

Understanding Bycatch Fisheries at Dhakke

Introduction

Bycatch is the incidental catch of non-target species during fishing operations. Bycatch can be the wrong species, the wrong size or juveniles of the target species. It can also include species that are not commercially valuable or are protected under conservation laws. Trawling, an important commercially used method to catch fishes which also includes fish that are not consumed but are used economically. Trawls are operated from surface to bottom intending to target specific groups of organisms, but being the most destructive non-selective gear catches everything that come across its towing path.

Karnataka has a coastline of 300 km with 96 fish landing centres among which Mangalore in Dakshina Kannada, Malpe in Udupi and Karwar in Uttara Kannada are the major landing centres. Mangalore is the largest marine fish landing centre with a wide continental shelf. It contributes about 44% of total marine landings of the state (CMFRI 2024). Bottom trawling in Mangalore was introduced in 1961 with an objective to exploit the fishing grounds and to target high valued prawns, squids, cuttle fishes, threadfin breams, ribbon fishes etc. (Dineshbabu et al. 2009).

The high demand for fishmeal in the poultry industry has intensified bottom trawling practices, leading to excessive bycatch of juvenile and low-value fish in centres like Mangalore. This not only threatens marine

biodiversity but also undermines the livelihoods of small-scale fishers dependent on sustainable fish stocks (Lobo et al. 2012).

This situation highlights the urgent need for continuous monitoring of bycatch species, evaluate the scale of unselective fishing practices that bulk capture species, understand its impact on benthic fauna, identify & prioritize vulnerable species that are impacted by such fishing practices for conservation, and to understand the drivers of such exploitative fisheries.

Therefore, the present study, although a short one, provides glimpse into bycatch situation at Dhakke covering aspects on bycatch composition, and its market trends to understand the following- which species are landed, how many of these are non-consumption uses, and where are they sold to and for what prices.

Methodology

Mangalore fishing harbour is one of the major landing centres of coastal Karnataka. Our survey involved visiting the harbor during fish landing time, recording species landed, and interviewing the fishermen & boat owner on fishing methods and trade information of the species. The study was conducted for a whole month of May with survey frequency of three days a week. On an average, two boats were surveyed each day, starting around 6:30 in the morning. Boats to

Zooreach Activity Update

interview was identified based on huge number of crates loaded with putrid, not-iced fishes with an assumption that these were most likely used for non-consumption purposes. Pictures of species were taken with a scale as a reference for species total length measurements.

A customized questionnaire was prepared and was asked among fishermen. Few of the questions asked are listed below.

- ✓ What is the time of landing?
- ✓ What was the fishing duration?
- ✓ What fishing gears were used?
- ✓ Was the boat mechanized or motorized?
- ✓ What was the fishing depth and the distance traveled from the shore?
- ✓ What were the abundant and major catches in the boat?
- ✓ How many crates per species were caught?
- ✓ What is the cost of fish per kg?
- ✓ Where it is sold to and for what purpose?

Data Compilation

Out of many surveys conducted four cases are described below.

Case 1: On 13 May 2025 around 6:30 in the morning, we surveyed 2 boats. The time of landing of one boat was 3:00 in the morning with the fishing duration of 11 days. When interviewed, we got to know that variety of fishing methods were used depending on the depth and the population of the species. The boats used were mechanized. They had traveled a distance of 60 nautical miles. The fishes were sold to mills in and around Mangalore for cutting

and preparation of fish meat. The major catches and its price are listed below.

Major Catches	No. of crates	Sold for (in Rs per Kg)
Pink Perch	51	65
Chilli	45	32
Rafale Fish	41	24
Aarol	6	60

Case 2: Two boats were surveyed on 14 May 2025 around 6:30 in the morning. We surveyed for about 3 hours. Out of the 2 boats, one boat was landed at 4:00 in the morning after 10 long days of fishing. Trawling and gillnets are the majorly used fishing methods. The boats used were mechanized. They travelled a distance of about 700 kilometers and fishing depth of 120 meters. The bycatch fishes were mainly sold for poultry, as fertilizers and to make fish oil. They were mainly sent to Kerala. The major catches and their prices are listed below.

Major catches	No. of crates	Sold for (In Rs per Kg)
Pink Perch	54	65
Cuttle fish	32	280
Rafale fish	35	23
Ball Fish	16	20
Aarol	7	23

Case 3: On 17 May 2025 we surveyed 2 boats at the harbour. One of the boats had a fishing duration of 10 days. The landing time was observed as 3:30 in the early morning. The fishing depth and the distance travelled were not available. The catches were sent to factory for cutting and to make fish meat. They were later exported to Europe. The major catches and its prices are listed below.

Zooreach Activity Update

Major Catches	No. of crates	Sold for (In Rs per Kg)
Pink Perch	33	55
Chilli	15	33
Cuttle Fish	8	400
Ball Fish	40	7

of fishing from the shore was 40 nautical miles. The fishes were sent to Kerala for cutting, extraction fish oil and as food in the poultry.

The fishes observed and its price per kilogram is noted below.

Major catches	No. of crates	Sold for (in Rs per Kg)
Pink Perch	46	70
Siidi	18	15
Ball Fish	36	12

Case 4: Another survey was conducted on 23 May 2025. We headed to Dhakke around 6:30 in the morning. After 10 days of fishing, the fish landing was done at 3:00 in the morning. The fishing depth was 120 meters and the distance

Analysis

Table 1. Price (in Rs per Kg) variation for different species across each day in Dhakke.

Species	Pink Perch/ Rani	Chilli Fish /Arane	Rafale / Flying Fish	Puffer Fish / Thonde	Carrot Fish	Siidi
06/05/25 Boat 1	75		30		25	
07/05/25 Boat 1				15		
13/05/25 Boat 1	65	32	24			
13/05/25 Boat 2	68	33	24			
14/05/25 Boat 1	65		23			
14/05/25 Boat 2	65		23	20		
17/05/25 Boat 1	70	33		35		
17/05/25 Boat 2	55		23			
23/05/25 Boat 1	70					15
23/05/25 Boat 2	66	30				

Species	Aarol / Eel	Nullu	Cuttlefish	Ball Fish	Ribbon Fish / Pam-bal	Mixed Crate
05/05/25 Boat 1						13
13/05/25 Boat 1	60				110	
13/05/25 Boat 2		24				
14/05/25 Boat 1	22					
14/05/25 Boat 2	23		280			
17/05/25 Boat 1			400	7	95	
23/05/25 Boat 1				12		
25/05/25 Boat 1						12
26/05/25 Boat 1						25
26/05/25 Boat 2						22

Zooreach Activity Update

Species found in mix crates:

Crab	Pucchae
Kalamkayi	Takate
Kollethar / Silver Fish	Prawns
Kurchi / Silver Belly Fish	Needle
Fish	

Table 2. Length of species recorded in Dhakke

Species	Length ranging from
Aarol	14 cm – 22 cm
Carrot Fish	7 cm – 15 cm
Chilli	6 cm – 13 cm
Crab	3 cm – 7 cm
Kalamkayi	7 cm – 14 cm
Kollethar	2 cm – 8 cm
Kurchi	2 cm – 10 cm
Needle Fish	15 cm – 30cm
Nullu	17 cm – 30 cm
Pink Perch	7 cm – 15 cm
Prawns	3 cm – 7 cm
Pucchae	9 cm – 13 cm
Puffer Fish	7 cm – 17 cm
Rafale Fish	8 cm – 20 cm
Ribbon Fish	20 cm – 35 cm
Siidi Fish	5 cm – 10 cm
Takate	5 cm – 10 cm

Findings

Pink Perch: It is also known as ‘Rani’. The analysis indicates that Pink Perch catch is the highest among all the species. They have high demand in the market and are sold extensively. They are often sold to mills and factories for cutting, poultry, fish feed and are also exported. These are commercially used and not for consumption. The length recorded indicates that juvenile to adult fish were caught and sold. Pink Perch landed were observed from 7–15 cm, of which 13 cm dominated the most. They were sold for price ranging from 55–75 rs/kg.

Chilli Fish: They were sold for reasonable price ranging from 30–35 rs/kg, and there was not much variation in the selling price over the month. Their length varied from 6–13 cm, of which 13 cm dominated the most. They were sold for mills and factories where they were powdered and used in making fish meat, poultry, fish oil etc. They were not sold for consumption.

Rafale Fish: Rafale fish is also known as ‘Flying Fish’ because of the presence of wing like structure. Rafale fish landed was observed in huge number of crates. It was sold for price ranging from 23–30 rs/kg. Not much fluctuation is seen in selling price over a month. The length of the Rafale Fish recorded was from 8–20 cm, of which 14–15 cm dominated the most. Again they were not consumed, but sold to factories and mills and later exported.

Puffer Fish: Its local name is ‘Thonde’. The price of Puffer Fish ranges from 15–35 rs/kg. Slight variation was observed. It indicates that it was in demand after a couple of days. The length recorded was from 7–17cm. The most dominated was of 15 cm. It was sold to mills and factories and also were exported to Kerala and not used for consumption.

Siidi: Siidi fish were mostly found in mixed crates, and it was observed that only one boat had a whole crate of Siidi Fish. They were sold for price ranging from 15 rs/kg. This indicates that it had low market value. The length range of Siidi Fish was from 5–10 cm, of which 7 cm dominated the most. Instead of being consumed, the goods were processed through factories and mills before being shipped abroad.

Zooreach Activity Update

Carrot Fish: It was observed only once. It was sold for 25 rs/kg. Carrot Fish landed were observed within 7–15 cm, of which 12 cm dominated the most. Instead of being consumed, the goods were processed through factories and mills before being shipped abroad.

Aarol: On most days, it was observed that 5-10 crates of Arol Fish were caught and sold. Arol fish were observed within 14–22 cm in length, of which the fish with 20–22 cm length dominated the most. It was observed that on May 13, it was sold for 60 and on May 14, it was sold for 22–23 rs/kg. A sudden depletion in price was noted. They were not used for consumption, but instead sold to factories and mills for export.

Nullu: Nullu fish was only observed on one day, which indicates a lack of demand. It was sold for 24 rs/kg. The length recorded was from 17–30 cm, of which 20–22 cm dominated the most. They were mostly sold to mills and factories for cutting, poultry, fish oil, and fertilizers rather than for consumption.

Cuttlefish: Cuttlefish landings were observed on few days. It was observed that they were sold for price ranging from 280–400 rs/kg. Their high market price suggests strong demand. It was mostly exported to Kerala, China and Thailand. Cuttle fish which belongs to adult group are used for consumption, while juveniles and damaged ones are sold to factories and even exported.

Ball Fish: Huge number of Ball Fish landing were observed. It was also observed that around 6–10 crates of Ball Fish were sold. They were sold for low prices ranging from 7–12 rs/kg. Ball Fish are poisonous fish and were sold to mills and

factories where they were powdered for making fertilizers and not for consumption.

Ribbon Fish: It was observed that Ribbon Fish were sold for good prices ranging from 90–110 rs/kg. The Ribbon Fish landed were observed within 20–35 cm in length, of which the fish with 25–30 cm in length dominated the most. The products weren't consumed but were directed to factories and mills, then exported.

Mixed Crate: Carrot Fish, Siidi, Kalamkayi, Crab, Kollethar, Kurichi, Needle Fish, Prawns, Pucchae, Takate and many other fish were found in huge number. Most groups like Prawns and Crabs which are usually consumed were found in the bycatch crate because they were either damaged or juvenile. They were sold for price ranging from 12–25 rs/kg.

Table 3. List of few species (Image 1) identified by Karuppasamy, Assistant Professor at Fisheries College & Research Institute, Thoothukudi, TN from photographs.

Local name of species (as referred by fishers)	Scientific name
Aarol	<i>Opichthys sp.</i>
Ball fish	<i>Diodon sp.</i>
Carrot fish	-
Chilli fish	<i>Saurida cf. tumble</i>
Kalamkayi	<i>Terapon cf. puta</i>
Kollethar	<i>Stolephorus cf. indicus</i>
Kurichi	<i>Gaza cf. minuta</i>
Needle fish	<i>Fistularia cf. petimba</i>
Nullu	<i>Acanthocephala cf. indica</i>
Rani/Pink perch	<i>Nemipterus bipunctatus</i>
Pucchae	-
Puffer fish	<i>Lagocephalus sp.</i>
Rafale fish	<i>Dactyloptena cf. orientalis</i>
Ribbon fish	<i>Trichurus cf. lepturus</i>
Siidi	<i>Mene cf. maculata</i>
Takate	<i>Atule cf. mate</i>

Zooreach Activity Update



Photographs of Bycatch Fish at Dhakke. A—Aarol | B—Ball Fish | C—Carrot Fish | D—Chilli Fish | E—Crab | F—Kalamkayi | G—Kollethar | H—Kurichi | I—Needle Fish | J—Nullu | K—Pink Perch | L—Prawn | M—Pucchae | N—Puffer Fish | O—Rafale Fish | P—Ribbon Fish | Q—Siidi | R—Takate. © Authors.

Conclusion

The survey revealed a rich species diversity with over 18 species identified in the landing site. Among these, Pink Perch, Chilli Fish, Rafale (Flying Fish), Ball Fish, and Puffer Fish were the most abundantly landed, underscoring their ecological and economic significance. High-value species such as Cuttle Fish, Pink Perch, and Ribbon Fish consistently fetched premium prices, reflecting strong market demand. These fish were sold to the fish meal industry and not for consumption.

The fish marketing system was found to be highly complex, involving multiple layers of traders, middlemen, and informal networks that influence both pricing and accessibility. Interviews with fishers revealed that bycatch—non-target species caught due to the non-selective nature of fishing gear—is now rarely discarded. Instead, it is commonly processed into fish food, oil, fertilizer, and other products, which are then distributed domestically and exported to countries such as China, Thailand, and those in Europe.

Some bycatch is also consumed within Indian states like Kerala and Tamil Nadu. While this has increased the economic value of bycatch, it has also led to more indiscriminate and unregulated fishing practices, including intensive trawling of seabed. The findings highlight growing pressure on marine biodiversity, particularly as vulnerable species are increasingly caught unintentionally.

GIS based mapping of bycatch hotspots could help identify critical zones of concern, aiding in targeted management efforts. Overall, the survey underscores the urgent need for

regulatory oversight and sustainable fisheries management to mitigate biodiversity loss and ensure long-term ecological and economic resilience.

Reference

CMFRI 2024. *Annual Report 2023*. Central Marine Fisheries Research Institute, Kochi 286 p

Dineshababu, A.P. & Radhakrishnan, E.V. (2009). Trawl fishery of juvenile fishes along Mangalore-Malpe Coast of Karnataka and its impact on fish stock. *Asian Fisheries Science* 22(2): 491–500.

Lobo, A.S. (2012). Managing fisheries in an ocean of bycatch. *Position paper for CBD-COP 11*.

Acknowledgement

We thank the 1OCEAN team from Zoo Outreach Organisation- Ms. Usha Ravindra, Mr. Koshik Shettigar for their continuous support and encouragement throughout the internship. We also like to thank Mr. Glavin Thomas Rodrigues and the Department of Zoology, St. Aloysius College (Autonomous), Mangaluru for their guidance to complete this internship. We thank Mr. Karuppasamy from Fisheries College & Research Institute, Thoothukudi for helping us with identification of species. This internship was part of the 1OCEAN project, 'Conservation of Critically Endangered Hammerhead sharks of India via Participatory Science' funded by WCT-BEES grant 2024.

Jaideep S Naik¹, Josten Crasta², Nidhi Jayakumar^{3*}, Priya Carolen Dsouza⁴, Tharun Thimmaiah⁵

¹⁻⁵III BSc, Department of Zoology, St. Aloysius College Autonomous, Mangaluru 575003.

*Email: nidhigujaran@gmail.com (Corresponding author)

Citation: Naik, J.S., J. Crasta, N. Jayakumar, P.C. Dsouza, T. Thimmaiah (2025) Understanding Bycatch Fisheries at Dhakke. In: *Zoo's Print* 40(7): 11–17.