FACE
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Confederation of Indian Industry

Study on
Infrastructure Gaps at

FISHING HARBOURS AND LANDING CENTRES

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A-F

AP
Andhra Pradesh

BAU
Business as usual

BOBP
Bay of Bengal Programme

BOT
Build-Operate-Transfer

CMFRI
Central Marine Fisheries Research Institute

CPT
Cochin Port Trust

D&D
Daman & Diu

DNH
Dadra and Nagar Haveli

DoF
Department of Fisheries

E-auction
Electronic-auction

EEZ
Exclusive Economic Zone

EIC
Export Inspection Council

e-NAM
Electronic National Agricultural Market

ETP
Effluent Treatment Plant

FAO
Food and Agriculture Organization

FGD
Focus Group Discussion

FH
Fishing Harbour

FIDF
Fisheries and Aquaculture Infrastructure Development Fund

F-M

FLC
Fish Landing Centre

FSI
Fisheries Survey of India

GJ
Gujarat

GO
Goa

GVA
Gross Value Added

HSD
High-Speed Diesel

HYG
High-growth

ICT
Information and Communication Technology

JNPT
Jawaharlal Nehru Port Trust

KA
Karnataka

KL
Kerala

KLD
Kilo Liters per Day

LED
Light Emitting Diode

MFN
Most Favored Nation

MoFAHD
Minister of Fisheries, Animal Husbandry and Dairying

MH
Maharashtra

MMT
Million Metric Tonnes

MoSPI
Ministry of Statistics and Programme Implementation

M-R

MPEDA
Marine Products Export Development Authority

MT
Metric Tonnes

NCAER
National Council of Applied Economic Research

NFDB
National Fisheries Development Board

NHM
National Horticulture Mission

NITI Aayog
National Institution for Transforming India

OD
Odisha

PD
Puducherry

PIB
Press Information Bureau

PMMSY
Pradhan Mantri Matsya Sampada Yojana

PPP
Public-private partnership

RD
Regional Division

S-W

SRD
Sub Regional Division

STP
Sewage Treatment Plant

TMT
Thousand Metric Tonnes

TN
Tamil Nadu

UAE
United Arab Emirates

UT
Union Territory

UNCLOS
United Nations Convention on the Law of the Sea

USA
United States of America

USD
United States Dollar

VAT
Value Added Tax

VPA
Visakhapatnam Port Authority

VPT
Visakhapatnam Port Trust

WB
West Bengal

Executive Summary

India, with its 8,118 km coastline, supports a robust fisheries sector, contributing 8.92 per cent to global fish production and 1.07 per cent to national GVA. The country has 7 major fishing harbours, 52 minor harbours, and 1,457 fish landing centres (FLCs), servicing approximately 2.54 lakh fishing vessels. However, infrastructure limitations hinder the sector's potential, with facilities catering to only 25-30 per cent of the fleet, leading to congestion and inefficiencies. With a target to achieve USD 18 billion export turnover for India's marine products by 2030, there is a need for enhanced infrastructure to meet domestic and global demand.

This study assesses infrastructure gaps at five key fishing harbours-Visakhapatnam (Vizag), Thoppumpady (Kochi), Jeppiaar (Muttom), Shankarpur (Digha), and Vanakbara (Diu)—focusing on landing, processing, logistics, and retail facilities. It evaluates future infrastructure needs, export potential, regulatory challenges, and losses due to wastage, providing actionable policy recommendations.

The study employed a mixed-method approach:

Phase I

Scoping Study

Secondary data collection from sources like the Department of Fisheries, MPEDA, and CMFRI to map infrastructure.

Phase II

Questionnaire

Structured interviews with stakeholders (fishermen, boat owners, traders, exporters) to address data gaps on catch handling and operational challenges.

Phase III

Focus Group Discussions (FGDs)

Conducted at each harbour with representatives from fisheries departments, harbour handlers, and boat owners to identify infrastructure needs and pain points.

Key Findings

Infrastructure Gaps

- Vizag: Lacks cleanliness, dry fish storage, and resting areas, with high diesel costs and governance issues due to multiple associations. Modernization is underway to increase capacity from 55 thousand MT to 70 thousand -80 thousand MT annually (budget: INR 151.81 crore).
- Thoppumpady (Kochi): Faces space constraints, prolonged unloading times, and inadequate cold storage, causing 5 per cent produce loss. Modernization includes AC auction halls and cold storage (budget: INR 169.17 crore).
- Muttom: A model harbour with minimal losses due to superior infrastructure (cold storage, sewage treatment). Needs additional parking space.
- Shankarpur (Digha): Suffers from space constraints, no cold storage, and poor waste management, with 15 per cent losses. Modernization includes effluent treatment plants (budget: INR 44.7 crore).
- Vanakbara: Lacks auction halls, with trading in trader cubicles, and faces 10-15 per cent quality loss due to improper handling. Modernization is at the tendering stage, including dredging and auction halls (budget: INR 93 crore).

Hygiene and Waste Management

- Muttom and Thoppumpady maintain high hygiene standards with regular cleaning and waste management systems.
- Vizag, Digha, and Vanakbara suffer from foul odours, stagnant water, and inadequate sanitation, impacting export eligibility.

Losses and Wastage

- Losses range from 0 per cent (Muttom) to 30 per cent (Kochi, due to no cold storage). Vizag and Digha report 15-20 per cent losses, and Vanakbara 10-15 per cent, primarily due to inadequate storage and handling.
- Small FLCs (e.g., Bheemli, Chepala Uppada) face significant losses due to no storage facilities.

Fish Auctioning

- Traditional open auctions dominate, often lacking transparency and fair pricing. Vizag uses commission agents (5 per cent commission), Muttom has harbour-mediated auctions (4 per cent commission), and Vanakbara relies on paper-chit auctions in trader cubicles.
- E-auction acceptance varies: 100 per cent in Vizag and Vanakbara, 70 per cent in Digha, 0 per cent in Kochi and Muttom. Stakeholders cite transparency and better price discovery as benefits.

Cost Dynamics

- Fuel is the largest expense for boat owners, mitigated by subsidies in Vizag (INR 9/litre) and Vanakbara (VAT-free HSD). Digha's lack of subsidies results in high costs (INR 13.90 lakh for large boats).

Policy Recommendations

Enhance Hygiene and Waste Management

- Implement regular cleaning schedules, water stations, and sewage treatment plants to improve hygiene and export eligibility.
- Provide sanitation facilities (restrooms, handwashing stations) and waste segregation systems.

Strengthen Cold Chain Infrastructure

- Develop comprehensive cold chains from catch to market to reduce spoilage and enhance export potential.
- Train fishermen on cold chain maintenance to minimize losses.

Promote E-Auctioning

- Pilot e-auction platforms in Vizag, Digha, and Vanakbara to improve transparency and price discovery.
- Integrate quality grading and logistics for efficient transactions.

Modernize Vessels and Energy Use

- Transition to energy-efficient or hybrid vessels to reduce fuel costs and carbon footprints.
- Offer incentives for adopting sustainable technologies.

Expand Infrastructure

- Prioritize dredging, harbour expansion, and facilities like net mending and boat repair to improve navigability and efficiency.
- Increase landing capacity (e.g., Vizag: 300 to 695 boats; Vanakbara: dredging for faster unloading).

Enhance Processing and Exports

- Establish processing units for value-added products (e.g., fillets, canned fish) to boost export value.
- Ensure compliance with international standards to capture larger market shares.

Address Overfishing

- Enforce regulations with satellite tracking and promote larger mesh nets to protect marine ecosystems.
- Educate fishermen on sustainable practices for long-term viability.

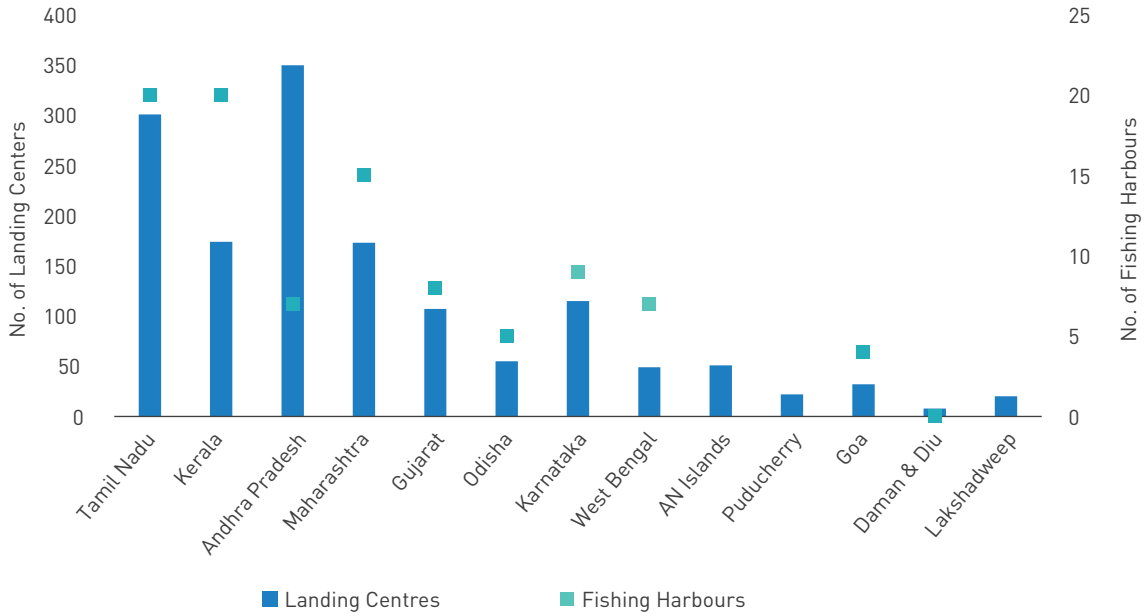
01 Introduction

1.1 Background of the Study

India is the second largest fish producing country, contributing 8.92 per cent to the global fish production (DoF, 2024) and the sixth largest marine fish producer with 5 per cent share in the global marine produce (FAO, 2022). With the sector contributing 6.9 per cent in the agriculture GVA and 1.07 per cent in National GVA (MoSPI, 2023), it is an important sector contributing to the economy, providing sustenance and livelihoods to millions of fish farmers and other actors in the value chain, while contributing significantly to the nation's food security and economic prosperity. India's fisheries sector is also witnessing rising domestic demand, driven by increasing incomes, urbanisation, and a growing preference for protein-rich diets. However, the sector is marked by a clear mismatch between supply and demand across regions and seasons, particularly in marine fisheries. For example, while Andhra Pradesh reported a surplus of 38.26 lakh tonnes, Kerala faced a deficit of 6.7 lakh tonnes (NCAER, 2023). In 2022, India recorded 3.49 million metric tonnes (MMT) of marine fish landings, with 46% of these landings occurring in the Southwest region (MPEDA, 2024). The sector also exhibits zone-wise seasonal variations, with the East and West Coasts having different peak landing periods. This leads to a mismatch between where fish is landed and where it is needed. India handled a total fish catch volume of 13.7 MMT in 2020–21, of which 77% (10.6 MMT) was sold as fresh fish—reflecting a strong consumer preference for freshness (DoF, 2023). This underscores the critical need to preserve quality and ensure timely distribution across regions. Looking ahead, fish demand is projected to reach 37 MMT by 2047–48 under a business-as-usual (BAU) scenario and could rise to 48 MMT under a high-growth trajectory (NITI Aayog, 2024). These trends of growing domestic demand, regional and seasonal mismatches, and high consumer preference for fresh fish collectively point to the urgent need for robust infrastructure development.

India currently has 7 major fishing harbours, 52 minor fishing harbours, 1457 fish landing centres (FLCs) and about hundreds of other small traditional landing centres along its 8118 km long coastline (DoF, 2023) (Lok Sabha Questions, 2022). There are about 2.54 lakhs fishing vessels registered in India, of which 52.3 per cent are motorized non mechanical boats, 26.1 per cent are motorized mechanical boats, 21.5 per cent are non-motorized boats and about 0.02 per cent of them are deep sea fishing boats (RealCraft, 2024). Fishing harbours (FH) and fish landing centres (FLCs) serve as vital hubs for the exchange of marine produce, connecting fishermen directly with buyers, processors, and exporters. They play a crucial role in the fisheries supply chain, receiving freshly caught seafood and conducting primary processing, sorting, and storage before transportation to relevant retail markets, processing units or exports market. The efficiency of these facilities is paramount in determining the quality, quantity, and marketability of the marine produce, thereby significantly impacting the economic viability of the fishing industry.

Figure 1: Fishing Harbours and Landing Centres in India



Source: DoF, 2023

The increasing number of fishing vessels has outpaced the current infrastructure facilities developed at the harbours. In fact, as per government estimates, current infrastructure facilities at the harbours are only able to cater to about 25-30 per cent of the total fleet facilities (DoF, 2020). Due to this space constraint, FHs face congestion at the landing sites leading to prolonged loading and unloading of the catch.

With an annual growth rate of 10.3 per cent in fish production (DoF, 2023), the fisheries economy is poised for substantial growth, fuelled by international demand as well. During the financial year 2023-24, India achieved an all-time high seafood export volume of 1.78 MMT, valued at USD 7.38 Billion , contributing 15.31 per cent to the total agricultural exports of USD 48.15 Billion (Lok Sabha Unstarred Question, 2024) (DoC, 2024).

Looking ahead, MPEDA has set a target to achieve USD 18 billion export turnover for India's marine products by 2030 (MPEDA, 2024a) (PIB, 2025).

With seafood exports occupying a significant portion of India's export market there is a pressing need to bolster the infrastructure at FHs and FLCs to capitalize on global opportunities effectively. Currently, India's seafood exports are predominantly led by frozen shrimp, constituting nearly 49 per cent in terms of volume and 72 per cent in terms of value of total exports, while chilled products account for a meagre 1.42 per cent (MPEDA, 2024b). This glaring asymmetry highlights the need for enhancing cold chain infrastructure at harbours and landing centres to facilitate the storage, preservation, and transportation of perishable marine produce, thereby expanding the export horizon and maximizing value realization. The target of USD 18 billion marine exports by 2030, further necessitates addressing the infrastructure gap at harbours, landing centres, ports, airports, and railways. This will require synchronized efforts to fortify the infrastructure backbone of the fishing industry.

Against this backdrop, this study endeavours to assess the infrastructure gap for handling marine produce at identified harbours and landing centres, with a keen focus on elucidating the pivotal role of these facilities in catalysing the growth and sustenance of India's fisheries economy. By delineating the current challenges, opportunities, and imperatives, this study aims to inform policy interventions and strategic initiatives aimed at fortifying the infrastructure ecosystem of the fishing industry, thereby propelling India towards its envisioned position as a global leader in seafood exports.

1.2 **Scope of the Study**

1. Assess present fisheries infrastructure in terms of landing centres, harbours, processing, logistics and retail. This would also include mapping the actual loss of fish catch due to wastage.
2. Evaluate the future need of harbours and identify the possible gaps in cold chain infrastructure, testing infrastructure, logistics infrastructure and handling infrastructure.
3. Provide key recommendations specific to the regulatory challenges to enhance trade of marine produce.
4. Map the current rules and regulations for landing, trading and auction practices at the selected harbours.

1.3 **Study Approach**

The study adopted a mix of top-down and bottom-up approach combined with a participatory approach from different stakeholders in the marine supply chain to assess the infrastructure status and requirements at identified harbours / landing centres in India. The following methodological steps were undertaken:

Phase I

Scoping Study

Firstly, a scoping study of overall infrastructure for fisheries sector in India as well as state-wise was undertaken through secondary sources of data. Data was sourced from reports and databases from Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, MPEDA, Central Marine Fisheries Research Institute (CMFRI), Fisheries Survey of India (FSI), NFDB, etc.

Phase II

Questionnaire

Phase II involved the development of a questionnaire to address the data gaps identified during secondary research regarding the actual catch per day, including size, quantity, freshness, and quality of the catch, along with related information. This questionnaire was designed based on the data inconsistencies identified, aiming to guide the fieldwork in Phase II effectively. Structured interviews were conducted with representatives from harbours, boats, trawlers, fishers, landing centre/harbour handling firms, and buyers. These interviews followed a set of predefined questions aimed at obtaining insights into various aspects of the fisheries sector, including data accuracy, operational challenges, and market dynamics.

Phase III

Focus Group Discussions

Phase III involved conducting Focus Group Discussions (FGDs) at all identified harbours and landing centres to gather additional insights on infrastructure gaps. The stakeholders involved in these discussions comprised representatives from various sectors, including the state government fisheries department, harbour handlers, exporters, and trawlers/boat owners' association. At least one FGD was held per harbour to elicit their perspectives on the necessary infrastructure types, requirements, and challenges they face. These discussions aimed to provide a comprehensive understanding of infrastructure needs and pain points.

Details of Harbours Studied

The study identified key fishing harbours across various states in India, each playing a crucial role in the development of the fisheries sector. The selection was carefully made to ensure representation from all fishing zones, coastlines, and types of ownership, including union government, state government, and private ownership:

Andhra Pradesh: Visakhapatnam Fishing Harbour, Vizag

Kerala: Thopumpady Fishing Harbour, Kochi

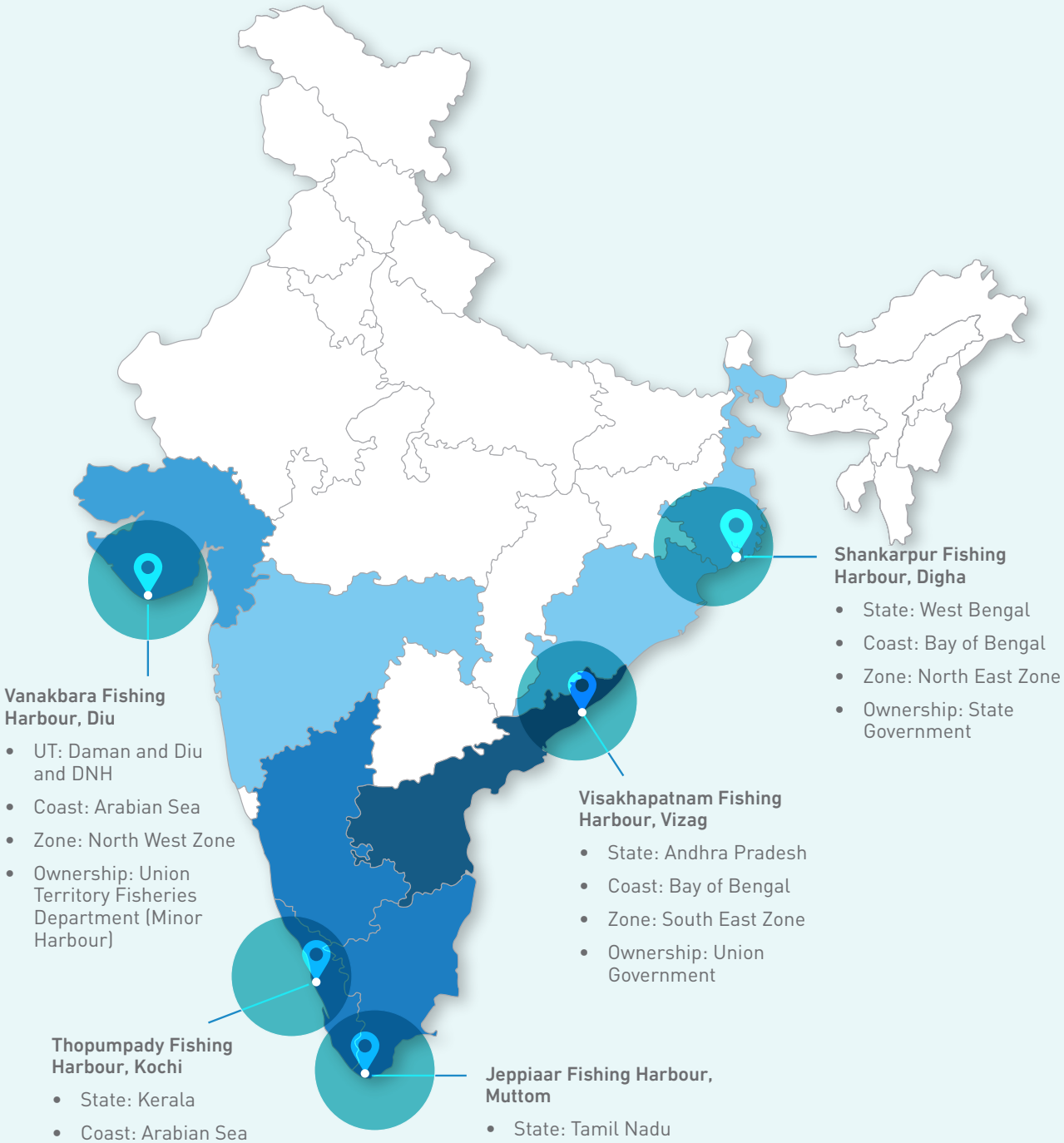
Tamil Nadu: Jeppiaar Fishing Harbour, Muttom

West Bengal: Shankarpur Fishing Harbour, Digha

Daman and Diu and Dadra and Nagar Haveli: Vanakbara Fishing Harbour, Diu

The chosen harbours represent a diverse cross-section of India's fishing infrastructure. Among the five harbours, two harbours were located on the Arabian Sea coast: Vanakbara in the North West Zone and Thopumpady in the South West Zone. Two others, Digha in the North East Zone and Vizag in the South East Zone, are on the Bay of Bengal coast. The fifth harbour, Muttom, is on the Indian Ocean coast. Additionally, the selection includes different ownership models: Vizag and Thopumpady are under the Union Government, Digha is state-owned, Muttom is privately owned and built on a BOT (Build-Operate-Transfer) basis, and Vanakbara is a minor harbour owned by the Fisheries Department of the Union Territory. This comprehensive selection ensures that the study encompasses all major fishing zones and a variety of management structures.

Figure 2: List of identified fishing harbours



Vanakbara Fishing Harbour, Diu

- UT: Daman and Diu and DNH
- Coast: Arabian Sea
- Zone: North West Zone
- Ownership: Union Territory Fisheries Department (Minor Harbour)

Shankarpur Fishing Harbour, Digha

- State: West Bengal
- Coast: Bay of Bengal
- Zone: North East Zone
- Ownership: State Government

Visakhapatnam Fishing Harbour, Vizag

- State: Andhra Pradesh
- Coast: Bay of Bengal
- Zone: South East Zone
- Ownership: Union Government

Thopumpady Fishing Harbour, Kochi

- State: Kerala
- Coast: Arabian Sea
- Zone: South West Zone
- Ownership: Union Government

Jeppiaar Fishing Harbour, Muttom

- State: Tamil Nadu
- Coast: Indian Ocean
- Zone: South West Zone
- Ownership: Private (BOT model)

List of Stakeholders Consulted

The study involved comprehensive consultations with a wide range of stakeholders to ensure a holistic understanding of the fishing harbour operations and requirements. A total of six stakeholder consultations were conducted across key fishing harbours and landing centres: Jeppiar Fishing Harbour (Muttom); Vishakhapatnam Fishing Harbour and Bheemli Landing Centre in Andhra Pradesh; Thopumpdady Fishing Harbour in Kochi and Vanakbara Fishing Harbour in Diu. These consultations engaged about 150 stakeholders, with participation number as follows: Jeppiar (30) Vizag (40), Bheemli (15), Thopumpaddy (30) and Vankabara (35). The stakeholders consulted included boat owners, fishermen, traders, exporters, government officials from the State Fisheries Departments, Port Trusts, Fisheries Survey of India, and MPEDA, as well as harbour handlers, fish processors, and ice plant owners.

1.4 Organization of the Report

The report is organized into seven main sections to systematically explore the complexities of fisheries infrastructure and fish marketing in India.

Section 1 — Introduces the report by outlining the context, the study objectives, the scope of the study and the study approach.

Section 2 — Provides an overview of fisheries infrastructure present in India and lists out the components of an ideal fishing harbour.

Section 3 — Examines the fish marketing landscape in India, focussing on landing mechanisms, deposition channels and supply-demand dynamics.

Section 4 — Presents a comparative analysis of the identified fishing harbours and landing centres across different regions.

Section 5 — Discusses the findings from stakeholder consultations assessing perspectives on fisheries infrastructure and fish marketing practices.

Section 6 — Summarizes the key insights from the study and offers policy recommendations towards actionable strategies for enhancing infrastructure, improving marketing practices, and promoting sustainable development in the fisheries sector.

02 Overview of Current Fisheries Infrastructure

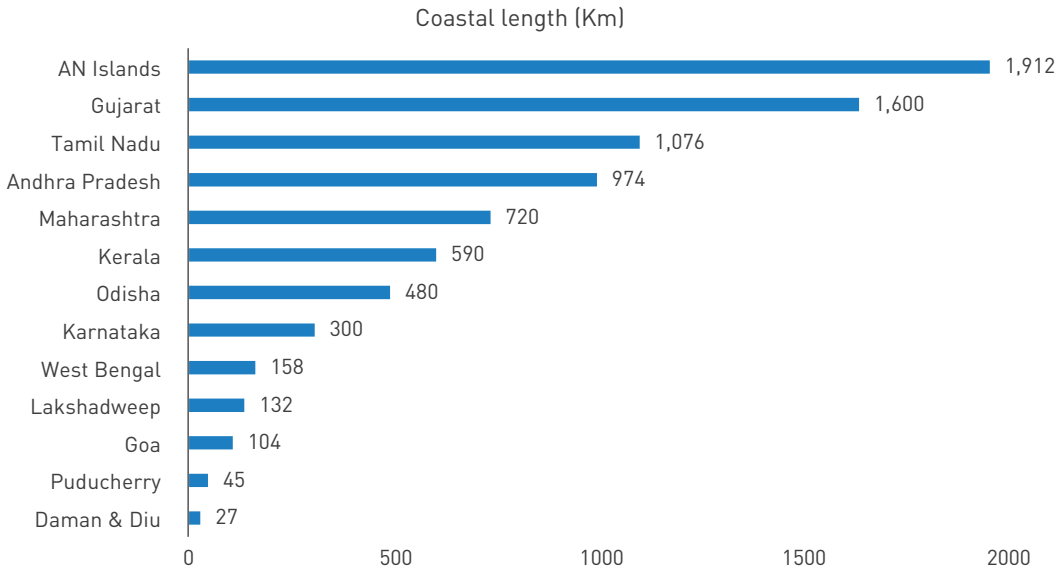
2.1 **Mapping Fisheries Infrastructure in India**

Marine Fisheries Resources in India

India boasts a coastline spanning approximately 8118 Km which is rich in biodiversity and natural resources. The union territory of Andaman and Nicobar Islands has the largest coastline of 1912 Km, followed by Gujarat with 1600 Km and Tamil Nadu with 1076 Km of coastline. The Exclusive Economic Zone (EEZ) for India, which is the area within the jurisdiction of India extending upto 200 nautical miles as per The United Nations Convention on the Law of the Sea (UNCLOS), covers an expansive area of 2.02 million Km^2, representing a significant maritime territory for economic activities and resource exploitation. The Continental Shelf extends over 0.5 million Km^2, with the inshore area, characterized by depths of less than 50 meters, encompassing 0.18 million Km^2. A total of 3461 fishing villages are dispersed along the Indian coastline, reflecting the integral role of marine resources in sustaining livelihoods and economic activities (DoF, 2023).

While the fisheries operations within the first 12 nautical miles from the coastline falls under the jurisdiction of the State Fisheries Department in India's coastal states, deep-sea fisheries activities occurring beyond the 12-nautical-mile limit up to the outer boundary of the EEZ are subject to regulation by the Union Government (DoF, 2020).

Figure 3: State-wise coastal length in India



Source: DoF, MoFAHD, Govt of India

Development of Fishing Harbours in India

In India's maritime landscape, the development of fishing infrastructure has been a pivotal aspect of supporting the nation's flourishing fisheries sector. India started constructing FH and FLCs since the mid-1960s through the assistance of the FAO in identifying and selecting suitable sites. While initially only limited landing and berthing facilities such as jetty, breakwater, marketing halls, guide lights, deepening of entrance channel, etc. were provided; the construction of self-contained fishing harbours with modern facilities started after the establishment of the Pre-Investment Survey of Fishing Harbours Project in Bangalore in 1968 (BOBP, 1982).

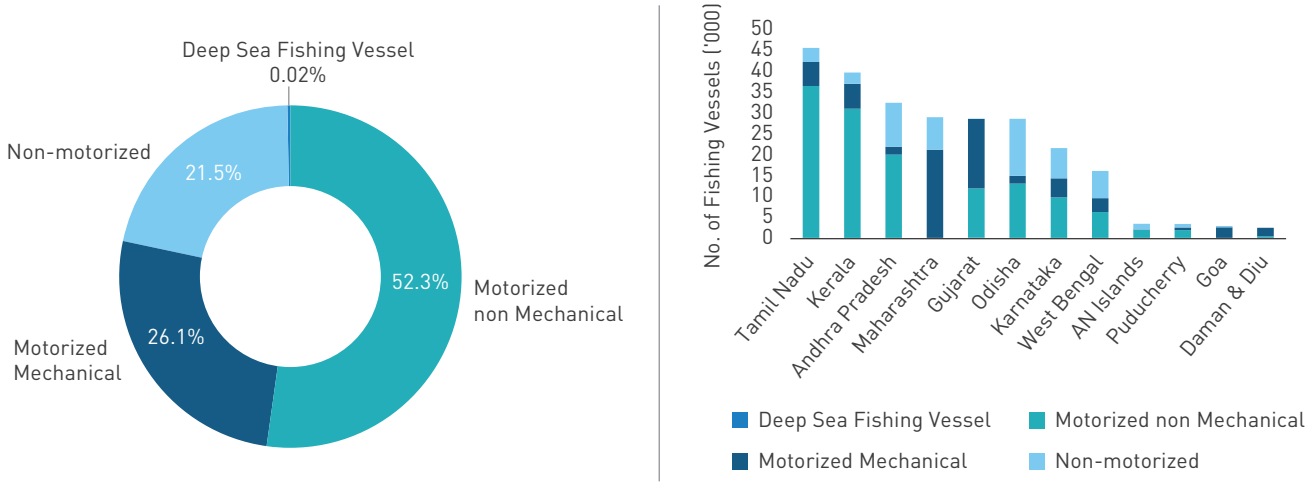
Fishing harbours in India can be classified as major harbours and minor harbours. Major harbours are under the control of Government of India and are regulated under the major ports trust act. Port Trusts are responsible for management and maintenance of the respective major fishing harbours. Minor harbours are under the control of the respective state Governments. Development and management of minor harbours is done by the state through their state fisheries department.

Currently, India has a network comprising seven major fishing harbours and a substantial array of 86 minor fishing harbours. The seven major fishing harbours include Visakhapatnam, Kochi, Kolkata, Mangalore, Pipavav, Krishnapatnam, and Jawaharlal Nehru Port Trust (JNPT).Among these, 52 fishing harbours have been commissioned, with an additional 31 undergoing construction to meet the evolving demands of the fishing industry. Tamil Nadu and Kerala have 20 FHs each followed by Maharashtra and Karnataka with 15 and 9 FHs. Moreover, India's coastline has 1457 fish landing centres, with Andhra Pradesh having highest number i.e. 350 FLCs followed by Tamil Nadu (301 FLCs) and Kerala (174 FLCs). Theses FLCs are acting as crucial intermediaries between the fishing vessels and the market.

Fishing Vessel Development in India

A total of approximately 2.5 lakhs fishing vessel are available in India, engaged in harvesting the rich marine resources of the Indian coastal waters. Amongst the total count, motorized non mechanical fishing vessel comprises 52.3 per cent, motorized mechanical comprises 26.1 per cent, non-motorized comprises 21.5 per cent and deep-sea fishing vessel comprises 0.02 per cent.

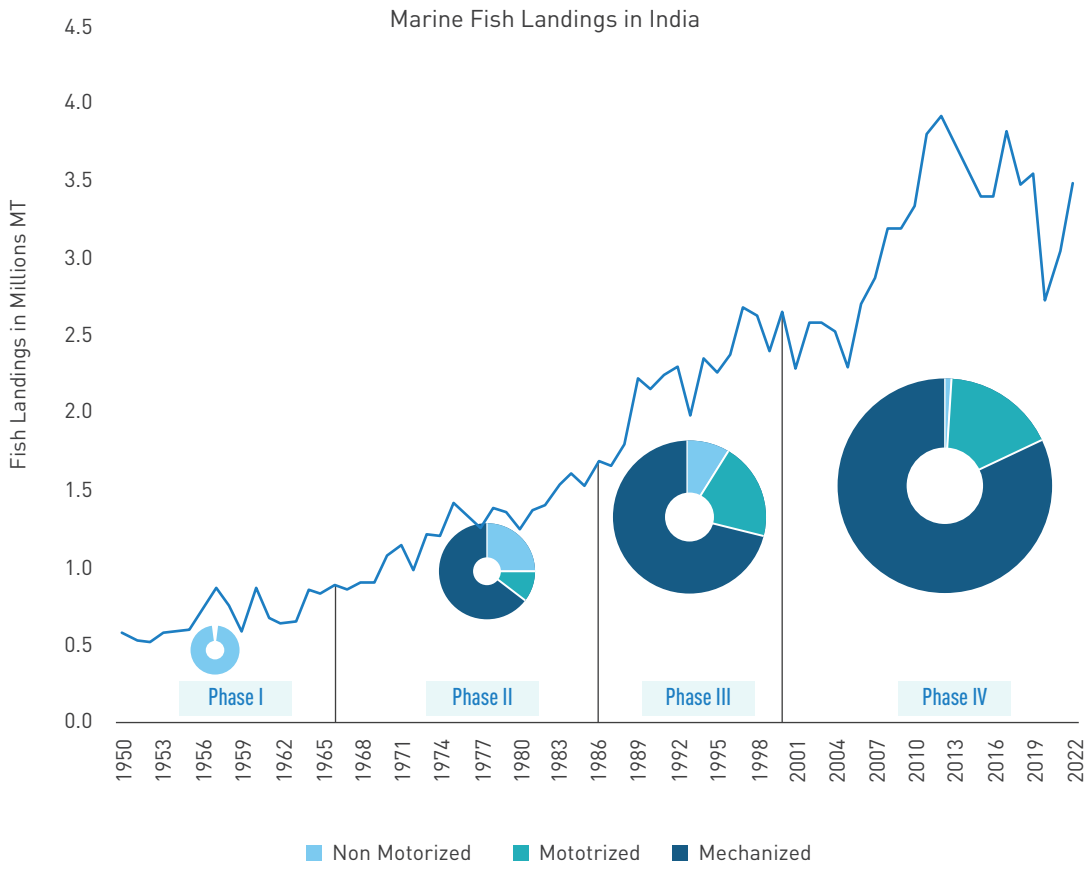
Figure 4: Types of fishing vessels in India



Source: Realcraft, 2024

Tamil Nadu has the highest number of fishing vessels, followed by Kerala and Andhra Pradesh. Deep-sea fishing vessels play a pivotal role in accessing offshore fishing grounds and targeting high-value species. Kerala, Gujarat, and the union territory of Diu are notable hubs for deep-sea fishing operations. Kerala's coastal waters host 10 deep-sea fishing vessels, Gujarat boasts a fleet of 51 vessels, while the union territory of Diu contributes with 2 vessels.

Figure 5: Comparing fish landings and phases of vessel development in India



Source: CMFRI (Various Sources)

The exponential growth in marine fish landings from Phase I to Phase IV of fishing vessel development in India (Box 1) reflects the dynamic evolution of the country's fisheries sector over the past seven decades. In 1950, during Phase I characterized by traditional non-mechanized fishing methods, marine fish landings stood at 0.5 million metric tonnes (MT). As India progressed through subsequent phases of fishing vessel development, marked by the introduction of motorization, peak mechanization, and modernization efforts, marine fish landings experienced remarkable expansion. By 2022, marine fish landings surged to 3.49 million MT, representing a substantial increase over the decades. During phase I 100% marine fish landing was performed by non-motorized fishing vessels, eventually with gradual development 65% of fishing vessels were replaced by mechanized one, followed by 25% non-motorized and 10% motorized. In phase III the proportion of mechanized fishing vessels increased to 71% and in Phase IV to 82%. With extensive use of mechanized fishing vessels the use of non-motorized one is restricted to only 1% in the present time.

However, a pressing challenge remains. The rapid expansion of the fishing fleet has outpaced the expansion of infrastructure at fishing harbours and landing centres. This imbalance has precipitated a host of infrastructural constraints, including congestion, maintenance challenges, and increased waiting times for unloading.

Box 1: Phases of Fishing Vessel Development

Phase 1 (1950-1966)

Traditional Non-Mechanized Fishing

During this initial phase, fishing in India was characterized by traditional non-mechanized methods employing primitive crafts and techniques. Indigenous communities relied on age-old practices handed down through generations to sustain their livelihoods along the coastal regions.

Phase 2 (1967-1986)

Introduction of Motorization

The introduction of motorization marked a significant shift in fishing practices, with the introduction of outboard engines ranging from 5 to 7 horsepower. This period saw the gradual replacement of traditional vessels with motorized counterparts.

Phase 3 (1986-2000)

Peak of Mechanization

Driven by the demands of industrial fishing and increasing market pressures, the fishing industry witnessed a peak in mechanization during this phase. Vessels were equipped with advanced machinery and technology, facilitating multi-day voyages and enabling fishermen to venture further into the ocean in pursuit of higher yields. Concurrently, conservation measures such as seasonal closures were implemented to mitigate the impacts of overfishing.

Phase 4 (Post-2000)

Challenges of Modernization

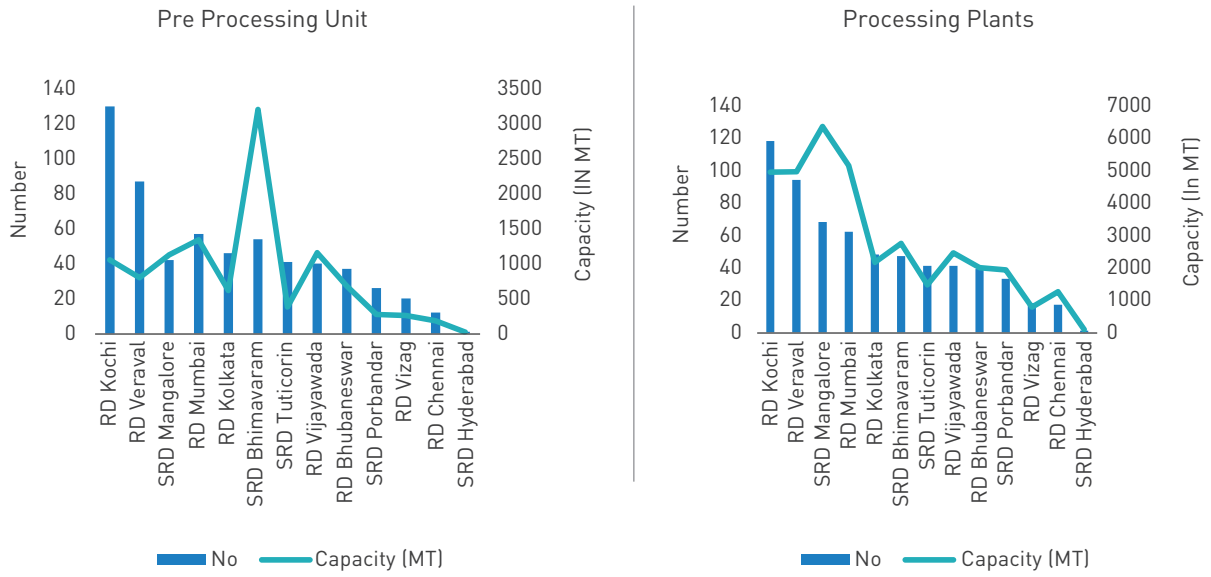
Post-2000 brought forth many challenges amidst efforts towards modernization. Depleting fish stocks, declining catch rates, conflicts over resources, and escalating investment requirements posed formidable obstacles to the sustainability of the fishing industry. In response, the late 2010s witnessed a shift towards prioritizing infrastructure development, modernization initiatives, and the adoption of sustainable fishing practices aimed at ensuring the long-term viability of India's fisheries sector.

Source: CMFRI

Fish Processing and Storage Infrastructure

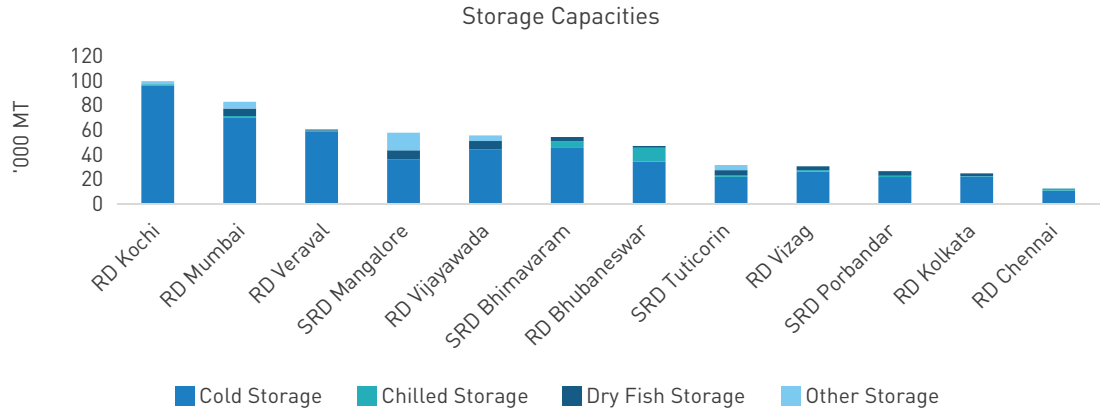
According to MPEDA, total 627 fish processing units are in India with a capacity of 36.20 thousand Metric Tonnes (TMT) across regional and sub regional divisions of fisheries. Kochi has the highest number of processing plants of 118, followed by Veraval at 94, Mangalore at 68 and Mumbai at 62. In terms of capacity, the maximum quantity of sea food is processed in Mangalore, followed by Mumbai, Veraval and Kochi. Kochi (Kerala), Veraval (Gujarat) and Bhimavaram are hubs for seafood processing units.

Figure 6: Fisheries Processing Capacity



Source: MPEDA, 2024

Figure 7: Fish storage capacities in India



Source: MPEDA, 2024

Storage capacities for the fisheries sector include various storages establishments in the cold chain including cold storage (684), chilled storage (44), dry fish storage (81) and other storage requirements (53), with a combined capacity of 588.5 thousand MT. RD Kochi has the highest capacity for fishing storage, followed by Mumbai and Veraval. The highest capacity for cold storage is available in Kochi, followed by Mumbai and Veraval. The capacity for chilled storage is highest in Bhubaneshwar followed by Bhimavaram. Dry fish storage capacity is highest in Mangalore followed by Mumbai.

2.2 Components of an Ideal Fishing Harbour

The Export Inspection Council of India, which is the official export certification body of India under the Ministry of Commerce and Industry, Government of India has set guidelines in 2012 for approval of landing centre and fishing harbours and auction centres for fisheries. It has suggested that a model fishing harbour should be located in a clean, pollutant-free area to ensure the integrity of marine products. It should have adequate working space for hygienic handling, with suitable coverings to protect from environmental contamination. Floors and walls must be smooth and easy to clean, complemented by an efficient drainage system to prevent waterlogging. Access to potable water and ice is crucial for maintaining product freshness, along with proper lighting and sanitary facilities. Measures to prevent exhaust fumes and control pests are essential. Regular cleaning and sanitation should be enforced, overseen by designated hygiene inspectors. Surfaces and utensils must remain clean, with proper icing and refrigeration facilities available to extend product shelf life. Effective waste management and pest control are vital. A separate, pest-free auction hall with raised platforms ensures product quality during auctions. Random quality checks and detailed record-keeping of vessels and products should be conducted, including monitoring vessel hygiene and ice quality, to maintain high standards.

The following summarizes the key requirements for approval of the landing centres, fishing harbours and auction centres as laid down by the Export Inspection Council (EIC) of India (EIC, 2012).

Premises & Infrastructural Facilities

- **Clean, Pollutant-Free Location:** The harbour should be situated in a clean, pollutant-free environment to maintain the integrity of the marine products.
- **Adequate Working Space:** Sufficient space should be provided for hygienic handling of marine products, ensuring compliance with food safety standards.
- **Suitable Covering:** Adequate covering should be in place to protect products from environmental factors and contamination.
- **Smooth, Easy-to-Clean Surfaces:** Floors and walls should be smooth and easy to clean to prevent the accumulation of dirt and bacteria.
- **Proper Drainage System:** An efficient drainage system is essential to prevent waterlogging and facilitate proper disposal of wastewater.
- **Provision of Potable Water and Ice:** Access to clean, potable water and ice is crucial for maintaining product freshness and quality.
- **Adequate Lighting and Sanitary Facilities:** Proper lighting and sanitary facilities should be available to ensure a hygienic working environment.
- **Prevention of Exhaust Fumes and Pests:** Measures should be implemented to prevent exhaust fumes from contaminating products and to control pests in the vicinity.

Good Hygiene Practices

- **Regular cleaning and sanitation:** Regular cleaning and sanitation and personal hygiene practices should be enforced.
- **Designated hygiene inspectors:** Designated hygiene inspectors should be employed for overseeing compliance.
- **Cleanliness and Proper Handling:** Surfaces and utensils should be kept clean, and products should not come into direct contact with the floor to prevent contamination.
- **Proper icing and refrigeration:** Proper icing and refrigeration facilities should be available to promptly chill and maintain the freshness of harvested marine products, ensuring their quality, and extending their shelf life.
- **Efficient Waste Management:** Proper waste management and pest control measures should be in place to maintain hygiene standards.

Auction Hall

- **Separate, Pest-Free Auction Hall:** A dedicated auction hall free from pests ensures the integrity of the auction process and product quality.
- **Raised Platforms for Product Display:** Raised platforms or suitable provisions should be available for the display of products, enhancing visibility and accessibility.

Inspection and Testing

- **Random Quality Checks:** Regular inspections and random checks should be conducted to ensure product quality and temperature control.

Monitoring and Record Keeping

- **Records Maintenance:** Detailed records of fishing vessels and products supplied should be maintained.
- **Monitoring of vessel hygiene and ice quality:** Effective monitoring for vessel hygiene and ice quality should be followed.

03 Fishing Harbours & Landing Centres- Infrastructure Gap Assessment

3.1 **Fishing Harbours in Kanyakumari**

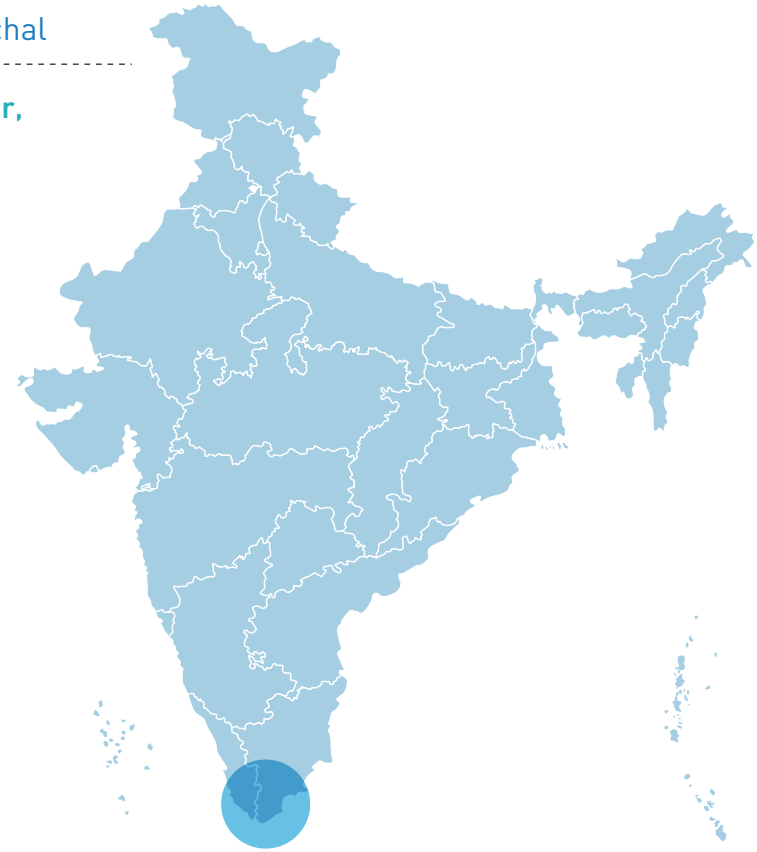
In Kanyakumari district of Tamil Nadu, following four harbours were visited to study the infrastructure gap and requirements:

Jeppiaar Fishing Harbour, Muttom

Chinnamuttom Fishing Harbour, Kanyakumari

Colachal Fishing Harbour, Colachal

Thengapattinam Fishing Harbour, Thengapattinam



Each of the four harbours offer unique characteristics and operational nuances. Jeppiaar Fishing Harbour was established in 2014 under a public-private partnership (PPP) on Built Operate and Transfer (BOT) basis. The harbour primarily uses medium to large boats employing a combination of trawl (80 per cent) and gillnet (20 per cent) fishing methods, with voyages lasting 7 to 10 days. In contrast, Chinnamuttom, operating since 1984 under government ownership, caters to smaller vessels with same day return trips, predominantly using trawl net (80 per cent) and gillnet (20 per cent) techniques.

Colachal fishing harbour was inaugurated in 2016, mirrors Jeppiaar's fishing practices but is under government administration. Thengapattinam harbour established in 2019 is the only harbour which solely focuses on gillnet fishing with medium-sized boats, operating longer voyages spanning 15 to 45 days. While Chinamuttom which is towards the Eastern Coast of India adheres to fishing ban period applicable for Tamil Nadu, i.e. April 15 to June 14. The other three harbours adheres to the Kerala style of fishing and fishing ban period of June 01 to July 31.

Table 1: Fishing harbours in Kanyakumari District, Tamil Nadu

	Jeppiaar	Chinnamuttom	Colachal	Thengapattinam
Establishment Year	2014	1984	2016	2019
No. of Voyage days	7 to 10 days	Same day return	7 to 10 days	15 to 45 days
Fishing Method	Trawl net (80%), Gillnet (20%)	Trawl net (80%), Gillnet (20%)	Trawl net (80%), Gillnet (20%)	Gillnet (100%)
Types of Boats	Medium to large	Small	Medium	Medium
Ownership	Private (BOT basis)	Government	Government	Government
Fishing Ban Period	June 01 to Jul 31	Apr 15 to Jun 14	June 01 to Jul 31	June 01 to Jul 31

Jeppiaar Fishing Harbour

- Expansion of the bridge is necessary to alleviate traffic congestion at the harbour, highlighting an infrastructure deficiency that could impede operational efficiency.
- Despite the presence of a modern cold storage facility, logistical and operational challenges may be limiting its optimal use, highlighting the need for better resource management and efficiency.
- High diesel costs pose a significant financial burden for boat owners, indicating a need for innovation and government support in the form of research and development for energy-efficient engines and potential subsidies to mitigate operational expenses.
- The implementation of refrigerated boxes onboard could enhance catch preservation and quality, addressing a crucial aspect of the fishing process.

Chinnamuttom Harbour

- With over 300 boats operating at capacity, the urgent requirement for additional landing space or a new bridge underscores the pressing infrastructure needs to accommodate the growing fleet.
- The narrow entry and shallow water levels necessitate sea deepening and widening, indicating a need for dredging and infrastructure improvements to facilitate smoother navigation and operations.
- Inadequate space for boat repair and net mending highlights challenges in maintaining and servicing vessels, potentially impacting fleet readiness and operational downtime.
- Previous requests to the government for additional infrastructure support have gone unresolved, indicating bureaucratic hurdles or resource allocation challenges that hinder development efforts.

Colachal & Thengapattinam Harbours

- In Colachal, there is a requirement to double the landing space capacity from 150 to 300 boats in order to support increased fishing activity.
- Thengapattinam encounters challenges related to extended deep-sea fishing durations during storms, highlighting the need for improved communication infrastructure, including addressing the high cost of satellite phones and the lack of internet connectivity, which are essential for ensuring safety and operational coordination in adverse conditions.

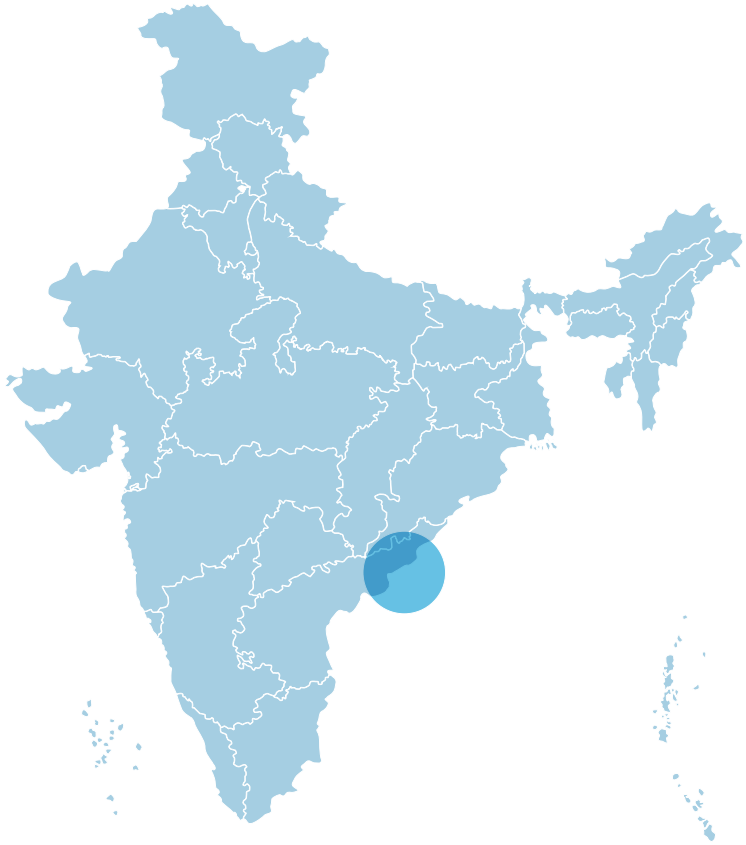
3.2 **Fishing Harbours and Landing Centres in Vishakhapatnam**

In Vishakhapatnam, one major harbour and 2 small landing centres were explored as part of the study:

Vizag Fishing Harbour

Chepala Uppada Fish Landing Centre

Bheemli Fish Landing Centre



Vizag Fishing Harbour was constructed in 1976 on an area of spreading across 24 ha of land. It is one of the deepest fishing harbours in the East cost of India. The harbour is under the control of Vishakhapatnam Port Trust (VPT). Initially constructed to accommodate 100 trawlers and 300 mechanized boars, the infrastructure is lacking for the increased landing. Characterized by its extensive infrastructure and diverse range of fishing methods, accommodates vessels of varying sizes with voyage durations ranging from one day for small boats to up to 45 days for larger vessels. Boasting of 11 jetties, 2 auction halls, 2 net mending facilities, and 5 ice plants, it provides comprehensive support for fishing activities. In contrast, Bheemli FLC and Chepala Uppada FLC, both government-owned, cater predominantly to small-motorized boats, offering same-day return trips without essential facilities like sheds, net mending halls, or storage.

Table 2: Fishing harbours in Visakhapatnam

	Vizag Fishing Harbour	Bheemli FLC	Chepala Uppada FLC
No. of Voyage days	Small: 1; Medium: 5-7 Large: 30-45	Same day return (6 hrs)	Same day return (6 hrs)
Infrastructure	11 Jetties, 2 Auction Halls, 2 Net Mending Halls, 5 Ice plants	No shed, no net mending halls, no storage	No shed, no net mending halls, no storage
Fishing Method	Trawl net and Siene	Trawl net	Trawl net
Types of Boats	695 Mechanized; 240 Motorized	Small motorized boats	Small motorized boats
Ownership	VPT	Government	Government
Fishing Ban Period	Apr 15 – Jun 14	Apr 15 – Jun 14	Apr 15 – Jun 14

Vizag Fishing Harbour

- Challenges include the lack of harbour cleanliness and resting areas, impacting international exports and supplier engagement, potentially hindering economic growth and market competitiveness.
- The absence of infrastructure for dry fish storage affects both human consumption and poultry feed quality, highlighting gaps in post-harvest management practices.
- High diesel costs pose a significant financial burden for boat owners, potentially affecting profitability and sustainability in the fishing industry.
- The presence of multiple associations and ownership by the Visakhapatnam Port Authority (VPA) may lead to a lack of consensus on important issues, potentially impeding decision-making and collective action towards addressing challenges.

Bheemli FLC

- The very small size of the landing centre and the absence of facilities pose significant challenges for fishermen, limiting operational capabilities and potentially impacting livelihoods.
- Inadequate storage facilities result in losses for small fishermen, highlighting inefficiencies in catch handling and preservation practices.
- The lack of essential infrastructure such as sheds, net mending halls, and landing platforms further exacerbates operational challenges and organizational inefficiencies.
- There is potential for development into a small harbour, offering relief to the burden on Vizag Harbour and potentially improving accessibility and operational efficiency for local fishermen.

Chepala Uppada FLC

- Shares similar challenges with Bheemli FLC, including the lack of essential infrastructure such as sheds, net mending halls, platforms, and storage facilities, indicating common shortcomings in supporting small-scale fishing operations.
- The absence of key facilities hinders operational efficiency and catch management practices, potentially impacting the quality and value of the catch.
- Like Bheemli FLC, there is potential for development to alleviate pressure on larger nearby harbours and enhance local fishing capabilities, suggesting opportunities for infrastructure investment and capacity building.

3.3 Fishing Harbours in Kochi

In Kochi, following three harbours were visited for the study:

Thoppumpady Fishing Harbour

Munambam Fishing Harbour

Chelllanam Fishing Harbour

Thoppumpady, Munambam, and Chellanam all represent distinct fishing hubs, each with its own set of characteristics and challenges. Thoppumpady, under the ownership of the Cochin Port Authority, boasts robust infrastructure including auction halls, net mending facilities, and ice plants, supporting a diverse fleet of boats engaging in trawl and gill net fishing across varying voyage durations.

In contrast, Munambam, managed by the Fishing Harbour Management Society, faces infrastructure deficiencies such as the absence of an auction hall and inadequate toilet facilities, potentially impacting operational efficiency and fish quality.

Similarly, Chellanam, under government ownership, lacks essential facilities like loading docks, further complicating logistics for fishermen relying on trawl net fishing methods. Like all other fishing harbours on the West coast, fishing ban period in the three harbours in Kochi is from June 1 to July 31.

Table 3: Fishing harbours in Kochi

	Thoppumpady	Munambam	Chelllanam
No. of Voyage days	Small: 2; Medium: 7 Large: 30	Small: 2; Medium: 7 Large: 30	Small: 2; Medium: 7 Large: 30
Infrastructure	Auction Halls, Net Mending Halls, 3 Ice plants	No auction hall, parking area, inadequate toilet facilities	No loading and unloading dock
Fishing Method	Trawl net, gill net	Trawl net	Trawl net
Types of Boats	280 large, 80 medium 35 Small country boats	400 large, 100 medium and 50 small boats	10-50 Small motorized boats
Ownership	Cochin Port Authority	Munambam Fishing Harbour Management Society	Government
Fishing Ban Period	June 01 to Jul 31	June 01 to Jul 31	June 01 to Jul 31

Thoppumpady Fishing Harbour

- Space constraints at Thoppumpady lead to prolonged loading and unloading times, potentially impacting operational efficiency and causing delays in the supply chain.
- The lack of cold storage facilities affects the quality of produce, potentially leading to spoilage and reduced market value.
- Handling issues contribute to a 5% loss of produce, highlighting the importance of improving handling practices to minimize wastage.
- Connectivity issues at sea result in high expenses for mobile recharges and satellite phones, adding to operational costs and reducing profitability.

Munambam Fishing Harbour

- Similar to Thoppumpady, space constraints at Munambam result in prolonged unloading times, impacting operational efficiency and potentially causing delays in the supply chain.
- The influence of middlemen (Taragans) on pricing affects fishermen's profits, highlighting challenges related to market access and pricing transparency.
- The absence of cold storage facilities, resting areas, and clean washrooms hinders prospective buyers and exporters, potentially limiting market opportunities and revenue potential.
- Narrow access roads and lack of checking at the harbour entry pose logistical challenges and may impact safety and security measures.
- The absence of labour registration further complicates management and oversight of the workforce, potentially leading to labour-related issues and regulatory compliance challenges.

Chelllanam Fishing Harbour

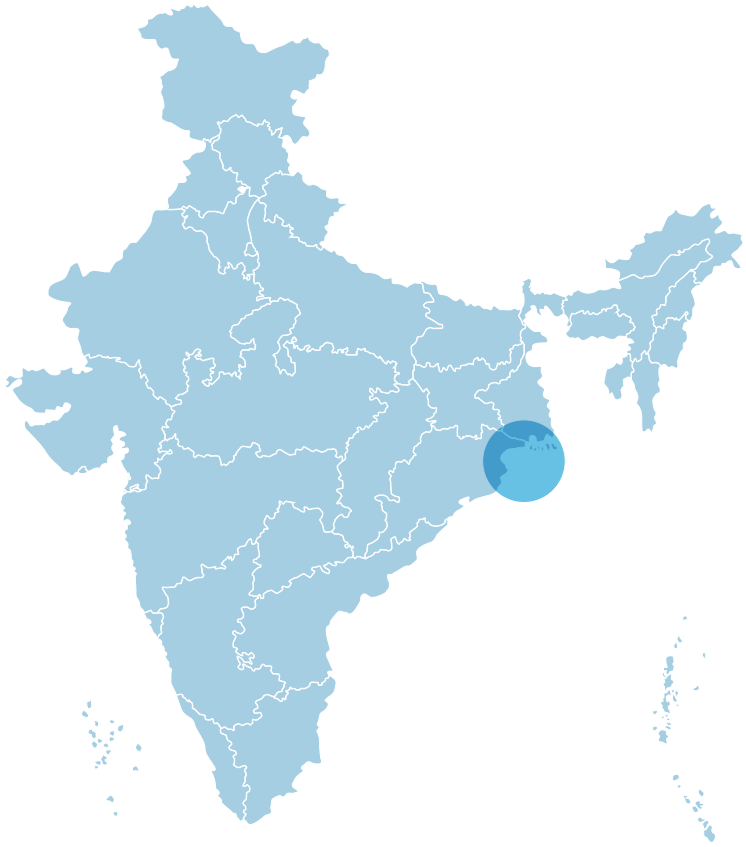
- Chelllanam faces unique challenges as the smallest harbour in Kochi, compounded by its underdeveloped infrastructure and the poor financial condition of farmers.
- Inadequate infrastructure for loading and unloading, waste disposal, and resting areas further exacerbates operational challenges and impacts productivity.
- The absence of cold storage and ice plants limits the ability to preserve and maintain the quality of produce, potentially leading to spoilage and reduced market value.

3.4 **Fishing Harbours in Digha**

In Digha, following two harbours were visited for the study:

Shankarpur Fishing Harbour

Mohana Fishing Harbour



The Digha Fishing area encompasses Shankarpur, Mohana, Old, and New Digha, however, fishing activities in Old and New Digha have been discontinued, where traditional methods involving boats and manual net fishing were once practiced. With two active harbours, Shankarpur serves as the primary hub for fishing operations, offering infrastructure including auction halls, net mending facilities, and ice plants. Harvested fish from Shankarpur are swiftly transported to Mohana. In Shankarpur, fishing voyages span from 2 to 30 days, accommodating a variety of vessel sizes and fishing methods, primarily utilizing trawl nets. In contrast, Mohana has limited infrastructure, yet supports fishing activities. Both areas fall under the ownership of the West Bengal Fisheries Corporation.

Table 4: Fishing harbours in Digha

	Shankarpur	Mohana
No. of Voyage days	Small: 2; Medium: 15 Large: 30	Small: 2; Medium: 7 Large: 15
Infrastructure	4 Jetties, 2 Auction Halls, 3 Net Mending Halls, 8 Ice plants	1 Jetty, 1 fixed mending Hall, 3 Ice plants
Fishing Method	Trawl net	Trawl net
Types of Boats	695 Mechanized; 240 Motorized	144 Mechanized 47 Motorized boats
Ownership	West Bengal Fisheries Corporation	West Bengal Fisheries Corporation
Fishing Ban Period	April – June	April-June

Shankarpur Fishing Harbour

- Space constraints lead to prolonged loading and unloading impacting operational efficiency and potential delays
- The absence of cold storage facilities and quality testing mechanisms affects the quality of the produce, potentially leading to spoilage and reduced market value.
- Involvement of unions and middlemen in fishing activities results in low incomes and payment delays for fishermen, driving a shift towards e-commerce platforms for trade.
- The need for more ice factories and subsidies on ice highlights the importance of adequate cooling infrastructure for preserving the catch and maintaining its quality.
- Pending quantity-based dredging of the Digha-Majhaua stretch of the National Waterway further compounds infrastructure challenges and affects navigability.

Mohana Fishing Harbour

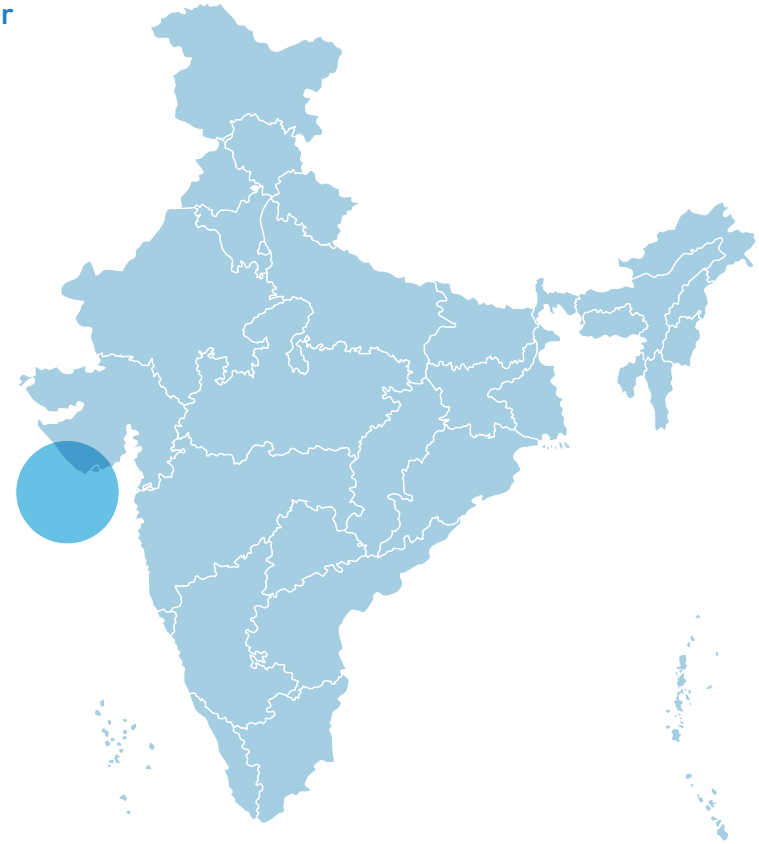
- Mohana is undergoing development primarily as a tourist attraction, leading to the discontinuation of fishing activities in favour of resort establishments.
- Limited fishing activities, mainly involving traditional boats, which is highlighting the shift in economic activities towards tourism.
- Scaling up storage facilities is necessary to support both tourism and remaining fishing activities, ensuring adequate infrastructure to meet demand.
- The construction of Marine Drive, connecting Shankarpur and Mohana, has reduced usable land, contributed to pollution, and negatively impacted fish reproduction and size, highlighting environmental and ecological concerns.

New Digha, Old Digha & Mandarmani

- Fishing activities in these areas have largely been discontinued, with operations shifting to Shankarpur due to various reasons.
- Development into attractive tourist destinations has been prioritized, with inadequate infrastructure for loading and unloading, waste disposal, and resting areas posing challenges.
- Shortage of cold storage and ice plant facilities further limits economic opportunities and hampers the preservation of perishable goods.

3.5 **Fishing Harbour in Diu**

Vanakbara Fishing harbour



Vanakbara, Diu in the Union Territory of Daman & Diu and Dara & Nagar Haveli, is a minor fishing harbour established in 1996, serving as a vital hub for the local fishing community. The harbour boasts of a lengthy jetty stretching 1.3 kilometres. Yet, the harbour lacks dedicated auction halls, prompting traders to conduct auctions within their own shops on-site. The presence of six ice plants nearby and 26 within the broader vicinity of Diu ensures sufficient ice availability for the fishermen. There are only two processing units operating within the area, with just one currently functional, potentially affecting the value-added processing of harvested seafood. Majority of the catch goes to Veraval for processing, which is a hub for fish processing. The fishing fleet of Vanakbara encompasses a diverse array of crafts, including mechanized trawlers, deep-sea vessels, and gill-netters, catering to various fishing methods and requirements. The ownership of the harbour vests with the UT administration under the Central Government.

04 Key Findings from the Survey

4.1 Overview of selected fishing harbours

Infrastructure facilities at selected harbours

In this section, the five major harbours selected for the study has been analysed for various infrastructure facilities (Table 3). The table shows that except Vanakbara, all other harbours have auction halls where buyers and sellers participate in auction process after the catch is landed at the harbour. In Vanakbara, auction takes place inside the individual cubicles meant for the traders. While Vizag boasts of 11 jetties, all other harbours had one jetty each where the incoming fishing vessels is docked up. All harbours had sufficient number of ice plants within the harbour complex as well as in the vicinity of the harbour ensuring adequate supply of ice. Only Muttom has a cold storage, yet it was not operational. Muttom harbour also had a sewage treatment plant, a shipyard, diesel pump stations, bank, canteen, showcasing the attributes of a model fishing harbour. Like Vanakbara, Vizag harbour also had 23 export cubicles for trading fish and shrimps. Kochi is a hub for sea food processing, and the produce is loaded onto reefer vehicles for transporting within the first two hours of landing.

Table 5: Infrastructure facilities at selected fishing harbours

Facilities	Vizag	Muttom	Kochi	Digha	Vanakbara
Auction Halls	2	1	2	4	0
Fishing Jetties	11	1	1	1	1
Net Mending Halls	2	1	1	3	1
Ice Plants	5	2	3	8	6
Cold Storages	0	1	0	0	0
Other Facilities	23 Export Cubicles for fish & shrimps	Diesel pumps, STP, Supermarket, Bank, Hotel, Shipyard	Reefer vehicles for transporting to GJ, WB. Insulated for AP & KA.	Natural sun drying facility (Mohana) of 50 MT/month Capacity	Cubicles for traders
Method of Fish Catching	Trawling/Gill netting	Trawling(80%), Gillnet (20%)	Trawling	Trawling	Trawling (70%), Gillnet (30%)
Harbour Capacity	300	600 boats	40-60 boats	300 boats	27400 sq. ft
How much capacity needed	100% expansion needed for 695 boats	About 5-6 acres more space needed for parking.	Additional area required for landing	Overhaul of infrastructure with additional facilities needed	Dredging at harbour entrance needed

Hygiene Standards and Waste Management at Fishing Harbours

Proper waste management and hygiene practices play a crucial role in shaping the conditions of harbours. Efforts to enhance waste treatment and cleanliness can lead to better environmental outcomes. Out of the five harbours selected in this study, only two met satisfactory hygiene standards:

Muttom Harbour

Muttom Harbour stands out for its excellent hygiene standards. Equipped with an effluent treatment plant within its premises, Muttom exemplifies the attributes of a model harbour. There are no foul odours from dried or rotten fish, as auction halls are regularly cleaned with running water.

Thoppumpady Fishing Harbour (Kochi)

Thoppumpady Fishing Harbour maintains cleanliness through regular cleaning with water. Auction halls remain free from any foul smells. The efficient transportation of catch in reefer vehicles within two hours of landing further minimizes odour issues. Additionally, a waste management area is under construction as part of the modernization project.

Vizag Harbour

Dried fish on the roads near the harbour emits a strong foul smell. Solid waste from the harbour is collected and dumped in a nearby yard by the Municipal Corporation. Stagnant water near the shore worsens hygiene conditions.

Digha Harbour

The shore of Digha Harbour also suffers from stagnant water with waste and a foul smell. Inadequate waste disposal systems, improper handling of fish waste, and plastic debris contribute to water pollution. Insufficient sanitation facilities for fishermen and harbour workers exacerbate hygiene challenges. The absence of clean restrooms, handwashing stations, and waste bins further impacts cleanliness. Although, the West Bengal Fishery Development Corporation has taken steps by constructing public washrooms and a potable water supply unit in Mohana.

Vanakbara Harbour

Vanakbara is a minor harbour with a long jetty and no auction halls. The harbour had cubicles for traders which were mostly clean and washed with water frequently. However, a strong foul smell persists due to stagnant water with waste, especially during low tide.

Improper handling of fish, catch lying on the ground during auctions, and the use of contaminated water for boat cleaning pose both food safety and health risks. Stagnant water in harbour areas can become breeding grounds for pests and foul odours, emphasizing the need for better drainage. There is a need to invest in better sanitation facilities, drainage systems, and waste management infrastructure. By adopting best practices, harbours can be made cleaner and safer, which will also enhance opportunities for international exports. Investing in sanitation facilities, drainage systems, and waste management infrastructure is crucial. Prioritizing hygiene practices benefits workers, consumers, and the environment.

Losses and Wastages

A typical fish value chain comprises of a number of stages for the movement of fish catch from the sea to the final retail market. Given the perishable nature of fisheries, losses and wastages can occur during all stages of the value chain: during fishing, loading/unloading, handling, auctioning, retail, among others. The losses incurred at each stage vary depending upon the handling and technologies used in the fish supply chain.

The factors that contribute to losses and wastages in fish include inadequate on-board facilities during fishing, seasonal demand fluctuations, physical damage to the catch, improper handling and insufficient icing at fish harbours and landing centers, unhygienic practices, lack of chilled storage, transport limitations, damage and spoilage at retail markets, and variations in consumer demand.

The stakeholder consultation across fishing harbours, reveals that losses and wastages in fish can occur due to a combination of factors (Table 4). In Vizag, stakeholders informed that post-harvest losses can range anywhere between 15% to 20%, with the primary cause being lack of storage infrastructure. The two landing centres in Vishakhapatnam visited as part of the study were without any facilities and inadequate storage. This resulted in substantial losses for small fishermen as the catch cannot be preserved effectively.

Similarly, Digha experiences losses of around 15%, attributed to inadequate storage facilities and improper handling practices. Without proper facilities to store and handle the catch, spoilage occurs, impacting the overall yield. Kochi faces a 5% loss due to both improper handling and space constraints, while a significant 30% loss results from the absence of cold storage infrastructure and lack of ice plants. Vanakbara also grapples with around 10-15% quality loss due to improper handling and insufficient storage facilities. In contrast, Muttom stands out with minimal losses (0%) due to better infrastructure, which ensures efficient handling, storage, and preservation of the catch.

Table 6: Losses at selected fishing harbours

Harbour	Losses	Remarks
Vizag	15%-20%	Lack of storage infrastructure
Digha	15%	Lack of storage and improper handling
Kochi	5%-30%	Improper handling and space crunch; absence of cold storage
Muttom	0%	Better infrastructure
Vanakbara	10%-15%	Improper handling and lack of storage

Source: Stakeholder consultation at various fishing harbours conducted between October 2023 and March 2024

Major Varieties and Major Markets Catered by the selected harbours

The fishing facilities across Vizag, Muttom, Kochi, Digha, and Vanakbara offer a diverse array of fish varieties and cater to both domestic and international markets. Vizag is known for its Yellowfin Tuna, Rani Fish, Pomfret, Shrimp, Mackerel, and Ribbon Fish, supplying mainly to Kerala and exporting to the USA and China. In Muttom the major varieties include Squid, Octopus, and Cuttle Fish, catering to Tamil Nadu and Kerala, with exports reaching Japan, the USA, Europe, and China. At Muttom and nearby harbours, large quantities of Klati, the processing variety for fish meal is also caught. These generally fetch lower prices and is sold without any auction system.

Kochi specializes in species like Systomus rufus, Reef Cod, Tuna, Stingray, Shark, Sailfish, Mahi Systems, Shipjack Tuna, and Swordfish, distributing to Delhi, Bangalore, and Goa, and exporting to the EU, Korea, China, South-East Asia, and the USA. Digha offers Squid and Tuna, with a focus on the domestic markets of Kolkata, Odisha, Maharashtra, and Andhra Pradesh, and exports to Saudi Arabia, Oman, UAE, and Muscat.

In Vanakbara, the major varieties include Ribbon Fish, Bombay Duck, Pomfret, Prawns, Croaker, Catfish, Seer Fish, Shrimps, Cuttle, and Squid. The catch is mostly sent to Veraval for processing or sold in the local market and does not engage in exports.

Logistics Cost

The analysis of expenses for boatowners across Digha, Kochi, Muttom, Vanakbara, and Vizag reveals significant variations in costs based on the size of the boats and regional differences in pricing. The variation is also due to the range of fuel subsidies offered by different state governments, showing how government policies impact operational costs. The data shows that across harbours, fuel cost is the largest cost component for boatowners and has an impact on overall expenses. Regional variations in ice and food costs also play a substantial role in the financial outlay required by boatowners.

In Vizag, the subsidized diesel rate of INR 9 per liter for up to 3,000 liters per month dramatically lowers fuel expenses, making it one of the most cost-effective regions for fishing operations, despite high nominal fuel costs. This subsidy helps to keep total expenses for large boats at INR 10.06 lakh, significantly reducing the burden of fuel costs. In contrast, Digha, with no fuel subsidy, faces the highest expenses for large boats at INR 13.90 lakh, primarily due to the lack of financial relief on fuel prices, which constitute a major portion of the costs.

Kochi's reduction in diesel subsidy from INR 1 to 50 paise per liter through Matsyafed slightly increases the fuel expenses but still offers some relief, keeping the total costs for large boats at INR 6.60 lakh, a moderate figure compared to other regions. Muttom benefits from a substantial tax exemption on diesel, providing 1,800 liters tax-free for 10 months a year. This policy considerably lowers fuel expenses, resulting in total costs of INR 8.73 lakh for large boats, despite the high nominal price of INR 95 per liter.

Vanakbara's VAT-free HSD oil scheme, with a tiered system based on the boat's horsepower, offers significant savings. The allowance of up to 24,000 liters per year for boats with over 100 BHP helps maintain low total expenses of INR 4.19 lakh for large boats. The combined effect of these subsidies and tax exemptions demonstrates a clear disparity in operational costs among the regions, highlighting the critical role of government support in sustaining the fishing industry. While Vizag and Vanakbara benefit from substantial relief, Digha's lack of subsidy places a considerable financial strain on boatowners, emphasizing the need for more equitable support mechanisms across regions to ensure the viability of fishing operations.

4.2 Fish Auctioning

A critical aspect of India's fish marketing system is the auction system, which plays a crucial role in price discovery and market transactions. Across fishing harbours, traditional auction practices prevail, often characterized by open auctions without proper weighing or quality examination of products. This system leads to non-remunerative prices for boat owners and fishers, particularly in regions like Vizag, Digha, and Vanakbara. Moreover, small aqua farmers face challenges in bargaining power, compelling them to sell their produce at lower prices to middlemen, ultimately impacting their returns on investment and livelihoods.

Fish Auctioning at Selected Harbours

Although all harbours practice traditional auctioning system, the process differs from harbour to harbour. Generally, high value catch are displayed in plastic crates and weighed, catch which are low value and high quantity are displayed on the floor of the auction halls.

Auction at Vizag

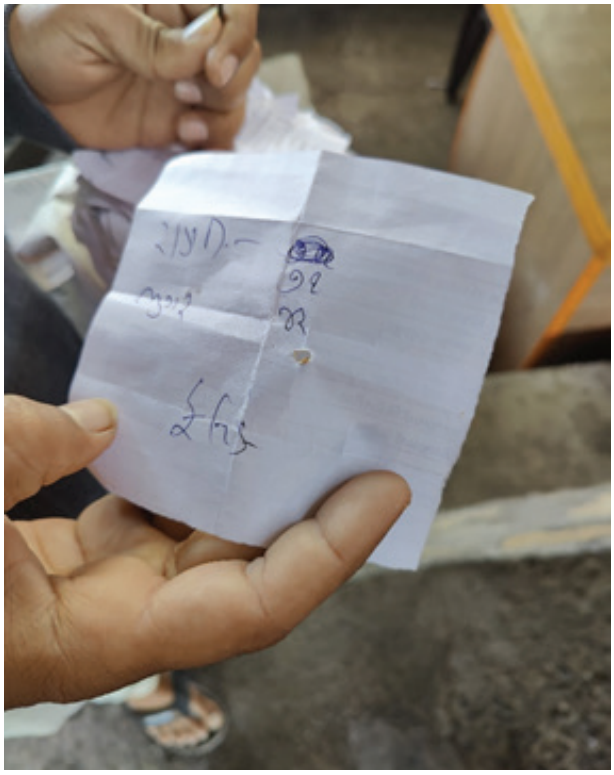
- Auction Halls: Vizag Harbour boasts two auction halls where auctions occur twice a day: once in the morning and again in the evening. These dedicated spaces serve as the central venues for buyers and sellers to engage in trade.
- Commission Agents as Intermediaries: There are no government officials or harbour handlers to facilitate the auction, rather, the commission agents play a pivotal role in facilitating the auction process. These agents act as intermediaries, connecting boat owners (sellers) with traders (buyers). They charge 5 per cent commission from boat owners for their services.
- Platform Display: The auction process primarily takes place on the platform within the auction hall. High value and low volume produce may be kept in plastic crates.
- Open Auction System: Vizag follows an open auction system. The produce is laid out on the auction hall platform, where the commission agents inspect the quality and quantity of the catch. Based on their assessment, these agents bid their prices on behalf of buyers. If the price is acceptable to the boatowner, the produce is sold.

Auction System at Muttom

- Registration of Boats: Before participating in the auction, boats must be registered with the harbour authorities to carry out trade activities at the harbour.
- Purchase Call and Bond Issuance: The auction process begins with a "purchase call" issued by the harbour to notify boat owners that an auction is about to take place. A bond is established between the boat owner and the harbour to formalize the boat owner's commitment to participate in the auction.

- Open Auction: Muttom Harbour conducts only open auctions. During the auction, fish catch from various boats is put up for sale. Buyers participate in the bidding process to purchase the catch. However, there is no direct link between boat owners and buyers.
- Harbor as the Middleman: The harbour acts as an intermediary between boat owners and buyers. It facilitates the auction process and ensures fair transactions. The harbour charges a 4% commission on the sale price as compensation for its services.
- Limited Boat Landings: Muttom Harbour restricts the number of boats allowed to land in a day. Typically, only about 20 boats are permitted to unload their catch. This limitation helps manage the auction process efficiently.
- Auction Handlers and Private Auctioneers: On the harbour side, there are 20 auction handlers employed on a salary basis (earning around INR 20,000 per month). These handlers oversee the auction proceedings. From the boat owners' side, private auctioneers participate. These auctioneers are paid INR 2,000 to INR 3,000 per day for their services.
- Frequency of Boat Landings: Each boat can land at the harbour only four times a month. This corresponds to approximately 6 to 7 days of voyage. The limited frequency ensures fair distribution of auction opportunities among boat owners.
- Catch Value Distribution: The value of the catch is shared between boat owners and labourers. The ratio is 6:4, where 60% of the proceeds go to the boat owners, and the remaining 40% is allocated to the labourers.
- Handling Mishaps: In case of any mishap during the auction process (such as damage to the catch or unforeseen circumstances), all related expenses are borne by the boat owners.

Auctioning at Vanakbara



- No Auction Halls: Unlike other harbours, Vanakbara does not have dedicated auction halls. Instead, traders operate their own shops within the harbour premises, which serve as the auction venues. Traders and buyers interact directly in these cubicles and engage in the auction process.

- Paper Chit Auctions: The auction process follows a paper chit system. When a buyer is interested in purchasing a particular variety, they write down their bid price on a piece of paper. The produce is sold to the buyer with the highest bid.
- Planned Modernization: Vanakbara Harbour has ambitious plans for modernization to construct new auction halls to enhance the infrastructure and hygiene conditions ensuring food safety and quality.

Acceptance of E-Auction at Selected Harbours

Electronic-auctioning (e-auction) at fishing harbours, on the lines of e-NAM (electronic agricultural marketing), can play a crucial role in the fish industry. It can enhance the transparency in the auction process. By moving away from traditional manual auctions, where prices might be influenced by intermediaries, e-auctions ensure a fair and open bidding system. e-auctions also has the potential to streamline the auction process, reducing paperwork and administrative overhead. This efficiency can benefit both buyers and sellers.

E-auctions may also facilitate better price discovery where buyers can access real-time market prices, leading to fairer transactions.

Effectiveness of e-auctions in the fish industry can be enhanced through in real time, allowing buyers to bid online. These platforms provide immediate feedback on prices and enable efficient transactions. It will also help incorporate quality grading mechanisms. Buyers can assess the quality of fish before bidding, ensuring transparency and trust. Integration of e-auction may be integrated with logistics systems ensuring timely transportation of fish from the harbour to markets or processing units.

Based on the Focus Group Discussions conducted at the five harbours, there was a mixed reaction for proposal of adopting e-auction at the harbour premises.

Vizag

E-auction acceptance is at 100%. The current auction system lacks transparency, awareness and education about technology adoption which are essential for a successful transition.

Digha

E-auction acceptance stands at 70%. The promise of better price discovery motivates stakeholders to embrace e-auctions, as they enable a wider market reach.

Kochi

E-auction acceptance is currently at 0%. However, stakeholders express interest in transitioning. The primary challenge is the need to dispose of the catch within two hours of landing, which currently happens through reefer vehicles.

Muttom

E-auction acceptance remains at 0%. The existing auction system is satisfactory, with the harbour acting as an intermediary. However, the high commission charges and reliance on private auctioneers pose challenges.

Vanakbara

E-auction acceptance is at 100%. Fishermen are enthusiastic about adopting e-auctions due to perceived transparency issues in the current system. They believe e-auctions will lead to better prices.

As e-auctions has the potential to transform fish marketing in India by offering transparency, efficiency, and improved price discovery, there is a need for several pilot schemes for e-auctioning. While challenges exist, educating stakeholders and addressing logistical concerns can enhance e-auction adoption in these harbours.

4.3 Modernization of Fishing Harbours

Modernizing harbours is essential for economic growth, trade efficiency, and overall regional development. The Department of Fisheries under the Ministry of Fisheries, Animal Husbandry, and Dairying has so far approved 107 FH and FLC for modernization projects amounting for Rs 9.08 thousand crore. The projects comprise of three schemes: Blue Revolution, PMMSY and FIDF which are aimed at enhancing safety, fish production, subsidiary industries, employment, and local socio-economic conditions (Table 5).

Table 7: Schemes for fishing harbour modernization projects

Scheme	Number of FH covered under the scheme	Scheme Cost (Thousand crore)	Selected FH
Blue Revolution: Integrated Development and Management of Fisheries	13	1.46	
PMMSY (Pradhan Mantri Matsya Sampada Yojana)	48	2.53	Kochi, Vizag, Shankarpur Digha, Colachal
FIDF (Fisheries and Aquaculture. Infrastructure Development Fund)	46	5.09	Thengapattinam
Total	**107**	**9.08**	

Source: (Lok Sabha Unstarred Question, 2023)

During the Focussed Group Discussions conducted at the fishing harbours and landing centres, there was a general consensus on the need for expanding the present capacity at all the harbours by the stakeholders. At Vizag, there is a requirement of doubling the current landing capacity from about 300 boats to accommodate 695 boats. Kochi harbour too needs additional space for landing which currently is under construction. In Muttom, there is enough landing space, space for auction and shipyard, however, stakeholders expressed their concern on needing additional 5-6 acres of parking space. Digha needs an overhaul of infrastructure along with additional facilities. In Vanakbara, dredging at the harbour entrance is needed for enhancing the landing space and reducing the waiting time for unloading.

All selected harbours are covered under various schemes for the modernization and at different stages of progress. In Kanyakumari district, there is a proposal to modernize and expand Thengapattinam Fishing Harbours at the cost of INR 253 crores. Maintenance dredging of Colachal FH is proposed at a cost of INR 4.94 crore.

In case of **Vizag**, the modernization project was approved in March 2022 and is currently under progress. The plan is to increase current handling capacity from 55 thousand MT per year to about 70 – 80 thousand MT per year of fish. Other facilities include renovation of 2 auction halls, construction of packaging area, parking, food court, cold chamber, ETP, office premises, and internal roads. The total estimated budget is INR 151.81 crore (VPA, 2023).

Kochi harbour modernization is also in progress. The proposed model is on lines of international standards redesigned to fit Indian context. The new facilities at the developed harbour include AC Auction halls, packaging unit, internal roads, loading & unloading platforms, office, dormitory, food court, cold storage, ice plants, multi-level parking and retail market. The total project cost is estimated as INR 169.17 crore (CPT, 2022).

In **Digha**- Shankarpur FH, there is a proposal to modernize and upgrade the existing fishing harbour at a cost of INR 44.7 crore. The project includes installing 25 KLD Fish Preservation Effluent Treatment and 105 KLD Sewage Treatment Plants.

The modernization project of **Vanakbara** is currently at the tendering stage. The proposed facilities include dredging, sorting and grading hall, ice flakes production unit, auction hall, boat maintenance yard, office, washrooms, generator and electric room, fire safety, drinking water, and storage tank. The total project cost is INR 93 crore.

05 Conclusion and Policy Recommendations

5.1 **Key Takeaways**

Following are the key takeaways from the study regarding the fishing harbours and landing centres under review.

- **Hygiene and Cleanliness Concerns:** The study identifies hygiene and cleanliness issues as pervasive challenges across most harbours, impacting the eligibility of catch for international exports. Notably, Muttom and Kochi stand out as exceptions, maintaining higher standards in this regard.

- **E-Auction Uptake Disparity:** Kanyakumari and Kochi face challenges with e-auction adoption, with no takers for this mode of trading. Conversely, stakeholders in Digha, Vizag, and Vanakbara express openness to exploring e-auction as a potential trading avenue.

- **Losses Due to Storage Infrastructure:** Lack of adequate storage infrastructure and handling facilities contribute to average losses reported across various harbours. While Kochi, Vizag, Shankarpur Digha, Mohana Digha, and Vanakbara report losses ranging from 5% to 20%, Muttom boasts minimal losses due to superior infrastructure. Similarly, Chinnmuttom, Bheemli, and Chepala Uppada FLCs mitigate losses through same-day return policies.

- **Fuel Costs as a Significant Expense**: Fuel cost emerges as the single largest component of boat owners' expenses, underscoring its financial impact on operations. The cost of ice and diesel, influenced by subsidies and varying state policies, adds to the financial complexity of fishing operations.

- **Regional Variations in Cost Dynamics:** The study highlights regional variations in the cost dynamics of ice and diesel, influenced by state-level policies and subsidies. Such variations necessitate nuanced approaches to cost management and resource allocation across different fishing regions.

- **Importance of Infrastructure:** Better infrastructure including storage facilities emerges as a crucial factor in mitigating losses and ensuring the efficiency and profitability of fishing operations. Investments in infrastructure improvements can yield significant benefits for fishermen and stakeholders alike. This also has profound impact on enhancing the exportability of the produce.

5.2 **Policy Recommendations**

Based on our study, the following policy recommendations are suggested to address critical issues at fishing harbours and landing centres, aiming to enhance sustainability, efficiency, and profitability of the fisheries sector:

Addressing Hygiene Issues

- Cleanliness of harbours: Implement comprehensive cleanliness programs to regular cleaning schedules, along with the provision of water stations for washing and sanitation, can significantly improve hygiene standards.
- Facilities for water and resting places: Ensure the availability of clean water facilities for the fishermen and labourers with provision of water stations for washing and sanitation. Establish well-maintained resting areas for fishermen to ensure their well-being and productivity. These facilities should include shelters, toilets, and potable water.
- Sewage and waste treatment plants: Harbours with no sewage treatment plants should construct it to handle waste efficiently, preventing contamination of water bodies and ensuring a cleaner environment. Enforce waste management protocols, including segregation, recycling, and safe disposal of waste products.

Transition to Better Energy Efficiency

- Modernizing Vessels: Transition from fossil-fuelled trawlers and fishing boats to those powered by superior engines, hybrid technology, hydrogen, or batteries. Electric and hybrid fishing vessels will help reduce carbon footprints and fuel costs.
- Incentives for Sustainable Energy: Government should provide incentives to boatowners, for the adoption of energy-efficient technologies and infrastructure upgrades.

Addressing Cold Chain Gaps

- Comprehensive Cold Chain Infrastructure: Develop a robust cold chain from the point of catch to final consumption in order to maintain fish quality. This will help open up more export opportunities.
- Training and Awareness: Train fishermen and handlers on the importance of maintaining the cold chain to reduce spoilage and increase the shelf life of fish products.

Adopting e-Auctioning

- Pilot and Phased Implementation: Introduce e-auctioning on a pilot basis in open-minded regions like Digha, Vizag, and Vanakbara. Gradually expand to other regions based on feedback and success.
- Wider Market Access: Use e-auctioning platforms to connect buyers and sellers across geographies, ensuring better pricing and market reach.

Enhanced Fish Processing for Value Addition

- Establish Processing Units: Develop and enhance fish processing units to create value-added products such as fillets, canned fish, and ready-to-eat seafood. For instance, Kerala's success in processing and exporting value-added seafood products can be a model.
- Export Facilitation: Facilitate exports by meeting international standards and certifications, thus enabling better pricing and market access.

Need based Infrastructure Improvements

- Dredging and Harbour Expansion: Prioritize dredging projects and the expansion of narrow openings to improve navigability and safety. For example, the dredging project in the Cochin port can serve as a model.
- Net Mending and Boat Repair Facilities: Establish dedicated net mending and boat repair facilities at landing centres with no such facilities to ensure operational efficiency and reduce downtime.

Addressing Overfishing

- Regulation and Monitoring: Implement stricter regulations and monitoring to prevent overfishing and ensure sustainable fishing practices. Utilize technology such as satellite tracking for compliance.
- Conservation Measures: Promote the use of larger mesh sizes in nets to allow smaller fish to escape and grow and discourage the use of harmful fishing practices such as LED lights, which can disrupt marine ecosystems.
- Education and Training: Educate fishermen on sustainable fishing practices and the importance of preserving fish populations for long-term viability.

Implementing these policy recommendations will require collaboration between government bodies, local communities, and industry stakeholders to ensure a sustainable and prosperous future for the fishing industry.

Annexure

Expenses of boatowners

Digha			
Expenses	Small	Medium	Large
Ice @ INR 2000/MT	30000	150000	400000
Fuel /unit catch quantity required	190000	332500	760000
Water & Food (INR)	75000	1,00,000	220000
Miscellaneous	5000	7000	10000
Total	**300000**	**589500**	**1390000**

Kochi			
Expenses	Small	Medium	Large
Ice @ INR 1700/MT	50000	100000	200000
Fuel /unit catch quantity required	48000	200000	300000
Water & Food (INR)	7000	50000	150000
Miscellaneous	5000	7000	10000
Total	**110000**	**357000**	**660000**

Muttom		
Expenses	Medium	Large
Ice @ INR 1600/MT	12000	76000
Fuel (INR 95/ltr)	325500	762000
Food (INR 500/day and INR 1000 on fish selling day per laborer apart from food expenses)	25000	35000
Total	**362500**	**873000**

Vanakbara			
Expenses	**Small**	**Medium**	**Large**
Ice @ INR 1500/MT	10000	15000	19000
Fuel (INR 75/ltr)	105980	250000	300000
Food (Food expenses for about 17-20 days)	14500	115000	100000
Total	**130480**	**380000**	**419000**

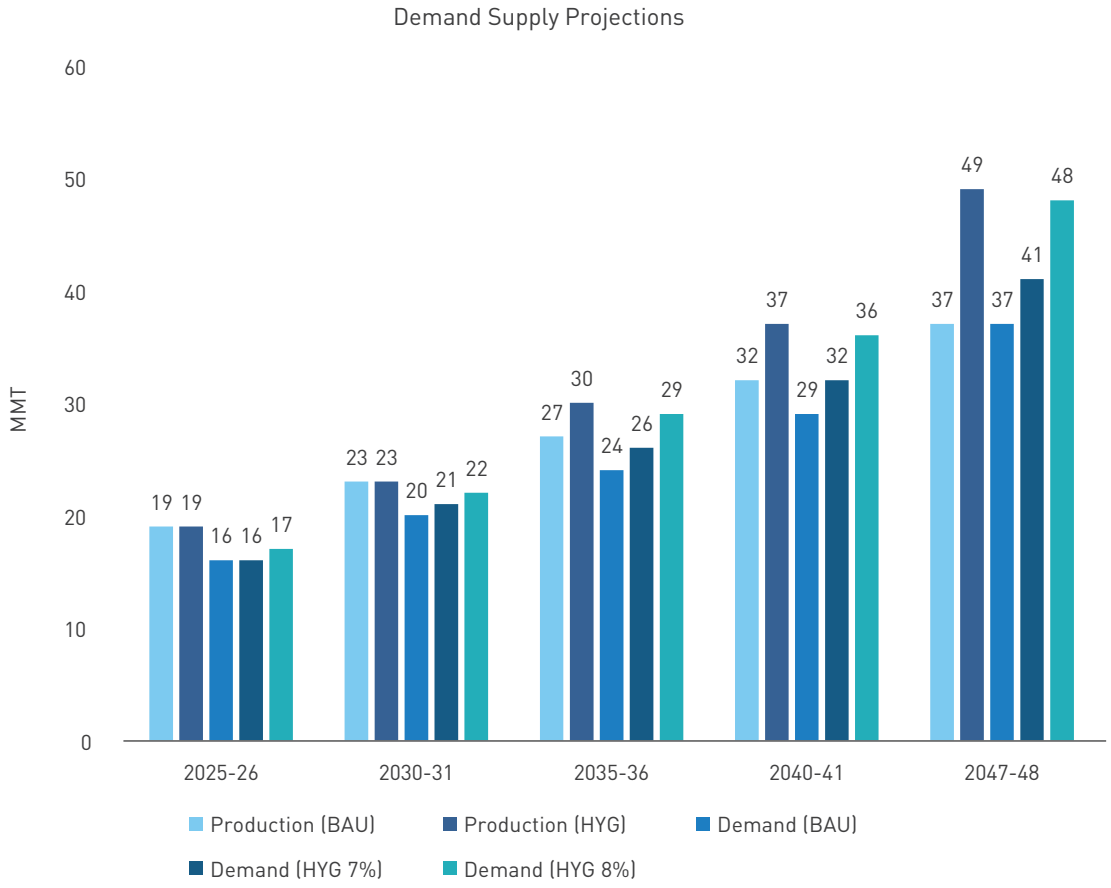
Vizag			
Expenses	**Small**	**Medium**	**Large**
Ice @ INR 1700/MT	8500	20400	34000
Fuel @ INR 93/ Liter	232500	372000	930000
Water & Food (INR)	10000	20000	30000
Miscellaneous	8000	10000	12000
Total	**259000**	**422400**	**1006000**

Marine Fish surplus and deficit states in India

States/UTs	Production (Lakh Tonnes)	Consumption (Lakh Tonnes)	Gap	Surplus/Deficit
Andhra Pradesh	41.74	3.48	38.26	Surplus
Goa	1.05	0.19	0.86	Surplus
Gujarat	8.59	0.58	8.01	Surplus
Karnataka	6.32	3.94	2.38	Surplus
Kerala	6.8	13.5	-6.7	Deficit
Maharashtra	5.86	3.05	2.81	Surplus
Odisha	8.18	6.32	1.86	Surplus
Puducherry	0.51	0.24	0.27	Surplus
Tamil Nadu	7.57	9.44	-1.87	Deficit
West Bengal	17.82	23.29	-5.47	Deficit

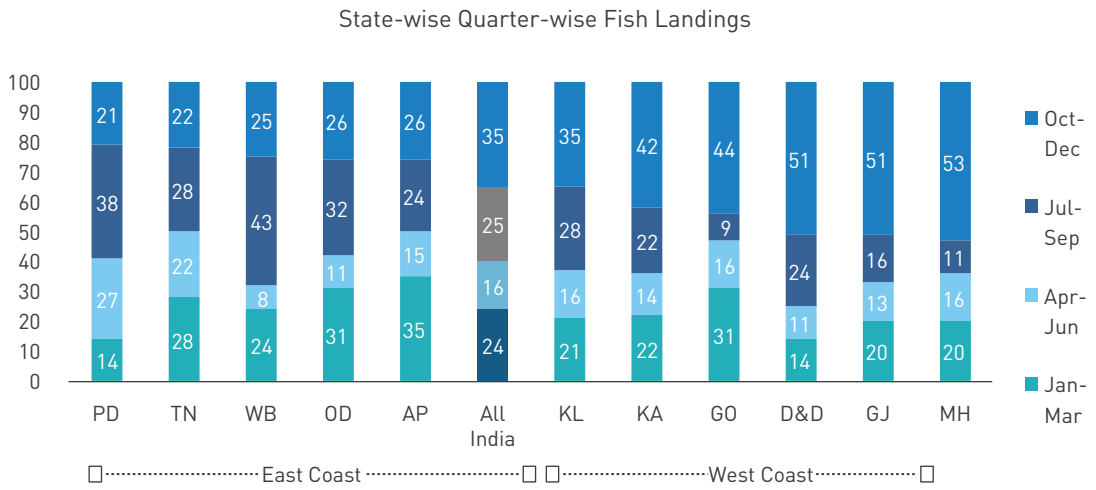
Source: NCAER, 2023

Demand supply projections for fisheries



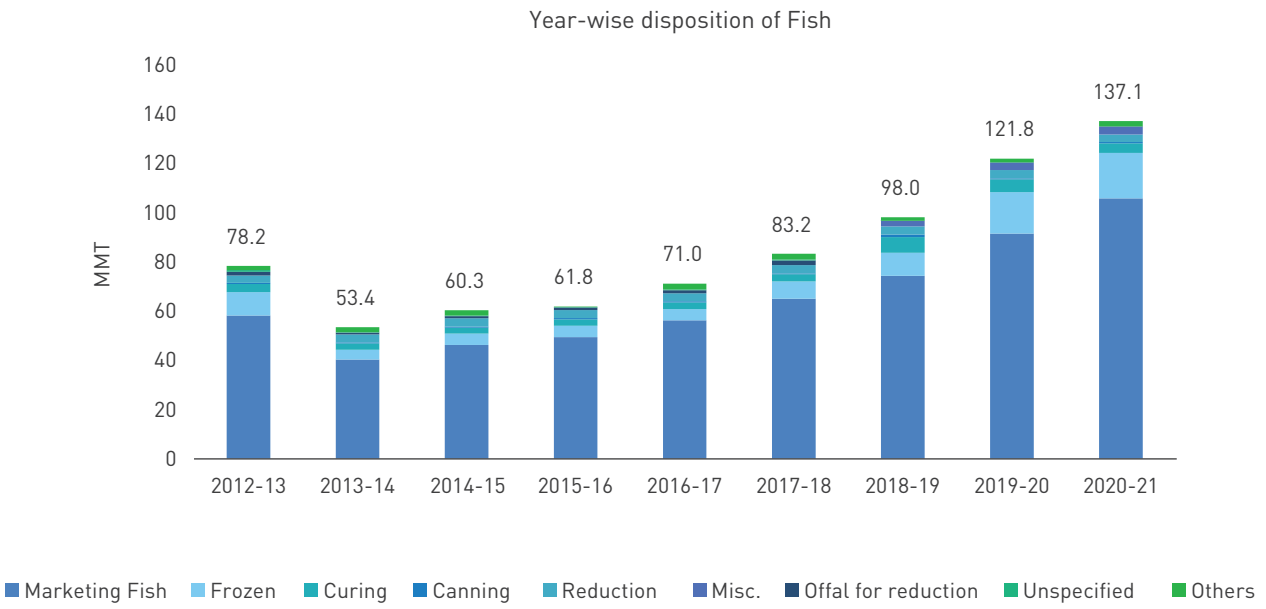
Source: CMFRI (Various Sources)

Fish landings in India



Source: MPEDA, 2024

Fish disposition in India



Source: DoF, (2023)

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- Invest in capacity building initiatives and skill development for supply chain participants across the value chain
- Strengthen linkages across the value chain through market access initiatives, thereby reducing losses and increasing farmer incomes

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