No. j-01013/68/2025-Fy
Government of India
Ministry of Fisheries, Animal Husbandry & Dairying
Department of Fisheries

Chanderlok Building, Janpath, New Delhi
Dated the 13th October, 2025

CIRCULAR

Subject: Draft National Framework on Traceability in Fisheries and Aquaculture – Seeking Comments from Stakeholders – reg.

The Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, has prepared the Draft National Framework on Traceability in Fisheries and Aquaculture through a duly constituted Drafting Committee.

2. The final draft framework is hereby placed in the Department of Fisheries Website and National Fisheries Digital Platform for inviting comments from all stakeholders, fisheries sector organizations, exporters, industry associations, research institutions, and the general public.

3. The stakeholders are requested to furnish their comments/suggestions to the Department of Fisheries **by 31st October, 2025**. Comments may be sent via email to **tarunkr.singh@gov.in and sharma.anu@govcontractor.in** .

Yours faithfully,

(V. Srinivasa Rao)
Director (Fisheries)

National Framework on Traceability in Fisheries and Aquaculture

2025

Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY)

(A Central Sector Sub-Scheme under PMMSY)

Department of Fisheries
Ministry of Fisheries, Animal Husbandry and Dairying
Government of India

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1. Introduction

1.1 Context

India's fisheries and aquaculture sector plays a pivotal role in its socio-economic development, contributing significantly to food security, livelihoods, and exports. As one of the top three fish-producing countries globally and a leading exporter of seafood, the sector supports over 30 million livelihoods. Yet, the rapidly evolving domestic and international landscape has made it imperative to modernize how fish and fishery products are monitored, recorded, and verified through their entire journey from capture/farm to plate.

Global trade is increasingly prioritizing traceability, driven by stringent import regulations from key markets like the European Union and the United States. These regulations require clear, verifiable documentation of product origin, legal harvesting (catch), and safety standards. In parallel, international organizations including the FAO advocate traceability as a critical mechanism for ensuring legal, sustainable, and responsible fishery practices. As a result, aligning with these global standards has become essential not only to maintain access to export markets but also to strategically strengthen India's competitive position in the global trade of fish and fishery products and ensure sustainability.

Domestically, growing consumer awareness around food safety, hygiene, and quality assurance is fuelling demand for products with clear traceable origins and transparent handling processes. Retail chains, e-commerce platforms, and institutional buyers are increasingly favouring fish and fishery products that are ethically sourced, environmentally sustainable, and backed by a robust traceability system. In the absence of a digital traceability system, it becomes challenging to ensure the sustainability of aquatic resources, uphold food safety standards, or respond promptly to issues such as disease outbreaks, product rejections, or recalls.

Given this context, there is an urgent need for an integrated and unified digital traceability system that facilitates real-time tracking of product movement and transactions throughout the value chain. Such a system would not only bridge existing compliance gaps but also lay the groundwork for effective resource management, enhanced food safety, improved export performance, and sustainable growth of the sector in alignment with both national and international priorities.

This Framework is envisioned as a transformative initiative to standardize and implement traceability across India's capture fisheries and aquaculture sectors, delivering benefits to all stakeholders from small-scale fishers and farmers to processors, exporters, regulators, and consumers.

1.2 Rationale for National Framework on Traceability

India's fisheries value chains are extensive and diverse, encompassing all forms of marine and inland capture fisheries, brackishwater and freshwater

aquaculture, mariculture, post-harvest handling, processing and trade. Despite their scale and economic significance, traceability practices across these segments remain largely inconsistent, often manual, and mostly fragmented. While some exporters and processors have adopted systems to meet specific market and regulatory requirements, these efforts are generally isolated, requiring standardization, interoperability, and integration with public systems.

These inadequacies lead to the following issues to be addressed:

a) *Regulatory gaps and lack of data cohesion:* Fragmented and manual record-keeping makes it difficult for authorities to enforce compliance with domestic and international regulations, particularly on Illegal, Unreported and Unregulated (IUU) fishing and food safety standards, leading to increased scrutiny, delays in clearance, and export rejections.

b) *Crisis Response:* Any event requiring product recall, the lack of a traceability system hampers timely and targeted interventions.

c) *Consumer Confidence:* In the absence of traceable information regarding product origin, production methods, and hygiene standards, consumers are unable to make informed purchasing decisions undermining food safety and confidence.

d) *Market Access:* Exporters face increased scrutiny and risk of rejection in global markets due to insufficient or non-verifiable traceability documentation affecting market access.

e) *Small-scale stakeholders:* Small-scale fishers and farmers often lack access to digital tools and standardized systems, leaving them out of formal supply chains and limiting their ability to benefit from premium markets.

The requirement for a National Framework on Traceability stems from the need to address systemic gaps through a unified, scalable, and digitally integrated platform. This platform shall enable data standardization, transparency, and trust across the fisheries and aquaculture sector.

The proposed framework aims to consolidate fragmented initiatives, clearly defining stakeholder roles and responsibilities, and ensuring seamless data capture at every critical point in the value chain. By doing so, it strengthens regulatory compliance, accelerates certification and audit processes, enhances product credibility, and promotes both inclusive growth and sustainable resource management.

This is not merely a technological upgrade, but it also represents a governance reform designed to modernize the management, regulations, and global positioning of India’s fisheries sector.

1.3 Strategic Alignment with National Goals and Global Seafood Trade Standards

This Traceability Framework is firmly embedded within the broader vision and strategic directives of the Central and State Governments. It aligns with several key national initiatives and policy priorities, including:

a) **Pradhan Mantri Matsya Sampada Yojana (PMMSY):** Under Pradhan Mantri Matsya Sampada Yojana (PMMSY) and Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY), the government emphasizes sustainable, inclusive development of the fisheries sector through infrastructure development, market linkages, and digital platforms. Traceability has been identified as a core digital intervention under Component 3 of PM-MKSSY.

b) **Digital India:** The Digital India mission prioritizes the digitization of citizen services, data systems, and governance processes of which fisheries traceability is a critical subset.

c) **Ease of Doing Business:** The Ease of Doing Business (EODB) action plan for fisheries recommends end-to-end digitization of regulatory approvals, certification, and compliance tracking. A national traceability system supports this recommendation by simplifying compliance and reducing transaction costs.

d) **Food Safety and Standards:** Traceability supports the implementation of the Food Safety programmes of Food Safety and Standards Authority of India (FSSAI) and Traceability Standards of Bureau of Indian Standards (BIS), ensuring fishery products meet domestic food safety and traceability standards through standardized documentation and data sharing.

e) **Blue Economy Policy:** The policy promotes data-driven decision-making, digital monitoring, and transparent value chains of marine and aquatic resources, with a strong emphasis on environmental stewardship, economic resilience, and technological innovation.

f) **SHAPHARI**: A certification scheme of Marine Products Export Development Authority (MPEDA) for the shrimp hatcheries and farms that produce shrimp for the export markets. It is a process certification applicable to aqua farms that conform to the basic guidelines on Good Aquaculture Practices (GAP).

g) **ReALCraft:** A web enabled work flow based online application system of the Department of Fisheries, Government of India for Vessel Registration Under MS Act and License Certificate under Marine Fisheries Regulation (MFR) Act to the fishing vessels operating along the Indian coast. With the registration under ReALCraft, the Security Agencies, citizens and other approved Government agencies would be able to track the status of any Registered Vessel at any point of time from anywhere, through internet or via SMS. It is a web-enabled solution under open-source technology.

The proposed Traceability Framework aligns closely with India's national priorities for sustainable fisheries development, digital governance, and inclusive economic growth. It supports key policy objectives such as enhancing food safety, improving livelihoods, and promoting responsible resource management.

At the global level, the Framework would position India to meet the expectations of key trade partners and international bodies:

a) It ensures alignment with international regulations including the requirements of importing countries.

b) It facilitates India's exporters in achieving and maintaining compliance with national and international certification regimes, which require validated and tamper-proof traceability from farm or capture to final product.

c) It enables integration with national and international traceability standards, which reinforce India's credibility in the global marketplace.

By aligning with both national development objectives and international trade standards, the Traceability Framework serves as a strategic catalyst for inclusive growth, modernization of the fisheries sector, and India's long-term positioning as a reliable supplier of safe and sustainable fish and fishery products.

2. Objectives of the National Traceability Framework

i. Establish a unified national digital traceability system for fisheries and aquaculture.

ii. Ensure compliance with domestic and international regulations on fish and fishery products.

iii. Promote food safety, hygiene and quality assurance through transparent digital documentation system.

iv. Enhance sustainability and resource management by discouraging IUU fishing, supporting ecosystem-based management.

v. Bring transparency, accountability, and enhancing consumer confidence in the fisheries and aquaculture value chains.

vi. Empower regulators with digital tools for licensing, inspections, certifications, and risk management.

vii. Facilitate participation of small-scale fishers and farmers in domestic and international trade of fish and fishery products.

viii. Support data-driven decision-making for fisheries governance and ease of doing business.

3. Challenges in Implementation of National Traceability System

While the benefits of a national Traceability System are clear, its implementation faces several operational, institutional, and technological challenges. Understanding these challenges is essential to design an inclusive, feasible, and scalable Traceability System.

3.1 Infrastructure and Technology Gaps

One of the most pressing limitations is the infrastructure deficit across many regions in India. Coastal and inland fishing zones often face poor internet connectivity, unreliable power supply, and inadequate cold chain infrastructure, which are all critical for maintaining traceability, particularly for perishable fish and fishery products.

Equally significant is the technological gap. Essential tools such as digital devices, IoT-enabled sensors, Quick Response (QR) code scanners, GPS-based tools and blockchain technology for effective traceability are often either unavailable or unaffordable for small-scale operators. This limits large-scale adoption and creates disparities in implementation capacity across the sector.

Another limitation lies in system interoperability. Broodstock facilities, hatcheries, aquaculture farms, input units, fishing vessels/crafts, fish landing centres, processing plants, markets, other ancillary units and regulatory bodies frequently operate on isolated digital platforms that do not communicate effectively with one another. This results in data silos, duplication of records, and gaps in real-time information exchange, thereby undermining both regulatory oversight and the credibility of the traceability system. Without common data standards and integrated digital platforms, achieving seamless, reliable, and verifiable data flows across the value chain remains a significant barrier to building trust and ensuring compliance in traceability in fisheries and aquaculture.

3.2 Small-scale Fisheries and Inclusivity

India’s fisheries sector is largely composed of small-scale and artisanal fishers and fish farmers, who often lack access to digital tools and are less familiar with mobile applications, online forms, or digital record-keeping systems. They need to be connected with the formal supply chains through a digital infrastructure to enable them to engage with traceability systems.

Additionally, transactions from small stakeholders often occur through informal channels such as local traders and middlemen with limited documentation and processes. To ensure inclusivity, the system will feature simplified, vernacular-language interfaces, offering assisted data entry options, and support offline functionality to accommodate users in remote or low-connectivity areas.

3.3 Regional Disparities and Socio-economic Factors

India's fisheries value chains exhibit significant regional diversity shaped by geography, ecosystems, and socio-economic conditions. Variations in technical expertise, budgetary support, and policy prioritization further contribute to inconsistent implementation across States/UTs. Social and cultural factors also influence adoption. Traditional fishing communities may be hesitant to embrace digital systems due to concerns over data misuse, loss of autonomy, or unfamiliarity with technology. Women and marginalized groups, who play vital roles in post-harvest and retail activities, risk exclusion if systems do not address their specific access barriers. The regional and societal gap shall be bridged by a user-friendly digital platform for stakeholders linked to a centralised national traceability system, besides training and capacity building.

3.4 Complexity of Implementing Traceability in India

The current traceability system in India's fisheries and aquaculture value chain is highly fragmented and institutionally complex, as illustrated in the Fig. 1 and Fig. 2. Multiple stakeholders, from fishers/farmers and input suppliers to regulatory bodies and exporters, operate within isolated systems that lack seamless integration. At the production end, stakeholders such as fishers/farmers, input suppliers, and hatchery operators are often not digitally connected to any central database. These upstream segments form the foundation of traceability, yet they typically rely on manual recordkeeping or informal channels, which compromise data continuity as the product moves downstream. As products reach processors and exporters, traceability requirements become more stringent due to compliance needs tied to export destinations. Exporters interact with a dense network of institutions, including the Department of Fisheries (DoF), Export Inspection Council (EIC), and Marine Products Export Development Authority (MPEDA), each with independent data capture systems, inspection protocols, and certification requirements.

Parallel to this, entities such as Food Safety and Standards Authority of India (FSSAI), Coastal Aquaculture Authority (CAA), and Bureau of Indian Standards (BIS) regulate standards, safety, and certification processes. However, these bodies too function in relative isolation, often lacking interoperability. The States/UTs and Central agencies play critical roles in field-level compliance, yet their involvement remains varied and inconsistent across regions. Hence, a comprehensive IT-based centralised national interoperable traceability system connecting these stakeholders is essential for avoiding duplicative efforts, inconsistencies in data and gaps in verification. This unified system will further boost confidence of consumers of fish and fishery products.

The Figs. 1 and 2 emphasize that while stakeholders are individually engaged in traceability-related functions, the lack of a unified digital backbone results in inefficiencies and weak linkages. A clear need exists to develop a comprehensive system that standardizes traceability protocols across value chains, supported by real-time interoperable digital technologies.

Fig. 1: Complexity of Traceability for Domestic Consumption in India

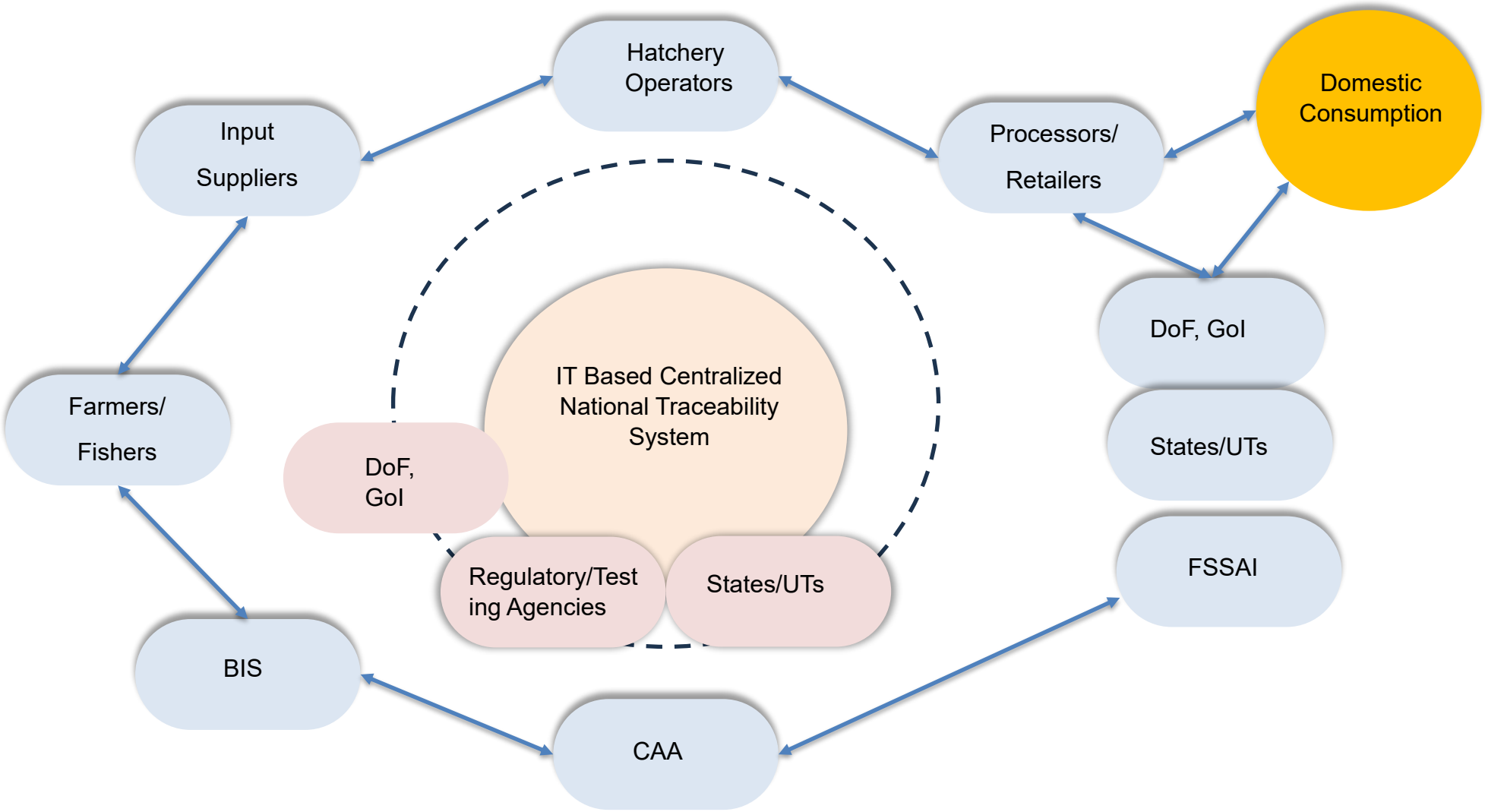
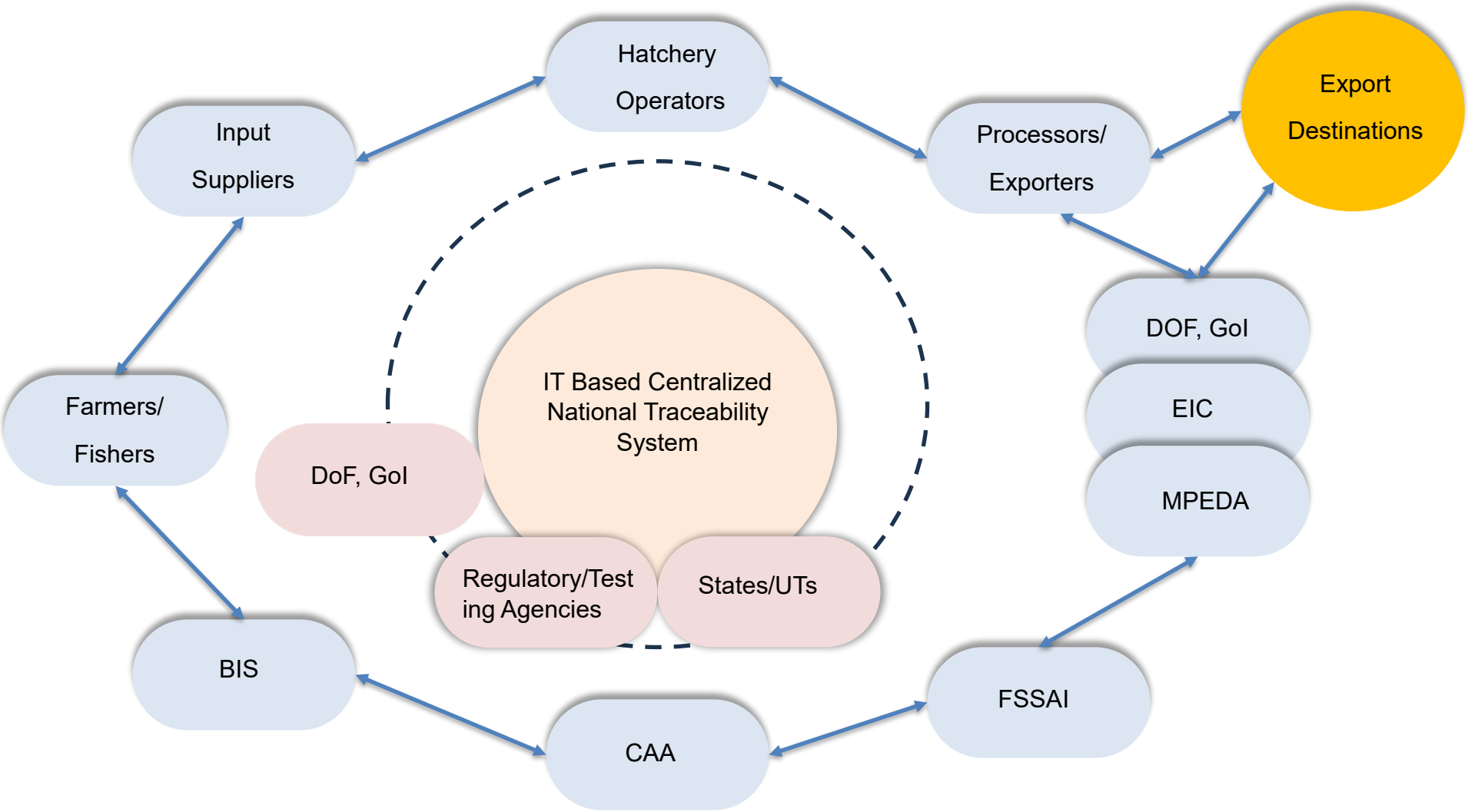


Fig.2: Complexity of Traceability for Exports from India



4. Enabling Policy Framework for Supporting Traceability

India's policy environment is increasingly supportive of traceability in fisheries and aquaculture, recognizing its role in ensuring sustainability of the resources, legal compliance, improving food safety, enhancing export competitiveness, and promoting inclusive growth. A number of national policies, regulatory frameworks, and institutional programs is either directly or indirectly contributing to the establishment of a robust traceability system. These policies offer the foundation for a digital, interoperable, and legally backed traceability framework.

4.1 PM-MKSSY and Traceability Component

The Pradhan Mantri Matsya Kisan Samridhi Saha-Yojana (PM-MKSSY) is the sub scheme under PMMSY and supported by World Bank and Agence Française de Développement (AFD), aimed at improving income opportunities and market access for fishers and fish farmers across the country.

Component 3 of the PM-MKSSY includes the development of a digital traceability system as a core intervention. It mandates the creation of a national framework for traceability and the deployment of an IT-enabled platform that can record, track, and verify fish and fishery products through all stages from input supply and production to processing and marketing.

PM-MKSSY's traceability sub-component seeks to:

a) Strengthen market linkages for producers through product differentiation and certification.
b) Enable compliance with national and international standards.
c) Promote transparency and reduce post-harvest losses through real-time monitoring.
d) Facilitate inclusive participation by tailoring digital tools for small-scale fishers and FPOs.

4.2 Food Safety and Standards Authority of India (FSSAI) Regulations

The Food Safety and Standards Act (FSSA), 2006, administered by the Food Safety and Standards Authority of India (FSSAI), provides a legal foundation for food quality, hygiene, and traceability. While the Act does not prescribe a specific traceability architecture, its regulatory provisions require food business operators to maintain records of the sourcing, processing, storage and distribution activities.

4.3 SHAPHARI Certification of Marine Products Export Development Authority (MPEDA)

SHAPHARI Certification is a quality standard developed by Marine Products Export Development Authority (MPEDA) for aquaculture products, particularly shrimp. This assures global consumers about the quality and safety of Indian shrimp with respect to absence of antibiotic residues.

4.4 Export Inspection Council (EIC)

The Export Inspection Council (EIC), under the Ministry of Commerce & Industry, is the apex body for export certification of various commodities, including marine products. EIC's operations generate critical data on product quality, sourcing, and compliance. However, these records are typically maintained at the batch or shipment level. Integration of EIC's certification systems with a national traceability platform would enable end-to-end visibility strengthening India's positioning in markets that demand catch documentation and legally verifiable sourcing.

4.5 ReALCraft

A web enabled work flow based online application system of the Department of Fisheries, Government of India for Vessel Registration Under MS Act and License Certificate under MFR Act to the fishing vessels operating along the Indian coast. With the total registration, the Security Agencies, citizens and other approved Government agencies would be able to track the status of any Registered Vessel at any point of time from anywhere, through internet or via SMS. It is a web-enabled solution under open-source technology.

4.6 Quality Council of India (QCI)

The National Accreditation Board for Testing and Calibration Laboratories (NABL) under the Quality Council of India provides accreditation of food testing laboratories through an integrated assessment scheme. There are more than 240 NABL-accredited laboratories, both government and private, involved in regulatory testing of fish and fishery products, providing crucial support for domestic and export-oriented food safety regulatory requirements.

4.7 Blockchain based Traceability Protocol of ICAR- Central Institute of Brackishwater Aquaculture

ICAR- Central Institute of Brackishwater Aquaculture (ICAR - CIBA) has developed an Internet of Things (IoT) with blockchain based traceability protocol and pilot tested for shrimp value chain. This QR code based system stores and retrieves the information at different stages of value chain. The system is open platform and amenable for customization for any other value chain.

4.8 Initiative of the Government of Andhra Pradesh on Aquaculture Traceability:

Andhra Pradesh Fisheries Department has taken up the effort on Aquaculture traceability by identifying all aquaculture ponds on Google maps and created cluster maps on Keyhole Mark-up Language Zipped (KMZ) files. Further, the identified 2,07,765 aquaculture ponds and 9,630 aqua-business units are given the 11-digit unique code. A mobile application is developed to capture the basic traceability data regarding aquaculture farmers. Based on the captured data at farm level, a separate QR code is generated to each farmer.

4.9 Data Protection Laws

With the increasing digitization of fisheries operations and the collection of producer and enterprise-level data, data privacy and security have become important considerations. The Digital Personal Data Protection (DPDP) Act, 2023, establishes a legal framework for data protection, consent, and role-based access in India. Any traceability system that collects geo-location data, farm records, personal identifiers, or trade details must be designed to comply with the DPDP Act.

5. Implementation Strategy

The Centralised National Traceability System will be implemented across the entire fisheries and aquaculture value chains, covering all production sources, post-harvest activities, and market segments. It will adopt a phased, inclusive, and technology-driven approach to ensure that both small-scale operators and large commercial enterprises can comply without disruption.

5.1 Mapping the Fisheries and Aquaculture Value Chains

The marine capture fisheries value chain begins with the harvesting of fish using mechanized, motorized, or non-motorized fishing vessels. Fish are landed at fishing harbours or fish landing centres and enter the post-harvest system. These value chains are geographically distributed across India's vast coastline, involving multiple stakeholders including fishers, auctioneers, aggregators, traders, processors, and exporters. Traceability in this chain is complicated by the diversity of species, varied fishing gears and the lack of uniform recording mechanisms.

Inland capture fisheries take place in rivers, lakes, reservoirs, lagoons, estuaries and wetlands, often dominated by small-scale fishers. These chains are more localized, with a shorter path from harvest to consumption, primarily serving domestic markets. However, they lack formal institutional structures for monitoring, grading, or data documentation, making traceability a greater challenge.

Aquaculture, including freshwater, brackishwater and mariculture systems is increasingly organized. The aquaculture value chain includes broodstock suppliers, hatcheries, input suppliers (feed producers, chemical/medicine/probiotics providers), farmers, aggregators, processors and traders. Since aquaculture operations are more controllable and often vertically integrated, they offer better scope for traceability particularly when combined with geo-tagging, farm registration, and batch-wise documentation.

The post-harvest and processing chain is a critical node across all segments. It includes handling, icing, grading, transportation, processing, cold storage, packaging, and export readiness. This stage is essential not just for value addition but also for compliance with food safety, hygiene, and quality assurance standards. Export-oriented units are generally more advanced in their documentation and certification, while units involved in domestic production vary widely in standards and systems.

5.2 Addressing Domestic and Export Market Requirements

The national traceability framework will be designed to comprehensively cover the diverse value chains that support both domestic and international markets. These chains originate from multiple sources including marine capture fisheries, inland capture fisheries, and aquaculture systems, and flow through various distribution and processing pathways that serve end consumers across geographies.

In the case of marine capture fisheries, fish are harvested using a variety of fishing vessels/crafts and gears. Fish are landed at fishing harbours or fish landing centres

and are then routed to local or international supply chains. Given the dynamic and dispersed nature of marine operations, tracking origin of catch, fishing effort, and compliance with IUU regulations is complex yet essential for export.

Inland capture fisheries, carried out in rivers, reservoirs, lakes, and wetlands, primarily cater to domestic consumption. These value chains are typically short and informal, with minimal documentation and traceability. However, their inclusion in the national traceability framework is crucial to ensure food safety, especially in States/UTs where inland fisheries are dominant.

Aquaculture, both freshwater and brackishwater, forms the backbone of India's fish and fishery products exports, particularly in shrimp production. Brackishwater aquaculture is highly concentrated in coastal States/UTs and is integrated into global supply chains. These systems offer better scope for traceability due to more controlled farming environments and registration regimes for hatcheries and farms such as CAA and MPEDA. Freshwater aquaculture, while largely catering to domestic demand, is growing in scale and organization and thus must also be integrated into the Traceability System to ensure consumer safety and enable potential market diversification including export readiness.

Across all these production sources, the post-harvest and processing segment serves as the convergence point. Traceability at this stage is critical not only for maintaining food safety and hygiene but also for fulfilling documentation requirements for export certification. Export-oriented processing units are generally more advanced in their documentation protocols, but similar rigor must be encouraged for domestic supply chains to ensure consistent quality and traceability.

The framework will address the specific needs of both domestic and export markets, integrating diverse production systems, streamlining documentation across post-harvest operations, and enabling transparent, verifiable data flows. While export markets require full compliance with global standards and real-time verification mechanisms, the domestic market demands scalable, adaptable solutions that enhance consumer confidence and support food safety objectives across India.

6. Traceability System Design

6.1 Core Concepts: Traceability, Critical Tracking Events (CTEs), Key Data Elements (KDEs)

Traceability

Within the National Traceability Framework, traceability is defined as the systematic ability to track the movement of fish and fishery products along with all relevant production, processing, and distribution data throughout the entire value chain. This encompasses two directions:

a) Backward traceability – tracing the history of a product from its point of sale or export back to its point of origin, including vessel/farm, harvest location, inputs used, processing undergone and kind of storage used.
b) Forward traceability – tracking a product from its source to its final point of distribution or consumption.

For operational purposes, traceability is data-driven and digital-first, supported by:

a) Unique product identifiers such as Unique Trade Unit Identifier (UTUI) and Unique Logistic Unit Identifier (ULUI) using digital tools like QR codes, Barcodes, RFID tags/labels, IoT sensors, blockchain ledger IDs.
b) Interoperable databases linking all stakeholders, from primary producers to exporters.
c) Real-time data capture at each CTE to prevent delays and reduce data loss.
d) Role-based access controls to ensure that each stakeholder can input and retrieve only relevant information.

Critical Tracking Events (CTEs):

CTEs are the points in the fisheries and aquaculture value chain where product movement or transformation occurs, and where traceability data must be recorded. They represent events such as fishing/farming, landing, auctioning, harvesting, processing, packaging, transportation, export, or retail sale. Each CTE serves as a checkpoint to ensure continuity of information and prevent data gaps.

In practice, defining CTEs allows the system to:

i. Identify the custodian responsible for data entry at that stage.

ii. Enable forward traceability (from source to consumer) and backward traceability (to origin in case of recalls).

iii. Strengthen compliance by ensuring that every transfer of custody in the chain is digitally linked.

Key Data Elements (KDEs):

KDEs are the essential data points that must be recorded at each CTE. They include details such as species name, catch/harvest location, date and time, vessel or farm registration, weight, processing method, cold chain temperature, packaging identifiers, and shipment information.

By standardizing KDEs across all CTEs, the framework will ensure that:

a) Data is consistent, interoperable, and verifiable across different systems.

b) National and international regulatory and certification requirements are met.

c) Information can be digitally tagged to products using Barcodes, QR codes, RFID or Blockchain entries.

The tables 1 to 5 below integrate CTEs and their corresponding KDEs for Capture Fisheries, Aquaculture, Seaweed, Ornamental and Bivalve Fisheries. These are the identified indicative KDEs for the national traceability system.

Table 1: Critical Tracking Events (CTEs) and Key Data Elements (KDEs) in Capture Fisheries Supply Chain

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
1	**Fishing**	Fishing Vessel/Craft operator/ Fisher	Fishing ground details (location via GPS), fishing vessel/craft & owner details, fishing gear, operation duration, hauls, fish holds/ice holds, catch details (species, weight, date & time of catch), certifications.
2	**On-board Processing**	Vessel/Craft operator	Mothership registration, processing plant details, raw material receipt, fish processed, processing method, product types, temperature logs, storage/freezer facilities, packing details, quality systems, certifications.
3	**Landing**	Auctioneer/ Aggregator	Landing centre details (name, GPS, port state), landing time, species/weight, icing, ice/cold storage availability, potable water facilities.
4	**Auctioning**	Auctioneer	Auction hall details (size, type, flooring), auctioneers, condition (iced/uniced), auction method, species/weight auctioned, details on to whom auctioned, auction duration, hall temperature, potable water and drainage facilities.

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
5	**Transportation**	Transporter/ Cold chain operator/Aggregator	Transporter details, carrier type/capacity, insulation/ refrigeration, temperature at packing/transit/ destination, species/weight transported (including details on origin of raw material).
6	**Marketing**	Distributor/ Wholesaler	Market details (location, size, stalls), buyers/sellers' details, temperature, stall type, fish sold (species/weight), icing/hygiene, cutting & cleaning, storage/ice availability, potable water, drainage, Data on e-Commerce (name of platform, quantity sold, buyer details)
7	**Pre-Processing/ Processing**	Processor	Plant details (location, approval, capacity, processor credentials), raw material receipt, fish processed, products developed, temperature monitoring, storage/freezers, packaging, QC lab approval, food safety data.
8	**Inter State Trading/ Exporting**	Trader/Exporter	Exporter Credentials [Registration No., Import-Export Code (IEC)], Mode of export, shipping liner details, loading/unloading time/location, container specifications, consignment details, fish exported (species/weight), product condition (live/processed), temperature logs. Certification of product/species authenticity, Details of Indian Trade Classification-Harmonized System Code (ITC-HSC)
9	**Retailing**	Retailer/ E-commerce vendor	Retailer/shop details, product temperature at sale, product condition (live/fresh/chilled/ready-to-cook/ready-to-eat), e-commerce details.

Table 2: Critical Tracking Events (CTEs) and Key Data Elements (KDEs) in the Aquaculture Supply Chain

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
1.	**Broodstock Facility**	Brood Bank/Broodstock Multiplication Centre (BMC)/Nulceus Breeding Centre (NBC) operator	Unique ID of fish and fishery produce, National Fisheries Digital Platform (NFDP) Registration Number, Broodstock facility details (Name, Address, Species, Genetic selection, Date of receipt); CAA approval; Quantity & size of broods; Import and Quarantine details (if imported); Health certificate [World Organization for Animal Health (WOAH) diseases], Source, Feeding regime, Specific Pathogen-Free (SPF) status
2.	**Hatchery/ Nursery**	Hatchery/Nursery operator	Unique ID of fish and fishery produce, NFDP Registration Number, Broodstock supplier details (Name, Address, Species, Date of receipt); CAA approval; MPEDA enrolment number, Quantity & size of broods; Import and Quarantine details (if imported); Health certificate (WOAH diseases); Hatchery details (Name, Address, Location, Capacity, License No.); Seed production details (Species, Quantity, Date, Survival %); Hatchery units; Feed details (name, date of receipt & usage, schedule); Details of live feeds used; Details of Inputs used (name, dosage, frequency); Nursery ponds (number, size, capacity).
3.	**Grow-out System**	Farmer/Farm owner	Unique ID of fish and fishery produce, NFDP Registration Number, Farm details (Name, Address, Location, License/CAA Reg. No./MPEDA enrolment number); Owner details (Name, Contact, Email); Farm size & capacity; Ponds (Type, No., Size, Location); Species farmed; Stocking density; Seed size/weight, Date of stocking, Quantity; Feed details; details of inputs (suppliers, dosage); Feeding schedule; culture duration; Certifications;

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
			Food safety testing data; Water quality parameters.
4.	**Production of feed & other aquaculture inputs**	Feed manufacturer /feed supplier/input supplier/distributor	Feed manufacturer details (Name, NFDP Registration Number, Address, Location, Owner, Capacity, License/Reg. No.); Feed name, species targeted; Ingredients; Date of production & expiry; Quantity, Batch No.; Supplier & buyer details; Selling date; use of approved aquaculture inputs, Certifications. Input quality data.
5.	**Harvesting**	Farmer/ Farm owner /Aggregator	Unique ID of aquaculture produce/product (Mixing of raw material/product from multiple farms, if any), Harvesting Date, Unique Trade Unit Identifier Quantity; Method & Gear used; Duration; Species harvested; Partial/Full harvesting; Ice used.
6.	**Aggregation/Trading at Farm Gate**	Aggregator/Trader	Unique ID of fish and fishery produce/product (Mixing of raw material/product from multiple farms, if any), Trade Date, Details of Aggregator/Traders, Species & Quantity Aggregated, Ice used; Details of next custodian, Grade Wise Quantity.
7.	**Transportation**	Transporter/ Cold chain operator/Aggregator	Unique ID of fish and fishery produce/product (Mixing of raw material/product from multiple farms, if any), Transporter details (Name, No.); Type (Truck/Container); Carrier details (Size, Capacity, Refrigerated/Insulated); Condition (Open/Closed, Iced/Uniced/Live); Temperature at packing, transit, destination (temperature data logger); Species transported (Type, Grade, Weight);
8.	**Marketing**	Distributor/Wholesaler	Unique ID of fish and fishery produce/product (Mixing of raw material/product from multiple farms, if any), Market details (Name, Address, GPS, Size); No. of shops/stalls; Seller

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
			details (Men/Women); Temperature; Stall type (Ground/Platform); Species sold (Name, Type, Weight); Conditions (Iced/Uniced/Live, Hygiene parameters) Facilities (Cutting/Cleaning, Ice, Cold store, Potable water, Drainage); Ice plant (No. & Capacity), Data on e-Commerce (name of platform, quantity sold, buyer details).
9.	**Processing (direct from farms)**	Processor	Unique ID of fish and fishery produce/product (Mixing of raw material/product from multiple farms, if any), Processing plant details (Name, Address, GPS, Approval No., Capacity); Processor credentials; Time of receipt of raw material; Species processed (Type, Grade, Weight); Product type; Temperature (receipt, in-process, storage, dispatch and transit); Equipment details (Freezers, Cold stores, Chill stores, Ice plants, Sterilizers, Boilers, Packaging machines with No. & Capacity); Packaging (Bulk/Consumer, Date/Time); Laboratory approval; Water availability; Waste management; Packaging-to-transport timing; Certifications; Safety/Quality Data.
10.	**Exporting**	Exporter	Unique ID of fish and fishery produce/product (Mixing of raw material/product from multiple farms, if any), Exporter Credentials (Registration no., IE code) Export mode (Air/Ship; Live/Processed); Shipping liner details (Name, Size, Country of loading/unloading, Date & Time); Transport duration; Container details (Size, Temperature); Air consignment details (Airline, Place of Embarkation/ Disembarkation); Species exported (Type, Grade, Weight); Category (Live, Ready-to-cook, Ready-to-eat);

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
			Temperature (Loading, In-transit, Unloading); Certification on product authenticity. Details of ITC-HSC.
11.	**Retailing**	Retailer/ E-commerce vendor	Unique ID of fish and fishery produce/product (Mixing of raw material/product from multiple farms, if any), Retail seller details (Name, Address); Temperature on product retail sales to consumers; product category on retail sales (Live/ ready-to-cook; ready-to-eat). Data on e-Commerce (name of platform, quantity sold, buyer details) in selling fish and fishery product to consumers.

Table 3: Critical Tracking Events (CTEs) and Key Data Elements (KDEs) in the Seaweed Supply Chain

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
1	**Seed Multiplication**	Seed multiplication unit operator	Data on Seed multiplication (Name and address of units with GPS location and production capacity with licence/ registration number of multiplication unit); Data on import of seedlings (Name and address of the importers with details on importation including method, date and time of import, and seaweed species and quantity of import); Name(s) & Source(s) of seaweed species used for seed multiplication (plantlets/ propagules); Method adopted for seedlings production (vegetative propagation/micro-propagation/sporulation); Quantity/ volume of plantlets/ propagules/ seedlings produced with date(s); No. of units in the multiplication complex with capacity of each unit; Survival percentage of seedlings; Name(s) and

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
			address(es) of supplier(s) of seedlings/ plantlets/ propagules; Source of energy for multiplication/ processing (renewable/non-renewable).
2	**Farming/ Harvesting**	Farmer/ Farm owner	Data on farming of seaweed (Name(s) of the seaweed species farmed with quantity of each seaweed species biomass obtained and the date(s) of collection after growth; and address with GPS location of farming areas (on-shore/near-shore/open-sea) and licence, if any); No. of rafts/ lines/ nets in the farming area(s) with size/ production capacity; Data on name and supplier(s) of plantlets to farm(s); Species and quantity of seaweed plantlets obtained by farms for growing; Data on harvesting of wild seaweed (Name(s) of the seaweed species harvested with quantity of each seaweed species biomass harvested along with the date(s) of harvesting; address with GPS location of the harvesting areas); Data on pre-processing of seaweed (Date(s) and duration of cleaning/ drying (solar/mechanical) done on the collected/ harvested seaweed biomass); Data on water quality of farming/harvesting area(s); Name and nature of certifications.
3	**Procurement**	Procurement agent//Aggregator	Data on procurement of species of seaweed biomass from the farming/ harvesting areas (Date(s) and time(s) of procurement of the seaweed biomass; Name(s) of the procurement agency(ies) with address(es) and authorized person(s) involved in the supply of the same to the processors); Details on re-drying of seaweed biomass done, if any (Date(s), and duration of drying with

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
			natural/ artificial process, before supply to the processors).
4	**Processing**	Processor	Data on processing (Name & Address, GPS Location, Approval No., Size/ Capacity of processing plant; Name(s) of the processor(s) with registered credentials); Date(s) and Time(s) of receipt of seaweed biomass for processing; Seaweed biomass processed (Species, Types, Grades, Weight); Type(s) of products developed (Name(s) and quantity of products (agar, alginates, carrageenan, bio-stimulants, nutraceuticals, cosmeceuticals, organic fertilizers) prepared/ produced from seaweed biomass; Data on methods used for extracting components from seaweed biomass (enzymatic extraction/ultra-sound assisted extraction/microwave assisted extraction/solid-liquid extraction/solvent extraction); Date(s) of production and date of sale(s); Temperature of seaweed biomass on receipt, in-process at various stages of processing, and on sales/ export; Packaging Machines (Nos., Types and Capacity); Type and Size of packing (Bulk/ Consumer); Date and Time of packing of products; Details of Quality Control Laboratory; Potable water ; Waste Management system; Time spent on packaging products for loading onto the Transport Containers/ Trucks for further loading onto ship/ air for export; Temperature during the transit from processing factory to ship/ air for loading for export; Importer details, to receive the identified processed products; Name and nature of the certifications.

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
5	**Transportation**	Transporter/Cold chain operator//Aggregator	Data on transporters (Numbers & Names); Type of transport (Trucks/ Containers); Transport carrier (Size, Capacity, Insulated/ uninsulated, Refrigerated/ unrefrigerated); Transport condition (Open/ closed, Whole/ shared containers); Temperature of transport carrier on packing/ transit/ destination; Seaweed biomass, and their products transported (Species, Type, Grade, Weight); GPS location of transport trucks for online monitoring.
6	**Exporting**	Exporter	Exporter Credentials (Registration no., IE code) , Data on export (Mode of export- Air/ Ship; Fresh/ products); Name & Size of Shipping Liner; Country of loading/ unloading; Date & Time of Loading and unloading (ship/ air); Duration of transport (ship/ air); Size & Temperature of transport containers; Details of air consignment (Name of Air Carrier, Country/ Place of Embankment/ Dis-embankment), Seaweed products exported (Species, Types, Grades and Weight); Temperature on loading/ in-transit/ unloading; Details of ITC-HSC for seaweeds and their products, Authenticity certification.
7	**Domestic Market**	Distributor/Wholesaler	Data on marketing of seaweed biomass/ products (Name(s) & Address(es) of the marketers/ sellers involved in the sales of seaweed products); Name and Type of Certifications, if any. Data on e-Commerce (name of platform, quantity sold, buyer details) in selling seaweed products to consumers.

Table 4: Critical Tracking Events (CTEs) and Key Data Elements (KDEs) in the Ornamental Fisheries Supply Chain

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
1	**Breeding / Hatchery**	Broodbank operator / Hatchery operator	Data on Brooders (Imported/ Wild collected; Name and address of supplier of brooder(s); Species of the brooder and Date of receipt of brooder in the hatchery); Number and size of brooders, Details of quarantine done for brooder, if imported; Health Certificate of brooder(s) with respect to WOAH reported aquatic animal diseases; Data on Hatchery (Name and address of hatchery unit with GPS location and production capacity with licence/ registration number of hatchery, if any); Name(s) of fish species used for seed production; Quantity/ numbers of seeds produced with date(s); No. of tanks used in the hatchery unit with capacity of each tank; Survival percentage of seeds; Name of the feed(s) for the hatchery of the identified ornamental fish species; Details of live feeds used; Date of receipt of feed(s); Period and duration of feed usage; Feeding schedule/ pattern of feeding in the hatchery/ nursery; Name(s), dosage and frequency of usage of input(s, if used; Name(s) and dosage/ quantity of probiotics and/or prebiotics used, if any, in the hatchery/ nursery; Number of nursery ponds with size and capacity.
2	**Feed Production**	Feed manufacturer/ feed supplier/input supplier/distributor	Data on feed (Name and address of feed manufacturing company(ies)/ mills with GPS location and owner details; production capacity and licence/ registration number of feed mill); Name of the feed(s) for the identified aquatic animal species under culture; Details of feed(s) ingredients; Date of production;

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
			Date of expiry; Quantity of feed produced, Batch No(s); Name and address of feed supplier(s); Feed selling date; Name and address of feed buyer(s); Name(s) of supplier(s) and potency/ dosage of approved antibiotics, if used; Name(s) of supplier(s) and dosage of approved hormone(s), if used; Name(s) of supplier(s) and quantity of approved chemical(s), if used in the feed production; Name and nature of certifications.
3	**Farming (Freshwater / Marine)**	Farmer/ Farm owner	Data on farm (Name and address of farm(s) with GPS location and licence/ registration number); Size/ production capacity of the farm; No. of ponds/ tanks/cages in the farm with size; Species of freshwater/ marine fish farmed; Details of imported species, quantity for farming; Import Health certificate, Quarantine details Stocking density; Size/ weight of seed at stocking in the grow-out pond; Date of stocking; Total stocking done; Details of feed(s) with ingredients used in the farm; Details of other inputs used, if any during the farming period including their suppliers; Feeding schedule/ pattern of feeding in the farm; Details on certifications.
4	**Ornamental Fish Farming Aids / Accessories**	Manufacturer/ Distributor	Data on ornamental fish farming aids/ accessories (Details on manufacturers, types and capacity of fish tanks, aerators, air compressors, temperature sensors, DO monitors, water quality testing kits, etc.).
5	**Export / Wholesale**	Exporter / Wholesaler	Exporter Credentials (Registration no., IE Code), Data on harvesting (Date of harvesting, Method of harvesting; partial harvesting/ full harvesting); Quantity and species of ornamental fish harvested from the pond/tank/cage(s); Data on

S. No.	CTEs	Stakeholder/ Custodian	Indicative KDEs
			transporters (Numbers & Names); Type of transport (Trucks/ Containers); Transport carrier (Size, Capacity, Aerated / Non-aerated); Details of packaging; Farmed fish transported (Species, Type, Quantity); Data on export (Name and address of the Exporters; Details of air consignment (Name of Air Carrier, Country/ Place of Embankment/ Dis-embankment; Date & Time of loading/ unloading; Duration of transport); Size of transport containers; Ornamental fish exported (Species, Type, Quantity); Details of ITC-HSC. Data on wholesale markets (Name & Address, GPS Location, Size); No. of shops/ stalls in the market; No. of persons (Men & Women) involved in the sale of ornamental fish in the market; Ornamental fish sold in the market (Name(s) of Species, Types, Quantity); Aeration and packaging facilities; Potable water; Drainage facilities;, Data on e-Commerce (name of platform, quantity sold, buyer details); Health certificate; pre – quarantine and quarantine details; Importer details.
6	**Retailing**	Retailer/E-commerce vendor	Data on retail sales for consumers (Name and address of retail sellers/ shops); Aeration and packaging facilities; Potable water; Data on e-Commerce in the sale of ornamental fish to consumers.

Table 5: Critical Tracking Events (CTEs) and Key Data Elements (KDEs) in the Bivalve Fisheries Supply Chain

S. No.	CTEs	Stakeholder /Custodian	Indicative KDEs
1	**Hatchery**	Hatchery Operator	Data on Bivalve hatchery (Name and address of hatchery units with GPS location and production capacity with licence/ registration number of hatchery); Name(s) of bivalve species used for seed production (spats); Quantity/ volume of seeds produced with date(s); Details of live feeds used; No. of hatchery units in the hatchery complex with capacity of each unit; Survival percentage of seeds; Name(s) and address(es) of supplier(s) of seeds.
2	**Farming / Harvesting**	Farmer/ Farm owner	Data on farming of Bivalves (Name(s) of the bivalve species farmed with quantity of each bivalve species biomass obtained and the date(s) of collection after growth; and address with GPS location of farming areas; and licence, if any); No. of ropes/ rafts/ racks in the farming area(s) with size/ production capacity; Data on harvesting of wild bivalves (Name(s) and quantity of each bivalve species harvested along with the date(s) of harvesting; address with GPS location of the harvesting areas); Data on harvesting ground (Name, Location-Latitude & Longitude using GPS); fishing boat (Name, Size/ Length, Engine capacity, Registration No., Owner Name, Authorized person (Captain/ Bosun/ Driver) in the boat, fishing gear used (Type, Size/ Length, Mesh Size); Date(s), Duration/ length of harvesting operation (Each & Total); Containers/ baskets (Nos., Size) taken on-board; Name and nature of certifications; Catch Certificate/ IUU Certification.

S. No.	CTEs	Stakeholder /Custodian	Indicative KDEs
3	**Procurement**	Procurement agent/Aggregator	Data on procurement of species of bivalve from the farming/ harvesting areas (Date(s) and time(s) of procurement of each bivalve species; Name(s) of the procurement agency(ies) with address(es) and authorized person(s) involved in the supply of the same to the processors).
4	**Depuration**	Depuration unit operator	Data on depuration of bivalves (Date, time and duration of depuration done on the harvested/ farmed bivalves); Temperature at which the depuration process carried out.
5	**Shucking**	Shucking unit operator	Data on shucking of meat from bivalves (Date, time and duration of shucking of bivalve meat); Method of shucking; Temperature of shucking.
6	**Transportation**	Transporter/ Cold chain operator/Aggregator	Data on transporters (Numbers & Names); Type of transport (Type of vehicle); Transport carrier (Size, Capacity, Insulated, Iced/ uniced, Refrigerated/ unrefrigerated); Transport condition (Open/ closed, Whole/ shared containers); Temperature of transport carrier on packing/ transit/ destination; Bivalves transported (Name(s) of Species, Types, Weight).
7	**Processing**	Processor	Data on processing (Name & Address, GPS Location, Approval No., Size/ Capacity of processing plant; Name of the processor with registered credentials); Date & Time of receipt of raw material for processing; Bivalves processed (Name(s) of Species, Types, Weight); Type of products developed; Temperature on receipt, in-process at various stages of processing, and on sales/ export; Freezers (Nos., Types and Capacity); Frozen/ Cold Stores (Nos. and Capacity); Ice plants (Nos. and Capacity); Chill Stores (Nos. and Capacity); Sterilizers (Nos. and Capacity); Boilers (Nos. and Capacity);

S. No.	CTEs	Stakeholder /Custodian	Indicative KDEs
			Packaging Machines (Nos., Types and Capacity); Type and Size of packing (Bulk/ Consumer); Date and Time of packing of products; Quality Control Laboratory; Potable water; Waste Management system; Time spent on packaging products for loading onto the Transport Containers/ Trucks for further loading onto ship/ air for export; Temperature during the transit from processing factory to ship/ air for loading for export; importer details for processed products; Name and nature of the certifications; Certification of authenticity.
8	**Export / Market**	Exporter / Wholesaler	Exporter Credentials (Registration no., IE Code), Data on export (Mode of export- Air/ Ship; Live/ products, Name of the End Market State); Name & Size of Shipping Liner; Country of loading/ unloading; Date & Time of Loading and unloading (ship/ air); Duration of transport (ship/ air); Size & Temperature of transport containers; Details of air consignment (Name of Air Carrier, Country/ Place of Embankment/ Dis-embankment), Bivalve meat exported (Species and Weight); Product category for export (Ready-to-cook; Ready-to-eat); Temperature on loading/ in-transit/ unloading; Details of ITC-HSC; Data on marketer (Name(s) & Address(es) of the sellers (GPS Location, Size, No. of persons, Gender; Temperature of product; Type of stalls (On ground/ raised platform); No. of shops/ stalls in the market; Bivalve & their products sold in the market (Name(s) of Species, Types, Weight); Condition of marketing ; Ice plants (Nos. & Capacity) in/ near the market; Cold store (Nos. & Capacity) in/ near the market; Potable water; Drainage facilities.; Name and Type of Certifications, if any, Data on

S. No.	CTEs	Stakeholder /Custodian	Indicative KDEs
			e-Commerce (name of platform, quantity sold, buyer details)

6.2 Data Flow in Traceability System

The data in the traceability system flows systematically across the fisheries and aquaculture value chain, ensuring that every product can be tracked from its origin (seed/fishing vessel) to the final consumer (domestic or international, or traced vice-versa). The framework mandates that at each Critical Tracking Event (CTE), the relevant Key Data Elements (KDEs) are digitally captured, time-stamped, and linked to the product's unique identifier.

The operational flow structure will be as under:

a) **Origin Registration (Source Authentication)**

i. Capture Fisheries: Fishing craft registration, fishing area, and gear specifications are recorded before departure. Each fishing trip generates a trip ID linked to catch certificates.

ii. Aquaculture: Farms, hatcheries, and feed suppliers are registered and geo-tagged, and each production cycle is assigned a batch number.

b) **Harvest and Primary Collection**

i. Catch data (species, weight, location, date & time) or harvest data (pond ID, batch no., harvest date & time) is captured at the point of catching/harvesting.

ii. QR code/Barcode/RFID tags/labels/IoT sensors/Unique identifiers are affixed at the batch or container level.

c) **Landing and First Point of Sale**

i. Fish captured are recorded on landing at fishing harbours/fish landing centres, while aquaculture harvests are logged at farm gates or collection points.

ii. At this point, products are linked to chain-of-custody documentation (auction records, transport slips, e-auction logs).

d) **Post-Harvest Handling and Processing**

During handling, icing, grading, processing, and storage, each lot retains its unique identifier. The mixed lot, if any, shall also be digitally captured. KDEs such as processing method, facility ID, HACCP/GMP compliance, and storage temperatures are added.

e) **Packaging, Storage, and Distribution**

i. Packaged products are labelled with QR codes embedding batch history.

ii. Cold chain monitoring devices capture and log temperature records automatically.

f) **Domestic and Export Market Channels**

i. For domestic markets, retail outlets and wholesale markets shall capture retail-level KDEs (product condition, hygiene, seller ID), which could be retrieved by the concerned regulatory agencies as and when required.

ii. For exports, data flows to MPEDA's SHAPHARI, Export Inspection Council, and customs systems ensuring alignment with importers' regulations.

g) **Consumer-Level Access**

i. End consumers (domestic and international) can scan the QR code/label to view the verified origin, handling, and certification details of the product.

6.3 Product and Process Identification Mechanisms

A robust traceability system requires **clear and standardized identification mechanisms** that uniquely link each fishery or aquaculture product to its production and processing history. These identifiers serve as the **anchor** for capturing, storing, and transferring data across the value chain, ensuring that every unit of product can be reliably traced from its source to the consumer and tracked vice-versa.

The framework establishes the following actionable mechanisms:

A. Unique Product Identification

i. Each product lot or batch (whether harvested fish, aquaculture produce, or processed product) will be assigned a Unique Identifier (UID) by the system at the first point of capture or harvest. However, traceability will follow Unique Trade Unit Identifier (UTUI) and Unique Logistic Unit Identifier (ULUI)**.**

ii. UTUI is the smallest unit, which guarantees the integrity of the unit as it moves from one link of the chain to the next. This unit is kept whole and undivided with no change in content or label/identification. This will be linked to Critical Tracking Events (CTEs) and Key Data Elements (KDEs), ensuring that every subsequent action landing, processing, packaging, or export etc., adds verifiable data to the same identifier.

iii. If multiple trade units having different UTUIs are transported together, a separate Unique Logistic Unit Identifier (ULUI) will be assigned. The ULUI is any

composition that is established for transport and/or storage and needs to be identified and managed through the supply chain.

iv. Mechanisms: Barcodes, QR codes, or RFID tags/labels or IoT sensors affixed to crates, boxes, or packages. For live consignments, UID can be linked to batch-level certificates or e-tags.

B. Fishing Vessel/Craft and Farm Identification

i. All fishing vessels/crafts, aquaculture farms, hatcheries, and feed suppliers must be registered and geo-tagged.

ii. Vessel/Craft Registration Numbers (as per DG Shipping/State Fisheries Departments) and Farm IDs (as per CAA/MPEDA/State systems) will form the primary source identifiers in the system.

C. Post-Harvest Process Identification

I. Every pre - processing/processing facility, cold storage, and packaging unit will be mapped with a Facility ID.

II. Each processing event (e.g., filleting, freezing, value addition) is logged against the Facility ID, recording time, method, and compliance standards (HACCP, GMP, SSOP).

D. Custody Transfer Identification

I. Each custody transfer (e.g., from fisher/farmer to auctioneer, from auctioneer to processor, from processor to exporter) will generate a digital transfer log.

II. These logs capture buyer/seller IDs, transaction date and time, and product UID, ensuring transparent movement of products along the chain.

III. Mechanisms: Mobile-based app for small-scale operators, API integration for large processors and exporters.

E. Integration with Certification and Compliance Systems

I. Export-oriented consignments shall integrate product UIDs with catch certificates (for capture fisheries), CAA, SHAPHARI certifications (for aquaculture), and EIC/Customs clearances.

II. Domestic consignments shall link to local food safety compliance records.

F. Consumer-Facing Transparency

Each retail-ready pack (domestic or export) will carry a QR code/ Barcode providing access to:

i. Species identity and harvest source

ii. Harvest/fishing date and location

iii. Processing facility and method

iv. Certifications

6.4 Resource Mobilization and Funding Mechanisms

The successful design and rollout of a national traceability system requires sustained resource mobilization and appropriate financing strategies. The framework will ensure that infrastructure creation, technology deployment, capacity building, and operational maintenance/upgradation are adequately supported without placing disproportionate burden on small-scale fishers and farmers.

The funds for the development of the Traceability System will be met out from the Central sector sub scheme “Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY)”. The cost for sustainability, improvement, operation and maintenance will be met from the Phase-II of PMMSY or any other schemes of DoF, GoI. Wherever possible, suitable convergence with the schemes of other involved Ministries shall be undertaken for sustainability of the developed digital traceability system. Minimal fees on high-value export consignments can be reinvested to sustain digital platforms and traceability audits. Seafood Exporters Association of India, Prawn Farmers Federation of India or any similar associations or institutions shall be made a party to manage the traceability system financially as a self-sustaining system.

7. Traceability Framework Architecture

7.1 Guiding Principles

The design of the traceability architecture will be guided by foundational principles that will ensure inclusivity, adaptability, and long-term sustainability.

a) **Inclusivity:** The framework will be inclusive of all stakeholders, including small-scale fishers, farmers, women, tribal and coastal communities, private sector stakeholders, and civil society. Accessibility will be ensured through user-friendly, mobile-compatible systems tailored for users with low digital literacy and diverse regional needs.
b) **Transparency and Accountability:** Traceability will provide real-time visibility of product movement, supported by accurate, tamper-proof records and transparency labels for consumer confidence. Accountability mechanisms, including clear roles, audit systems, and escalation protocols, will ensure integrity and compliance.
c) **Interoperability:** The system will adopt open standards, APIs, and harmonized data models to integrate with existing IT platforms and value chains. Cross-border compatibility will align India's traceability with international import and compliance requirements.
d) **Scalability and Flexibility:** The framework will be designed for phased expansion in geography, species, and data depth. Flexibility will allow for adaptation to regional needs, new technologies, and evolving policy or compliance norms.
e) **Cost-Effectiveness and Sustainability:** Affordable digital solutions, use of existing infrastructure, and public-private partnerships will ensure cost-effectiveness. Sustainability will be promoted through phased investments, open-source tools, and institutional capacity-building.
f) **Data Security and Privacy:** High standards of cybersecurity, including encryption, secure logins, and role-based access, will safeguard sensitive data. Consent-based sharing and compliance with national and global data ethics will build trust among stakeholders.
g) **Standardization and Harmonization:** The system will follow national and international standards, ensuring alignment with national regulations and international trade requirements. This will create uniformity and facilitate integration with national and international certification systems.
h) **Evidence-Based Decision-Making:** Real-time data and analytics will guide monitoring, policy interventions, and risk management, including product recalls. Data-driven governance will improve efficiency and service delivery in the fisheries sector.
i) **Collaboration and Stakeholder Engagement:** Multi-stakeholder collaboration will be central, involving national and state departments, industry bodies, farmer organizations, NGOs, and research institutions. Continuous engagement will ensure the framework remains practical, inclusive, and widely accepted.
j) **Continuous Learning and Innovation:** The system will adopt a culture of innovation, integrating global best practices and emerging technologies such as AI, blockchain, and remote sensing. A feedback-driven and adaptive approach will ensure long-term relevance and resilience.

7.2 Development of IT-Based Traceability System

The development of an IT-based Traceability system, as given in Fig. 3, is a core pillar of the National Framework on Traceability in Fisheries and Aquaculture. The central objective is to create a centralized, secure, and interoperable digital system that enables real-time, end-to-end traceability of fish and fishery products right from hatchery, farm, or vessel to the consumer. This system will support both domestic food safety goals and global trade requirements, ensuring that India's fisheries sector remains competitive, compliant, and sustainable.

The centralised IT-Based Traceability System will be developed on National Fisheries Digital Platform (NFDP) and designed as a modular, scalable solution that covers the full value chain from pre-production activities like hatchery and feed supply to harvesting, post-harvest processes such as processing, distribution, retail, and export. The system will support the onboarding of State/UT-specific value chain, through standardized protocols. This enables customization at the state level while maintaining national-level consistency and data consolidation.

To ensure transparency and trust in the data, the system will leverage emerging technologies such as Blockchain to maintain immutable records of traceability, Artificial Intelligence (AI) for risk flagging and trend analysis, and Internet of Things (IoT) devices for real-time tracking of key environmental parameters like location. GPS-enabled tracking and time-stamping will further support audit trails and quick verification across the value chain. These innovations will help detect anomalies, reduce anomalies, and enable targeted interventions by regulatory bodies.

A major feature of the system will be its ability to capture real-time data at every stage of the value chain, using a set of predefined Critical Tracking Events (CTEs) and Key Data Elements (KDEs). These will include details such as species, batch number, method of harvest, processing parameters, logistics information, and hygiene scores etc. The data architecture will follow open APIs and standardized formats, ensuring that various public and private digital systems can interact seamlessly. Interoperability with exporters, processors, logistics operators, and certification bodies will be a key requirement.

The backend will be hosted on a cloud-based infrastructure, offering centralized dashboards and tools for monitoring, analysis, and alerts. These dashboards will be accessible to different stakeholders including fishers, farmers, processors, exporters, and government departments based on role-based access control to ensure data privacy and security. The cloud design will support high availability, scalability, and real-time performance monitoring.

The implementation of this system involves institutional collaboration at multiple levels. States and Union Territories will play a vital role by preparing customized proposals based on their value chain requirements and will oversee local implementation through their respective fisheries departments. They will also ensure that local data collection systems are linked to the national traceability platform. To support this, collaboration with technical partners such as EIC, MeitY, ICAR, MPEDA,

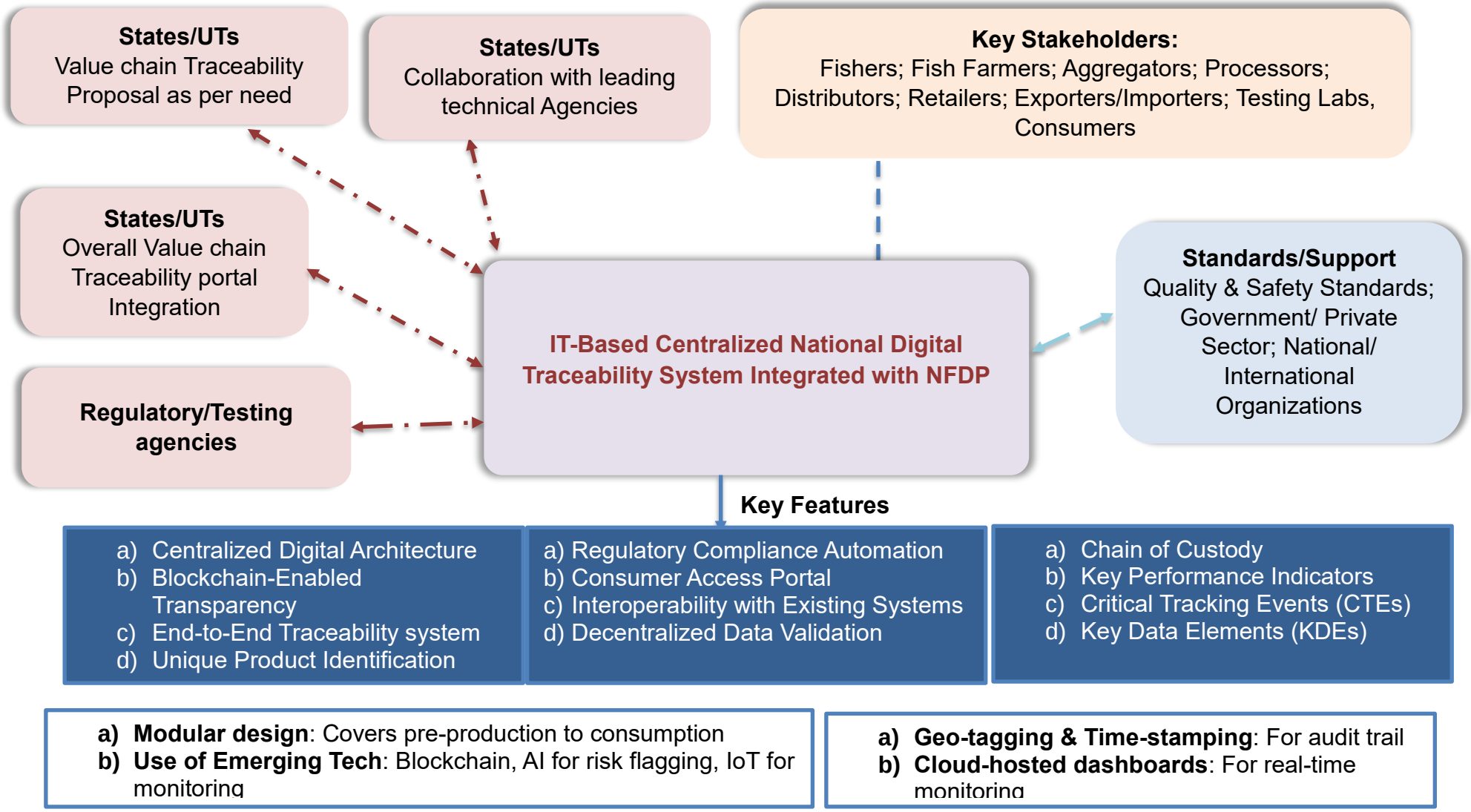
NFDB, FSSAI, BIS, and CAA will be institutionalized to provide technical support, validation, and sectoral expertise.

A key enabler of this system will be capacity building. Comprehensive training programs will be conducted for fishers, farmers, auctioneers, processors, and government functionaries to ensure digital literacy and promote effective use of the platform. Alongside this, public awareness campaigns will highlight the importance and benefits of traceability, helping drive adoption and compliance.

The governance of the system will be anchored in a robust regulatory and oversight mechanism. This includes role-based access protocols, encrypted data storage, and detailed audit logs. Designed with future-readiness in mind, the IT system will be scalable and adaptable to accommodate additional features such as eco-labelling, sustainability metrics, carbon footprint tracking, and certification schemes. It will also be compatible with global fisheries value chains, enabling integration with international import systems. Features like digital certificates, e-documents, and automated compliance tracking will facilitate ease of trade and reduce transaction costs.

The IT-based traceability system will deliver multiple benefits across the value chain. It will enhance transparency, improve food safety, enable global market access, empower farmers and fishers through digital inclusion, and strengthen sustainability and regulatory compliance. It represents a transformative step in modernizing India's fisheries and aquaculture sector in alignment with national priorities and global best practices.

Fig.3: Development of IT-based Traceability System



7.3 Digital Technology

The use of advanced digital technologies will further enhance the robustness of the framework.

Blockchain technology offers an immutable ledger for recording data across value chains. Each transaction, from harvesting to export, will be time-stamped and tamper-proof, providing international buyers with the highest level of confidence in product authenticity.

Internet of Things (IoT) devices and sensors will be deployed in aquaculture farms, processing plants, and cold storage facilities to automatically record parameters such as water quality, temperature, and storage conditions. This minimizes human error and enhances credibility.

Satellite Map GIS technology for precise identification of all Aquaculture ponds and Aqua business units of stakeholders and to track the movements of the supply chain on GIS maps.

QR codes and barcodes will be embedded on packaging, enabling consumers and retailers to scan and instantly access information about product origin, harvest date, and supply chain journey. Such consumer-facing traceability is becoming an international norm and will enhance the marketability of Indian fish and seafood products.

GPS and AIS (Automatic Identification Systems) will be crucial for vessel monitoring, ensuring that fish catches originate from legally designated zones and are not associated with illegal, unreported, and unregulated (IUU) fishing practices. This will align India with global sustainable fisheries initiatives.

Finally, the system will be hosted on a secure cloud infrastructure, ensuring scalability, cost-efficiency, and resilience against data loss. The cloud-based approach enables multiple stakeholders to access and update data in real time while maintaining strict role-based access controls.

7.4 Interoperability and Data Standards

For the traceability system to function effectively, interoperability and data standardization are paramount. The framework will adopt internationally recognized standards and guidelines for food traceability. By aligning with global benchmarks, Indian exports will be seamlessly accepted in international markets.

Open APIs will be built into the system, allowing possible integration of a centralised national traceability system with other existing government platforms. This prevents duplication and ensures that stakeholders need to enter data only once, which is then shared across relevant agencies.

Uniform data standards such as FAO species codes, FAO fishing area codes, farm identifiers, and catch method classification will be established to avoid ambiguity and ensure consistency of data across regions and markets.

7.5 Users of Digital Traceability System

The effectiveness of the Centralised National Traceability System in Fisheries and Aquaculture will depend on the coordinated participation of multiple stakeholders.

Shared responsibilities of all the stakeholders involved in the Traceability System

Users are collectively responsible for several key areas within the system. Regarding data accuracy, all information including data on catch, culture, inputs, processing, logistics, and distribution must be accurate, timely, and verified. For digital literacy, users are expected to participate in digital literacy programs and adopt user-friendly traceability tools. Compliance and integrity require users to adhere to regulatory guidelines and maintain transparency in records to prevent data manipulation or fraud. Finally, through the feedback mechanism, users are encouraged to share challenges, feedback, and suggestions with authorities to enhance the usability and impact of the traceability system.

7.6 Value Chain Stakeholders/ Custodians

Broadly, stakeholders can be categorized into value chain stakeholders/custodians, who are directly responsible for data entry/capture and compliance at various points of the chain, and institutional stakeholders, who will provide regulatory, policy, technical, and financial support to enable seamless adoption of digital traceability.

S.No	Value Chain Unit	Capture Fisheries – Stakeholder/Custodian	Aquaculture – Stakeholder/Custodian
1.	Fishing	Vessel/Craft Owners, Fishermen	Not Applicable
2.	Seed Production	Not Applicable	Brood Bank Operators, Hatchery Owners
3.	Nursery / Juvenile Production	Not Applicable	Nursery Operators
4.	Grow-out Production	Not Applicable	Aquafarmers/owners
5.	Harvesting	Not Applicable	Aquafarmers/owners
6.	Landing / Aggregation	Vessel Owners, Fishing Harbour Management Committees/Councils, Intermediaries	Aquafarmers/owners, Aggregators
7.	Auctioning	Auctioneers, Intermediaries	Aquafarmers/owners, Intermediaries, Registered Auctioneers, Intermediaries

S.No	Value Chain Unit	Capture Fisheries – Stakeholder/Custodian	Aquaculture – Stakeholder/Custodian
8.	Transportation	Transport Operators, Cold Chain Providers, Intermediaries,	Transporters, Cold Chain Operators, Intermediaries
9.	Marketing (Wholesale)	Wholesalers, Auctioneers, Marketers, Intermediaries,	Wholesalers, Marketers, Intermediaries
10.	Processing	Processing Unit Owners, Exporters	Processing Unit Owners, Exporters
11.	Exporting	Exporting Firms, Seafood Exporters Association of India	Exporters, Seafood Exporters Association of India
12.	Retailing	Fish Vendors, Retail Chains, e-Commerce Vendors	Fish Vendors, Retailers, e-Commerce Vendors
13.	Regulatory / Oversight	DoF (GoI), Fisheries Departments of States/UTs, MPEDA, EIC, FSSAI, BIS, other Government Agencies	DoF (GoI) ,Fisheries Departments of States/UTs, MPEDA, CAA, EIC, FSSAI, BIS, other Government Agencies
14.	Traceability System Management	DoF (GoI)	DoF (GoI)
15.	Technical Advisory Institutions/Bodies	ICAR Fisheries Research Institutes, NABL Accredited Labs, Fisheries Universities/ Colleges	ICAR Fisheries Research Institutes, NABL Accredited Labs, Fisheries Universities/ Colleges

7.7 Role of each stakeholder/custodian in the value chain

The roles of major stakeholder/custodian in the value chain are given below:

I. **Fishers:** Record and share catch data of fishes caught in the wild, including details of species caught, date & time of capture, method of capture, fishing area, compliance with sustainability standards.

II. **Farmers**: Record and share production-level data, including input use, farming methods, harvest information, and compliance with biosecurity and sustainability standards.

III. **Input Suppliers**: Provide verified details of seeds, broodstock, feed, and medicines supplied, ensuring authenticity and traceability to source.

IV. **Processors**: Capture processing, packaging, quality checks, and certification details; ensure linkage of processed products with origin data.

V. **Exporters**: Maintain accurate export documentation, adhere to importing country requirements, and provide traceability assurance to international buyers.

VI. **Logistics Providers**: Record movement of products, storage conditions, and transport timelines to ensure the integrity of cold chains.

VII. **Market Operators (wholesale and retail)**: Maintain transparent sales records, enable product labelling through QR/barcodes, and ensure consumers can trace product origin.

VIII. **Consumers (end-users)**: While not custodians, they act as beneficiaries by accessing traceability information to make informed purchasing choices, thereby reinforcing accountability across the chain.

7.8 Ministries and Departments at Central Level

The roles and responsibilities of Ministries and Departments at the Central Level under the National Framework on Traceability in Fisheries & Aquaculture are mentioned below:

Ministry/Department	Roles and Responsibilities
Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying	a) Nodal agency for policy formulation, coordination, and overall implementation of the National Framework on Traceability. b) Lead the development of SOPs, data standards, and institutional mechanisms. c) Oversee integration with NFDP/National Framework on Traceability and monitor nationwide implementation. d) Coordinate with Central Ministries, States/UTs, Regulatory Institutions, Technical, Advisory Bodies and other Stakeholders for field-level rollout. e) Grievance redressal.
Ministry of Health & Family Welfare	Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions/laboratories under their control.
Ministry of Commerce and Industry	a) Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions/laboratories under their control. b) Support international trade facilitation through traceability-linked export certification. c) Guide exporters on compliance with global market traceability requirements.
Ministry of Food Processing Industries	a) Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through

Ministry/Department	Roles and Responsibilities
	the agencies/institutions/laboratories under their control. b) Promote integration of traceability in fish processing and value addition facilities. c) Facilitate adoption of the National Framework on Traceability in Fisheries and Aquaculture among processing units, food parks, cold chains, logistics and other value chains under MoFPI-supported schemes.
Ministry of Environment, Forest and Climate Change	a) Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions under their control. b) Support environmental sustainability, biodiversity conservation, and pollution monitoring efforts as per the National Framework on Traceability in Fisheries and Aquaculture. c) Support the integration of eco-labelling, carbon footprint tracking, and responsible sourcing into the traceability framework. d) Collaborate on regulatory linkages for marine protected areas and coastal ecosystem protection.
Ministry of Earth Sciences	Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions/laboratories under their control.
Ministry of Electronics and Information Technology	Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions under their control.
Department of Consumer Affairs	Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions/laboratories under their control.
Ministry of Shipping and Waterways	Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions under their control.
Ministry of Skill Development and Entrepreneurship	Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions under their control.
Ministry of Road and Transport	Collaborate and cooperate with DoF for the implementation of the National Framework on Traceability in Fisheries and Aquaculture through the agencies/institutions under their control.

7.9 Regulatory Bodies

Each regulatory body plays a complementary role in ensuring the legitimacy, transparency, and compliance of traceability across production, processing, certification, and trade. Their active engagement and coordination are critical for the credibility of India's national traceability system at both domestic and international levels.

The roles and responsibilities of key Regulatory Bodies under the National Framework on Traceability in Fisheries & Aquaculture are mentioned below:

Regulatory Body	Roles and Responsibilities
Coastal Aquaculture Authority	a) Integration with the National Framework on Traceability in Fisheries and Aquaculture. b) Support training and awareness on traceability among coastal farmers.
Export Inspection Council	a) Oversee quality inspection and certification of fish and fishery products for export. b) Integrate traceability data into the export inspection process to ensure batch-level trace-back capability. c) Conduct audits to verify traceability system adherence in approved export establishments. d) Support implementation of electronic certification linked to traceable supply chains.
Marine Products Export Development Authority	a) Promote adoption of traceability among exporters, processors, and aquaculture units. b) Assist in developing traceability protocols and digital platforms aligned with international market requirements. c) Register aquaculture farms and certify them under traceability-linked sustainability and quality programs. d) Liaise with international buyers and regulatory authorities to ensure compliance and recognition of India's traceability efforts.
Food Safety and Standards Authority of India	a) Ensure domestic food safety compliance through integration of traceability data with food testing, hygiene, and certification protocols. b) Develop standards for labelling, packaging, and QR-code-linked consumer transparency. c) Enforce traceability-linked food recall procedures and supply chain accountability. d) Coordinate with state food authorities to ensure traceability compliance at retail and wholesale markets.

Regulatory Body	Roles and Responsibilities
Bureau of Indian Standards	a) Develop and notify national standards related to traceability data formats, product codes, and quality assurance protocols. b) Support formulation of standardized terminologies, taxonomy, and digital tags used across the traceability platform. c) Promote adoption of traceability standards through certification, training, and collaboration with industry bodies.
National Accreditation Board for Testing and Calibration Laboratories	a) Accredit laboratories performing quality testing and certification as part of the traceability process. b) Ensure labs involved in seed/feed/drug quality verification and product safety meet national/international standards. c) Collaborate with EIC, MPEDA, and FSSAI for lab data integration with the traceability platform.
Fisheries Departments of States/UTs	a) Implement fisheries and aquaculture traceability protocols at the ground level. b) Monitor compliance in local fish markets, processing units, and retail outlets. c) Facilitate local enforcement, awareness, and grievance redressal mechanisms.
Other Government Regulatory Bodies (as required)	Any additional regulatory bodies (e.g., pollution control boards, environmental regulators) involved in overseeing aspects like effluent discharge, carbon footprints, or ecosystem impacts should support data integration and regulatory harmonization with traceability systems.

7.10 Other Government Agencies

These government agencies will act as technical enablers, knowledge partners, and capacity-building institutions. They will ensure that the traceability framework is scientifically sound, technologically robust, and locally implementable.

The roles and responsibilities of these Government Agencies under the National Framework on Traceability in Fisheries & Aquaculture are as follows:

Agency	Roles and Responsibilities
Indian Council of Agricultural Research	a) Provide scientific and technical validation for traceability protocols across fisheries and aquaculture value chains. b) Support R&D in fisheries and aquaculture traceability systems

Agency	Roles and Responsibilities
	c) Conduct testing, training, and capacity building for field-level personnel. d) Guide data standards and good practices through its research institutes e) Assist in last-mile outreach, sensitization, and on-field training of small and marginal fish farmers. f) Disseminate traceability tools, mobile apps, and SOPs to grassroots users. g) Provide real-time field feedback for system improvement.
National Fisheries Development Board	a) Act as a key implementing body for national-level traceability programs and infrastructure. b) Provide financial and technical assistance for IT systems, infrastructure upgradation, and capacity building. c) Coordinate national rollout and pilot projects in collaboration with States/UTs.
Central/State Fisheries Universities/ Colleges	a) Act as nodal institutions for training, outreach, and knowledge dissemination. b) Support development and validation of region-specific traceability models. c) Conduct practical and digital literacy programs for students, farmers, and field staff. d) Collaborate on research for innovations in traceability systems and applications.
State Fisheries Training Institutes	a) Facilitate hands-on training and capacity building of fisheries department officials, aquaculture farmers, and fishers. b) Serve as state-level knowledge and skill hubs for traceability literacy. c) Integrate traceability into curricula and certification modules.
NABL Accredited Laboratories	a) Conduct quality testing and certification of fish, inputs (seed, feed, water, drugs), and processed products. b) Ensure traceability compliance through digital integration of test results with the central traceability platform. c) Support batch-wise data tagging for chemical residues, microbial quality, and safety parameters.

7.11 Criteria for On-boarding of Stakeholders

The successful implementation of the traceability framework depends on active participation by stakeholders across fisheries and aquaculture value chains.

On-boarding will be guided by the following criteria:

a) **Registration and licensing** with State or Central Fisheries Authorities as a prerequisite.

b) **Minimum digital readiness**, such as access to mobile devices and basic digital literacy.

c) **Capacity-building support** for small-scale fishers, fish farmers, cooperatives, and Farmer-Producer Organizations (FPOs), ensuring they are not excluded due to technological barriers.

d) **Willingness to comply** with reporting and traceability protocols for branding benefits.

Through this inclusive approach, the framework ensures that all players whether artisanal fishers/ fish farmers or large-scale exporters can participate and benefit.

7.12 Management of IT-Based Traceability System

The long-term sustainability of the system depends on effective management. The Centralised National Traceability System hosted by DoF, GoI will be maintained as per the funding source mentioned in Para 6.4 of this framework document. The system will be upgraded from time to time

For data protection, the IT platform will be hosted at a national data centre with disaster recovery infrastructure to ensure resilience. Regular third-party audits will be conducted to verify cybersecurity, data integrity, and overall performance. The system will also include user support services, such as training, helpdesk support, and capacity-building programs, ensuring smooth adoption by all categories of stakeholders.

7.13 Grievance Redressal Mechanism

No digital system can succeed without addressing the concerns and challenges faced by stakeholders. The traceability framework will therefore include a dedicated grievance redressal mechanism.

Stakeholders including farmers, fishers, exporters, and processors will be able to raise issues through multiple channels such as a helpline number, online portal, and mobile app. A time-bound resolution protocol will be instituted to ensure that grievances are addressed promptly and unresolved issues, if any, will be reviewed by higher authorities.

Transparency will be maintained by enabling stakeholders to track the progress of their complaints in real time, thereby fostering trust in the system.

8. Institutional Arrangement

The successful implementation of the National Framework on Traceability in Fisheries and Aquaculture will require a robust, multi-tiered institutional arrangement that ensures strategic oversight, coordinated execution, and localized adoption. The framework is supported by an integrated governance structure comprising the National Level Governance Committee that provides policy direction and inter-ministerial coordination; the Adoption Committee for guiding phased implementation and stakeholder on-boarding; and specialized Technical and Value Chain Committees for developing value chain-specific protocols and solutions. These national-level bodies work in close collaboration with Fisheries Departments of States/UTs, which act as the nodal agencies for regional implementation, and with field-level fisheries institutions, including Fisheries Cooperatives, FPOs, hatcheries, and fish landing centers, which play a critical role in on-ground data capture, stakeholder engagement, and system adoption. This coordinated institutional architecture ensures coherence across policy, technology, and field operations for a seamless, scalable, and inclusive traceability ecosystem in India's fisheries and aquaculture sector.

8.1 National Level Governance Committee

The National Level Governance Committee (NLGC) shall be constituted under the Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying (MoFAHD), Government of India. It will function as the apex body for providing strategic oversight, inter-agency coordination, and policy guidance to ensure the effective implementation of the National Framework on Traceability in Fisheries & Aquaculture.

Composition:

1.	Secretary, Department of Fisheries, MoFAHD, GoI	Chairperson
2.	Joint Secretary (Inland Fisheries), DoF, GoI	Vice Chairperson
3.	Joint Secretary (Marine Fisheries), DoF, GoI	Vice Chairperson
4.	Chief Executive, National Fisheries Development Board (NFDB)	Member
5.	ICAR Deputy Director General (Fisheries)	Member
6.	Director (Fisheries), DoF, MoFAHD, GoI	Member
7.	Deputy Commissioner (IF), DoF, MoFAHD, GoI	Member
8.	Deputy Commissioner (MF), DoF, MoFAHD, GoI	Member
9.	Assistant Commissioner (Fisheries), DoF, MoFAHD, GoI	Member

10.	Representative of Ministry of Electronics and Information Technology, GoI	Member
11.	Representative of Coastal Aquaculture Authority (CAA)	Member
12.	Representative of MPEDA, Ministry of Commerce & Industry, GoI	Member
13.	Representative of EIC, Ministry of Commerce & Industry, GoI	Member
14.	Representative of Food Safety and Standards Authority of India (FSSAI)	Member
15.	Representative of Bureau of Indian Standards (BIS)	Member
16.	Representative of Ministry of Environment, Forest and Climate Change (MoEFCC), GoI	Member
17.	Two representatives from Fisheries Departments of States/UTs (on rotational basis)	Member
18.	One domain expert (IT/Blockchain/Traceability systems) (As and when required)	Member
19.	Representative from Indian Coast Guard/Ministry of Defence (for marine security interface)	Member
20.	Fisheries Development Commissioner, DoF, MoFAHD, GoI	Member Secretary

Terms of reference for the NLGC

The NLGC shall serve as the apex body to provide policy direction, strategic oversight, and institutional coordination for the effective planning, implementation, and review of the National Framework on Traceability in fisheries and aquaculture. The roles and responsibilities of NLGC shall *inter alia* include:

1. Policy Oversight and Strategic Direction

a) Define the long-term vision, objectives, and roadmap for a unified national traceability framework.

b) Provide policy guidance to ensure alignment with global trade and regulatory standards.

c) Ensure consistency with national policies on Blue Economy, sustainability, food safety, etc.

2. Institutional Coordination and Convergence

a) Facilitate coordination among Ministries, regulatory authorities, and implementing agencies at the central level.

b) Promote collaboration with States/UTs for seamless integration of state-level systems into the national platform.

c) Strengthen partnerships with research institutions, certification agencies, and technology providers.

3. Technical and Operational Oversight

a) Approve technical standards, data protocols, and system architecture for traceability.

b) Review and endorse guidelines on Critical Tracking Events (CTEs) and Key Data Elements (KDEs) across value chains.

c) Monitor progress of implementation and ensure adherence to quality standards during rollout.

4. Capacity Building and Awareness Programme

a) Oversee the design and implementation of training and capacity building programmes for fishers, farmers, processors, exporters, officials, etc.

b) Support nationwide awareness campaigns highlighting the importance and benefits of traceability.

5. Monitoring, Evaluation, and Review

a) Periodically assess system performance, usage levels, and stakeholder feedback to recommend improvements.

b) Undertake reviews of the traceability framework and publish progress reports.

c) Recommend updates based on emerging technologies, international best practices, and evolving sectoral needs.

6. Resource Mobilization and Approvals

a) Advise on budgetary allocations, funding mechanisms, and financial support modes at the national and state levels.

b) Approve the proposals related to major infrastructure, IT system development, and innovation initiatives under the programme.

8.2 Adoption Committee

The Adoption Committee shall function under the overall guidance of the NLGC. The committee will recommend the mechanism for the adoption of the IT-based centralized national traceability system in aquaculture and capture fisheries at the national level by different stakeholders.

Composition:

1.	Joint Secretary (Inland Fisheries) & Project Director, PM-MKSSY	Chairperson
2.	Fisheries Development Commissioner, DoF, MoFAHD, GoI	Member
3.	Secretary, CAA	Member
4.	Senior Executive Director, NFDB	Member
5.	Director, ICAR- CMFRI	Member
6.	Director, ICAR –CIFT	Member
7.	Director, ICAR- CIBA	Member
8.	Director, ICAR –CIFA	Member
9.	Director, ICAR –CIFRI	Member
10.	Director, ICAR –CICFR	Member
11.	Director, MPEDA	Member
12.	Director, EIC	Member
13.	Advisor, FSSAI	Member
14.	Director- FAD 12, BIS	Member
15.	Representative of National Informatics Centre (NIC)	Member
16.	Representatives from Fisheries Departments of States/UTs	Member
17.	Assistant Commissioner (Fy) & Addl. Project Director, PMMKSSY	Member Secretary
	Co-opted Members	
18.	Representative of Seafood Exporters Association of India	Member
19.	Representatives of Fisheries Research and Academic Institutes/IT Organizations	Member
20.	Representatives of Fisheries Industries and Associations (As and when required)	Member

Terms of reference of the Adoption Committee

The Adoption Committee shall play a critical role in operationalizing the traceability system by ensuring readiness, engagement, and phased rollout across the fisheries and aquaculture value chain. The roles and responsibilities shall *inter alia* include:

1. Phased Adoption Strategy

a) Develop and periodically revise a clear, time-bound strategy for the adoption of traceability standards across different regions, value chains (e.g., shrimp, tuna, rohu), and stakeholder segments.

b) Recommend pilot projects and model districts for early adoption.

c) Prioritize adoption based on risk, export relevance, and sustainability criteria.

2. Stakeholder Readiness and Engagement

a) Assess stakeholder readiness (infrastructure, digital literacy, data availability) and propose targeted capacity-building interventions.

b) Promote partnerships with private sector stakeholders, cooperatives, and FPOs for wider adoption.

c) Ensure inclusion of small-scale fishers and fish farmers through appropriate handholding and support mechanisms.

3. Customization and Localization

a) Recommend necessary customization of traceability modules to suit specific regions, species, and production systems.

b) Support integration of local/state-level initiatives with the national framework.

4. Technical Validation and Feedback

a) Evaluate and validate digital traceability tools, platforms, and mobile applications from a user-adoption and field operability perspective.

b) Recommend necessary improvements based on field-level feedback.

5. Adoption Monitoring and Reporting

a) Track adoption progress through defined metrics such as the number of stakeholders on-boarded, CTEs captured, and compliance reports generated.

b) Submit periodic progress reports and recommendations to the National Level Governance Committee.

6. Enabling Policies and Incentives

a) Recommend enabling policies, fiscal/non-fiscal incentives, and regulatory requirement to drive adoption across the value chain.

b) Facilitate alignment with certification and export promotion schemes to promote traceability.

8.3 States/UTs Fisheries Departments

Fisheries Departments of States/UTs shall play a pivotal role in operationalizing and sustaining the traceability framework at the ground level. As the primary implementing agencies, they shall be responsible for contextualizing the national traceability system to local realities and ensuring smooth, inclusive, and coordinated execution across their jurisdictions.

The indicative roles and responsibilities of States/UTs Fisheries Departments under the National Framework on Traceability in Fisheries & Aquaculture are mentioned below:

i. Implementation of Traceability System

Fisheries Departments of States/UTs shall be responsible for rolling out the traceability system across inland and marine fisheries, and aquaculture value chains within their respective jurisdictions through:

a) Identification of local value chains and key stakeholders (fishers, farmers, processors, traders, etc.).

b) Support DoF, GoI in customization of the traceability system based on local fisheries and aquaculture landscape, infrastructure availability, and technology readiness.

c) Support in undertaking pilot testing and scaling up of traceability modules in a phased and targeted manner.

ii. Data Capture, Validation & Integration

Ensure the real-time collection, validation, and integration of traceability data from field-level stakeholders by:

a) Assigning responsibilities for data entry at every Critical Tracking Event (CTE) in the Value chain.

b) Training local officials, extension workers, and enumerators to assist with accurate and timely data capture.

c) Verifying and validating submitted data through field inspections, audit trails, and quality checks.

iii. Capacity Building and Training

Build capacity among fishers, farmers, processors, and traders on the use of traceability systems by way of:

a) Organizing regular training sessions, workshops, and field demonstrations.

b) Developing user-friendly guides and localized materials in regional languages.

c) Facilitating digital literacy and on-boarding of stakeholders through mobile and offline tools.

iv. Stakeholder Coordination

Serve as the link between national authorities and ground-level stakeholders, ensuring multi-stakeholder coordination by:

a) Convening state- and district-level coordination committees involving primary fisheries cooperatives, FFPOs, processors, and exporters.

b) Liaising with national agencies and technical partners for system development and deployment.

c) Engaging private sector players to ensure supply chain integration and shared compliance.

v. Infrastructure Development and Support

Assess and improve the physical and digital infrastructure required for traceability, including:

a) Upgradation of landing sites, auction halls, cold chains, and data entry kiosks.

b) Facilitation in the deployment of mobile devices, GPS trackers, and data collection tools at remote sites.

c) Establishment of Traceability Helpdesks or Support Units at district and block levels.

vi. Monitoring, Evaluation and Compliance Enforcement

Regularly monitor the performance of the traceability system and enforce compliance, including:

a) Tracking participation and data consistency across all stakeholders.

b) Identifying gaps, anomalies, or non-compliance, and taking corrective action.

c) Submitting regular reports to the central monitoring system and providing feedback on challenges and learnings.

vii. Integration with State Schemes and Policies

To ensure sustainability of the Traceability System, Fisheries Departments of States/UTs shall integrate traceability objectives into:

a) State fisheries and aquaculture scheme components.

b) Criteria for licensing, approval and quality assurance mechanisms.

viii. Conducting Awareness and Outreach Programmes

Fisheries Departments of States/UTs must lead the design and execution of awareness campaigns to build public and stakeholder trust in traceable fish products. This includes:

a) Promoting consumer awareness about safe, quality and traceable fish and fishery products.

b) Encouraging producers and processors to adopt best management practices (BMPs) linked to traceability.

c) Undertake mass outreach programmes in vernacular language.

ix. Documentation and Best Dissemination Practices

Fisheries Departments of States/UTs should document implementation experiences and promote knowledge sharing by:

a) Publishing case studies, impact stories, and region-specific innovations.

b) Sharing successful models with other States/UTs and national forums. Facilitating exposure visits and cross-learning platforms.

x. Feedback for Policy and System Improvement

Fisheries Departments of States/UTs serve as critical feedback channels for refining the national framework. They should:

a) Provide field insights to Central Ministries, Regulatory Bodies and Technical Advisory Bodies.

b) Suggest improvements in digital platforms, SoPs, and training modules.

c) Support policy documentation in collaboration with Central Ministries, regulatory bodies and technical advisory bodies.

8.4 Field Level Fisheries Institutions of DoF

Besides, NFDB, the other institutions of Department of Fisheries (DoF), Ministry of Fisheries, Animal Husbandry & Dairying namely, Fishery Survey of India (FSI), Central Institute for Fisheries Nautical and Engineering Training (CIFNET), National Institute of Fisheries Post Harvest Technology and Training (NIFPHATT), and Central Institute of Coastal Engineering for Fisheries (CICEF) shall facilitate the implementation of centralised national traceability system in fisheries and aquaculture.

9. Data Governance and System Management

A secure, transparent, and well-governed data environment is essential for the national traceability system. As traceability relies on the continuous flow and accuracy of data across multiple stakeholders and institutions, strong data governance and system management protocols are essential to ensure trust, integrity, accountability, and compliance.

The long-term success and credibility of the centralised national traceability system depend on a strong foundation of data governance and secure system management. By ensuring clear data ownership, responsible access, and robust cybersecurity, the traceability system will foster trust, transparency and efficiency making traceability not just a compliance tool, but a catalyst for transformation in India's fisheries and aquaculture sector.

The IT platform will conform to and comply with all the extent rules, regulations and guidelines of the Government of India on data privacy, cybersecurity and vulnerability audit issued from time to time.

9.1 Data Ownership and Access Protocols

A clear, equitable, and legally sound data ownership framework will be established to instill confidence among value chain stakeholders and encourage voluntary data sharing.

Key elements include:

a) Data entered by each stakeholder shall be owned by the respective stakeholder, however the data shall be used by other value chain stakeholders, regulators and other stakeholders of centralised national traceability system according to their role-based access rights.

b) All the data entered by the custodian shall be correct, authenticated and verifiable.

c) The data entered by the custodian shall be tamper-proof to ensure data integrity.

d) All data submitted to the centralized national traceability platform by custodian/stakeholder must be voluntary, authenticated, verifiable, and digitally timestamped, ensuring traceability and accountability.

e) Custodianship of data (for governance and compliance) shall be held by relevant authorities, with data access governed by - policies of MeiTY.

f) Define tiered access rights e.g., individual-level data accessible only to owners, while aggregate-level data may be accessible to regulators and policymakers.

g) In the case of food safety testing data governance, the food safety testing data voluntarily generated for a particular ULUI in the traceability system will

be accessed, reviewed, analysed, and used by relevant regulators, such as EIC, MPEDA, and FSSAI. Such food safety testing data is often necessary for export-oriented value chains. The associated food safety testing data can also be accessed by stakeholders who are procuring the ULUI. However, the original ownership of the food safety testing data will remain with the stakeholder, who requested to generate the data, and shall reserve the right to disclose the data, except to domestic government regulators. To maintain confidence in the food safety data governance, FSSAI-National Referral Laboratory (NRL) will provide referral testing services, retesting services, and support for the confidentiality of food safety data governance, as per the clauses of ISO/IEC 17025:2017. Additionally, the NRL will provide participating laboratories with appropriate analytical methods, sampling protocols, training and proficiency testing services.

h) Provisions shall be made for data portability and informed consent, especially in the case of smallholders, cooperatives, and SHGs.

This will ensure a balance between data privacy, utility, and transparency, promoting responsible data sharing across the system.

9.2 Role-Based Access Control and MIS Tools

To manage the centralized national traceability system with diverse stakeholders and users, it is essential to adopt a role-based access control model to ensure that data access is aligned with the users' functions, responsibilities, and authorization levels.

Key actions include:

a) Implementing a secure login system with multi-factor authentication, user roles, and permission hierarchies (e.g., producer, aggregator, certifier, regulator, policymaker).

b) Designing dashboards and Management Information System (MIS) tools tailored to each role e.g., fishermen may access QR code generation, while regulators may access compliance summaries.

c) Ensuring granular-level access control for sensitive data such as input use, health records, and trade transactions, while promoting transparency for public-interest data like certifications and hygiene scores.

d) Enabling user audit trails and logs to track data changes, entry errors, or unauthorized access, supporting trace-back and accountability.

e) Providing offline and mobile-friendly interfaces for field-level users to enter and retrieve data without compromising access control or data integrity.

This structure will ensure that each stakeholder accesses only what is relevant to them, thereby upholding data security, operational efficiency, and user confidence.

9.3 Cybersecurity and Data Validation Measures

As the traceability system becomes fully digital and interoperable with national platforms, cybersecurity and data validation become critical to protect system integrity, prevent misuse, and ensure data authenticity.

Cybersecurity and validation protocols will include:

a) Deployment of end-to-end encryption, secure hosting environments (preferably government or MeitY-certified cloud platforms), and regular penetration testing.

b) Implementation of firewalls, antivirus layers, intrusion detection systems (IDS), and backup protocols to safeguard data and ensure disaster recovery readiness.

c) Use of blockchain, where appropriate, to create immutable data records and digital audit trails, especially for export consignments and certified production.

d) Automated data validation layers to flag inconsistencies, duplication, or missing information at the point of entry.

e) Periodic data quality audits and third-party verification by certified agencies to uphold the trust and reliability of the traceability data.

These measures will make the traceability system technically robust, resistant to manipulation, and trustworthy across all layers of the value chain.

10. Capacity Building and Outreach Programmes

The effective implementation of a centralized national traceability system requires technology and demands the empowerment of people. Time to time capacity building and outreach programmes should be undertaken to understand, adopt, and benefit from the traceability system. The approach will be inclusive, continuous, and tailored to the specific roles and learning needs of different stakeholders.

By empowering people with knowledge, tools, and support, the system will become not just a compliance requirement but a participatory, value-generating transformation in India's fisheries and aquaculture sector.

10.1 Training Programmes for Different Stakeholders

A structured and tiered training architecture will be implemented to build competence across the entire value chain. Each stakeholder group will receive training relevant to their functions in the traceability system.

Key training audiences and focus areas:

Audiences	Focus Areas
Fishers and Fish Farmers	Digital literacy, mobile-based data entry, understanding QR codes, and compliance with traceability standards at the production level.
Hatchery Operators and Feed Suppliers	Batch-level documentation, input traceability, and quality control protocols.
Processors, Marketers, and Exporters	Advanced modules on digital traceability systems, data synchronization, HACCP integration, hygiene tagging, and cold chain traceability.
Government Officials (Central, State, District levels)	Use of dashboards and MIS, system administration, certification workflows, and real-time compliance monitoring.
IT and Technical Service Providers	Training on integration with national platforms, blockchain tools, and API-based interoperability.
Other stakeholders as decided by the competent authority	On relevant aspects of national digital traceability system, as and when required.

Training will be delivered through workshops, e-learning modules and on-site demonstrations ensuring practical learning and retention.

10.2 Awareness Creation

A multi-tiered awareness strategy will be implemented to reach key user groups and the public. Awareness building is crucial for adoption, behavioural change and the long-term sustainability of traceability efforts.

a) Fishers and Fish Farmers

a) Focus on basic system orientation, benefits of traceability, and building digital confidence.

b) Use of vernacular training material, simple infographics, and mobile demonstrations.

c) Promote the idea of "data as an asset" that can help them access better markets, recognition, branding and advocacy.

b) Marketers, Processors and Exporters

a) Build capacity for advanced data management, traceability-linked certifications, temperature monitoring, and recordkeeping aligned with HACCP principles.

b) Emphasize the role of traceability in improving product reputation, export readiness, and regulatory compliance.

c) Government Officials

a) Raise awareness on their roles in system functioning, compliance audits, and enforcement protocols.

b) Enable confident use of real-time dashboards, reporting tools, and data verification mechanisms.

d) Consumers

a) National campaigns to raise consumer awareness about traceable fish and fishery products as safe, quality and sustainable.

b) Consumers are encouraged to use QR codes/barcodes to access product origin, producer details, and food safety standards

c) Use mass media, digital platforms, retail collaborations, and eco-labelling to shape demand for traceable products.

10.3 Field Support

Effective capacity building extends beyond classroom training. On-the-ground support mechanisms are crucial for sustained adoption, troubleshooting, and handholding.

Field support will include:

All stakeholders including Government Fisheries Officials, Regulatory Bodies, Technical Advisory Bodies, Academic and Research Institutions, Private Parties may facilitate necessary support as may be required for the implementation of the centralised national traceability system.

11. Phased Rollout and Roadmap

For building a robust, inclusive, and future-ready centralised national traceability system for fisheries and aquaculture in India, the implementation will follow a structured phased roadmap. Each phase is designed to lay the groundwork for the next, ensuring progressive development, stakeholder engagement, and systemic maturity.

11.1 Phase I: Development of National Framework on Traceability in Fisheries and Aquaculture

This foundational phase marks the beginning of a transformative journey toward establishing a robust centralised national traceability system for fisheries and aquaculture in India. It will focus on the strategic design, policy formulation, and development of institutional architecture necessary to support a national-level framework. The objective is to create a comprehensive, nationally endorsed policy foundation that clearly defines the roles, responsibilities, and implementation pathways for all stakeholders. This phase will lay the groundwork for an integrated, transparent, and accountable traceability system that can be scaled nationwide.

Key Activities in this phase are given below:

a) Formulation of the National Traceability Framework, incorporating national and global best practices.

b) Identification of key stakeholders, value chain nodes, Critical Tracking Events (CTEs), and Key Data Elements (KDEs).

c) Drafting of national Standards (DATA), SOPs, Protocols, and Certification Guidelines.

d) Constitution of a National Level Committee, domain expert groups, and state-level implementation task forces.

e) Alignment with food safety, trade, and sustainability objectives, including regulatory mandates from FSSAI, MPEDA, and CAA.

11.2 Phase II: Development of IT-Based Centralized National Digital Traceability System

This phase will involve the design, development, and deployment of a centralized, secure, and interoperable digital traceability platform on National Fisheries Digital Platform (NFDP). This system will serve as the technological backbone of the National Framework, enabling real-time data capture, seamless stakeholder connectivity, and end-to-end traceability across the fisheries and aquaculture value chain. The outcome of this phase will be a fully functional, field-tested digital platform, equipped with validated workflows and scalable infrastructure ready for phased rollout across selected geographies and value chains.

Key Activities involved in this phase will include the following:

a) Development of a modular, IT-based traceability system with real-time dashboards, user interfaces, and mobile applications.

b) Integration of emerging technologies such as blockchain, AI/ML for risk analytics, GPS, and IoT for monitoring.

c) Definition of data architecture, standard APIs, and security protocols to ensure interoperability and role-based access control.

d) Pilot testing of the digital system in selected districts across the aquaculture and fisheries value chains.

e) On-boarding of early adopter stakeholders (farmers, processors, exporters) for data entry and feedback.

11.3 Phase III: Implementation of Project-based Traceability System

This phase will focus on implementing traceability system through targeted pilot projects across select geographies and value chains. These demonstration models will serve as practical testbeds to validate system design, assess on-ground feasibility, and refine workflows in real-world settings. By capturing insights and lessons from diverse production environments such as marine fisheries, inland aquaculture, and post-harvest operations this phase will produce tested and optimized models that can serve as blueprints for broader national adoption in the subsequent scale-up phase.

Key Activities involved in this phase will include the following:

a) Selection of species, regions, and value chains for project-based implementation (e.g., shrimp in Andhra Pradesh, marine capture fisheries in Tamil Nadu and Kerala, Inland capture fisheries in Assam, Coldwater Fisheries in Uttarakhand).

b) Partnership with States/UTs, private sector players, FFPOs, and cooperatives to implement traceability on a cluster basis.

c) Linking traceability with schemes, such as PMMSY, eco-labelling, certification, and insurance.

d) Data integration with testing laboratories, auction centers, cold chains, and processing facilities.

e) Monitoring and documentation of success stories, gaps, and stakeholder feedback.

11.4 Phase IV: Integration of Existing System

This phase will focus on consolidating and integrating all existing digital platforms used in the fisheries and aquaculture sector. The goal is to avoid duplication of

efforts and make sure all systems can work smoothly with each other. By doing this, a single, connected traceability system shall be created that will allow for easy sharing of information, better coordination, and clear tracking of fish and fishery products from farm to plate across different platforms and departments.

Key Activities include:

a) Mapping and review of existing digital platforms (e.g., MPEDA's shrimp traceability, State/UT MIS systems, FSSAI compliance modules).

b) Development of common data standards and API interfaces for integration with private and public systems.

c) Onboarding of processors, exporters, logistics companies, and cooperatives with established internal traceability systems.

d) Synchronization with international trade documentation platforms and customs clearance systems (DGFT, EIC).

e) Institutionalization of data governance protocols and access policies.

11.5 Phase V: National Level Scale-Up

Building on the insights and successes of Phases II, III and IV, this phase will focus on the nationwide expansion of the traceability system, extending coverage across all major fisheries and aquaculture zones. The emphasis will be on scaling the platform in collaboration with States and Union Territories, ensuring seamless integration into existing governance structures and local value chains. This phase will establish a nationally scalable, unified, and digitally enabled traceability ecosystem, characterized by strong state-level ownership and active participation from multiple sectors, including government agencies, private stakeholders, and community-based organizations.

Key Activities involved in this phase will include the following:

a) State/UT-wise roll-out plans with technical and financial support from the Department of Fisheries and NFDB.

b) Comprehensive training and capacity-building campaigns for value chain stakeholders, state officials, and technical partners.

c) Integration of existing States/UTs traceability portals with the centralized system through data-sharing protocols.

d) Expansion of traceability coverage across inland fisheries, brackishwater aquaculture, marine capture fisheries, and ornamental fisheries.

e) Creation of national certification programs for traceable, safe, and sustainable fish and fishery products.

11.6 Phase VI: Continuous Improvement

Traceability is a dynamic process that must evolve in response to technological advancements, regulatory changes, and shifting market expectations. This final phase ensures that the system remains agile, responsive, and future-proof.

Key Activities involved in this phase will include the following:

a) Establishment of a national feedback and monitoring mechanism, including grievance redressal and technical support systems.

b) Regular system audits, upgrades, and version releases based on user feedback and stakeholder consultations.

c) Promotion of innovation and R&D in traceability technologies (e.g. satellite tracking, AI for quality grading, authentication).

d) Periodic policy reviews, updates to standards, and alignment with global traceability regulations and sustainability goals.

e) Support for new modules such as carbon footprint tagging, socio-economic traceability and eco-certifications.

11.7 Indicative timelines for Phased Rollout

Phase	Activity	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15	M-16
Phase I	Finalisation, approval and release of National Framework for Traceability																
Phase II	IT-based Centralized National Digital Traceability System																
Phase III	Project-based Traceability System																
Phase IV	Integration with Existing System																
Phase V	National Level Scale-Up																
Phase VI	Continuous Improvement																

12. Monitoring, Evaluation, and Compliance

Monitoring, evaluation and compliance mechanisms will help in ensuring that the traceability system is implemented effectively and remains responsive, accountable, and aligned with relevant national and international standards. It will uphold the principles of transparency, accountability, and sustainability thereby fostering trust among the fisheries and aquaculture value chain stakeholders like producers, consumers, regulators, and global trade partners.

12.1 Key Performance Indicators (KPIs)

The national traceability system will be measured through a well-defined set of Key Performance Indicators (KPIs) that reflect system effectiveness, stakeholder participation, data quality, and market impact.

Indicative KPIs may include:

i. Baseline information on the stakeholders in value chain like fish farmers, fishers, hatchery operators, processors, etc.) including production, processing, export data.

ii. Number of stakeholders (fish farmers, fishers, hatchery operators, processors, etc.) States/UTs-wise onboarded on the centralised national traceability system for fisheries and aquaculture.

iii. Percentage of stakeholders in each value chain against the base line and onboarded data on the centralised national traceability system for fisheries and aquaculture.

iv. Time taken for data availability at each critical tracking event (CTE).

v. Number of certifications (e.g., safety, sustainability) linked to traceability data.

vi. Reduction (in %) in product rejections, recalls, or trade non-compliance due to lack of traceability.

These KPIs will be monitored at both the national and state levels, with real-time dashboards providing visibility to key stakeholders including the Department of Fisheries, NFDB, and regulatory authorities.

12.2 Compliance Checks and Certification Integration

Traceability System shall ensure compliance to national and international regulations to foster credibility and utility. A multi-tiered compliance monitoring mechanism will be established, integrated with routine inspections, third-party audits, and digital verification tools. The centralized national traceability system will

thus become a compliance enabler and a quality assurance backbone for both domestic and export supply chains.

The compliance strategies will include the following:

i. Enabling automatic flagging of data anomalies or gaps at each stage of the value chain.

ii. Linking traceability compliance with licensing, insurance schemes, and government support

iii. Integrating with national and international certification schemes

iv. Supporting third-party verification and lab integration through NABL-accredited facilities.

v. Conducting traceability-linked inspections as part of existing food safety and export audit protocols.

12.3 Regular Monitoring

Regular and structured monitoring at multiple levels shall be established to ensure consistent implementation and adherence by the stakeholders. Monitoring findings will help to formulate course correction strategies, resource allocation decisions, and risk mitigation measures.

The regular monitoring mechanisms will involve the following:

i. National-level monitoring by NLMC under the Department of Fisheries through centralized dashboards and state-wise performance analytics (Monitoring unit under the Chairmanship of Fisheries Development Commissioner).

ii. State-level monitoring units established within Fisheries Departments, responsible for tracking regional rollout and compliance. (Monitoring unit under the Chairmanship of Director/Commissioner).

iii. District-level monitoring by field officers, supported by training institutions and cooperative networks (Monitoring unit under the Chairmanship of District Fisheries Officer).

iv. Engagement of third-party monitoring agencies for independent validation and cross-verification of implementation status.

12.4 Feedback and Grievance Channels

Continuous stakeholder feedback is crucial to refine the traceability system, address implementation bottlenecks, and enhance user adoption. These mechanisms will ensure that the system is user-centric, agile, and continuously improving based on field-level realities.

Key feedback strategies will include the following:

a) Development of user-friendly feedback modules within the digital traceability system and mobile apps.

b) Organization of consultation with relevant stakeholders

c) Inclusion of grievance redressal mechanisms to resolve disputes related to data ownership, system access, or certification delays.

12.5 Policy Review and Updates

The centralised national traceability system for fisheries and aquaculture shall be reviewed and updated based on monitoring insights, regulatory changes, and global developments to maintain relevance.

The review mechanisms will include:

a) Annual review meetings convened by the National Level Traceability Governance Committee.

b) Performance audits and system evaluations conducted by independent experts or knowledge partners.

c) Updating SOPs, data standards, and certification protocols in response to emerging technologies, trade requirements, and stakeholder feedback.

d) Reviewing alignment with international regulations and recommending corrective or strategic actions.

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