PROJECT REPORT

Bycatch & Beyond: FishSafe 2.0 Devices for Artisanal Fishing Boat

Communication Network, Boat Tracking and Live-Release

Date: 13th February 2026

Key Facts

Boats equipped	10 artisanal wooden boats
Core capabilities	Two-way messaging, GPS tracking, distress alerts, device health logs
Operating model	Boat ↔ office coordination + peer-boat relay when needed
Conservation outcome	Increased verified live release of protected/at-risk species

Marine Megafauna By-catch Mitigation Through a Participatory Approach- Using Technological Innovation 'FishSafe'

Project Team

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Thank you,
Dr Heather Koldewey

1. Table of Contents

2. Acronyms and Definitions

Acronym	Meaning
GPS	Global Positioning System
QA	Quality Assurance (verification and review)
HF	High Frequency (HF) radio
Hermes	Device (Project communication + tracking device used on participating boats)

Executive Summary

This report presents the Hermes Communication and Tracking Initiative, which equipped ten artisanal wooden fishing boats with Hermes devices as part of an operational support and conservation incentive program in offshore areas lacking communication infrastructure. Artisanal fishing vessels operating in remote offshore areas often encounter safety risks and lack practical channels to report incidental capture of endangered or vulnerable species. By deploying Hermes devices, the project enhances communication accessibility while creating an accountability framework. As part of the project design this enabled us to monitor catch and bycatch of Endangered species in a geo-spatial manner. This worked as a significant incentive that encourages live release of endangered bycaught/target species, reporting and improves coordination with monitoring staff.

Improved communication and enhanced access to real-time information significantly increased safety at sea. Notably, for the first time in Bangladesh under this type of initiative, a rescue mission was successfully conducted using the installed communication devices. This demonstrated the practical effectiveness of the technology in emergency response situations and strengthened confidence among stakeholders. Fishing communities expressed strong interest in adopting additional devices after directly observing their benefits. The intervention also contributed to improved release behavior and strengthened self-regulation capacity, as reflected in the growing willingness of fishers to comply with safety guidelines and sustainable fishing practices. The project placed strong emphasis on capacity building to ensure effective management and maintenance of the technological devices. Training sessions enhanced users' technical skills, enabling fishers and boat owners to independently operate and troubleshoot the equipment with the help of the technical manager at the port. Access to market information, capacity to be connected with the port improved decision-making processes, allowing fishers to better plan fishing trips, reduce risks, and optimize economic returns. The availability of timely and reliable information reduced uncertainty and improved operational efficiency. Furthermore, the initiative contributed to trust-building among boat owners and fishers. Transparent communication, shared access to information, and collective problem-solving strengthened collaboration within fishing communities and enhanced overall governance practices at the pilot level.

Human Rights Dimensions: Access to Safety and Information for Marginalized Communities

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Improved Willingness and Practice of Live Release for Endangered Sharks and Rays

The project contributed to an improvement in both the willingness and actual practice of live release of threatened sharks and rays caught as bycatch. Through trust-building, co-ownership of the solution designed, bi-lateral education and discussion sessions, real-time communication, and strengthened self-regulation within fishing communities, fishers demonstrated increased compliance with conservation guidelines and a stronger empathetic behavior towards these species. Improved live release behavior plays a critical role in advancing sustainable fisheries management. Sharks and rays are generally slow-growing, late-maturing species with low reproductive rates, making them particularly vulnerable to overexploitation. The survival of incidentally caught individuals—when released alive and handled properly—can significantly reduce fishing-related mortality. This directly supports the recovery and stabilization of threatened populations. Reducing mortality of bycatch species contributes to maintaining ecological balance in marine ecosystems. Many shark and ray species function as apex or meso-predators, regulating prey populations and helping maintain healthy trophic structures. Their conservation therefore supports broader ecosystem resilience, which in turn sustains long-term fish productivity.

The project's focus on self-regulation and responsible fishing practices also can strengthen long-term economic sustainability If scaled. Healthier marine ecosystems lead to more stable target fish stocks, reducing the risk of stock collapse and supporting consistent livelihoods for fishing communities. By aligning conservation practices with livelihood security, the initiative demonstrates that biodiversity protection and economic resilience can be mutually reinforcing. Overall, improved live release behavior enhances compliance with national conservation regulations, supports sustainable fisheries management objectives, and contributes to the recovery of vulnerable bycatch species populations, ensuring long-term ecological and socio-economic benefits.

Data Sharing and Co-Ownership of Data

The project promoted transparent data sharing and community co-ownership of data as a core governance principle. Fishing communities were not treated merely as data providers; instead, they were recognized as active stakeholders with shared rights and responsibilities over the information generated through the project. Data collected through communication devices—including safety alerts, fishing effort, bycatch observations, and live release practices—are regularly systematically shared with participating fishers. This transparency strengthened trust, improved accountability, and encouraged evidence-based decision-making at the community level. At scale this can improve-

Co-ownership of data enhanced local empowerment. By having access to their own operational and conservation-related data, fishers were able to:

- Monitor safety incidents and response effectiveness
- Track improvements in live release behavior
- Make informed decisions based on weather and market trends
- Engage more confidently in discussions with authorities and market actors

This approach also indicated towards reduced power imbalances that often exist when external actors exclusively control information. Ensuring that communities could access, understand, and use their own data strengthened their agency and participation in fisheries governance processes. Furthermore, shared data systems encouraged collective responsibility for sustainable practices. When communities could see aggregated trends—such as reductions in bycatch mortality or improved compliance—they were more motivated to maintain responsible fishing behaviors.

Overall, the project's emphasis on data transparency and co-ownership contributed to improved governance, stronger trust among stakeholders, enhanced accountability, and more sustainable management of marine resources.

What the Hermes device enables

1) Provides reliable long-range voice communication for offshore coordination, 2) Enables structured text and voice-based messaging between boats and the project office, 3) Displays real-time vessel position through onboard GPS mapping, 4) allows onboard data sharing and 5) Allows continuous monitoring and recording of boat movement patterns

Item	Description
Intervention	Hermes communication + tracking devices embedded in an incentive package
Number of boats equipped	10 artisanal wooden boats
Core signals captured	GPS track, communications, incident alerts, release logs
Primary conservation aim	Increase verified live release of protected/at-risk species; reduce harmful bycatch outcomes
Operational aim	Improve safety at sea and coordination with office and peer boats
Reporting period	Insert deployment start date and monitoring window

1. Project Overview

Artisanal fishing boats operating in offshore waters often face significant communication limitations due to the absence of reliable mobile or internet network coverage. This lack of connectivity creates operational challenges related to safety, coordination and emergency response. It also limits the ability of fishers to communicate incidents such as the capture of endangered or at-risk marine species.

At the same time, incidental capture of vulnerable species including sharks, rays, guitarfish, dolphins, and sea turtles remains a conservation concern in small-scale fisheries. Fishers typically receive limited practical support or incentives that encourage live release behavior.

Implementation Scope

Hermes devices were installed on artisanal wooden fishing boats operating in communication-limited offshore environments. Each device provides:

1. Long-range voice communication capability
2. Text-based message exchange
3. Real-time GPS position display
4. Boat movement monitoring

Fishers received orientation on device usage and engagement expectations associated with the incentive provision.

Operational Exchange Logic

The project is structured around mutual benefit:

1. Support Provided to Fishers

a) Enhanced communication access offshore
b) Improved navigation awareness
c) Increased coordination capability
d) Safety and monitoring support
e) Access to information

2. Encouraged Behavior

a) Voluntary live release of vulnerable species
b) Communication of release actions when feasible
c) Community self-regulation and improved decision-making capacity

This cooperative model positions the Hermes device as a support tool rather than an enforcement mechanism, promoting trust-based engagement.

Scope and participants

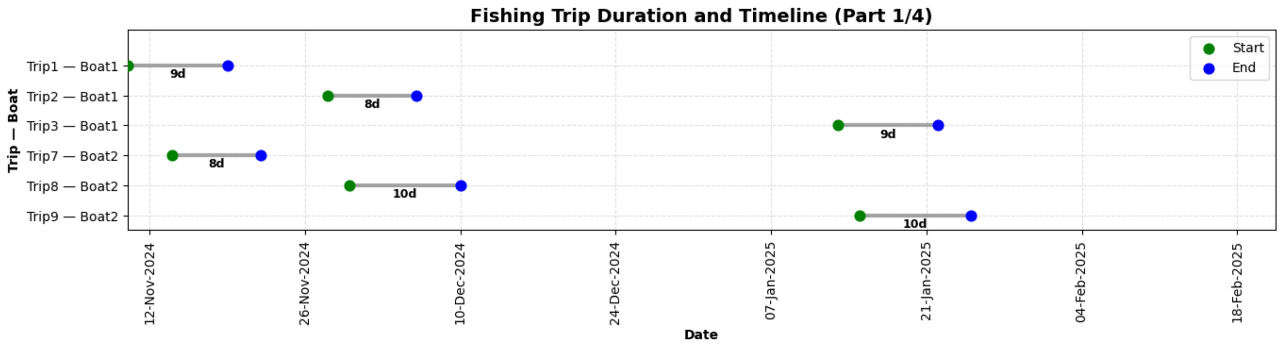
The intervention equips 10 artisanal wooden boats (using different type of fishing gear) with Hermes devices. The rollout began in November 2024 when the first Hermes device was installed and activated on an initial pilot boat. Following an initial implementation and learning phase, the programme expanded. Approximately four months later an additional eight boats were equipped with Hermes devices, extending coverage across the participating fleet. This phased installation approach allowed for system testing, refinement of communication protocols, and incorporation of early lessons before scaling deployment. This marked the operational start of the communication and monitoring system. The project office establishes a monitoring desk to receive and triage messages, validate conservation events, and provide feedback to fishers. A peer-boat relay mechanism supports coordination when direct connectivity is constrained.

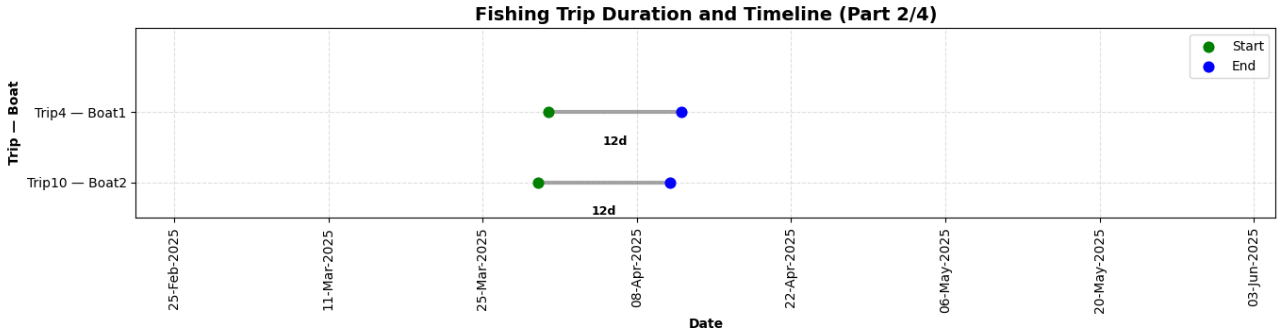
Theory of change

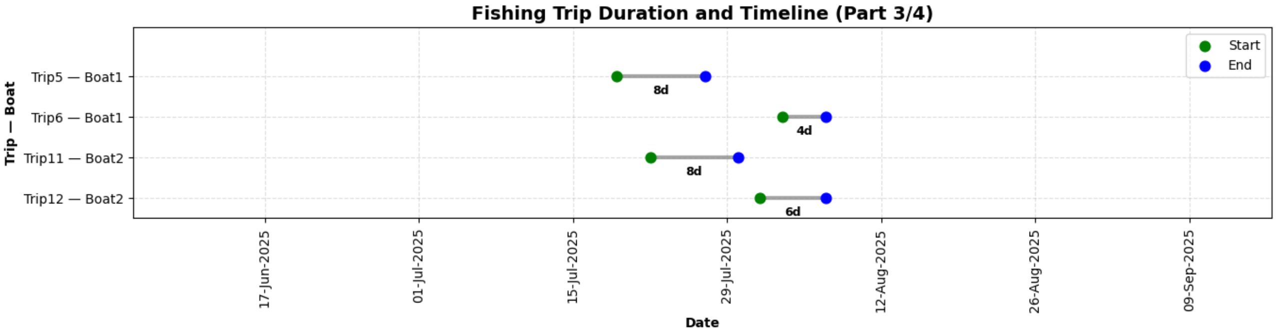
Theory of Change (indicative)

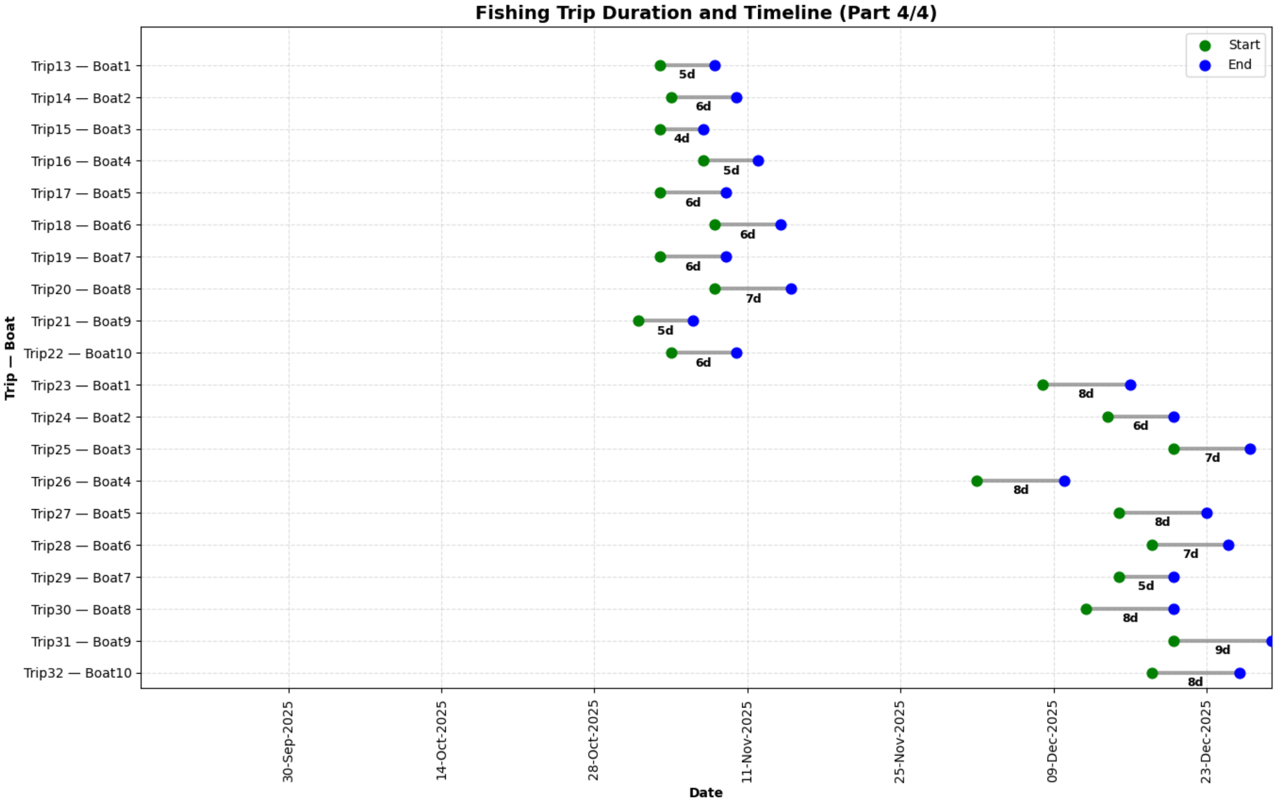
Fishing Trip Duration

Fishing trip timing and duration were visualized using timeline charts that display departure and return dates for each participating boat. Each trip is represented as a continuous line between start and end points allowing clear observation of operational scheduling and time spent at sea. The timeline highlights variation in trip length and clustering of fishing activity across the monitoring period. Understanding when and how long boats operate offshore provides essential context for interpreting communication engagement through Hermes devices, assessing exposure to potential encounters with vulnerable marine species and evaluating overall participation in the initiative.






Fishing Trip Duration and Timeline (Part 3/4)
Start
End
Trip5 — Boat1
Trip6 — Boat1
Trip11 — Boat2
Trip12 — Boat2
8d
4d
8d
6d
Trip — Boat
17-Jun-2025
01-Jul-2025
15-Jul-2025
29-Jul-2025
12-Aug-2025
26-Aug-2025
09-Sep-2025
Date


Fishing Trip Duration and Timeline (Part 4/4)
Start
End
Trip13 — Boat1
Trip14 — Boat2
Trip15 — Boat3
Trip16 — Boat4
Trip17 — Boat5
Trip18 — Boat6
Trip19 — Boat7
Trip20 — Boat8
Trip21 — Boat9
Trip22 — Boat10
Trip23 — Boat1
Trip24 — Boat2
Trip25 — Boat3
Trip26 — Boat4
Trip27 — Boat5
Trip28 — Boat6
Trip29 — Boat7
Trip30 — Boat8
Trip31 — Boat9
Trip32 — Boat10
5d
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6d
8d
6d
7d
8d
8d
7d
5d
8d
9d
8d
Trip — Boat
30-Sep-2025
14-Oct-2025
28-Oct-2025
11-Nov-2025
25-Nov-2025
09-Dec-2025
23-Dec-2025
Date

2. Technology & Innovation: The Hermes Device

Hermes is a rugged maritime communication and tracking unit that supports voice, two-way messaging (direct and relay), GPS tracking, incident alerts and device logs. The integration is designed for use on artisanal vessels, with minimal operator burden and standardized message categories for monitoring.

Installation Process

1. Receiver Station Setup

The receiver station was constructed with a dipole antenna designed in an upside-down "V" shape ensuring efficient signal coverage and space optimization. The detailed steps for the setup were as follows:

Design and Structure:

The antenna's structure was installed on the rooftop with the center point elevated at 3 meters (9.84 feet) and two ends positioned at 1.5 meters (4.92 feet) above the rooftop surface. This design was chosen to maximize signal performance while maintaining stability.

Hermes radio device with Microphone and GPS

Materials Used:

Radials: 2.5 mm copper electrical wires were selected for the radials each precisely cut into 8-meter lengths (two wires in total for the dipole antenna).
Electrical Terminals: Copper wires were soldered to electrical ring terminals at one end to securely connect to the center of the dipole antenna.
PVC Isolators: PVC pipes, cut into 20 cm lengths with drilled holes at both ends were used as isolators to maintain separation between the radials.
Support Structure: The antenna's center was supported by a 9-foot angle joint and a 2-inch PVC pipe resulting in a total antenna height of 13 feet.
RF Cables: Used to connect the radio devices to the antenna.
Radio Device: A Hermes radio device was installed as part of the receiver station connected to the antenna. The figure shows the radio device used in the setup. This device serves as the main interface for communication.

Construction Process:

The radials were carefully prepared and soldered to electrical ring terminals for a secure fit which were then attached to the dipole antenna's center point to ensure a stable connection. PVC isolators were placed along the radials to maintain proper spacing and prevent interference while the support structure was assembled by positioning the central 3-meter pole and securing the radials at both ends elevated at 1.5 meters above the rooftop. The Figure provides a visual representation of the receiver station antenna highlighting the inverted "V" design.

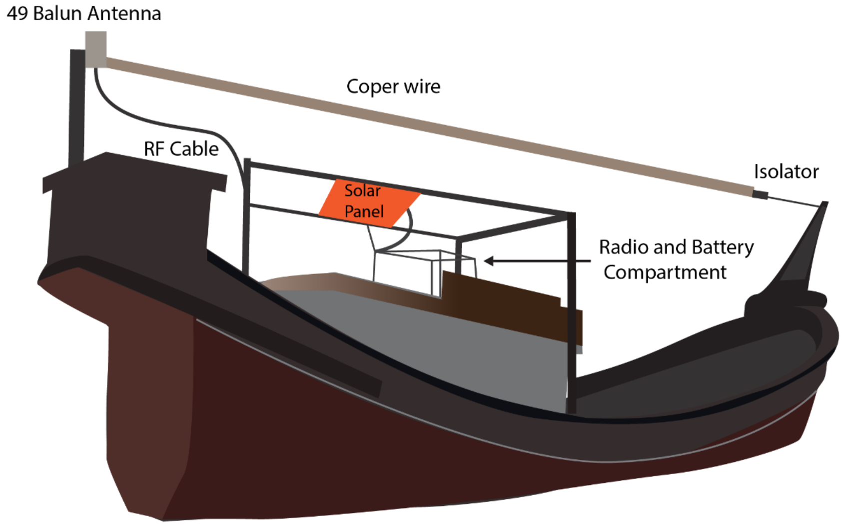
Receiver Station Antenna

Testing and Calibration Test

After assembling the antenna structure a calibration test was conducted to ensure optimal signal performance. This process involved connecting the RF cable to the antenna to measure the SWR (Standing Wave Ratio) value. Achieving an SWR value close to but not less than 1 was critical for efficient signal transmission and minimal power loss. Once the calibration was completed the RF cable was securely connected to the radio device and the device was linked to an ethernet internet connection to enable advanced communication features. Before turning on the radio device it was ensured that the antenna connection was properly secured.

2. Installation steps on each boat

The radio devices were installed on artisanal wooden fishing boats designed specifically to match the boats shape and operational requirements.



Installation of the Hermes communication device within the structural layout of an artisanal fishing boat

Boat Assessment and Preparation

The installation setup was designed for artisanal wooden fishing boats commonly used in fishing practices. These boats as shown in Figure below feature a robust wooden structure and are well-suited for fishing operations in coastal and offshore waters. Each boat measuring 44 to 56 feet in length was assessed to determine the optimal location for mounting the radio device and antenna. Care was taken to select positions where the radio devices would remain protected from water exposure such as rain and would be stable even when the boats leaned at sea. This ensured that the radio device was both accessible to the operator and securely installed.

Installation setup on Boat

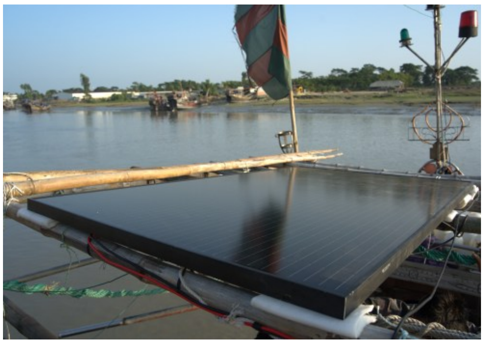
Antenna Installation

The monopole antennas made of copper wire were installed with lengths ranging from 15 to 16 meters depending on the size of the boat and frequency range that we used. The antenna was attached to the highest point at the stern of the boat to ensure optimal signal reception as shown in Figure- 4 below. The antenna wire was then carefully dragged and connected to an isolator which was tightly secured with a rope at the bow of the boat.

Overview of Antenna Setup – Antenna (Middle), Attached to Stern (Left) and Bow (Right)

Power System Setup

Solar panels were installed as the primary power source to charge the onboard batteries. The power system was further enhanced with electric lines that included fuses and a voltage controller to regulate the energy supplied to the radio device. The radio devices were configured to operate at the ideal voltage of 12V with a permissible range of 11V to 14V for flexibility but maintained at 12V for optimal performance.



Power System: Setup On Boat (left) and Solar Panel (Right)

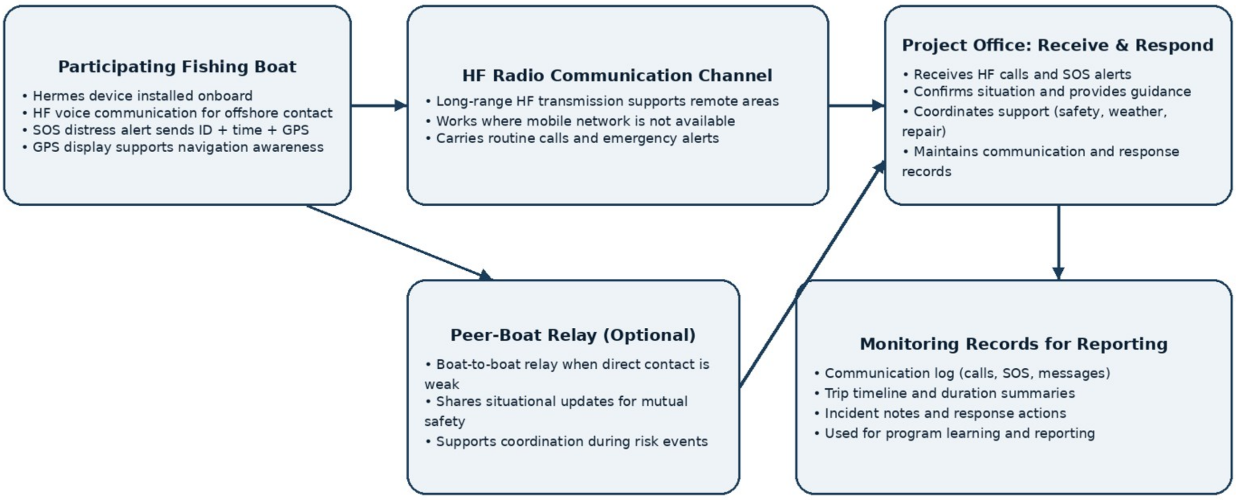
GPS Integration

GPS modules were connected to the radio devices to enable real-time location tracking for the boats while at sea. This integration provided critical safety measures ensuring that the boats' positions could be monitored accurately during their trips.

Frequency Configuration

The radio devices were configured to operate on the HF frequency of 8.758 kHz enabling reliable long-range communication. This frequency was chosen to support efficient signal transmission across vast distances.

System architecture



Hermes-enabled communication and coordination

Data captured (indicative)

Signal	Typical fields
GPS track	Time-stamped geographic coordinates recorded during trips, providing a track of boat movement over time.
Message event	Details of message exchanges including sender and receiver identifiers, message category, time of transmission, and any accompanying text or structured content.
Incident alert	Distress/urgent flag; location; escalation status
Release log	Information gathered through (Species group; condition; evidence type; verification status)
Device health	Operational information describing connectivity state and protective operation modes that help assess device functionality.

Design principle

Standardization is essential: a small set of message categories improves triage, enables consistent metrics and reduces misunderstanding for fishers and the monitoring team.

Installation and onboarding workflow

1. Boat selection and consent; assign a unique boat ID and device ID.
2. Physical installation and basic safety check (power, mounting, water resistance).
3. Short onboard training: message categories, emergency alert (SOS) and reporting process for live release.
4. Test transmission with the office and at least one peer boat; confirm GPS reporting.
5. Issue quick-reference guide (laminated) and record baseline contact details.

Onboard quick reference

This block fills the remaining space on the installation page and can be printed as a quick guide.

MESSAGE TYPE	PURPOSE	TYPICAL SITUATIONS	KEY DETAILS TO SHARE
EMERGENCY ALERT	Immediate safety response	Injury, illness, mechanical failure severe weather, or urgent risk	Boat name, location, situation description
ROUTINE SAFETY CONTACT	Non-urgent safety coordination	Weather clarification, route checks, general wellbeing updates	Current position, request or update
OPERATIONAL COORDINATION	Activity planning and logistics	Meeting points, landing timing, supply coordination	Location, timing, required action
CONSERVATION REPORTING	Environmental engagement	Encounter or live release of sharks, rays, turtles, etc.	Species group, condition, supporting evidence
TECHNICAL ASSISTANCE	Device troubleshooting	Signal loss, battery issue, equipment malfunction	Problem description, device status

3. Community & Fisher Engagement

The project’s effectiveness depends on fisher trust, usability, and a credible verification pathway for conservation events. Engagement combines (i) onboarding and refresher training, (ii) two-way feedback via Hermes communications, and (iii) recognition/incentives tied to verified live-release events.

Fisher interviews and baseline learning

Baseline interviews help the team understand fishing habits, risk perceptions, bycatch awareness, and current handling practices. Findings are used to tailor message categories, training emphasis, and incentive design.

Component	Approach
Objectives	Understand gear use, target species, bycatch frequency, safety incidents, and reporting barriers
Methods	Short survey + semi-structured in-person interviews; optional audio recordings
Sampling	All 10 participating crews; optional interviews with peer boats at landing sites
Outputs	Baseline profile per boat; key themes; practical recommendations for messaging and verification

Training package

Module	Focus
Module 1: Device basics	Power, signal checks, message sending, troubleshooting
Module 2: Safety at sea	Distress alert protocol; situational updates; coordination with peers
Module 3: Bycatch handling	Safe handling and release guidance; what to do for priority species
Module 4: Reporting + evidence	How to log a release event; photo/audio evidence; follow-up calls
Module 5: Incentives and recognition	Verification steps; how incentives are triggered; transparency rules

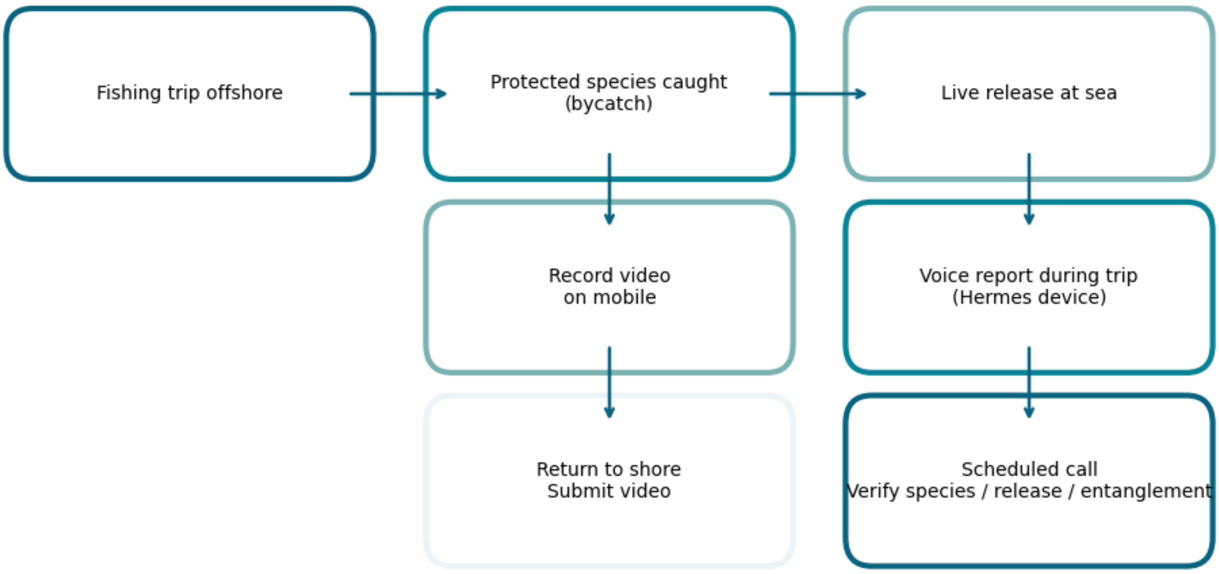
4. Monitoring & Communication Operations

Monitoring operations translate Hermes signals into timely support for fishers and verifiable conservation outcomes. The project office maintains a triage desk with response targets, escalation rules, and a verification pathway for conservation events.

Message categories

Category	Description
Safety – Urgent	Distress, medical emergency, vessel damage; triggers immediate escalation
Safety – Advisory	Weather/route questions, check-ins, non-urgent support
Operations	Logistics, rendezvous/peer coordination, fuel/supplies
Conservation event	Bycatch encounter, live release, request for handling guidance
Device support	Connectivity issues, battery/power, device faults

Live-release workflow



Live-release reporting and incentive workflow

Participation in live-release events was observed across multiple boats rather than being limited to a single operator indicating broader behavioral uptake within the fleet. A total of five live-release events were documented during monitored trips. These included the release of a guitarfish during Trip 1, a turtle during Trip 9, a ray during Trip 18, another guitarfish during Trip 27, and a ray during Trip 31. The events were distributed across different boats and operational periods demonstrating that conservation responses occurred under varying fishing conditions rather than within a single temporal cluster.

Boat ID	Live Release Observed
Boat1	✓
Boat2	✓
Boat3	—
Boat4	—
Boat5	✓
Boat6	✓
Boat7	—
Boat8	—
Boat9	✓
Boat10	—

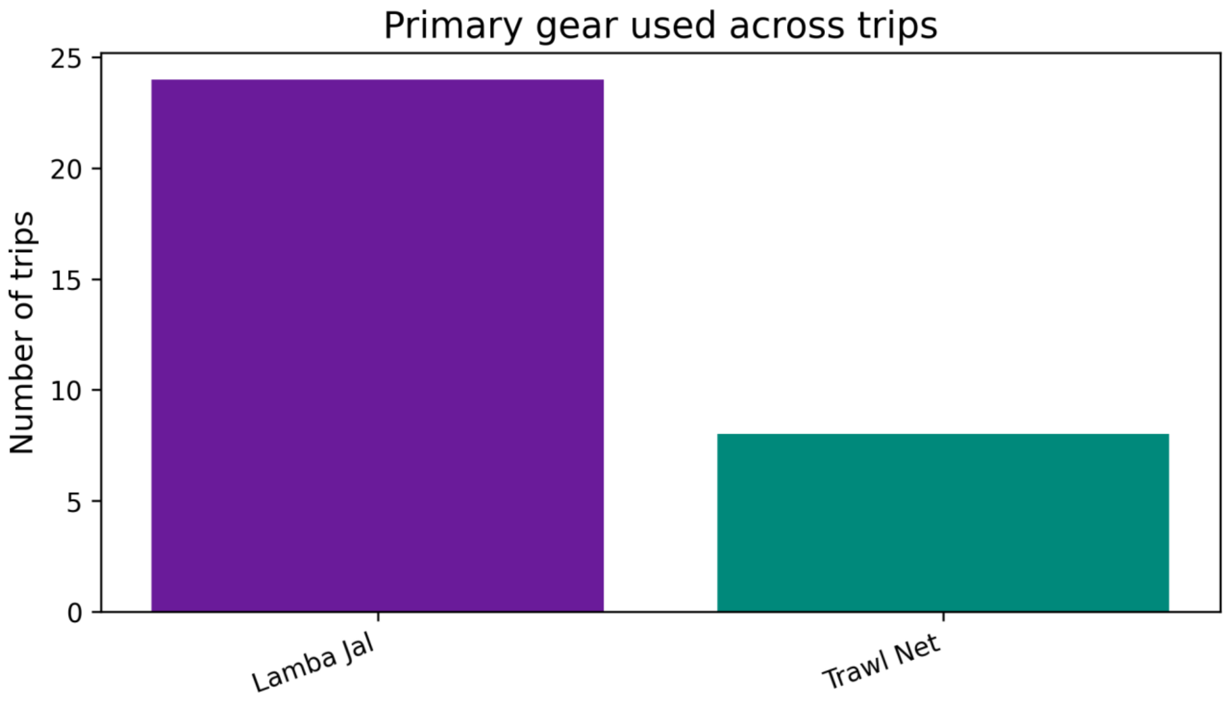
The recorded releases suggest that conservation messaging delivered through communication and engagement activities reached beyond isolated interactions. Although the overall frequency of events remained limited, their distribution demonstrates initial adoption of recommended handling practices among participating crews. This pattern indicates emerging influence of the intervention on fisher decision-making and provides a baseline for evaluating behavioral change as monitoring continues. Watch the live release video here.

Live-release events (Sharks, Rays, Turtle).

5. Results and Observation

1. Fishing gear profile

Across the 32 recorded trips, the primary fishing-gear profile shows a two-gear fishery dominated by Lamba Jal (24/32 trips; 75%), with Trawl Net (8/32 trips; 25%) as the secondary gear type. Lamba Jal operations were consistently reported with a larger mesh size (4 inch), very long net lengths (4–6 km), net width 80 hand and fishing was conducted across a wide depth band (15–75 bam; median 60 bam). Trawl Net trips used a smaller mesh (6 inch, 4.5 inch, 4 inch, 2 inch and 1.5 inch), shorter net length (~120 m), net width ~12 m, and longer soak time (~4/5 hours) and operating in deeper waters (70–80 bam; median 70 bam)



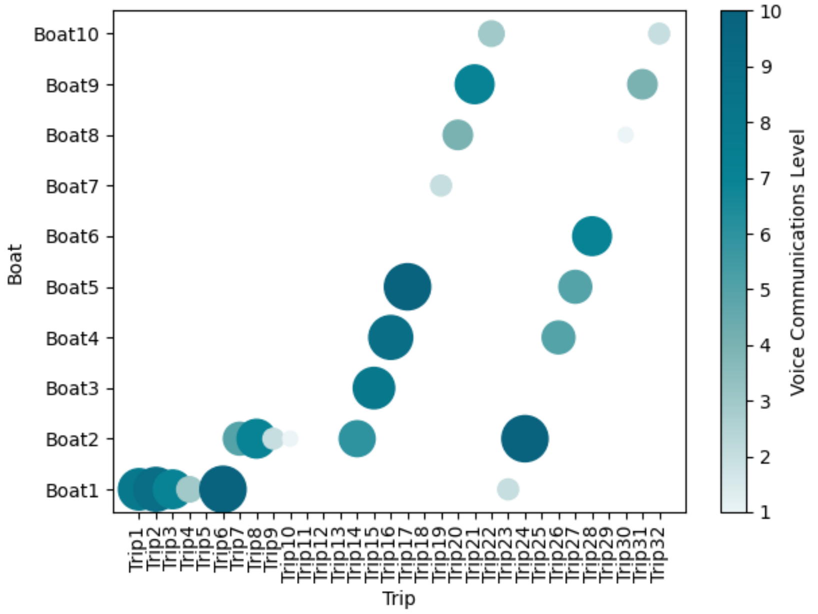
Primary gear distribution across trips

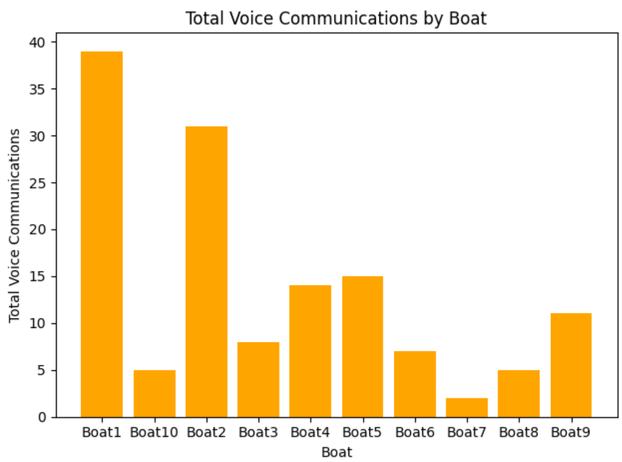
2. Voice Communication Via Hermes Device

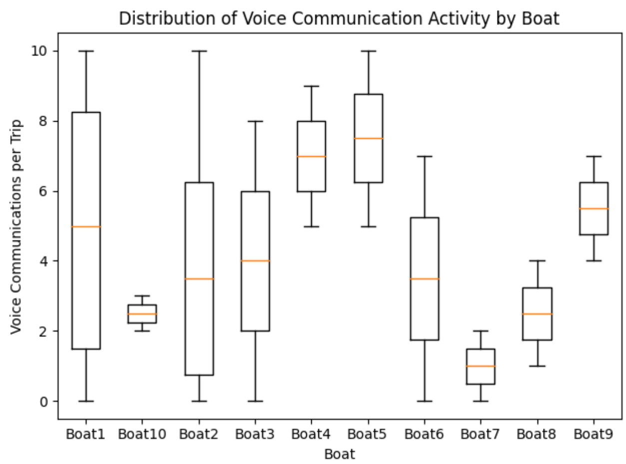
During the implementation period the Hermes communication devices enabled participating boats to maintain voice contact with the project office even when operating far offshore. The longest successful communication exchange was recorded at approximately 186 km demonstrating the practical reach of the system under real fishing conditions. This extended range allowed crews to remain connected for operational updates, safety coordination, and conservation reporting despite the absence of mobile network coverage. Maintaining communication at such distances proved particularly valuable when boats required guidance or needed to report encounters with sensitive species, reinforcing both safety support and responsible fishing engagement. Overall, the recorded communication range reflects the system's capability to provide dependable connectivity in remote marine environments where alternative communication options are limited.

Data note

All figures in this section are illustrative how many times of communication by voice





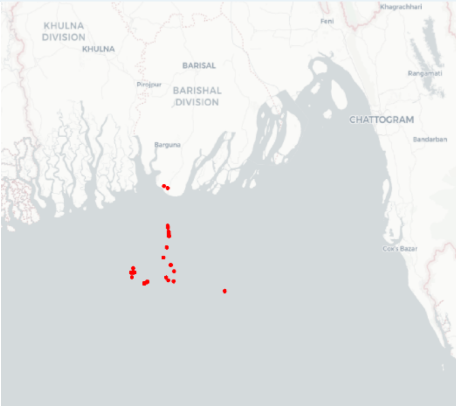


3. GPS Monitoring

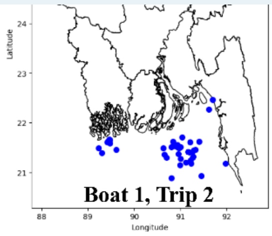
The boat monitoring system was implemented through a two-phase framework designed to progressively develop spatial understanding of fishing activity using GPS-derived movement tracks and map-based visualization. This approach enabled the project to move from basic tracking to structured spatial interpretation while maintaining minimal disruption to fishing operations.

Phase 1 — Mapping Deployment and Baseline Spatial Capture

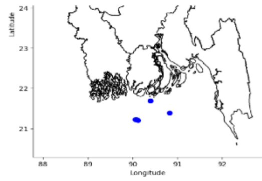
The initial phase focused on deploying Hermes devices and establishing reliable collection of boat position data for map generation. GPS tracks recorded during fishing trips were visualized to produce baseline spatial maps illustrating routes, trip extent, and offshore operating zones. Training and validation activities ensured that tracking data were consistent and accurately reflected vessel movement.



Boat 1, Trip 1



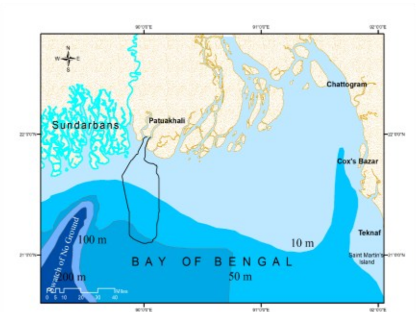
Boat 1, Trip 2



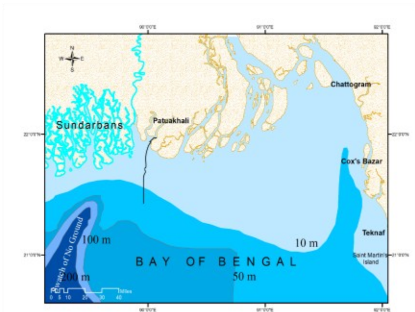
Boat 2, Trip 3

Phase 2 — Spatial Analysis and Interpretive Mapping

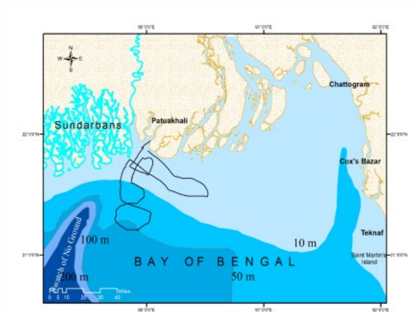
Once stable tracking was achieved, the second phase emphasized analytical use of map outputs. Spatial datasets were aggregated to generate multi-trip visualizations and comparative mapping across boats, supporting operational insight and programme evaluation. Mapping products were used to contextualize communication behavior, safety coordination, and conservation event reporting.



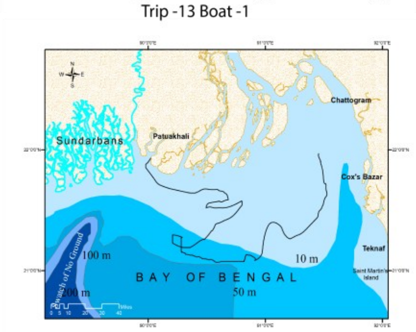
Trip -13 Boat -1



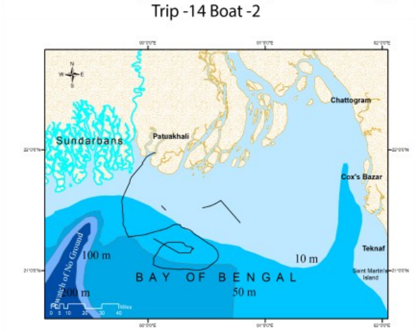
Trip -14 Boat -2



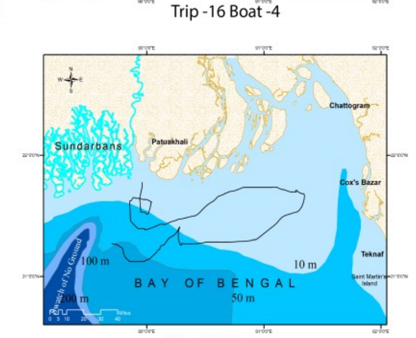
Trip -16 Boat -4



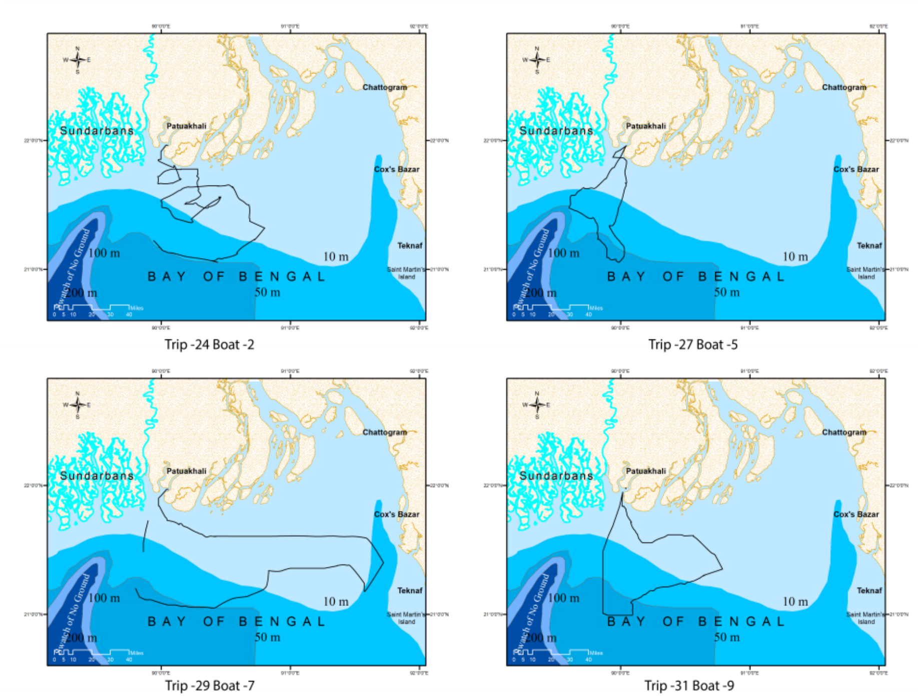
Trip -18 Boat -6



Trip -19 Boat -7

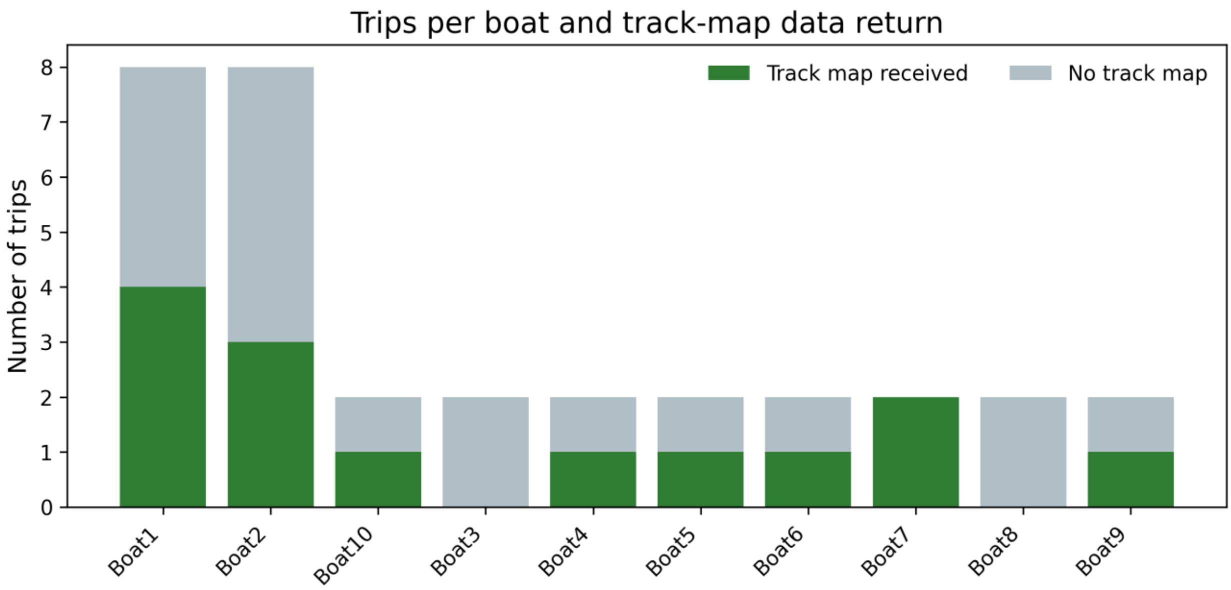


Trip -23 Boat -1

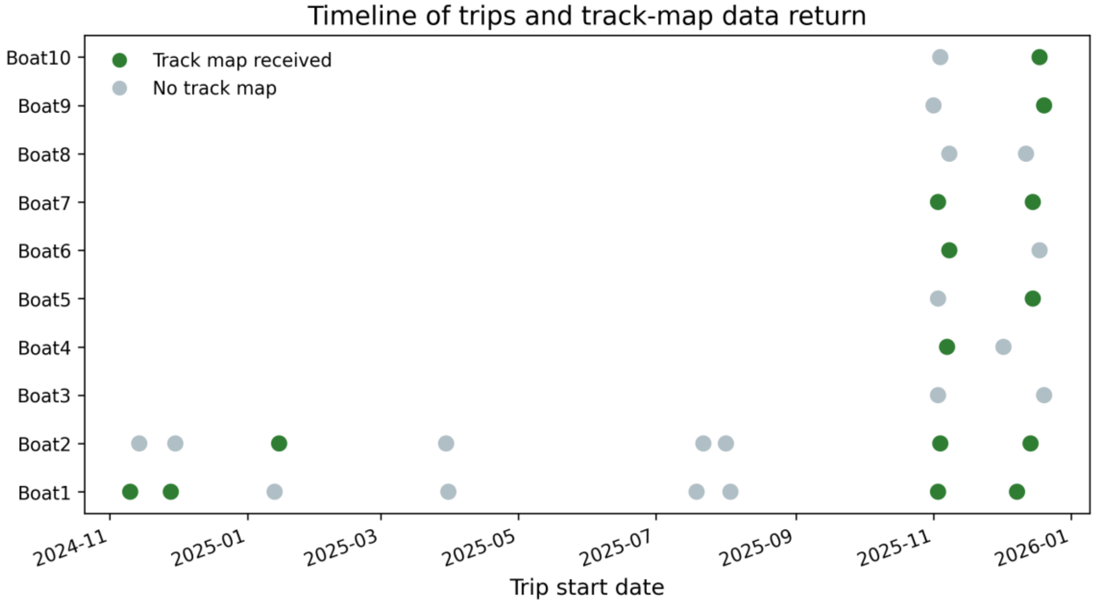


4. Communication device performance: track-map data return

Track-map data were successfully received for 14 of 32 trips (43.8%). Data return varied by boat, suggesting operational or connectivity differences across vessels and time periods.



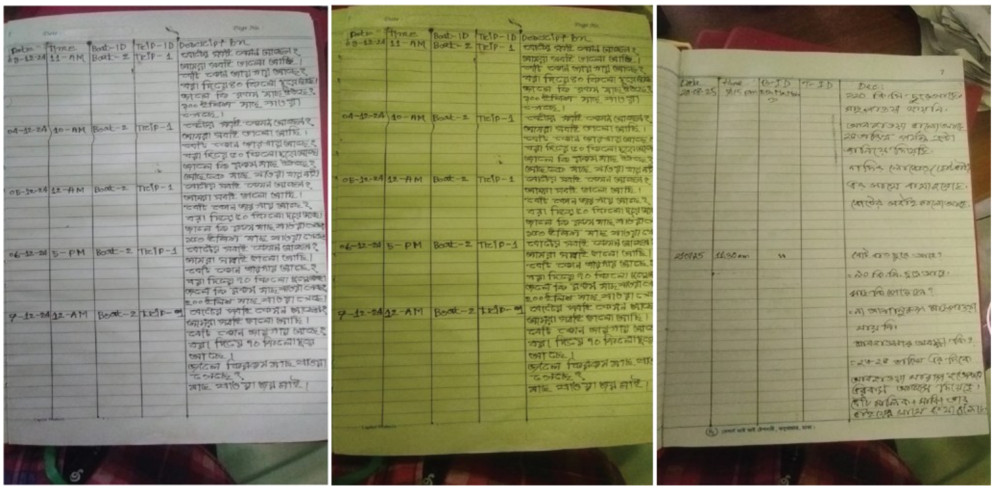
Trips per boat and track-map data return (received vs not received)



Timeline of trips (by start date) showing track-map data return status for each boat

5. Register Book Documentation During Trips

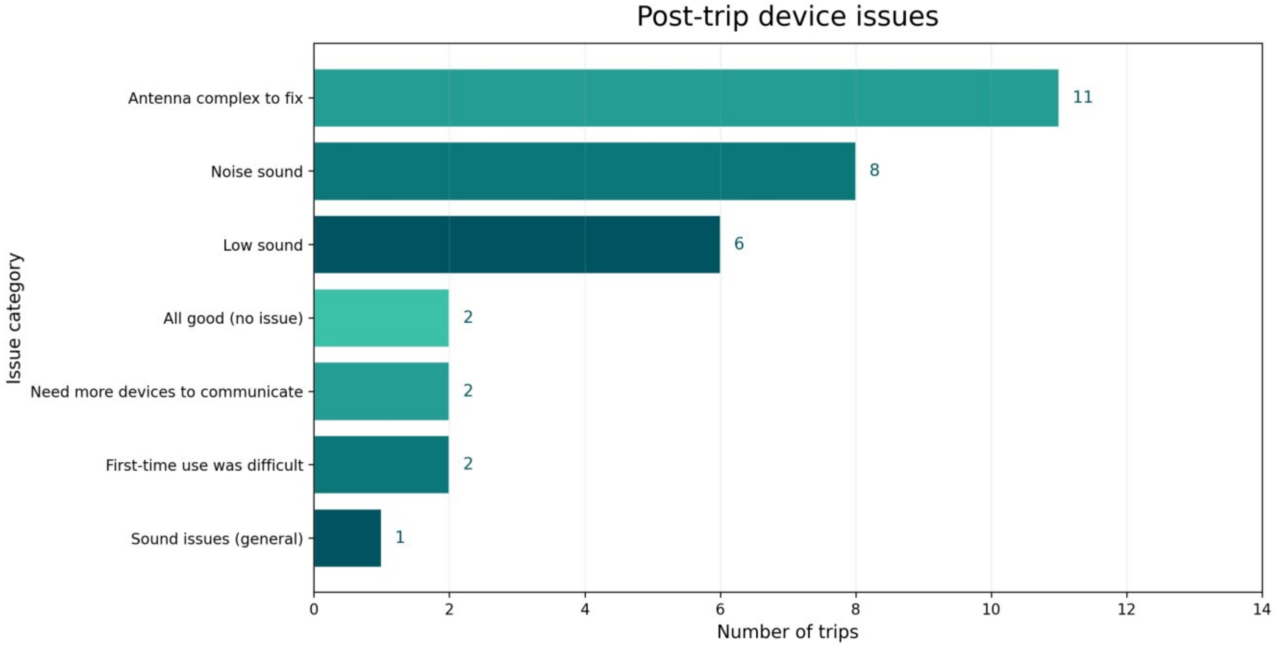
To ensure systematic monitoring and consistent communication with artisanal boats, a register book (logbook) was maintained throughout the trip period. This register was used to document all routine check-ins and operational conversations with the Majhi/crew. During each contact, the team recorded brief but essential updates—such as the crew's wellbeing (e.g., "How are you?"), the boat's current location, intended fishing area, and expected movement (where they are going next). Operational fishing updates were also noted, including when the net was set, whether fish were caught, whether the crew expected catch based on conditions and estimated return time to the ghat. In addition, the register captured weather-related discussions where the team periodically shared or collected information on sea and weather conditions including short-term outlooks (e.g., how conditions may change over the next 1–2 days) to support safer decision-making. A sample of the register book format and example entries are presented below to illustrate the standardized approach used for trip-wise communication documentation.



Sample register book used to document boat communication during trips

6. Post-trip device issues: frequency of reported problems

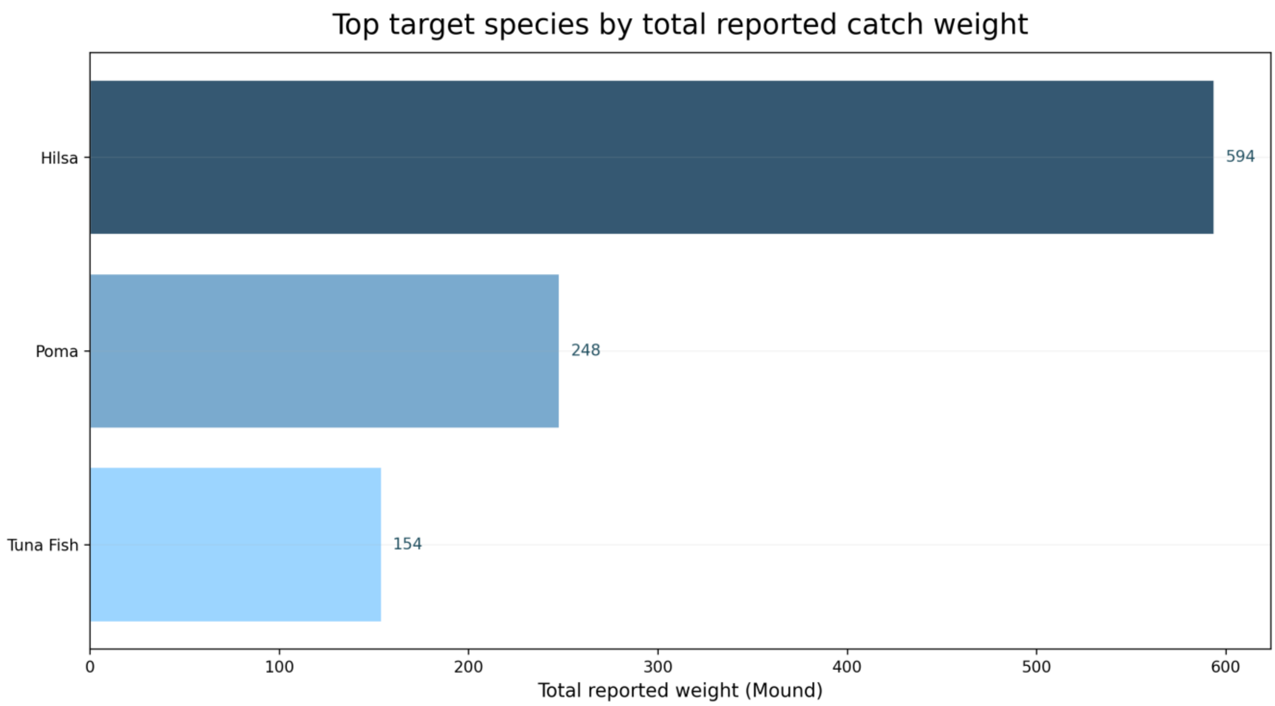
Post-trip feedback across the 32 trips indicates that the main operational barriers were concentrated in antenna handling and audio performance**.** The most frequently reported issue **was** "antenna complex to fix," suggesting that setup/repair steps are not yet user-friendly for routine artisanal operations without hands-on support. Sound-related limitations including low sound and noise sound were also common, which aligns with the practical challenge of communicating clearly in noisy boat environments (e.g., engine room/working deck). Only a small number of trips were recorded as "all good/no issue," and a few responses emphasized the need for more devices to expand communication coverage across crews/boats.



Post-trip device issues

7. Top Target Catch

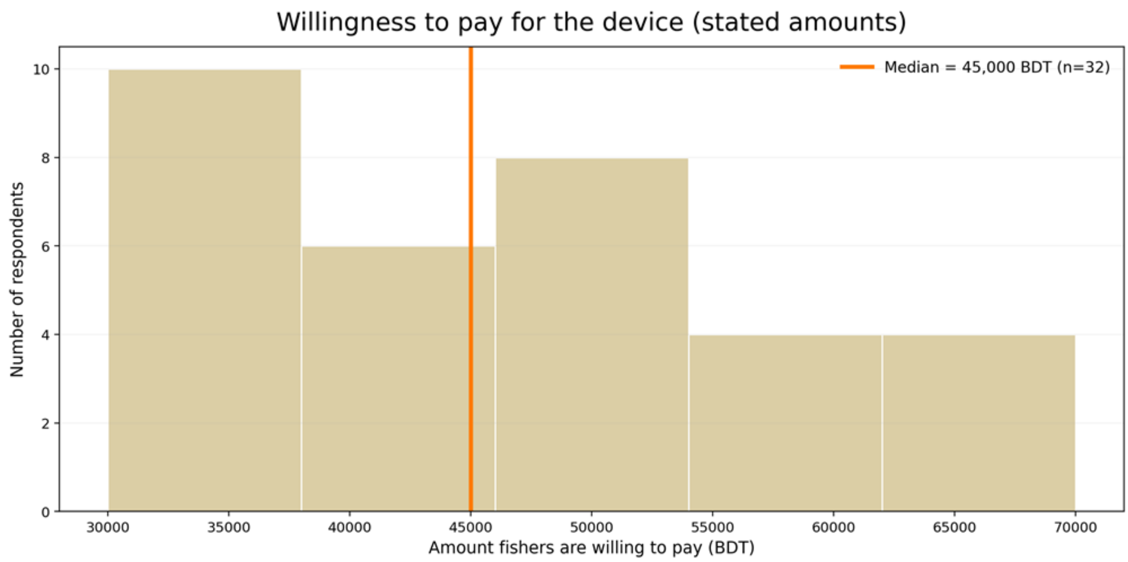
In the Bay of Bengal artisanal fishery records Hilsa (*Tenualosa ilisha*) clearly emerges as the primary target species across trips. The target-catch listings show that fishers consistently prioritized Hilsa over other species, reflecting its dominant role in local livelihoods and market demand in the coastal fishing system. While multiple fish types were reported as targets, the overall pattern indicates a Hilsa-centered fishery, with other species appearing as secondary or opportunistic targets depending on season, fishing ground and gear use. In the target-catch records (weights reported in Mound), fishers reported three dominant target species indicating that the catch profile during the monitored trips was concentrated in a small number of high-volume taxa. Across all filled target-species entries (n = 75), Hilsa contributed the largest total reported catch (594 Mound; 59.6% of total), followed by Poma (248 Mound; 24.9%) and Tuna fish (154 Mound; 15.5%). Hilsa was also the most frequently listed target species (32 entries), Poma (22) and Tuna fish (21) reported at similar frequencies suggesting consistent targeting of these species across trips.



Top target species by total reported weight (Unit in this dataset is recorded as Mound)

8. User acceptance and willingness to pay

All respondents reported that the Hermes Radio was beneficial (100%), and all stated willingness to pay for the device in the future (100%). Stated willingness-to-pay ranged from 30,000 to 70,000 BDT (median 45,000 BDT). The most consistent improvement request was to increase the number of available devices.



Willingness to pay (BDT). Bars show frequency; orange line shows the median

Emergency Communication and Assistance Coordination

Case Illustration: Coordinated Rescue Enabled by Offshore Communication

The images below document a significant operational incident that demonstrates the practical value of the communication system in remote marine environments. During a routine fishing trip, a participating vessel experienced severe engine damage in offshore waters beyond the reach of mobile network and internet connectivity. With no conventional means of contacting shore or nearby boats, the crew—comprising 14–15 fishers—faced a potentially life-threatening situation. Drifting at sea without propulsion placed them at high risk, particularly given unpredictable weather and sea conditions. Using the Hermes communication device installed under the project, the crew was able to establish immediate voice contact with the project office and nearby participating vessels. They clearly communicated their situation and transmitted their location details. This real-time communication triggered a coordinated response. Upon receiving the distress call, the fishing community mobilized quickly. A second equipped vessel arranged by fellow fishers set out toward the reported coordinates to provide assistance. Members of the research team accompanied the rescue vessel to monitor the response and ensure safe coordination. Through boat-to-boat communication enabled by the system, the teams maintained continuous contact until they reached the stranded crew. All 14–15 fishers were successfully rescued and returned safely. The incident demonstrated not only the technical effectiveness of the communication system but also the strengthened solidarity and collective response capacity within the fishing community.

Importantly, the experience had a lasting social and behavioural impact. Deeply aware that timely assistance had saved their lives, the rescued fishers publicly pledged to practice live release of all threatened shark and ray species encountered as bycatch. This commitment reflected a strengthened sense of stewardship and reciprocity—recognizing that improved safety, shared information, and responsible fishing practices are interconnected.

This incident highlights how reliable offshore communication can:

- Facilitate rapid emergency response in areas without connectivity
- Reduce isolation risks for small-scale fishers
- Strengthen trust and cooperation among crews
- Reinforce conservation commitments alongside livelihood security

The rescue serves as a powerful example of how technology, community cohesion, and conservation goals can converge to enhance both human safety and marine sustainability.

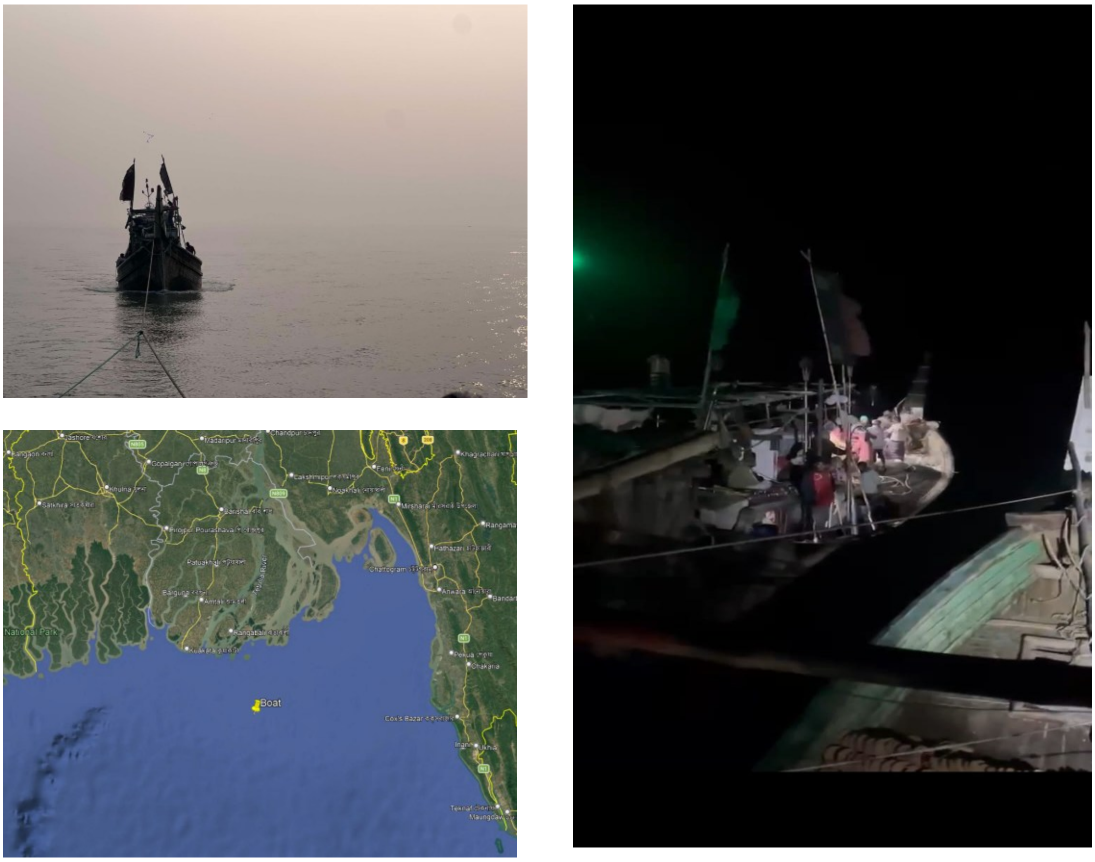


Figure 1: Documentation of an offshore engine failure (left) and coordinated assistance by a nearby participating boat (right) following communication established through the Hermes device.

6. Challenges & Lessons Learned

Implementation in artisanal contexts requires pragmatic solutions for connectivity limitations, device durability, and trust. The table below summarizes common risks and mitigation actions.

Risk and mitigation matrix

Risk	Implication	Mitigation
Signal coverage gaps	Messages delayed or not delivered	Use peer-boat relay; schedule check-ins; consider hybrid network options
Device maintenance	Antenna fix, water damage, mounting failure	Preventive checks; spare parts; simple troubleshooting guide
Trust and acceptance	Low reporting due to fear/mistrust	Transparent incentive rules; feedback loop; community focal points
Verification burden	Office overwhelmed during peak seasons	Triage rules; sampling approach; automate dashboard flags

Challenges and Requirements for Scaling Up

While the pilot phase has demonstrated strong results, scaling up the initiative will require addressing several structural and institutional challenges.

1. Government Engagement and Regulatory Facilitation

Obtaining individual permits for communication devices and related operational approvals can be complex and time-consuming, particularly when relevant government authorities are not directly engaged in the scaling process. Regulatory alignment and formal government involvement will be critical to streamline permitting procedures, reduce administrative barriers, and ensure long-term institutional support. Early coordination with relevant departments can facilitate smoother expansion and policy integration.

2. Dedicated Facilitators for Community-Level Implementation

Scaling up will require trained, dedicated facilitators at the community level. These facilitators would support device installation, capacity building, troubleshooting, data management, and compliance monitoring. Continuous engagement is essential to maintain momentum, ensure proper use of technology, and strengthen self-regulation and conservation commitments within fishing communities.

3. Initial Seed Funding for Large-Scale Deployment

Expanding the initiative to a larger fleet requires substantial upfront investment. Initial seed funding is necessary to cover:

- Procurement and installation of communication devices
- Training and capacity-building programs
- Monitoring and evaluation systems
- Technical maintenance and support
- Data management infrastructure

Seed funding is particularly important in small-scale fisheries contexts, where individual fishers often lack the financial capacity to invest in new technologies independently. Early-stage financial support can catalyze adoption, demonstrate value at scale, and eventually create pathways for cost-sharing or co-financing models.

Addressing these enabling conditions—government partnership, facilitation capacity, and catalytic funding—will be essential to ensure sustainable and equitable scaling of the intervention.

7. Recommendations & Scale-Up Roadmap

Scaling the Hermes model requires disciplined operations, clear governance for incentives and a data workflow that produces actionable insights without overburdening fishers or staff.

Scale-up principles

a. Maintain a limited and consistent set of communication categories, adjusting only after a defined learning or evaluation cycle to preserve clarity and usability.
b. Ensure a clear separation between safety coordination and incentive verification functions**,** preventing operational conflicts and supporting credibility among participants.
c. Apply a transparent and standardized verification framework for live-release reporting that combines submitted evidence, follow-up communication, and contextual plausibility checks.
d. Monitor device uptime and connectivity performance to support fair interpretation of communication behaviour and operational comparisons across boats.
e. Provide regular feedback to participating fishers, such as concise monthly summaries highlighting observations, lessons learned and positive actions taken

Phased roadmap

Phase	Focus
Phase 1 (0–2 months)	Focus on stabilizing device installation, communication protocols, and response procedures. Establish baseline engagement understanding through initial interviews and pilot the verification approach for conservation events.
Phase 2 (3–6 months)	Introduce monitoring indicators through simple dashboards, implement structured feedback cycles with fishers, refine incentive mechanisms, and establish routine preventive maintenance schedules.
Phase 3 (6–12 months)	Extend deployment to additional boats or locations while incorporating spatial or map-based analytical tools. Formalize governance structures, reporting processes, and operational documentation.
Phase 4 (12+ months)	Conduct external or independent evaluation, strengthen institutional partnerships, and develop sustainability planning to support long-term continuation and integration of the model.

8. Validation and Future Planning Workshop with Fishers

The Workshop on Technological Solutions for Sustainable Fisheries, held on 20 October 2025 at the Khan Palace Hotel, Kuakata, was designed to explore how emerging technologies can contribute to safer and more sustainable fishing practices among artisanal communities. The primary aim of the workshop was to understand fishers' experiences with three newly introduced devices—mobile phones with mapping and tracking tools, Fish Safe devices equipped with cameras and distress alerts, and Hermes HF Radios that enable long-range communication from the deep sea to shore. Through interactive group discussions, experience sharing, and demonstrations, the workshop sought to uncover how fishers operate these tools in real conditions, how they help maintain safety at sea, and what challenges or limitations exist in their use. Additionally, the sessions focused on identifying opportunities for technological advancement, understanding fishers' expectations and future investment interests, and gathering authentic stories from the sea—how technology is reshaping traditional fishing operations, improving communication, and encouraging the live release of sharks and rays as part of sustainable fisheries management.

Session / Activity	Description	Facilitators / Participants
Opening Session & Introduction	Opening remarks highlighting the purpose of the workshop, introduction to devices (Mobile App, Fish Safe Device, Hermes HF Radio), and discussion of workshop objectives—safety, sustainability, and technological innovation in artisanal fisheries.	*Dr. Alifa Binta Haque* (University of Dhaka)
Group Discussion: Device Usage & Benefits	Participants divided into three groups based on device type to discuss experiences, benefits, challenges, and limitations. Each group reflected on how the technologies supported safety, communication, and sustainable practices.	Group 1 – Hermes HF Radio Users; Group 2 – Fish Safe Device Users; Group 3 – Mobile Phone Users
Fisher Experience Sharing	Selected artisanal fishers shared real-life stories on how they operate these devices, how the technologies assist them at sea, and their perspectives on live release practices and bycatch reduction.	Artisanal fishers
Sawfish Documentary Screening	Short documentary to raise awareness on marine biodiversity, bycatch issues, and the importance of shark and ray conservation.	All participants
Closing Remarks	Concluding reflections emphasizing collaboration, knowledge sharing, and the importance of scaling up technological solutions for sustainable fisheries.	*Dr. M. Niamur Naser* and *Dr. Gawsia Wahidunnessa Chowdhury*
Lunch & Networking	Informal discussions among fishers, researchers, and facilitators to strengthen partnerships and future collaboration.	All participants
Boat and Device Inspection	On-site inspection of fishing boats to observe how the devices are installed, operated, and maintained during real fishing operations.	Workshop facilitators and selected fishers

Type	Number of Fishers	Active
Mobile phone	19	19
Fish safe device	05	00
HF device	10	10

Methodology

The methodology for this workshop was designed to capture diverse perspectives on the use of technological devices in artisanal fishing and their role in promoting sustainability and safety at sea. The workshop was organized into three separate groups, each consisting of fishers who used one of the three types of devices: Mobile Phones, Fish Safe Devices, and Hermes HF Radios. Each group engaged in individual category discussions, where fishers shared their experiences, challenges, and benefits related to the specific technology they were using.

This approach ensured that each device was addressed in depth, allowing facilitators to understand the unique issues associated with each. Following these individual discussions, the fishers participated in a combined Focus Group Discussion (FGD), where they shared collective insights on how the technologies impacted their fishing practices, bycatch reduction, and safety at sea. Additionally, experience-sharing sessions were held, allowing fishers to discuss their personal stories and how they operate these devices in real-world conditions. Finally, a field observation was conducted with a boat inspection, during which facilitators observed the practical use of the devices in fishing operations, assessing their functionality, ease of use, and effectiveness in real-time conditions. This comprehensive approach ensured a well-rounded understanding of the devices' roles and their potential for driving sustainable practices in artisanal fisheries.

Method	Description	Purpose	Tools / Instruments Used
Group Setup	The workshop was conducted with three tables, each representing a group of fishers. Each group consisted of fishers from three categories (Mobile Phone, Fish Safe Device, Hermes HF Radio).	To ensure comprehensive discussions on each technology by category.	Three separate discussion groups
Individual Category Discussions	Each group was asked separately about the specific devices they were using. This involved focused discussions on the Mobile Phone, Fish Safe Device, and Hermes HF Radio.	To capture category-specific feedback on device usage, benefits, challenges, and limitations.	Pre-prepared questionnaire (Bangla/English)
Focus Group Discussions (FGD)	After individual category discussions, the groups came together for a combined FGD to discuss the broader impact of these devices on sustainability and fisher safety.	To explore collective insights on how the devices affect fishing practices, bycatch reduction, and safety at sea.	Notes from facilitators, open-floor sharing
Experience Sharing	Fishers shared personal experiences of how the devices were used in real fishing operations, focusing on their impact on safety and conservation.	To understand real-world applications and challenges faced by fishers in using the devices.	Open-floor sharing session
Field Observations	Boat inspection and device operation assessments were conducted to observe how the technologies functioned in actual fishing settings.	To evaluate the practical use and effectiveness of the devices in real-time fishing operations.	Inspection checklist for boats and devices

The workshop utilized a structured approach to capture comprehensive insights into the use and impact of technological devices in artisanal fisheries. The initial phase focused on understanding the participants' familiarity with the introduced devices. Participants were first asked general introductory questions about the devices they had received from Bengal Elasmo Lab, such as: "What device(s) have you received?" and "How do you use these devices?" These questions were designed to establish a baseline understanding of the technologies being discussed.

In the second phase, the workshop delved into the role of these devices in conservation efforts. Fishers were asked whether they believed the devices could help them engage more actively in conservation activities, with the question: "Do you believe these devices can help fishers engage more in conservation activities? If yes, how?" In addition, participants were asked to assess the effectiveness of the devices in reducing bycatch or improving fishing practices: "How effective are these devices in reducing bycatch or improving fishing practices?" This section aimed to gauge the potential environmental benefits of the technologies.

The third phase explored the technological needs for sustainable fisheries. Participants were asked about additional technologies that could enhance their fishing practices: "What other types of technology or devices would help fishers in making their practices more sustainable?" This was followed by questions regarding the challenges or limitations they faced with the devices: "What are the main challenges or limitations of the current devices and equipment you are using?"

In the fourth phase, the focus shifted to comparing technological vs. non-technological solutions. Fishers were asked to reflect on whether they felt technology like the devices could motivate them more than traditional incentives, such as cash, education, or livelihood support: "Do you think technology like these devices can motivate fishers more than non-technological incentives (e.g., cash, education, livelihood support)? Why or why not?"

The fifth phase examined the impact of the devices on fisher safety and operational efficiency. Fishers were asked if they felt the devices ensured their safety at sea: "Do you think these devices ensure the safety of fishers at sea? If not, what additional safety measures would be required?" Further, they were asked to describe the overall effect these devices had on their safety and fishing efficiency: "In your experience, how have these devices affected the overall safety and efficiency of fishing operations?"

The sixth phase focused on investment and financial considerations. Fishers were asked if they or boat owners would be willing to invest in these technologies: "Would fishers or boat owners be interested in investing in these types of devices in the future?" Additionally, questions were posed to understand what factors might influence investment decisions, such as cost, proven effectiveness, and government support: "What factors would influence fishers or boat owners to invest in these devices?"

The seventh phase gathered insights into government and institutional support. Fishers were asked: "What kind of support would fishers expect from the government in adopting these devices?" This section aimed to capture the level of institutional backing required to scale up the technology.

In the eighth phase, the discussion moved towards challenges and opportunities. Fishers were asked to identify the biggest challenges they face when using technological devices in fishing: "What are the biggest challenges you face when using technological devices in fishing?" They were also asked to highlight the potential opportunities the adoption of these technologies could create in the fisheries sector: "What opportunities do you see arising from the adoption of these technologies in fisheries?"

Findings & Discussions

1. Understanding of the Technological Devices

The workshop revealed that the artisanal fishers in Kuakata were generally familiar with the technological devices provided to them, and they appreciated the potential benefits of each. The Mobile Phone, equipped with GPS and mapping features, was primarily used for tracking fishing paths and identifying fishing zones, allowing fishers to navigate more effectively and avoid overfishing specific areas. The fishers described using the phone to record their fishing routes, which helped them identify optimal fishing zones over time, reducing fuel costs and travel time. In contrast, the Fish Safe Device, which includes a camera and distress signal capability, was valued for enhancing safety during fishing trips. Fishers expressed confidence in using the device to send emergency distress signals and provide visual documentation in case of accidents or mechanical failures. The Hermes HF Radio was particularly significant for communication, especially when fishing in deeper waters far from shore, where there is no mobile network coverage. This device allowed fishers to stay in contact with other boats and the shore team, enabling timely responses in case of emergencies. Many fishers confirmed that the HF radio was a vital tool for long-distance communication, providing a sense of security when venturing farther into the sea.

2. Perception of Devices in Conservation Efforts

The fishers expressed a strong belief that these devices could contribute to marine conservation efforts, particularly in reducing bycatch and improving fishing practices. A key discussion point was the role of the Fish Safe Device in preventing the accidental capture of vulnerable species such as sharks and rays. The device's ability to document the condition of caught species through its camera system helped raise awareness about species protection, encouraging fishers to release these species back into the sea. This aligns with broader conservation goals, such as protecting endangered species and reducing bycatch, which has become a significant environmental concern in the region. Moreover, the Mobile Phone with mapping and tracking capabilities enabled fishers to access fishing zone information, which helped them avoid overfishing certain areas and manage their activities in a more sustainable manner. The data gathered from these devices also provided fishers with a better understanding of the marine ecosystem, enhancing their ability to monitor fish stocks and make informed decisions on where to fish. However, fishers noted that while the devices had potential, the effectiveness of these technologies was sometimes limited by external factors such as poor network connectivity, which could disrupt their functionality during trips in more remote areas.

3. Technological Needs for Sustainable Fisheries

During the discussions, participants identified several areas where additional technological solutions could significantly enhance the sustainability of artisanal fishing. A recurring suggestion was the need for video-enabled GPS devices, which could provide real-time insights into fish stock availability and help fishers locate high-yield fishing zones while minimizing environmental impact. Fishers also advocated for better communication systems between artisanal fishers and industrial trawlers, as the lack of coordination often led to conflicts and damage to fishing nets, especially when trawlers operated in the same waters. One fisher emphasized, "If we could communicate with the industrial trawlers, we could avoid overlapping our fishing areas and reduce the damage to nets caused by large trawl vessels." The need for improved audio clarity in communication devices, particularly in the HF radio, was also raised, as the noise from boat engines often made it difficult to hear radio transmissions. Additionally, fishers expressed an interest in technologies that could help them identify juvenile fish species, such as jatka, to avoid catching them, thus protecting the sustainability of local fish populations.

4. Challenges and Limitations

While the devices showed potential for improving fishing practices and fisher safety, several challenges and limitations were noted by the participants.

- Connectivity and Signal Issues: A significant limitation was the poor network coverage in some of the more remote fishing areas, especially when fishers ventured farther from the shore. The Mobile Phones and Hermes HF Radio devices, which rely on network coverage or radio signals, often failed to function effectively in areas where signal strength was low. This hindered the ability of fishers to communicate during critical moments, such as in emergency situations.
- Device Maintenance: Fishers reported difficulty in maintaining the devices, especially in the harsh marine environment. Saltwater exposure, rain, and rough handling during fishing trips often led to wear and tear of the devices. Many fishers expressed concerns about the high maintenance costs, which made it difficult for them to afford repairs or replacements.
- Training and Technical Support: While fishers were generally enthusiastic about the technology, they expressed the need for better training on how to operate and maintain the devices. The HF Radios, in particular, required some degree of technical knowledge, and fishers noted that lack of training often led to improper use, reducing their effectiveness.
- Cost Barriers: The upfront costs of the devices were a major barrier to adoption. Fishers indicated that while they recognized the long-term benefits of the devices, the initial investment was often prohibitive. Many fishers mentioned that they could only afford the devices with subsidies or financial support from government or NGOs.

5. Investment Willingness and Financial Considerations

Despite the challenges, most fishers expressed a strong interest in investing in these technologies, particularly if financial assistance or subsidies were available. Many fishers stated that they would be willing to invest between BDT 50,000 to 100,000 in devices that could improve their safety and the sustainability of their operations, but only if they were affordable and came with support services for maintenance. Several fishers also noted that while government support in the form of subsidies or low-interest loans would be helpful, they also wanted access to ongoing training programs to ensure proper usage and maintenance of the devices. The willingness to invest was particularly strong among fishers who planned to purchase new boats, as the devices were seen as beneficial for reducing operational costs and improving safety.

6. Safety and Impact on Fishing Operations

The Hermes HF Radio was particularly valued for its safety benefits, as it allowed fishers to communicate over long distances, even when mobile networks were unavailable. Fishers shared that the radio was essential for sending distress signals and contacting shore-based teams during emergencies. It provided a vital communication lifeline, particularly when fishing in deep-sea areas, where fishers are often isolated from immediate help. Fishers emphasized that the radio's ability to relay real-time updates on weather conditions and mechanical issues had made their operations safer. Although the Fish Safe Device and Mobile Phones contributed to safety, they were not as widely perceived as essential tools for long-distance communication. The Fish Safe Device, however, was valuable for emergency situations when fishers were stranded or faced mechanical issues, as it could help them call for assistance without relying on mobile signals.

7. Recommendations and Future Directions

The workshop participants provided several recommendations to improve the effectiveness of the technologies:

- Device Durability: Fishers requested that devices be more rugged and capable of withstanding harsh weather conditions. Many suggested improvements in waterproofing, as the devices often failed due to exposure to saltwater.
- Government Support and Subsidies: There was a strong call for government-backed financial support, such as subsidies, low-interest loans, and subsidized repairs, to make these technologies more accessible to fishers.
- Training and Education: Fishers emphasized the need for training programs to help them understand how to operate, maintain, and repair the devices properly. This would ensure that the technologies' benefits are fully realized.
- Wider Adoption: Fishers suggested that the adoption of these technologies should be scaled up, especially among smaller boats, to ensure that all fishers benefit from the safety, efficiency, and environmental benefits these devices offer.

In conclusion, while the technologies introduced in the workshop showed great promise in enhancing safety, fishing efficiency, and sustainability, addressing the cost, maintenance, and training barriers will be crucial for scaling their adoption. With adequate government support and ongoing improvements, these technologies could significantly contribute to the sustainable development of the artisanal fisheries sector in Bangladesh.

Annex A. Communication Log Template

Use this template to standardize communications captured via Hermes. For digital exports, map each exported field to the columns below.

Date/Time	Boat ID	Direction (In/Out)	Category	Summary	Action taken	Response time	Verified (Y/N)	Notes

Annex B. Live-Release Verification Form

Use this form to document and verify live-release events for incentive processing.

Event date/time	
Boat ID / Device ID	
Location (GPS)	
Species group (if known)	
Condition at release	Alive / injured / uncertain
Evidence provided	Photo / audio / witness / none
Office call-back completed	Yes / No
Verification decision	Verified / Not verified / Pending
Incentive issued	Yes / No (date)
Reviewer	
Notes	

Annex C. Data Dictionary

Indicative data dictionary for Hermes exports. Adjust fields to match the Hermes datasheet/export schema.

Field	Type	Description	Example
boat_id	string	Unique participating boat identifier	B07
device_id	string	Hermes device identifier	HMX-1034
timestamp	datetime	Event timestamp (UTC/local)	2026-01-25 10:30
lat	float	Latitude	21.35
lon	float	Longitude	91.98
msg_category	string	Message taxonomy category	Conservation event

Annex D. Installation & Maintenance Checklist

Checklist to standardize device installation and routine maintenance visits.

Frequency	Checklist items
Installation (Day 0)	Mounting secure; power supply stable; waterproofing confirmed; device ID recorded; test message sent; GPS fix confirmed
Trip wise	Clean connectors; check antenna/receiver; update contact list; refresh training on message categories, Battery/power check; message send/receive test; inspect mounting; review error codes
After incident	Inspect for water ingress; verify logs; replace damaged parts; document corrective action

Annex E. Field Photographic Documentation

Figure E (1): Boat-level consultation conducted to assess installation requirements and discuss appropriate antenna configuration for the Hermes device prior to deployment. (Date: 21 May 2024; Location: Mohipur, Kuakata)

Figure E (2): Antenna construction training conducted at the Center Office, including measurement calibration and preparation of installation schematics for field deployment. (22 May 2024; Center Office, Kuakata)

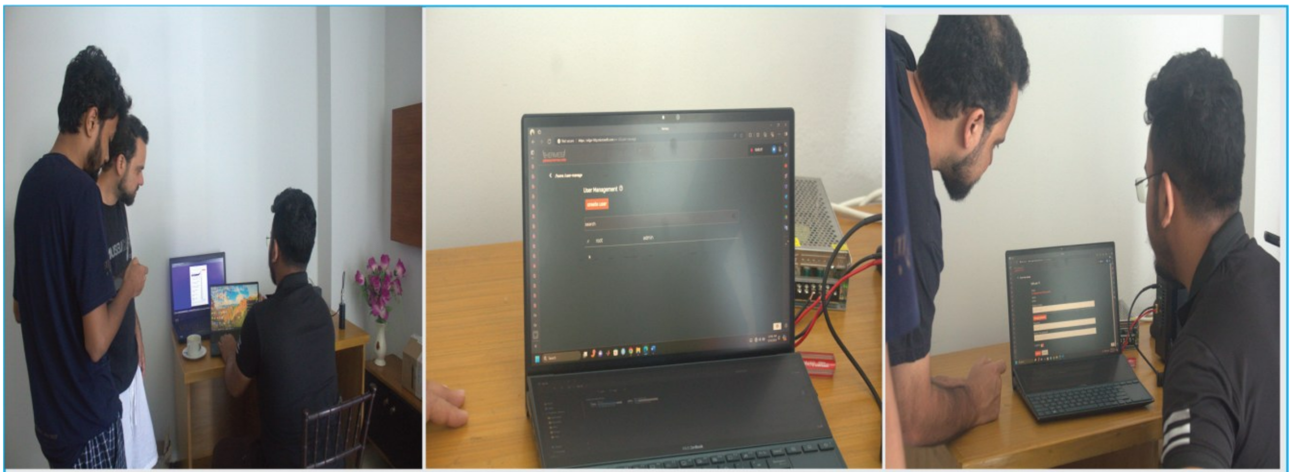


Figure E (3): Hands-on training demonstrating Hermes device interface functions, communication controls and data recording and storage mechanisms. (24 May 2024; Hotel Khan Palace, Kuakata)

Figure E (4): Photograph of the Hermes communication device used for offshore voice communication and boat monitoring within the project

Figure E (5): Antenna installation constructed for the receiver station on the rooftop of the Center Office to support offshore HF communication coverage. (Location: Kuakata)

Figure E (6): Hermes communication units prepared and arranged at the Center Office ahead of phased deployment to participating artisanal boats.

Figure E (7): Real-time two-way voice communication conducted through the Hermes system, illustrating operational interaction between offshore crew and the project monitoring desk.

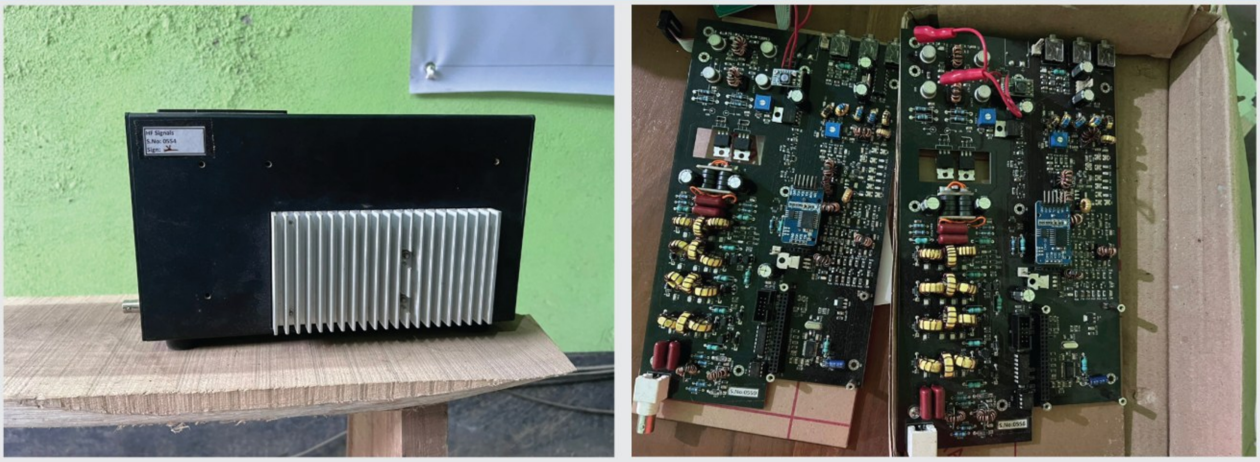


Figure E (8): Internal view of the Hermes communication device showing the integrated electronic circuit board and core hardware components.

Figure E (9): Fishers testing the Hermes immediately after installation, conducting initial voice communication trials to assess functionality and signal clarity.

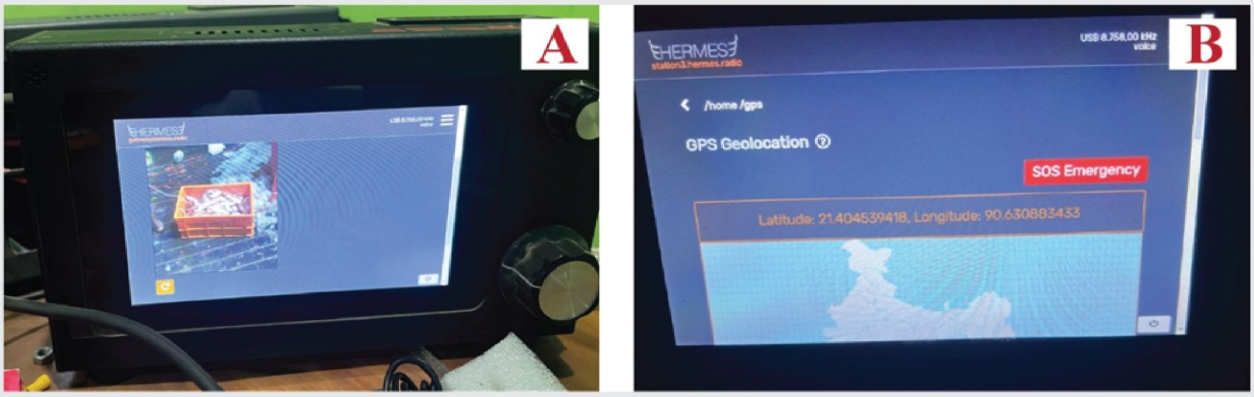


Figure E (10): (A) Image transmitted by fishers through the Hermes device as part of communication reporting. (B) Map-based interface displaying real-time boat location generated from GPS tracking data.

Figure E (11): Solar panel installation onboard a participating boat

Figure E (12): Installation of the power control system onboard the boat, including the voltage controller and MPPT unit, configured to regulate solar energy supply to the Hermes communication device

Figure E (13): Antenna installed on a participating boat to enable long-range HF communication through the Hermes system.

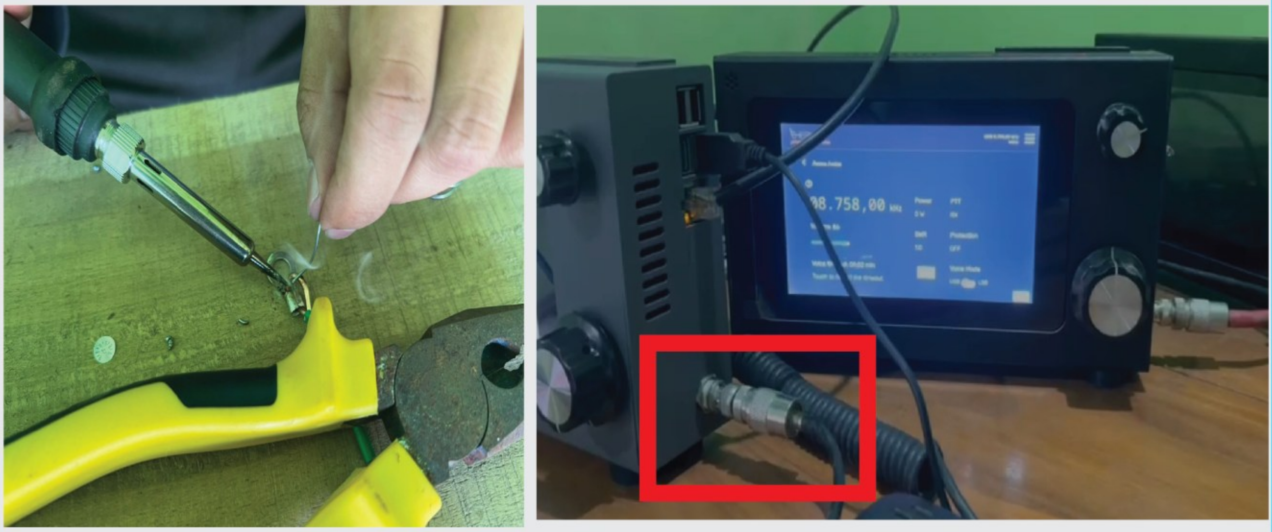


Figure E (14): Antenna assembly process showing soldering of connection points and subsequent integration with the Hermes communication device for operational use

Annex F. Starlink plan and installation options

The pages below summarize the available plan options, hardware configurations, indicative costs, and key operational considerations for maritime use in Bangladesh.

Starlink has basically two internet services available for now:

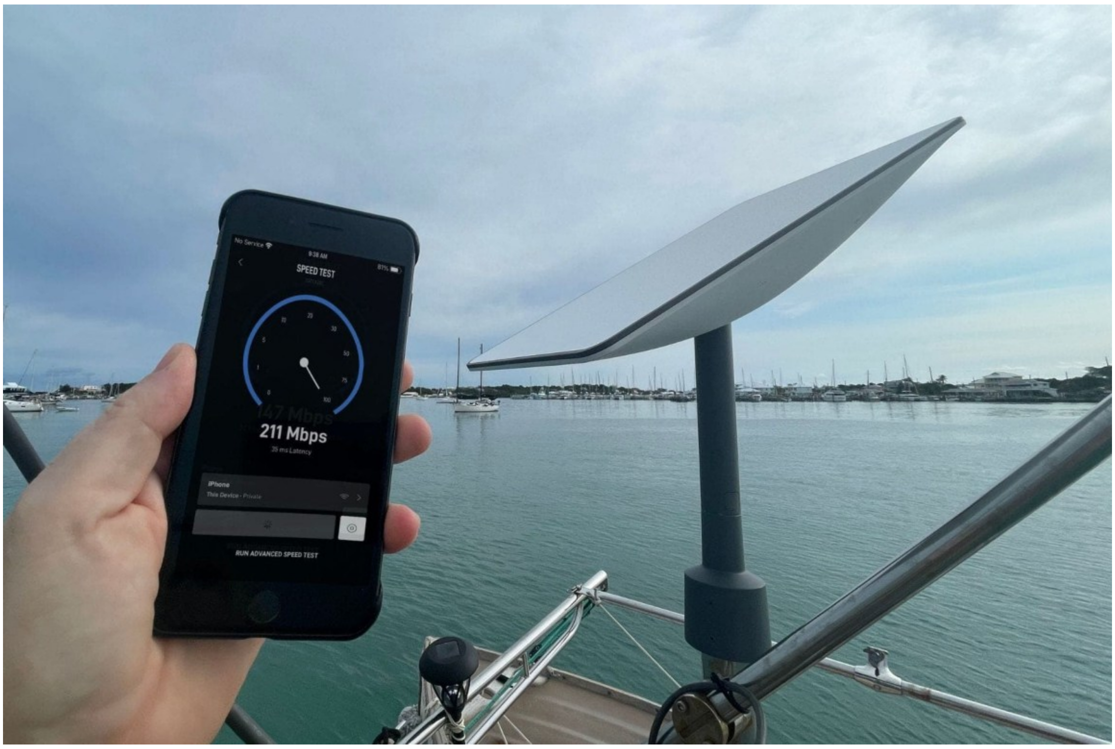
1. Local Priority
2. Global Priority

Local Priority (Best for fixed and mobile businesses on land)

The Local Priority plan is designed for businesses that require reliable internet access within a specific country, including regional travel. This plan prioritizes the network to ensure a stable connection, especially in areas where congestion may otherwise be a problem. It's suitable for businesses with fixed locations or those in transit, providing reliable use both on-site and on the move. Users also benefit from access to a public IP address and a dashboard for managing their connection, making it ideal for operations that need consistent connectivity within a country.

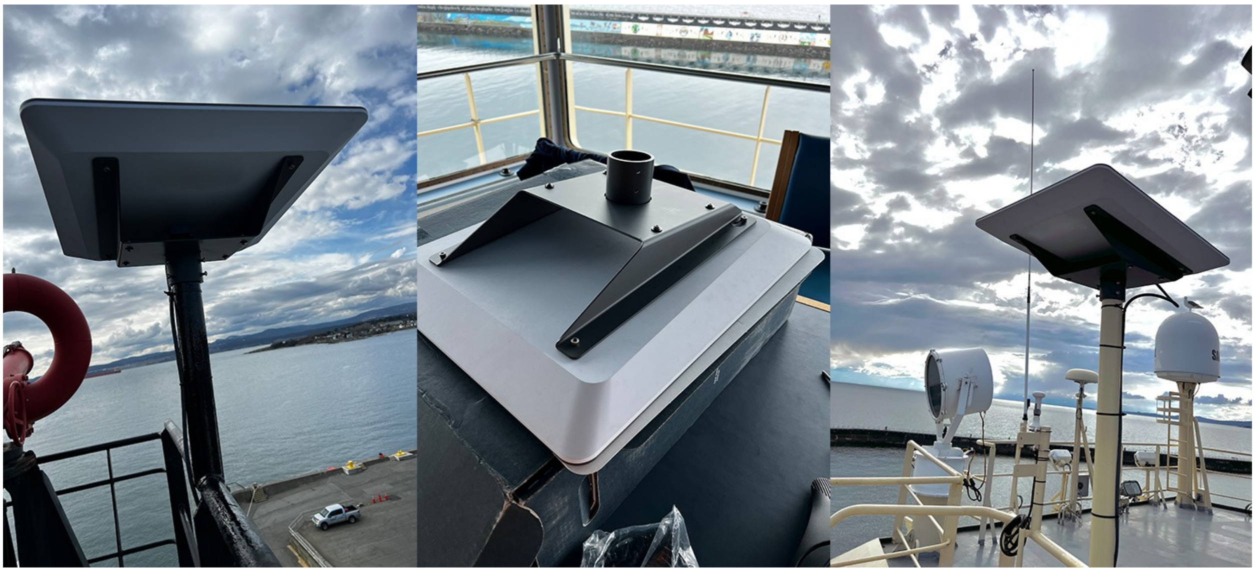
Global Priority (Best for maritime and global connectivity)

The Global Priority plan is designed for users who need worldwide connectivity, including ocean and land use. This plan ensures network priority for uninterrupted service in remote and offshore locations, including at sea. Whether you're operating on land or water, it provides reliable fixed and in-motion connectivity, ensuring connectivity remains strong even in dynamic conditions. Users also receive access to a public IP address and a dashboard, making it an excellent choice for businesses or individuals who require continuous global access across diverse environments.



Hardware

The hardware for both the Local Priority and Global Priority Starlink plans is the same: both use the standard Starlink dish or higher-performance business/marine dishes, depending on the user's needs. The key difference between the plans lies in the network prioritization and service terms, not in the hardware itself. Whether you're using Starlink on land or at sea, the same satellite dish can be used; the Global Priority plan simply offers global coverage and maritime support, while Local Priority is focused on fixed and regional use. Users may choose the higher-performance dish for better reliability, especially in motion, but this decision is separate from the service plan itself.



Starlink Boat Installation Components (Hardware)

Component	**Purpose**	**Approx. Cost (USD)**	**Sources**
Starlink Maritime Flat High-Performance Terminal	Satellite dish + modem/router engineered for marine/in-motion use	$1,999–$2,500 (one-time) (asiasatellite.co)	
Power Supply Unit & Cables	Converts boat power to run the Starlink system (included in kit)	$369.99	*Included with terminal* (asiasatellite.co)
Router + Mounting Hardware	Wi-Fi distribution onboard	Free	*Included with terminal* (asiasatellite.co)
Antenna Mounting Hardware	Mounts dish on mast/roof/fixed point	$50	*Included with terminal* (asiasatellite.co)
Ethernet / Power Cables	Connects dish to router and power	$50	*Included with terminal* (asiasatellite.co)

Instead of the Starlink Maritime Flat High-Performance Terminal, some options are available:

Hardware Option	Typical One-Time Cost (USD)	Suitable Use Case
Standard Dish (Residential / Roam)	$499–$599	Least expensive way to get Starlink hardware; works in coastal waters under *Roam* plans (less compliant for open sea) (West Marine)
Mini / Portable Kit	$299–$350	Small portable dish, lightest cost; okay for near-shore/moving use (if on *Roam* plan) (Travel Sketch)
Marine High-Performance Kit	$1,499–$2,500	Official maritime build for sustained open-sea use (recommended for safety/compliance) (ELCOME)

Local Priority plans

Local Priority Plan Tier	Priority Data Included (Monthly)	Estimated Monthly Cost (USD)	Key Notes
Local Priority 50 GB	50 GB	$65/mo *($40 terminal fee + $25 data)*	Entry-level priority data: best for basic business sync, messaging. (Mobile Internet Resource Center)
Local Priority 500 GB	500 GB	$165/mo *($40 + $125)*	Larger bucket for heavier data use on land. (Mobile Internet Resource Center)
Local Priority 1 TB	1,000 GB	$290/mo *($40 + $250)*	Extended data for data-intensive operations. (Mobile Internet Resource Center)
Local Priority 2 TB	2,000 GB	$540/mo *($40 + $500)*	High-use business connectivity in congested areas. (Mobile Internet Resource Center)

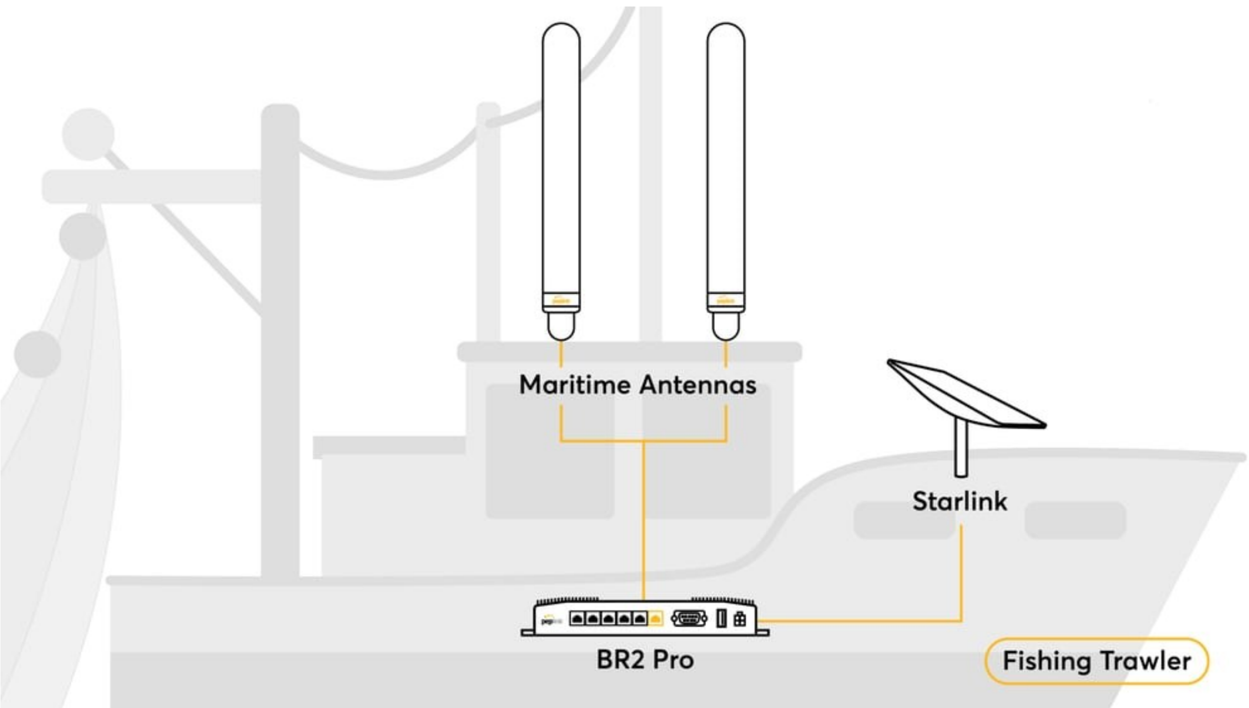
Global Priority Plans (Maritime & Global Coverage)

Plan Tier	Priority Data (High Speed)	Monthly Fee (USD)	Notes
Global Priority 50 GB	50 GB	$250/mo	Least expensive global option; good for light use at sea (ELCOME)
Global Priority 250 GB	250 GB	$400/mo	Mid-range maritime use (ELCOME)
Global Priority 500 GB	500 GB	$650/mo	Common choice for heavier data use (ELCOME)
Global Priority 1 TB	1,000 GB	$1,150/mo	Substantial priority data for larger teams (ELCOME)
Global Priority 2.5 TB	2,500 GB	$2,650/mo	Enterprise-level usage (ELCOME)
Global Priority 5 TB	5,000 GB	$5,150/mo	Very high usage needs (ELCOME)

Higher Tiers (7.5 TB, 10 TB, etc.)	Up to 15 TB	$7,500–$15,000/mo	Massive data demands (commercial heavy use) (ELCOME)

Lowest-Cost Starlink Combinations for Artisanal Fishers

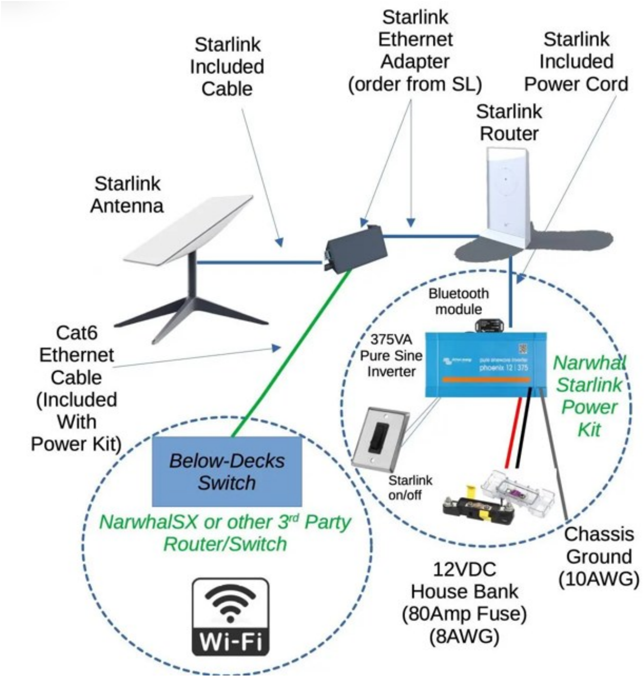
Setup Name	Hardware (One-Time)	Service Plan	Monthly Fee	Best For	Notes
1) Coastal Standard	Standard Starlink Dish $499	Roam/Coastal • Lowest tier	$50–$100	Near-shore fishing	Cheapest practical setup; *not* official maritime plan; best for coastal limits
2) Ultra-Low Portable	Starlink Mini/Portable $299	Roam/Coastal • Lowest tier	$50–$100	Very light use close to shore	Lowest hardware cost; very limited offshore reliability
3) Entry Maritime (Official Safe)	Standard Dish + Marine Mount $1,499	Global Priority 50 GB	$250	Offshore safety & basic data	Cheaper than High-Perf maritime but still official marine plan
4) Balanced Maritime	Marine High-Performance Kit -$1,999	Global Priority 250 GB	$400	Active communication & weather data at sea	Most realistic reliable small-fleet plan
5) Mid-Use Maritime	Marine High-Performance Kit -$1,999	Global Priority 500 GB	$650	Heavier data needs, team coordination	Better for multiple users / IP calls



Current usage pattern in Bangladesh:

In Bangladesh, most people currently use the Local Priority packages, which are mobile setups that work on land and extend up to 12 nautical miles offshore. Industrial trawling boats, on the other hand, use maritime package plans, but these also come with limited data plans, where each mobile device has a daily data usage cap. Some trawling boats from Khulna have been using the standard package, but they lose internet connectivity once they venture beyond 12 nautical miles.

Limitation	
Coverage Limitation (Beyond 12 Nautical Miles)	Starlink's Local Priority packages work only up to 12 nautical miles offshore. Beyond that, there is no internet access.
Data Caps on Maritime Plans	Maritime plans come with data limits. Once the cap is reached, speeds are reduced, affecting usage for critical tasks like weather updates.
Expensive Maritime Plans	High-performance maritime plans are costly for small-scale fisheries, with high upfront costs for hardware and ongoing monthly fees.
Regulatory Issues	Standard packages are not meant for maritime use. Using them offshore may violate Starlink's terms of service.
Power and Installation Challenges	Starlink requires a stable power source and proper installation on boats, which can be difficult due to space and mounting restrictions.
Weather Interference	Signal loss or slow speeds can occur due to severe weather conditions such as storms or heavy rain, affecting connectivity.
Limited Hardware Options	The marine hardware options, essential for continuous offshore use, are expensive and not as readily available in Bangladesh.



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