air bladder at the level of wholesaler to ₹40,000/- to 50,000/- of dried air bladder at the export node (Fig. 5).

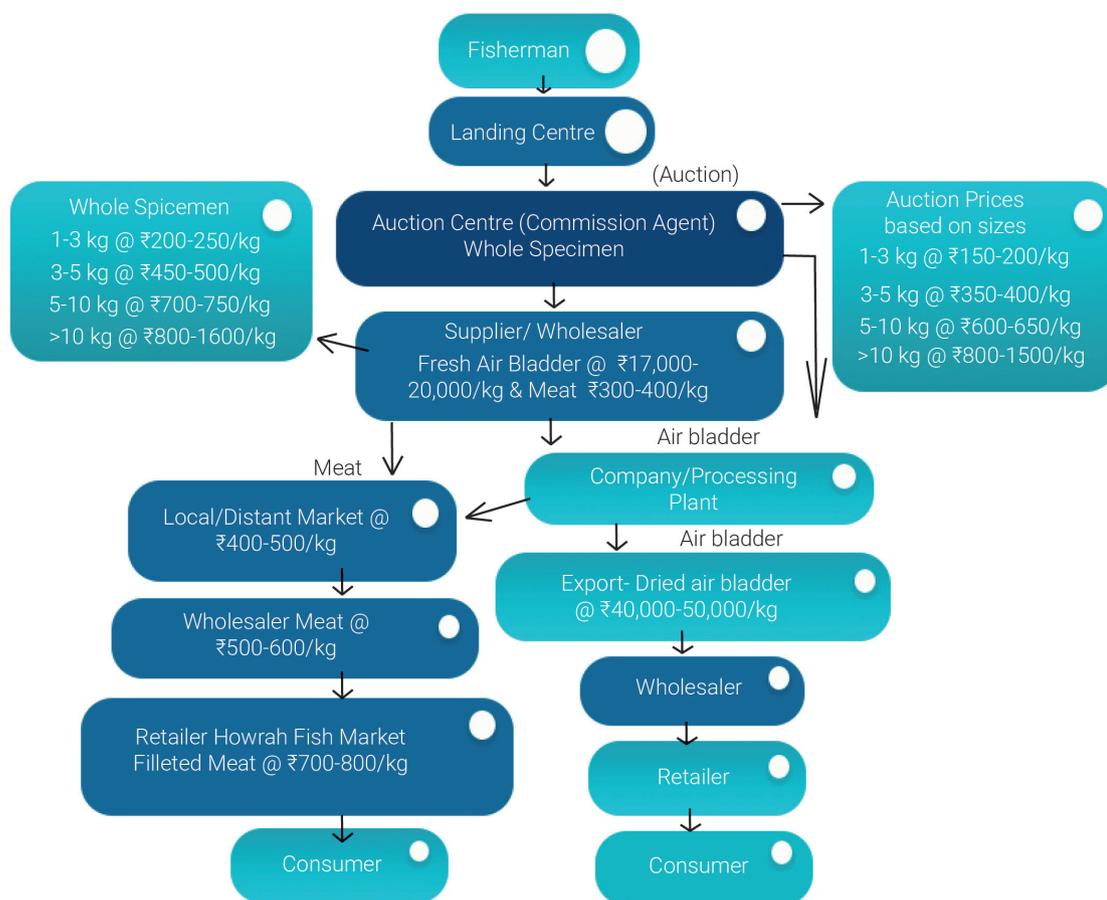


Fig. 5. Marketing and value chain mapping

From the focused group discussions with the various operators at the value chain, it could be assessed that 30 % of the catch goes to the local market and 10% to distant places, while 60% goes to the export market. The percentage source of arrival at and disposal of Bronze croaker, from Digha Mohana market is given in Table 1.

Table 1. Market arrivals and disposal of Bronze croaker in selected markets of West Bengal

Market	Arrival		Disposal	
	From	Percentage	To	Percentage
Digha Mohana	Paradeep Fishing Harbour	20	Howrah	60
	Bahabalapur	20	Kolkata	20
	Petuaghat Fishing Harbour	30	Sialda	20
	Shankarpur	20		
	Diamond Harbour	10		

The analysis of market access revealed that the distance from the market (Digha Mohana) to the nearest landing centre was 10 kms (Sankarpur); nearest railway station at 5 kms (Digha Railway Station); nearest airport at 210 kms (Dum Dum Airport) and the nearest seaport (Haldia Port) at 85 kms. The average quantity (t/yr) and value (₹/yr) traded and percentage distribution/sales at different levels in the value chain is given in Tables 2 & 3.

Table 2. Characteristics of the value chain for Bronze croaker

Value chain Point	Quantity (t/yr)	Value (₹/yr)
Fishers	14.0	56,00,000
Commission agent/Auctioneer	14.0	58,24,000
Wholesaler/Supplier	0.70	2,80,000
Local Market	0.70	3,50,000
Distant Market	0.70	4,20,000
Company/Processing Plant	11.2	56,00,000
Retailer	0.70	5,60,000

Table 3. Percentage distribution/sales to different value chain actors

Value chain actors	Wholesalers	Local Markets	Distant markets	Processing Units	Export Units	Vendors	Consumers
Fishers	5%	5%	5%	85%	0	0	100
Wholesalers	-	5%	90%	5%	-	-	100

The constraints in large-sized bronze croaker fishing were identified as: large-sized fish are primarily found in deeper waters, congregating in specific areas, with no available information on fishing grounds. Since the large-sized bronze croakers are often found in deeper waters, suitable, advanced fishing vessels and gears, fish storage facilities etc. are needed. In West Bengal, there are no specialized deep-sea fishing vessels capable of venturing into deep waters to capture these resources. The market for bronze croaker, particularly for its air bladder (used in Chinese medicine and cuisine), is also unpredictable. These fish exhibit shoaling behaviour and occasionally migrate toward the coast for breeding and feeding, making them vulnerable to being entirely caught. The species takes several years to mature, making it vulnerable to overexploitation. Probably, fishing pressure is also contributing to a significant decline in the population of large-sized bronze croakers, making them harder to catch.

The constraints in large-sized Bronze croaker marketing were perceived as: due to exceptionally high market prices, there are fewer buyers for this species; due to their large size, there is less demand in local markets; the demand for large-sized Bronze Croaker is inconsistent, especially since its main value lies in the air bladder, which is highly sought after in Chinese traditional medicine and cuisine; prices vary significantly based on market conditions, availability, and competition from alternative fish species; due to overfishing, fewer large specimens are available, making consistent supply difficult; the involvement of multiple intermediaries in the trade can reduce profit margins for fishermen and other stakeholders.

The problems in export as perceived by the producers were; since *Otolithoides biauritus* is a high-valued fish species, some countries like Vietnam listed this species in the National Red Book of Vietnam at the highest level of protection in year 2007, to prevent overfishing, which places restrictions or bans on its trade. A reduction in the availability of this species, is making it harder for traders to source sufficient quantities. Buyers demand high-quality, properly dried and preserved air bladders,

which can be challenging to maintain. The demand for fish air bladders (used in traditional Chinese medicine and cuisine) varies, affecting prices and export opportunities. The price of fish air bladders is highly volatile, making it difficult for producers to predict revenue. Fish air bladders require careful drying and packaging to prevent spoilage and loss of quality during transit. Some producers face issues with non-payment or delayed payments from international buyers. Exporters may suffer losses due to exchange rate fluctuations. The Garret ranking on the problems and constraints encountered in marketing is given in Table 4.

Most species within the 'greater sciaenid group' are characterized by long lifespan, larger maximum sizes, late maturity (in terms of both age and size), infrequent spawning and low relative fecundity which make them more susceptible to risks of overfishing. Targeting primarily large-sized fish reduces spawning stock biomass, increasing the risk of recruitment overfishing, while the by-catch of juveniles leads to growth overfishing. Therefore, continuous monitoring of these economically significant species for the impacts of fishing pressure, is crucial.

Table 4. Garret ranking of constraints in Bronze croaker market chains in West Bengal

Problem	Rank
High marketing cost	3
Lack of infrastructure and amenities	7
Lack of access facilities	8
Lesser number of buyers	4
Low market arrivals	1
High transportation cost	9
Competition among traders	6
Low product diversity	2
Price discrimination	5
Others	10

References

- Chao *et al.*, 2020. *The IUCN Red List of Threatened Species 2020*: e.T49188068A49235589.
- Waggy *et al.*, 2006. Evaluation of the reproductive life history of the Sciaenidae in the Gulf of Mexico and Caribbean Sea: "Greater" versus "Lesser" Strategies? *Proceedings of the Gulf and Caribbean Fisheries Institute*, 57: 263-281.