

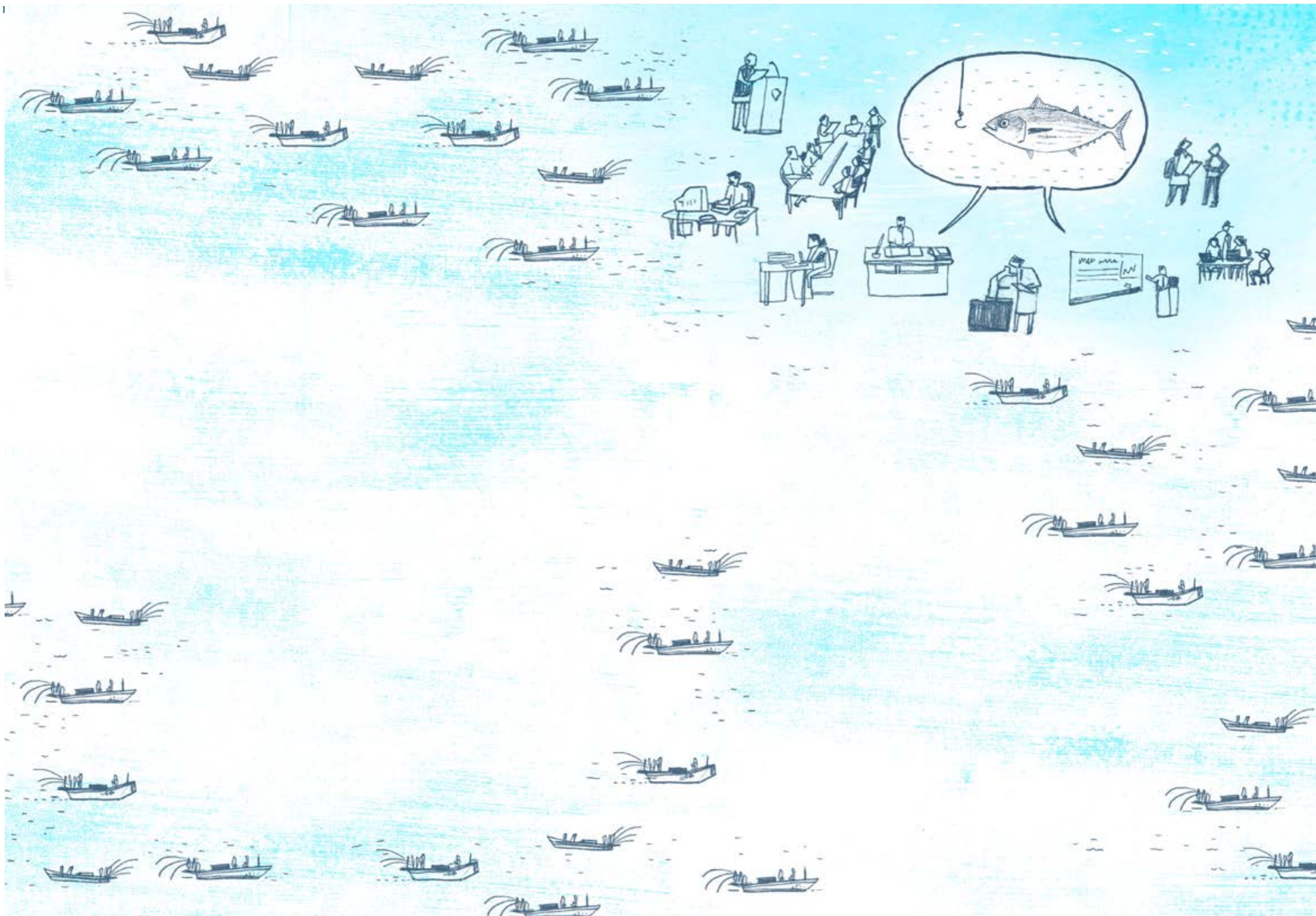
Re-imagining Fisheries in India's Oceanic Islands:

Building Resilience and Sustainability in a
post-Covid World



Project Report 2021-2024





Credits:

Illustrations: Kabini Amin and Prabha Mallya

Photos: Abel Job Abraham, Farook Agx, Abul Basher, Rahul Demello, Prerana Gawde, Meera P.K., Mahaboob Khan, Ishaan Khot, Meelu Mohanan, Madhuri Mondal, Shwetha Nair, Druva Kumar R, Kumar Sahayaraju, Ranjini Sen.

Maps: Abel Job Abraham, Kabini Amin, Prerna Gawde, Anand Rao

Edit & copyedit: Sreemoyee Mukherjee, Naveen Namboothri

Design & layout: Sreemoyee Mukherjee

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Authors: Abel Job Abraham, Anand Rao, Ishaan Khot, Mahaboob Khan C.P., Madhuri Mondal, Meera P. K., Prerana Gawde, Ranjini Sen, Kumar Sahayaraju, Naveen Namboothri

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Reimagining Fisheries in India's Oceanic Islands:

Building Resilience and Sustainability in a post-Covid World

Project Report

Dakshin Foundation

2021-2024



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Executive Summary

The **Reimagining Fisheries in India's Oceanic Islands: Building resilience and sustainability in a post-Covid world Project (2021-2024)** was conceived to address the critical and escalating challenges faced by fisheries in India's oceanic islands. For years, these vital marine ecosystems and the communities they support have been affected by resource depletion, social inequities, and the persistent failure of traditional top-down management frameworks that are often disconnected from local realities. These compounding issues have created an urgent need for a new paradigm in fisheries governance, one that is participatory, equitable, and environmentally sustainable.

Dakshin Foundation's central objective for this project was to develop inclusive, context-specific, and resilient co-management models for the oceanic islands of Lakshadweep and Andaman and Nicobar Islands (ANI). By placing local fisher communities at the forefront of decision-making, empowering them as the primary leaders of change, and leveraging their deep ecological knowledge, we aimed to co-create management systems that could ensure the long-term viability of both their livelihoods and the marine ecosystem on which it depends.



The strategic decision to focus on the Lakshadweep and Andaman & Nicobar archipelagos was based on the increasing socio-ecological complexity and fishing pressure on the islands. The focus on two distinct geographic areas allowed us to run tailored pilot interventions suited to their unique environmental and social contexts.

The project was guided by three primary interconnected objectives:

- 1. Preserving the sustainable P&L tuna fishery in Lakshadweep:** To support the long-term viability of this traditional, low-impact fishery by addressing critical challenges related to baitfish resource management through participatory governance and community-led monitoring frameworks.
- 2. Developing sustainable grouper management practices in the ANI:** To formulate and implement sustainable fisheries management plans for grouper fishery, which forms the mainstay of commercial reef fishing, by generating critical data, building collaborative platforms, and identifying community-driven management needs.
- 3. Strengthening local capacity for participatory management:** To create and reinforce the capacity of both community institutions and local government agencies for effective, inclusive, and collaborative fisheries co-management in both archipelagos.

Our work in Lakshadweep, in the intervention sites of Agatti, Kavaratti, and Minicoy Islands focused on strengthening the ecological and institutional foundations of the traditional P&L fishery, with notable accomplishments in several key areas:

- **Baitfish Management and Policy:** Community recommendations for baitfish management were formally proposed for inclusion in the Lakshadweep Marine Fisheries Regulation Act (LMFRA). Demonstrating direct policy impact, a major success of our engagement was the inclusion of a ban on destructive

light-assisted fishing in the Integrated Island Management Plan (IIMP) by the Lakshadweep Administration.

- **Community-led Knowledge Generation:** Through a highly participatory process incorporating traditional ecological knowledge, the project successfully mapped critical baitfish habitats across seven key islands. Furthermore, the Community-Based Fisheries Monitoring (CBFM) program was revived after the pandemic, inducting 15 new boats on Minicoy Island and re-engaging six previous participants on Agatti Island.
- **Scientific Protocol Development:** Standardized, non-extractive in-water survey methods were developed for the long term monitoring of baitfish stocks. These protocols, being scientifically robust, were designed to be intuitive and replicable, enabling implementation by the local SCUBA-trained diver community rather than relying solely on external marine scientists.
- **Institutional Strengthening:** In response to administrative changes, the project strategically pivoted from creating new entities to strengthening existing fisher cooperative societies in Agatti and Minicoy. By providing targeted administrative and technical support, these societies are being empowered to function as primary units for co-management.

In the more complex and heterogeneous fisheries of the Andaman Islands, the project has laid essential groundwork for future co-management by focusing on data generation, stakeholder engagement, and trust-building in the following areas:

- **Historical Data Analysis:** Over two decades of handwritten fish export data were digitised, providing an invaluable long-term perspective on seafood export trends in the region. This database, which was shared with the Andaman & Nicobar Department of Fisheries, enables analysis of the impacts of major events like the 2004 Tsunami and Covid-19.
- **Stakeholder Perception and Needs Assessment:** Detailed perception studies

with small scale fishers documented their primary concerns, including catch declines driven by the increased use of technology such as fish finders; and the fishing of gravid females and juveniles. Fishers identified an urgent need for both regulatory interventions and market-based solutions.

- **Participatory Monitoring and Engagement:** A community-based fish catch monitoring logbook was co-created in Telugu, and to overcome literacy barriers, a Community Resource Person (CRP) was engaged to assist fishers in logging data. Concurrently, multi-stakeholder consultations were conducted across 24 fishing villages to identify shared priority issues.
- **Building Collaborative Platforms:** The project invested significantly in fostering collaboration between small-scale fishers and the Fisheries Department, whose relationship had often been strenuous. Joint initiatives, such as the Sagar Mela and infrastructure improvements at the Junglighat fish landing centre, have created positive platforms for dialogue and cooperation.

These achievements, while significant, were realised in the face of numerous on-the-ground challenges, which required constant adaptation and strategic recalibration. The challenges encountered were not viewed as failures but as critical learning opportunities that prompted strategic adjustments to our approach, reinforcing the project's resilience and relevance. Through this adaptive management process, the project was able to navigate a complex and dynamic environment to deliver meaningful outcomes and establish a solid foundation for future work.

The Reimagining Fisheries project has successfully demonstrated a resilient, adaptive model for navigating the complexities of marine conservation. Despite navigating significant challenges, including market collapses, administrative hurdles, and a global pandemic, the project has laid the essential groundwork for more inclusive and sustainable fisheries management. The trust built with communities and government agencies, alongside the establishment of robust participatory



Challenges	Adaptive Strategy
<p>Shifting Priorities in Lakshadweep: The Sri Lankan economic crisis triggered a collapse in the market for masmin (dried tuna), causing a community shift away from P&L fishing, and creating a new threat of increased pressure on reef fisheries.</p>	<p>Shifted focus from baitfish-specific plans to strengthening existing fisher societies as resilient institutions capable of addressing broader livelihood crises, market access, and the emerging threat of reef overfishing.</p>
<p>Institutional and Political Barriers: Bureaucratic delays and administrative changes, such as the proposed LDAR, hindered the formalization of community-led governance. As a result, local village institutions like gram panchayats were deprived of their powers, significantly weakening collective action.</p>	<p>Inverted the approach to focus urgently on community collectivization within existing legal structures (e.g., reviving inactive societies), thereby building a foundation for future collective action on resource management.</p>
<p>Community Heterogeneity in the Andamans: Conflicts between diverse fishing groups (e.g., seiners, gill netters, long-liners, hand-liners, trawlers) due to overlapping grounds, different gear, and political influence complicated collective action.</p>	<p>Implemented a cluster-based consultation approach to group villages with shared affinities, identifying common ground and fostering the creation of new, localized fisher collectives to address shared priority issues before scaling up.</p>
<p>Pandemic Related Disruptions: Covid-19 travel restrictions, redirection of departmental efforts, and transfer of key officials slowed project momentum and engagement with communities and authorities.</p>	<p>Leveraged the period to conduct deep data analysis (e.g., 20-year export data in Andamans) and re-initiated on-field engagement post-restrictions with a focus on re-establishing trust and assessing changed community needs.</p>

- **Strengthening Local Institutions:** Continue to enhance the capacity of fisher societies and collectives in both archipelagos, positioning them as the primary units for co-management, market interventions, and constructive dialogue with government agencies.
- **Integrating Knowledge Systems for Sustainable Practices:** By integrating the fishers' traditional ecological knowledge with the datasets we have gathered, combined with the monitoring protocols developed in collaboration with the fisherfolk themselves, we aim to promote sustainable grouper fisheries co-management practices in the Andaman and Nicobar Islands.



platforms and strengthened local institutions, provides a strong foundation upon which to build a new, co-created future for the fisheries of India's oceanic islands.

Moving forward, our strategy will be guided by the lessons learned and the priorities identified by the communities themselves. The next phase of our work will focus on the following key areas:

- **Addressing Livelihood Security:** Prioritise interventions that directly address the livelihood crisis facing Lakshadweep's P&L fishers by working to improve market access and secure fair pricing for their sustainably harvested products.



Introduction

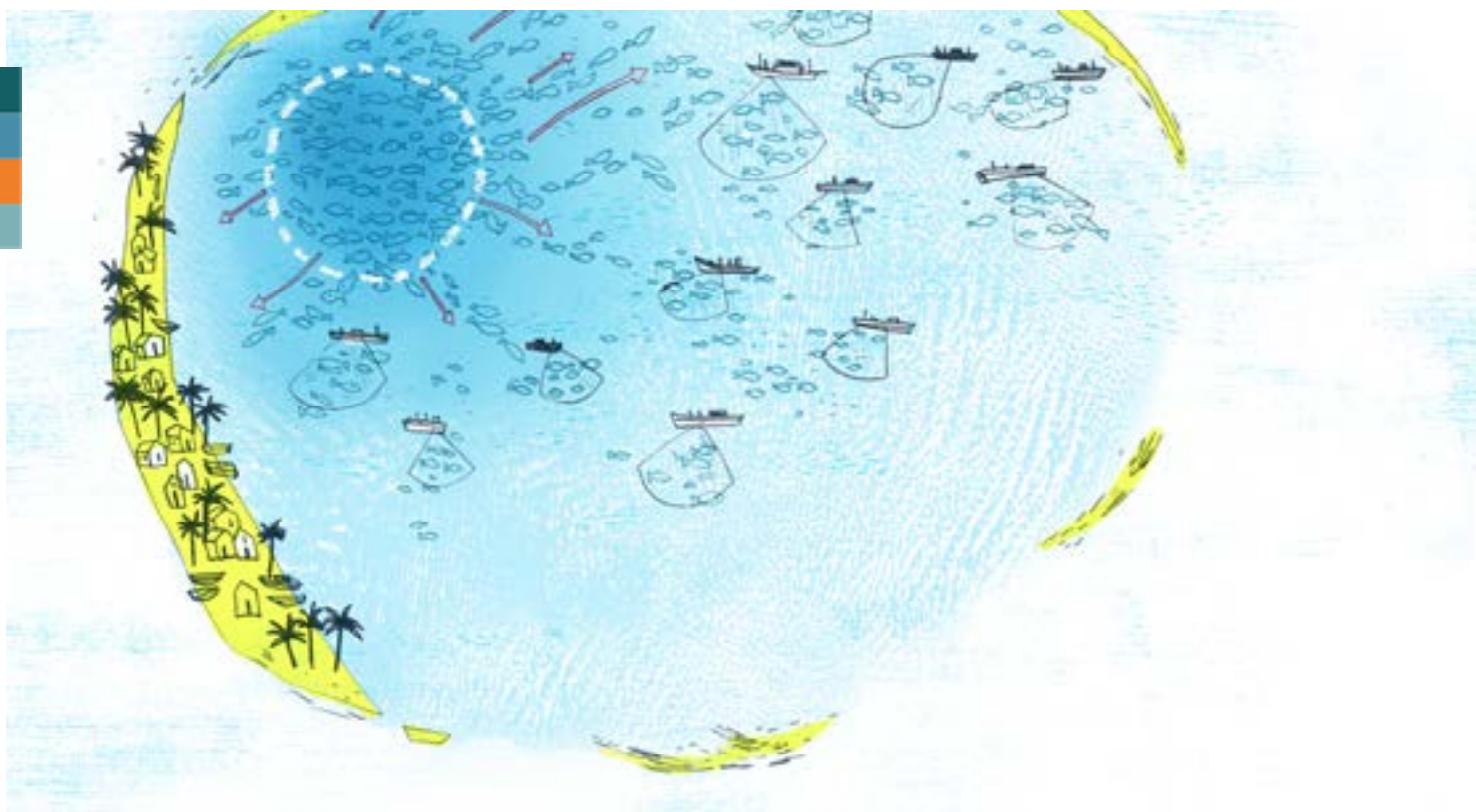
Dakshin Foundation has been engaging with marine fisheries in India for over two decades. During this time, our work has always been rooted in a deep understanding of the social, economic, and ecological complexities that characterise these systems. While our projects have spanned across various dimensions of fisheries management, we have always had a strong focus on creating governance frameworks that are participatory, equitable, and environmentally sustainable.

The Lakshadweep and Andaman and Nicobar Island (ANI) archipelagos in India, both with their unique socio-ecological complexity and fishing pressure, have been long-term engagement sites for us. Through our work, we have observed how the unregulated and open nature of India's fisheries have resulted in significant challenges, including overfishing, stock-depletion, and inequitable access to crucial natural resources. Traditional top-down management approaches have largely failed to address these issues, as they are often disconnected from ground realities, and offer little space for the involvement of local communities.

Our Reimagining Fisheries Project was undertaken to fill in these critical gaps in India's oceanic islands' fisheries governance systems. Driven by the growing recognition that conventional fisheries management approaches were insufficient to address the complex and dynamic challenges faced by the fishing communities in India's oceanic islands, this project sought to create and support participatory management systems in Lakshadweep and ANI, tailored to each region's unique ecological and social contexts. In Lakshadweep, where we have previously initiated work on fisheries co-management, there was a clear need to build on these efforts, particularly concerning the management of baitfish resources critical to the region's sustainable P&L (P&L) tuna fishery. In the ANI, where fisheries are more diverse and complex, there was a need to explore new avenues for participatory management, particularly focusing on the grouper fisheries. The Covid-19 pandemic further highlighted the vulnerabilities of these communities and the markets that they rely on, making it imperative to build resilience and sustainability into local management systems.

Dakshin Foundation's approach to fisheries management places fisher-communities at the forefront and aims to develop co-created models of fisheries governance. By actively involving fishing communities in the management process, we empower them to take ownership of their resources and ensure the long-term viability of their livelihood. By creating platforms for participatory management, we ensure that these communities are better equipped to navigate the challenges they face in a post-pandemic world and can actively contribute to the sustainable management of their resources. Despite many challenges posed by external factors, we are encouraged by our progress. Our efforts in both the Lakshadweep and ANI have laid the groundwork for more inclusive and sustainable fisheries management, and we are committed to building on this foundation in the coming years.





Project Overview

Objective 1: To preserve the sustainable P&L tuna fishery in the Lakshadweep Islands through participatory management

(Intervention sites: Agatti, Kavaratti, Minicoy Islands)

Deliverable	Progress	Challenges
Follow up on the collective recommendations regarding baitfish management made by the fisher communities at the initial consultation meetings Completed	<ul style="list-style-type: none"> » The meeting proceedings from the 2019 co-management consultations were taken to higher authorities for implementation. After persistent follow-ups, the department offered to include the recommendations in the Lakshadweep Marine Fisheries Regulation Act (LMFRA), a regulatory framework for managing fisheries in the Lakshadweep. » Though light-assisted fishing continues to some extent, particularly by large boats, our extensive awareness campaigns in local language have helped reduce its usage, improving baitfish availability. 	<ul style="list-style-type: none"> » Travel restrictions due to the pandemic and the redirection of all departmental efforts towards addressing Covid-19 challenges on the ground affected the continuity of meetings with the local officers and key community leaders. » Changes in senior officers in the department slowed progress.
Conduct island-level consultations with fisher communities to identify and map critical baitfish habitats and breeding grounds. Completed	<ul style="list-style-type: none"> » Consultations were carried out with key informants and fishermen of four islands » Mapped the baitfish grounds of Agatti, Bangaram, Perumulpar, Kavaratti, Suheli, Kadmat, and Minicoy. » The maps are displayed in key public places like boat jetties and government offices. 	Verifying the map with fishers took longer than expected due to a few correction rounds.

Deliverable	Progress	Challenges
Identify specific management measures to reduce the harvest of spawning stocks of baitfish. Completed	<ul style="list-style-type: none"> » Our sustained interaction with fishers have helped spread the core message about the impact of light-assisted fishing for livebait and the targeting of spawning stocks. » Proposed management measures to the community and authority, such as changing the mesh size of the net, managing the time of catch, LMMA to reduce harvests of spawning stocks of baitfish. » Our outreach brochure on the life histories of different species has helped create better awareness of the biological limits and ecological needs of different baitfish species. 	<ul style="list-style-type: none"> » The politics between large and small boats significantly shape the community's response to baitfish availability and the impact of light fishing. » Proposing uniform time for bait fishing was challenging because fishermen determine it based on tuna availability and the travel distance to tuna fishing grounds.
Scale-up monitoring of ongoing community-based fisheries to increase fisher participation in knowledge generation Completed/To-be-continued	<ul style="list-style-type: none"> » Community-based fisheries monitoring (CBFM) has been Dakshin Foundations long-term initiative in Lakshadweep since 2014, engaging P&L tuna fishers in recording the trends and dynamics in their fisheries. » CBFM has strengthened ties with the fishing community and laid the groundwork for participatory fisheries management. » In the year 2023, we revived our CBFM efforts, inducting 15 new boats on Minicoy Island and re-engaged six previous participants on Agatti Island. CBFM continues to provide valuable insights on the P&L tuna fisheries. » Fisherman Society of Agatti officially collaborated with Dakshin Foundation to promote CBFM for broader data sharing and management efforts. 	After the pandemic, during which the program was paused, fishers redirected their boats towards the more lucrative tourism activities. This transition was also facilitated by several other reasons such as market uncertainty of masmin (dried tuna), high operating costs and cyclone induced damage to boats.
Develop in water survey methods for long-term monitoring of baitfish stocks on key islands. Completed	<ul style="list-style-type: none"> » We developed standard procedures for monitoring baitfish resources in Lakshadweep and selected index sites across Agatti, Kavaratti, Bangaram, and Perumul Par islands for a long-term plan. » Involving local SCUBA-trained islanders, we conducted workshops and trained active diver groups on baitfish monitoring protocols. » Responding to community demand, we shared key reproductive characteristics of commonly targeted baitfish through fliers and posters in Malayalam and English, distributed to fishers and government offices in Agatti. 	<ul style="list-style-type: none"> » In-water assessments are resource-intensive. <ul style="list-style-type: none"> » Identifying species of small pelagic fish underwater remains challenging » Regular revision of protocols is required to make them robust and locally implementable.
Assess the efficacy of traditional baitfish management practices on Minicoy Island and facilitate the transfer of such knowledge to other islands. Completed	<ul style="list-style-type: none"> » We conducted a case study to document the strategies used by traditional fishers in Minicoy for sustainable baitfish resource management, capturing their significant TEK and customary practices. » Multiple consultations with Minicoy's Jamaath, the fishermen's collective, revealed the strengths and challenges of traditional baitfish management. » Our efforts focused on understanding these dynamics and documenting the system's strengths and weaknesses. 	<ul style="list-style-type: none"> » External pressures, a lack of state recognition of customary systems and internal inconsistencies. » Shifting youth priorities has contributed to the erosion of these practices. » The recent transition in fisheries as fishers leaving the fishing activity and involving in to tourism sector had eased the pressure on baitfish stocks, making them less of a priority. » An increase in operational costs, lack of targeted subsidies and lower market returns for dry tuna affected the continuity of fishing.

Deliverable	Progress	Challenges
Through extensive consultations, explore the potential for establishing locally co-managed baitfish reserves, including spatial and temporal regulations. Partially Completed	<ul style="list-style-type: none"> » There was interest in exploring the potential for baitfish management during the peak fishing season, when baitfish availability was in crisis. » Had initial meetings with fishers and the authority for trying out the LMMA to manage baitfish catch. » Geo-mapping of bait fishing grounds has been done, but further mapping of stakeholder interest is needed for effective LMMA planning. 	<ul style="list-style-type: none"> » Reduced community interest due to a shift towards lagoon-based tourism and reef fish exports has eased the pressure on baitfish stocks allowing their stock to recover. » A lagoon is a space where stakeholders involved, such as different types of fishermen, women in octopus fishing, research institutions, and government offices engaged in lagoon activities, must be included in LMMA discussions » Post-Covid, the closure of the trade route and the Sri Lankan economic crisis have led people to move away from P&L fisheries. Consequently, it has been hard to sustain an interest in baitfish management.
Facilitate the creation of island-level fisheries co-management institutions to address challenges facing P&L tuna fisheries collectively Completed	<ul style="list-style-type: none"> » P&L fisheries have gone through transitions for the reasons as mentioned earlier. » The recent regulatory changes in Lakshadweep does not permit the registration of new cooperative societies or other community-based collectives. » Wefocused on strengthening the existing cooperative societies in Agatti and Minicoy. We provided administrative and technical support to these societies during the project period and continue to support and strengthen their capacities towards improved fisheries co-management. 	<ul style="list-style-type: none"> » The recent administrative changes discourage the formal registration of new cooperative societies or other community-based collectives. » The fishermen and leaders were worried about the government's response to starting a new independent society.
Monitor and evaluate the ground-level implementation of the fisheries management plans, identify key hurdles or challenges and undertake course corrections if needed. Completed	<ul style="list-style-type: none"> » Recognising the lack of strong local institutions and leaders for participatory governance, we are strengthening the existing fisher cooperative societies, and fisher leaders. . » We shifted our focus from managing baitfish resources to strengthening collaborations with the local fishing community. » Local village governance institutions such as the gram panchayats were deprived of their powers significantly weakening collective action. Such approaches work against the tenets of co-management that aims at decentralising and providing the powers back to communities. » Poor regulation of markets and weak market support systems for masmin disincentivised fisheries management ongoing fisheries management efforts. » We built partnerships with local fisheries co-operative societies while undertaking various fisheries management initiatives. 	Fishers preferred strengthening existing institutions rather than creating new ones.

Objective 2 : To formulate and implement sustainable fisheries management plans for grouper fisheries in the Andaman Islands

(Intervention sites: Mayabunder, Wandoor and Junglighat)

Deliverable	Progress	Challenges
<p>Original deliverable: Understand the impact of COVID-19 on harvest levels, trade and export of groupers in the Andamans.</p> <p>Undertake a detailed perception study to understand the need, scope and potential strategies for grouper fisheries management in the Andamans.</p> <p>Modified deliverable: Analysis of export data of the past 20 years Completed</p>	<ul style="list-style-type: none"> » We conducted stakeholder interviews and secondary literature reviews to map the grouper value and supply chain in the ANI. » To understand trends in export and the impact of Covid-19, we digitised twenty years of fish export data from the ANI. The digitisation has been conducted for all species groups and submitted to the ANI Department of Fisheries. » Assessment on fishing practices, institutions, stakeholders and the value chain was undertaken for all the sites and perception of stakeholders on fisheries declines, management needs and issues were documented. » A part of this data is currently being written in the form of a peer-reviewed paper. 	<ul style="list-style-type: none"> » Significant time had to be invested towards compiling, curating and digitising datasets spanning two decades on fisheries exports. » Disaggregating the above-mentioned data to species level was not possible due to challenges in interpretation of data collected post-2018. » Internal conflicts between multiple fishing groups (seiners, gill netters, long-liners, hand-liners, artisanal fishers, trawlers) due to overlapping fishing grounds, fish stocks, ethnicity etc. differences and political influence, which affects dialogue on collective management.
Introduce the community-based fisheries monitoring programme through meetings at each fishing village Completed	Multiple meetings were done with fisher groups and fisher leaders to discuss the priority challenges in fisheries in the islands and chart a way forward. Participatory fishing ground mapping and community institution mapping were done to initiate discussions on fisheries monitoring and management	Fisheries in ANI are highly heterogeneous, targeting multi-species using multiple gears and are carried out by communities with diverse backgrounds. There are conflicts between fisher groups due to various factors.
Co-create protocols for community-based fisheries monitoring through follow-up workshops Completed	<ul style="list-style-type: none"> » A logbook for monitoring fish catch was developed in Telugu (language spoken by the majority of the traditional fishers in ANI) with the input of fishermen through multiple discussions. » Community based fish catch monitoring was piloted in Junglighat with seven boats initially. Currently, six boats are part of the ongoing catch monitoring initiative. » A community resource person (CRP) was hired to assist in the data recording. » We also understood how fishers maintained fish sale data through boat accountants. The data for 187 fishing trips over three years from two motorised boats were digitised to see what trends of historical fish catch could be derived. We are exploring ways to build up on this existing record keeping system and use it for creating critical baselines. 	<ul style="list-style-type: none"> » Though fishermen were interested in monitoring their catch, real-time recording while on the boats and poor numerical literacy amongst the crew members was a barrier. As a work around to this, a CRP from the community was engaged to assist the fishermen in logging the data after their fishing trips. » Though boats have maintained their fish sale data through an accountant, it cannot be directly used for assessing the Catch per Unit Effort (CPUE) as they do not record any information on the efforts required for catching. We are exploring slight modifications to the templates used by the accountants to include effort calculation.

Deliverable	Progress	Challenges
<p>Original Deliverable:</p> <ul style="list-style-type: none"> Facilitate preliminary multi-stakeholder consultations to co- create a grouper fisheries management road map for the Andaman islands, based on the Perception study. Develop a detailed implementation plan with clear roles for different stakeholder groups. <p>Edited Deliverable: Introducing participatory fisheries mapping and monitoring in other intervention sites Engage with multiple stakeholders and develop an outline for fisheries management in the ANI</p> <p>Partially Completed/ To-be Continued</p>	<ul style="list-style-type: none"> The fishing villages of South Andaman district were divided into seven clusters based on geographical local, fishing practices & intensity & socio-cultural affinity. Consultation meetings were conducted in five clusters consisting of 24 fishing villages, through which priority issues in fisheries management in the islands were identified and a way forward was developed. In each consultation meeting, a way forward was discussed to address the priority issues faced by the fishers. Key contact persons & fisher leaders were identified and responsibilities were divided. In Namunaghar & Collinpur clusters, fishers also nominated members and created a collective which they would be registering in future after getting consensus from the village through community meetings (Annexure 1) 	<ul style="list-style-type: none"> Due to lack of functional collectives of small scale fishers across the landscape, most fishers groups do not have proper platforms to have dialogue and negotiate with the administration on their priority issues. While fishers across most clusters identified declining fish catch and poor regulation as a priority issue faced by them, collective action was challenging especially in villages where multiple fishing practices lead to conflict of interests.
<p>Work with the local fisheries departments to implement the action plan</p> <p>Ongoing</p>	<ul style="list-style-type: none"> Dakshin's team has built good relationships with the Fisheries Department and local administration which have resulted in multiple collaborations. These collaborations were aimed at improving the relationship between the Department and the fishers and facilitating dialogue between them. Sagarmela – a festival to celebrate ocean & fishers was conducted on World Fisheries Day in Wandoor where issues of fisheries sustainability, fishers wellbeing and access to entitlements were highlighted. A drinking water system with an RO purifier was installed at the Junglighat fish landing centre in collaboration with the Fisheries Department & fishermen's committee. 	<p>Given the strenuous relationship between small-scale fishers and the Fisheries department in many villages we had to work towards building trust and a working relationship between the two key stakeholders. The efforts mentioned here, though not directly linked to improved grouper fisheries management, has helped build strong trust and linkages with both community institutions/leaders and the fisheries department.</p>
<p>Monitor and evaluate the ground-level implementation of the fisheries management plans, identify key hurdles or challenges and undertake course corrections if needed</p> <p>Partially Completed/To be continued</p>	<p>The team is following up with the fishers on the implementation of the action plans developed in the consultation meetings. Major challenges and gaps have been identified, and the team is working towards resolving those.</p>	

Objective 3: To create and strengthen capacities for participatory fisheries management on the ground

Deliverable	Progress	Challenges
<p>Assess the capacity of key local resource management agencies such as the fisheries and forest departments and respective panchayats (local self-government units) governing the targeted fishing villages</p> <p>Completed</p>	<ul style="list-style-type: none"> In Andamans, we have completed a thorough mapping of the different stakeholder groups critical for fisheries management which includes- formal and informal fisheries institutions, resource management agencies, different fisher groups, local government bodies etc. In Lakshadweep, we have worked with key local resource management agencies, such as the fisheries department, forest department, gram panchayat, and fisher societies, and assessed their strengths and weaknesses in engaging in participatory fisheries management. The Department of Fisheries is the authority that manages the fisheries sector in the both island groups, however, top-down mandates are aimed at maximising fish catch making fisheries management low-priority. The local self-governing body, the Panchayat, has a role in fisheries management as one of its members chairs the fisheries action council under the Department of Fisheries. However, this body has not been constituted in the past four years. 	<ul style="list-style-type: none"> In Andamans, all fisheries cooperative societies had been disbanded due to various social and political reasons. This acted as a barrier to working with key elected representatives. In Lakshadweep, the push towards centralising fisheries governance meant that participatory management efforts were not given priority, despite a keen interest amongst the fishing community to undertake collective action. The frequent transfers and replacement of officials make it challenging to continue the sustained engagement with government agencies in both island groups.
<p>Develop a series of stakeholder-specific training modules to address the gaps identified through the capacity assessment.</p> <p>Ongoing</p>	<ul style="list-style-type: none"> Based on the capacity assessment of stakeholders, themes have been shortlisted on which training modules are currently being designed. These include simplifying the Andaman & Nicobar Marine Fisheries Regulations Act (ANMFRA) and understanding the processes involved in setting up formal collectives. In Lakshadweep, we have identified the capacity-building necessities of the management agencies and developed outreach and training materials for them. To educate the fishermen about the importance of managing the bait fishing grounds, we conducted multiple participatory mapping initiatives and developed the only map for baitfishing grounds for the Lakshadweep islands. Consultation have been held with local dive centres on undertaking baitfish resource monitoring. Dakshin is working closely with active fisheries cooperative societies to address fisheries management challenges. The Agatti Fisheries Co-op Society is actively promoting our participatory data collection initiatives. We are developing a co-management practitioner guide to support fishers and departmental agencies in implementing management initiatives on the island. 	<p>Identifying and developing training modules in a way that is easily understandable by all stakeholders was a time-consuming process.</p>
<p>Develop a series of stakeholder-specific training programmes for capacity building at the local level.</p> <p>Ongoing</p>	<ul style="list-style-type: none"> Capacity-building sessions and meetings were undertaken, specifically on ANMFRA and GPS usage issues on fishing boats. Training modules on a few related themes are being designed currently. Various capacity-building and training programs for fishers, fisheries agencies, NGOs, youth clubs, and SHGs in Lakshadweep on sustainable fishing practices, sustainable use of marine resources, and the role of each individual and organisation in sustainable fisheries management were held. 	<p>In Lakshadweep, since fishing is challenged due to several issues, bringing fishers and stakeholders into the training programs was challenging.</p>



Project Objectives and Achievements

Objective 1: To preserve the sustainable P&L tuna fishery in the Lakshadweep Islands through participatory management (Intervention sites: Agatti, Kavaratti and Minicoy Islands)

Lakshadweep, is a tropical archipelago in the Arabian Sea and India's smallest union territory. The islands' vast lagoons and coral reefs make them ideal habitats for a diverse range of marine life and support a thriving fishing industry. For generations, the people of Lakshadweep have relied on fisheries as their primary source of livelihood, with many engaging in traditional fishing practices and associated knowledge systems that have been passed down over generations. The fisheries sector is the backbone of Lakshadweep's economy, providing employment and income for a significant portion of the population. The major fishing method in Lakshadweep is live-bait P&L fishing (P&L). It is a centuries-old tradition in Lakshadweep, where skilled fishermen use wooden

poles and lines to catch Skip Jack tuna one by one from the open ocean. This sustainable fishing method allows fishermen to target resilient species, reducing bycatch, and minimising damage to marine ecosystems. This traditional fishing practice has contributed significantly to the conservation of Lakshadweep's rich marine biodiversity by diverting the fishing pressure away from the vulnerable reef systems, and continues to play a vital role in the economy and identity of the island.

Background

As a Union Territory directly administered by the centre, incompatibility between the centre's vision for these islands, and local sustainable development needs for the region lead to constantly shifting priorities for the P&L tuna fishers. While baitfish resource management had been the most pressing issue while designing the project, the Covid-19 lockdown and significant administrative changes aimed at promoting tourism affected the priorities for the P&L tuna fishers, consequently affecting the timely execution of our deliverables.

The major changes that affected our objectives during the project period (2021-2024) are explained below:

- **Lakshadweep Development Authority Regulation Act (LDAR):** The putative administrative reforms for the Lakshadweep Islands in 2021 proposed the constitution of the Lakshadweep Development Authority Regulation Act (LDAR) as the sole regulatory agency superseding all existing regulatory safeguards and administrative departments. The move sparked concerns among islanders and environmentalists globally, who fear it will lead to displacement of local populations, environmental degradation, destruction of coral reefs, loss of traditional livelihoods, and unregulated tourism and commercialisation. There were concerns that the act would restrict access to coastal and marine commons and traditional fishing grounds, triggering unrest and protests in Lakshadweep

during the latter half of 2021. Local fishers' priorities shifted during this period to ensuring continued access and rights over the fishing commons. Our conversations with fishers indicated the need to collectivise and develop resilient institutions that can advocate for better cooperation and interface with government agencies and fisher unions on the mainland were their foremost priority. Access to the island also become difficult during this period due to the restrictions on entry permits and limited ships and inter-island vessel availability during the pandemic lockdown.

- Market Fluctuations:** The most significant export product of Lakshadweep's P&L fishing is Masmin (Tuna boiled in saltwater, smoked and sundried). The export route for Masmin typically goes through Tuticorin (A major port in Tamil Nadu, India) to Sri Lanka, where it merges with the Maldivian dry fish market. The regulations imposed as part of Covid-19 prevention measures impacted the Masmin export supply chain, and affected the viability of the P&L fishery. In addition, the Sri Lankan economic crisis in 2019 had already severely weakened the Masmin export market. This resulted in a drastic fall in the price of Masmin. Based on our key informant interviews, fishermen today face significant challenges as they grapple with low prices for their catch, particularly Masmin, and escalating operational costs for their fishing activities.
- Tourism Development:** In the Lakshadweep Islands, initiatives for large-scale, infrastructure-heavy, and capital-intensive tourism plans are being proposed along the lines of the Maldivian Model, which is incompatible with the Lakshadweep islands' fragile ecosystem and socio-cultural fabric. The limited carrying capacities and high population densities of these islands are not conducive for the construction of luxury resorts like water villas in the lagoons, and can harm coral reefs and marine ecosystems, displace traditional fishing communities, and place extreme demand on local resources like water, energy etc. This has led to some discontent on

the ground. Simultaneously, ever-rising operational costs are encouraging local communities to move away from fisheries. Many P&L fishers have transformed their fishing boats into tourism service boats and have shifted their occupation to tourism-based activities. Diversion of coastal spaces such as the beaches and lagoons for construction of new resorts, water sports activities and other recreational activities deprive the P&L fishers the space to dock their boats and carry out post-harvest activities, leading to occasional conflicts on the ground. Additionally, high-end tourism can exacerbate economic inequality, lead to cultural erosion, threatening traditional practices and customs and place more pressure on the already stressed natural ecosystems and resources of these islands. While well-regulated tourism can be an additional source of income, a complete shift to a tourism-based livelihoods that relies on external investments and tourists can make the island economy vulnerable to external shocks.





Fishing boats converted into tourism vessels in Agatti.

Changing Priorities and Evolving Plans of the Fishing Community

The increasing tourist footprint, declining masmin prices, conflicts over coastal commons, and increasing operational costs are pushing fishers to shift away from P&L fishing. The number of active P&L fishing boats has decreased over the years, as they turn towards tourism-based activities and other livelihood options, though not always willingly. Meanwhile, the increase in the market value for reef fish have led existing fishers to concentrate on reef fishing instead. This raises concerns about the health of the island ecosystem, including the fragile ecosystems of the reefs and lagoons. While this shift away from the P&L fishing has eased the pressure on baitfish stocks, it has opened up new pathways towards unsustainability in Lakshadweep's fishing practices.

In response to this transition, we have re-strategized and broadened the scope of our interventions to address the more pressing issues faced by the fishers of Lakshadweep. This includes discussions on sustaining the P&L fisheries of these islands. A majority of the fishers we interacted with preferred continuing the P&L fisheries if some of the above-mentioned barriers are addressed. We have also supported the fishers' interest in developing resilient institutions to advocate for better cooperation and interface with government agencies. These institutions can also function as units for participatory fisheries management

and market-level interventions, which are essential for the sustainability of the P&L tuna fishery threatened by various market pressures. We have extended our efforts to strengthen the fisheries co-operative society on Agatti Island and transform them into resilient institutions and primary units for co-management on the island.

Consultations with fishers on re-strategizing our interventions

Despite these challenges and deviations from the original project timelines, we remain committed to advancing efforts towards fisheries co-management in the

islands, and we have made significant progress in the

project deliverables. Our participatory mapping

initiatives have empowered communities

to assert their rights over commons

and safeguard traditional baitfish

grounds. Our monitoring initiative

also serves as a tool for community

involvement, providing scientific

grounding for their rights and

management needs amidst

political and developmental shifts.

In collaboration with different

stakeholders on the island, Dakshin

Foundation's various activities and

engagements have built trust and a positive

reputation among islanders and fishers, fostering

their support and participation in creating resilient fishers

and fisher communities.

The following section provides detailed information on the progress made against each proposed deliverable, highlighting the major outcomes and listing



Consultations with fishers on re-strategising interventions

some of the challenges encountered.

1. Follow up on the collective recommendations regarding baitfish management made by the fisher communities at the initial consultation meetings.

Our past efforts towards initiating a co-management platform on the Lakshadweep Islands had led to the fisher communities and other stakeholders coming together in 2019 and collectively taking resolutions on banning or



phasing-out unsustainable practices associated with baitfish harvests, such as the use of fine-meshed nets and the harvest of baitfish using LED lights at night. The fisheries department of Lakshadweep had offered to issue a formal government order supporting these decisions, but the Covid-19 lockdown and subsequent transfers of key department officials resulted in these management decisions not receiving formal support. Through this project, we aimed to revive some of the earlier interests and support for regulating such harmful practices and formalise collective decisions made by local stakeholder groups.

Our Fish for the Future-A 10 Year Report was used for advocacy

After the pandemic, we did multiple follow-ups with the senior officers at the fisheries department and the department units in charge in Kadmat, Agatti and Minicoy Islands. The responses from the officials indicated that the island administration's priorities on fisheries interventions have changed. Further, there is a drive towards more centralisation of governance rather than de-

Fishing Harbour Development	✓					✓							✓					✓					Subject to no damage to the ambient environment and as supported by an EIA study and permission from LCZMA.
All Light fishing	✓				✓																		Light fishing for Squids are prohibited on lagoon and reefs and permitted at open ocean with the permission of UTLA.
Fishing in spawning aggregation site of lagoon and reefs.	✓				✓																		
Fishing (including live bait fishing for tuna)	✓				✓																		

Suggestions to regulate light fishing in the lagoons and other areas included in IIMP draft

centralisation. Hence, initiatives such as co-management, which aims to devolve powers to the communities, finds lesser traction. While there seems to be little support for decentralised, collective action, the fisheries department have offered to incorporate the three bans requested by the communities into the Lakshadweep Marine Fishing Regulation Act (LMFRA).

A major success of our follow-ups has been that the recently proposed Integrated Island Management Plan (IIMP) calls for a ban on light fishing in Lakshadweep (image 4.) More importantly, conversations with the fishers from our network also indicated that other issues are being prioritised over baitfish management. Fishers from Minicoy are migrating to the Maldives in search of jobs. With increased fuel prices, lack of subsidies, and reduced market prices, P&L fishing is becoming less significant. The number of boats engaged in regular P&L fishing have decreased significantly, reducing fishing pressure on baitfish and allowing the recovery of different species. This made fishers less concerned about formalising the resolutions pertaining to baitfish management. However, the extensive outreach and sensitisation work Dakshin Foundation had undertaken over the project period has led to significant reduction in LED light-based fishery.

Towards the end of the project, we were able to reinstate conversations with the Lakshadweep fisheries department to follow up on our previous work. We met at the administration's secretarial office in the capital of Lakshadweep in March 2022 and presented our work to the new officials of the fisheries department and the fisheries



secretary, which was very much appreciated.

Fish for the future: A 10-year Report helped us to initiate conversations with fisheries officers and district collectors to consider the bait fish management suggestion in formal platforms.

2. Conduct island-level consultations with fisher communities to identify and map critical baitfish habitats and breeding grounds.

P&L tuna fishery in Lakshadweep is contingent on live bait fish used to catch the tuna. In 2016, there was increased pressure on bait fish resources that demanded management interventions to ensure the sustainability of this crucial marine species. As part of our multi-pronged approach to studying baitfish populations in Lakshadweep and to address critical knowledge gaps on baitfish resources, we designed a community mapping process on critical baitfish habitats and breeding grounds. A series of island-level consultations were conducted, and the mapping and triangulation of the spatial knowledge on baitfish resource use and ecology across Agatti, Kavaratti, Perumal Par, Bangaram, Kadmat and Minicoy were

Fishermen involved in the participatory mapping process



Poster of participatory maps of baitfish grounds put up in public spaces on Agatti Island

conducted. Together with key experienced and veteran fishers and boat owners across these islands, we comprehensively identified and demarcated all areas and spots associated with baitfish species, their fishing grounds, and spawning areas. We then cross-verified the mapped information with more fishers to obtain geospatial information using a Geographical Positioning System (GPS).

We returned the sample printed map to the community to check again and get their agreement to make a big poster and post it publicly. After the consultations, we designed and printed final versions of the maps including relevant conventional cartographic elements. We made it in two sizes, one wall poster for display, and a smaller portable printout. The wall-poster was displayed in the fisheries department office, while the smaller printouts were distributed to the fishers who are part of our community-based fisheries monitoring program, as well as in local public places and different government offices. Placing maps in public places helped raise awareness about protecting critical spots from lagoon-based high-end infrastructure development and potential disruption caused by adventure activities organised by local dive centres. It also fed as primary evidence of fishers' spatial use of the lagoons and reefs. Through the co-creation of maps, we highlighted the potential for incorporating fishers' traditional ecological

knowledge into widely accepted scientific frameworks and further feeding into collaborative fisheries management implementations.

The maps are also available in downloadable format from Dakshin's website. A QR code is attached to the poster design to access the soft copies of the maps. With the support of fishermen and fisheries stakeholders on the island, we are identifying the best ways to publish and display the maps in Minicoy. We are also drafting a report that compiles the background, methods, key observations, and lessons learned from the participatory mapping process.

3. Identify specific management measures to reduce the harvest of spawning stocks of baitfish.

Fishers' perspectives on resource availability and management are significant in identifying and implementing locally relevant fisheries management interventions. To understand the nuances of baitfish resource use and to identify appropriate management measures, we interviewed active P&L fishers across Agatti, Kavaratti, and Kadmat islands. We sought information on specific preferences in baitfish species and islands for baitfish fishing, their availability, fishers' knowledge of seasonality and spawning, factors affecting their catches, and fishers' conceptions of sustainable use and management of baitfish resources.

The key concerns identified were:

- The impact of recent LED light-assisted attractive baitfish fishing practice.
- A recent increase in the number of boats, especially, larger boats with bigger baitfish tanks which require more baitfish.
- The use of small-meshed nets which leads to spoiling the eggs and juveniles, cumulatively affecting baitfish stocks.
- Changes in the ocean also lead to crises, such as high currents in the lagoon and an increasing number of predators, such as trevally and triggerfish.
- Light fishing during pre-dawn hours, particularly targeting spawning

Spratelloides delicatulus (locally known as manja chaala), leading to capturing gravid females, eggs, and juveniles.

- Inter-island conflicts over baitfish fishing grounds, especially in uninhabited islands.
- Fishers suggested banning light fishing, increasing the mesh size of nets, and altering the timing of baitfish fishing from pre-dawn to morning as potential management measures to ensure sustainable baitfish harvests.

However, the prevailing livelihood uncertainties in Lakshadweep and the fall in market value for tuna have resulted in baitfish management taking a backseat. Hence, these management measures have yet to become relevant for implementation.

Meanwhile, our efforts towards public awareness to reduce the practice of light-assisted fishing have shown promising results. Even though light-assisted fishing is still used to a certain extent, its use has significantly decreased. Efforts have been made to raise awareness about the importance of sustainable fishing practices through regular conversations with fishers and distributing awareness materials in the local language. This has reduced the use of light-assisted baitfish catch, which has improved baitfish availability. Looking forward, we are initiating discussions with the fisher's collectives to establish Locally Managed Marine Areas (LMMA) not only to manage the baitfish resources but also to encourage the sustainable use and monitoring of their marine resources.

4. Scale up ongoing community-based fisheries monitoring initiatives to increase fisher participation in knowledge generation

Science-based fisheries management in developing countries, particularly in the case of small-scale fisheries, is challenged by a dearth of data and other forms of codified scientific knowledge. Fishing communities who work in the sea on a daily basis, however, are custodians of vast knowledge and understanding

of their fisheries and resources. Decision-makers or fisheries managers often fail to recognise these forms of knowledge as they do not follow the modern scientific framework, thereby excluding the small-scale fisher communities and their knowledge from all forms of policy conversations and decision-making processes.

In Lakshadweep, our community-based fisheries monitoring initiative (CBFM) involves fishers in the regular monitoring and reporting of their fish catch. It aims to decentralise the process of knowledge generation and lead to the creation of community-generated data repositories that fishers and resource managers can use to understand trends in fisheries over time without having to rely on external expertise. Dakshin Foundation launched its Lakshadweep CBFM initiative in 2014 in Agatti, and in Kavaratti, Kadmat and Minicoy in the following year. Our initiative involves active P&L

tuna fishers in regular and long-term monitoring of everyday fishery dynamics. With over 50 boats participating voluntarily across four islands and more than 4000 data points generated over four years, the monitoring efforts have provided valuable insights into the trends of the P&L fishery of Lakshadweep overtime.

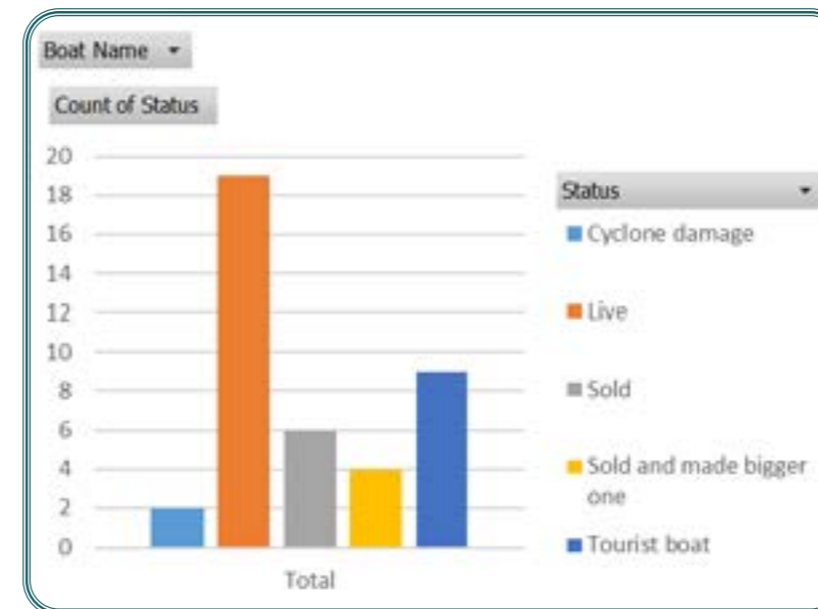
After the pandemic lockdown, and with changes in fishers' changing economic priorities, community interest in the CBFM initiative had slowed. In 2021, to reinitiate the participatory data generation process, we surveyed the status of the boats that had participated in the fisheries monitoring program in 2014-15. We found that of 40 participants, only 19 boats still continued fishing as their primary form of livelihood. Most participant boats had been converted to tourist boats due to the uncertainty of the market price for tuna; few were sold, and some were left without maintenance after the Tauktae cyclone in 2021. However, their responses indicated a strong interest in restarting the initiative.

To re-kindle the interest of fishers, we organised a workshop on the importance of data collection for fisheries in Minicoy Island,

and inducted 15 new boats into the CBFM initiative.

In Agatti, we have had multiple conversations with fishers and fisheries society leaders to support them in strengthening their unity, working, and taking the lead on fisheries-related interventions. As a result of our sustained engagement

with the fisheries society members, they have decided to monitor the changes in P&L tuna fishery in Agatti as a voluntary responsibility in addition to their existing executive committee responsibilities. Local registered fisheries societies are now officially collaborating with Dakshin Foundation in the CBFM initiative, encouraging all fisher members to contribute to the monitoring and help gather information



Present Status of former CBFM participant boats

regarding the changes in baitfish and P&L fishery on the island.

Through constant follow-up and discussions, both individually and through society meetings, we revived our long-term fisheries monitoring initiative in Agatti. Six former CBFM participants were re-registered in the initiative and have started to contribute data points for long-term monitoring. The societies in Agatti are now putting equal effort into strengthening CBFM among its members and sharing the data with their management boards to provide insights into the fish landing trends and baitfish capture of Agatti Island.

We are also extending our efforts to other islands, such as Minicoy in collaboration with *Maliku Maserike Jamaath* (the Minicoy Fishermen Society), and in Kavaratti and Kadmat, to gather catch monitoring data in a regularised manner to create pathways for co-management. Currently, 23 boats are engaging in CBFM and generating data points.



Since the fishers' priorities change depending on the challenges on the ground, CBFM demands continued engagement with fishers to keep participatory monitoring on track. With recent improvements in internet access and connectivity, fishers also suggested developing a mobile application for the CBFM system instead of a logbook.

5. Develop in-water survey methods for long-term monitoring of baitfish stocks on key islands.

In Lakshadweep, lack of information on baitfish populations and their stocks make it difficult to study the impact of fishing practices or track long-term population trends. This problem is exacerbated by the lack of standardised methods for assessing in-water baitfish populations and the quantities used in fishing operations. In-water ecological surveys of baitfish were initiated in the early years of our work in Lakshadweep to address this information gap. These early surveys detected preliminary patterns in baitfish abundance across various islands. However, those methods are highly subjective and researcher-dependent, making them challenging to replicate. Additionally, logistical and funding constraints further limit these surveys. Conventional in-water monitoring protocols, typically designed for larger commercially or ecologically important fish species, do not effectively quantify small schooling fish- like baitfish.

To overcome these challenges, we have developed new scientifically robust and standardised procedures for monitoring the baitfish resources (reference number) of Lakshadweep. We have selected index sites after conducting habitat and fish surveys across Agatti, Kavaratti, Bangaram and Perumal Par islands and designed the protocols with the involvement of the island communities, particularly leveraging the availability of many S.C.U.B.A-trained islanders in Lakshadweep. These protocols are designed to be easily replicable, resource-efficient, and generate comparable data. They employ

CBFM system supports fishers' society on monitoring and their decision making in P&L Fishing

a combination of visual and video-based techniques to quantify baitfish numbers, focusing on species such as herrings (*Spratelloides spp.*), silversides (*Atherinidae*), cardinalfish (*Apogonidae*), fusiliers (*Caesionidae*), and blue-green chromis (*Chromis viridis*). The protocols allow for visual or camera-based quantification, with video and photo footage processed to provide conservative estimates of baitfish numbers using established metrics. We have also identified active diver groups from the local area and conducted workshops and training on the monitoring protocols for sampling baitfish.

Looking ahead, the aim is to establish a long-term baitfish monitoring program led by the local youth of Lakshadweep. The data generated from this program will be crucial for formulating sustainable baitfish management plans.

Our monitoring efforts so-far have highlighted several key points:

- The critical need for quantitative information on baitfish in Lakshadweep's P&L fishery and how in-water assessments contribute to filling this gap.
- The development of robust survey protocols for long-term, non-extractive, standardised, and replicable baitfish monitoring.
- The potential application of these protocols for quantifying other small schooling fish.
- The need for the design of these protocols to be straightforward and intuitive,

enabling the local diver community in Lakshadweep to conduct baitfish monitoring, rather than restricting this capability to trained marine scientists.

In addition, as per the community's demand, we compiled and shared a range of fliers and posters in Malayalam and English that communicated the biological and ecological characteristics of baitfish. These were distributed to fishers and government offices in Agatti.

6. Assess the efficacy of traditional baitfish management practices on Minicoy Island and facilitate the transfer of such knowledge to other islands.

Minicoy Island in Lakshadweep stands out due to its distinct historical and social-ecological context. The inhabitants of Minicoy are unique in race, language, religion, and socio-cultural history. Geographically isolated, the community heavily relies on land and sea resources, and have subsequently developed a rich set of Traditional Ecological Knowledge (TEK) for sustainable resource management. This knowledge, passed down through generations, is essential for their survival and has been integral to P&L fishery originating from Minicoy.

Recognising TEK's importance in fisheries management, we advocate for its integration with formal fisheries management systems for participatory management of small-scale fisheries. This approach enhances community-stewardship by promoting the sharing of knowledge with other stakeholders.,

The Minicoy's fishers' TEK that showcases a system still governed by traditional management practices have been documented as part of this project. This documentation was done as a case study, where we collated strategies used by traditional fishers of Minicoy for sustainable baitfish resource use. We have included significant TEK, customary resources management practices, and institutions associated with the traditional fisheries management in Minicoy in the case study. Multiple



Outreach material on fishery distributed to fishers and govt. officials. (anx. 4).

meetings and consultations were also conducted with Maliku Maserike Jamaath (Minicoy Fishermen Society) -- the fishers' collective institution in Minicoy to understand the potential and challenges in traditional baitfish management practices. We used the Minicoy Fisheries Resources Map(reference) to discuss, document and triangulate the information we gathered on their traditional baitfish management practices.

Our engagements with the community of Minicoy reveal that a combination of external and internal factors are leading to the transitions in its customary management system. The lack of recognition of these customary systems in state legal frameworks have affected the levels of acceptance and support for the former. The hegemony of the local elite and inconsistent procedures within the customary systems have further eroded the influence of customary institutions such as the Jamaath. In recent years, we have also witnessed the influx of local politics and changes in the perceptions and priorities of the youth, which have

led to a sense of individual assertion, with a few youths even moving away from community-driven systems. In addition, a lack of conscious effort to pass on TEK to younger generations have led to the erosion and disregard for customary knowledge systems. Also, the changing political situations and the decrease in the Masmin market keep fishers from prioritising traditional management practices. These transitions highlight that certain socio-cultural and historical factors have been key in ensuring that Minicoy's customary systems persisted

over time.

Our efforts in Minicoy have been geared towards generating a nuanced understanding of the existing resource management systems, their strengths and weaknesses, and identifying ways of further strengthening them.

This is done through systematic

documentation, adapting community-based fisheries monitoring in the context of Minicoy, and facilitating inclusive spaces for participatory governance. We also validated Minicoy's traditional resource management measures and identified potential interventions that can be assimilated into baitfish management plans in other islands. Since baitfish management has become less of a priority throughout Lakshadweep due to many ongoing changes, incorporating learnings from Minicoy is still challenging in-practice.

7. Explore the potential for establishing locally co-managed baitfish reserves, including spatial and temporal regulations, through extensive consultations.

Pressure on bait fish resources was a critical issue that demanded management measures during the formulation of the project. We have initiated consultations with the fisher community and other stakeholders to understand

the perceptions of locally co-managed baitfish reserves, which include spatial and temporal regulations. Implementing a Locally Managed Marine Area (LMMA) in the field sites was a potential solution. However, while the market impact has reduced fishing pressure, leading to a reprieve from the baitfish crisis, community interest in managing these resources has also waned., Establishing an LMMA requires formal recognition and long-term collaboration with government institutions and all fishers, not just those in the P&L sector. The government's focus on lagoon-based tourism and the growing export demand for lagoon fish, such as groupers and snappers, further complicates the effort. If the tuna fishery revives, this crisis could resurface, underscoring the need for proactive management.

Additionally, modern fishing practices like spear-gun fishing have sparked conflicts with traditional fishers who claim it disturbs the ecosystem and limits their catch. Instead of stand-alone baitfish management measures, a holistic approach that addresses all these concerns is needed. As a first step, we have mapped key bait fishing grounds to raise awareness about the significance of managing these areas. Also, we have tried to understand the temporal knowledge on baitfish spawning, which still needs more extensive integration of TEK and scientific knowledge.

We sensitised the fishers' society in Agatti to monitor the changes in baitfish availability and fishing trends using CBFM. At Minicoy, we consulted with the fishers' society to strengthen customary regulations to preserve the baitfish resources. One of the key challenges was bringing fishers into discussions on baitfish management, which is less of a concern for them now. However, we channelled the



Discussion with Deputy Collector, Minicoy



Baitfishing



Consultations with fisher societies and TEK holders on various potential options for baitfish management in the islands.

discussion with all the stakeholders towards creating LMMAs if fishery is again disrupted due to the pressure on baitfish or other factors. We built capacity among fishers and other stakeholders to make use of the participatory maps, in-water surveys, and CBFM outputs to feed future discussions on LMMA.

8. Facilitate the creation of island-level fisheries co-management institutions for collectively addressing challenges facing the P&L tuna fisheries.

Given recent changes, we have decided to adjust our priorities to better suit the evolving situation and needs on the ground. As a result, we have re-strategized our focus and have started exploring ways to collaborate with the local community to address the issues faced by P&L tuna fisheries, including managing bait fish resources. We have identified several key issues related to small scale fisheries, such as access to commons, lack of ice and fuel, increasing operational cost, masmin market issues, tourism-related issues, increasing unsustainable fishing practices, pollution, etc. Redressal of all these issues depend on the creation of strong fisher institutions to initiate dialogues and collectively address the challenges. This was particularly evident on Agatti

Island, where we initiated a conversation to bring a fisherman to register a society under the Lakshadweep Cooperative Societies Registration Act 1986 and further drafted bylaws together in April 2022. Unfortunately, the Lakshadweep administration has currently lifted the act of registering new societies for amendments. Also, over time, fishers lacked the motivation to come forward on the leadership front to take the collective institution forward. Later, fishers chose to revive the existing fisheries cooperative societies that had been largely inactive and had limited functionality but was affiliated with the fisheries department and held legal registration. We have discussed this with the existing society members and extended our support to restructure its administrative matters, including revising the decades-old bylaws. As a result of this continuous engagement, the Agatti Island Matsyolpanna Matsya Bandhanopakarana Vipanana Sahakarana Sangham came forward to collaborate on our mapping and monitoring efforts. It started dialogues with government departments on various P&L fishery issues and is now acting as a primary institution in Agatti Island to monitor and manage the fisheries. In the same way, we made efforts to strengthen the capacity of the fisher's collective in Minicoy, Maliku Maserike Jamaath (Minicoy Fishermen Society) to act as a ground-level fisheries management institution on





the island.

The changing regulatory landscape of these islands meant that the challenges faced by local communities, particularly the fisher community have moved away from fisheries resource management to more fundamental challenges such as access. It also strongly highlighted the lack of strong, politically empowered community institutions to facilitate collective action and lobbying. The revival and strengthening of fisheries cooperative societies is one such step towards providing more agency and capacities to the SSF communities.

9. Monitor and evaluate the ground-level implementation of the fisheries management plans, identify key hurdles or challenges and undertake course corrections if needed.

In its first year, the project had identified crucial entry points to initiate dialogues around collective action and participatory resource management in Lakshadweep. Since the community responded favourably to the initial dialogues, we believed there was tremendous potential to build on this foundation in the next two years of the project. However, the critical changes and legislative developments that happened in the islands required a shift in priorities. Our conversations with fishers in 2022 indicated the need to collectivise and develop resilient institutions to advocate for better cooperation and interface with government agencies and

fisher unions on the mainland. Further follow-up conversations indicated that we may have to work towards market-level interventions since various market pressures threaten SSFs. The accessibility to the islands from the mainland was also reduced due to travel restrictions and a reduction in the number of ships being plied. All these challenges impacted the timely completion of the project deliverables. We also needed to re-strategize and recalibrate our approaches to respond to the changing priorities in the islands and accommodate more pressing concerns of the community.

The project's original goal was to use the then-pressing issues of baitfish

management as the focal area of the interventions for Lakshadweep. Considering the changes that have been unfolding on the ground, we essentially inverted this approach to focus first and urgently on the creation of community collectivisation, which can, in time, also deal with issues such as baitfish management. In Agatti Island, we organised an informal social gathering of fishers to strengthen and widen our networks within the island, and reinstate our community-led interventions.

In line with the cultural nuances of the islands, we coordinated a Ramadan fast-breaking event for the last two years, which helped bring fishers together regardless of internal conflicts and brought fishers



Left: Informal fisher gatherings. Below: The CBFM logbook

together to discuss registering new fisher collectives in Agatti and gradually in other islands. About 50 fishers, small and big boat owners, fisher cooperative members, and community elders participated in the event this year, and we presented our latest outreach materials – the participatory maps on baitfish, the 2024 calendar, and the baitfish outreach fliers.

While initial conversations hinted towards registering a new collective, it wasn't very successful because of the legislation restrictions on the island towards registering a new society, and the lack of leadership from the community. The fisher leaders were also worried about the response from the Fisheries Department if they registered a new society separate from the government. Several conversations with fishers and other stakeholders later were more inclined towards reviving and activating the existing societies instead of registering a new society. Hence, we again re-strategized our work to strengthen the existing society in Agatti and Mincoy. While this may seem like a deviation from the original baitfish management objective, we believe that helping the community collectivise and strengthen community institutions will also provide long-term opportunities for building sustainable and co-managed fisheries pathways in Lakshadweep. The trust and support that Dakshin Foundation has generated through this intervention gained a positive reputation among the fishers society in Agatti, and the society came forward to restart CBFM activities on their own capacity and leadership, publicizing the baitfish maps and facilitating the discussion with the fisheries department on various issues including the management of baitfish resources.



Objective 2. Formulate and implement sustainable fisheries management plans for grouper fisheries in the Andaman Islands

(Intervention sites: Mayabunder, Wandoor and Junglighat)

Deliverables

- Understanding the drivers of fish export from the ANI including the impact of Covid-19 on harvest levels, trade and exports.
- Undertaking a detailed perception study to understand the need, scope and potential strategies for grouper fisheries management in the Andamans.
- Edited deliverable: Ongoing analysis of export data of the past 20 years to be synthesized in a report by the end of July 2023.
- Introduce the CBFM initiative through meetings and co-create protocols for



community-based fisheries monitoring through follow-up workshops.

- Facilitate preliminary multi-stakeholder consultations to co-create a grouper fisheries management road map for the ANI, based on the perception study.
- Develop a detailed implementation plan with clear roles for different stakeholder groups
- Work closely with the local fisheries departments to action the plan.
- Monitor and evaluate the ground-level implementation of the fisheries management plans, identify key hurdles or challenges, and undertake course corrections if needed.

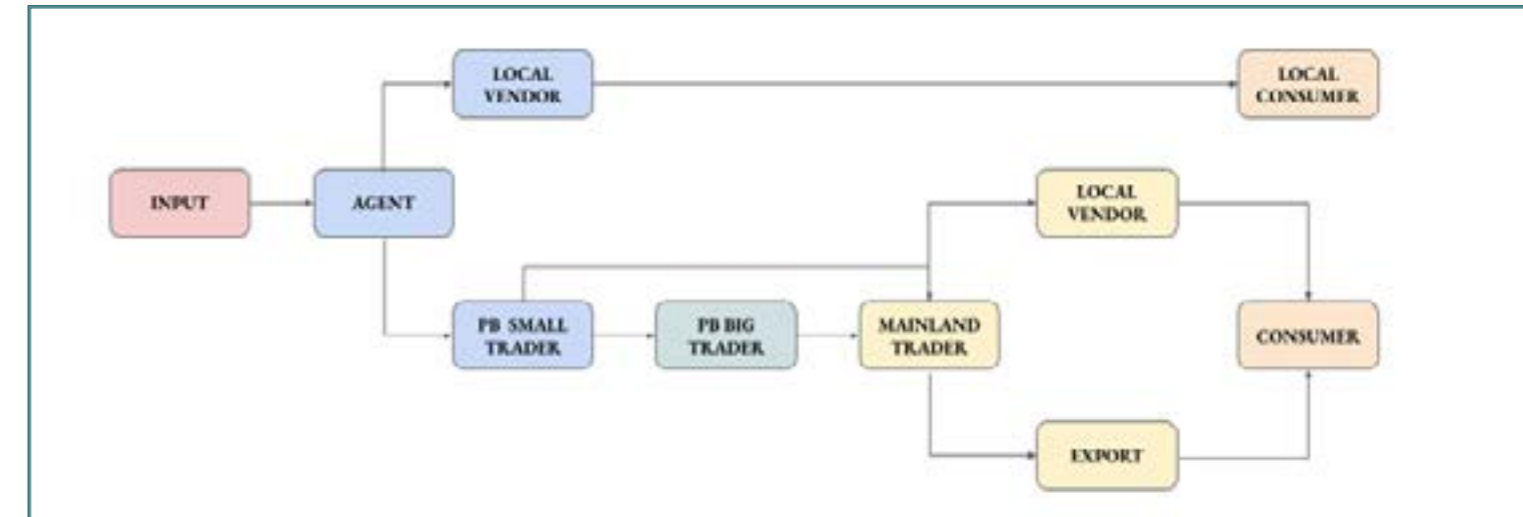
Background

The Andaman & Nicobar Islands house some of India's largest and most diverse coral reef ecosystems with nearly 580 species of corals and 1100 species of commercially important fish species (Rajan et al. 2013). Historically, subsistence-driven fisheries in the ANI changed dramatically since the early 2000s, especially post the 2004 Indian Ocean Tsunami, owing to the improved connectivity, market access, influx of resources and rising demand for reef-based seafood globally (Advani et al. 2013; Jaini et al. 2018). Today, reef fisheries form the mainstay of commercial fishing operations in the islands and are dominated by high-value species including groupers and lobsters.

Groupers in particular are a highly-prized commodity in the ANI and fetch high values in global markets, particularly in South-East Asia (Sadovy 2005). Most grouper fishing in the islands is carried out by small-scale fishers using hand lines or hook and lines, along with a portion of the catch caught using baited long lines. The major species harvested is the coral trout (*Plectropomus leopardus*) locally referred to as CT or Dollar due to its high export value. Similarly, other grouper species such as *Plectropomus* sp., *Epinephelus* sp. and *Cephalopholis* sp. are commonly fished due to their high value. Fishers also target other pelagic and reef-dependent fish including snappers, barracudas, trevallies, sharks, anchovies, mackerel and sardines.

Today, fish export in the ANI is facilitated by the intricate network of agents and middlemen who regulate trade and consequently fish prices. These agents have tie-ups with boats, an arrangement that ensures that all the fish is sold to the agent. To incentivise and maintain this exchange, agents sometimes provide the fishers with fishing supplies or advances for purchasing utilities, and sometimes even personal loans. This transaction is flexible and does not involve any interest, which benefits the fishers, but also keeps fishers tied to specific middlemen.

Depending on the size, species and quality of the fish, agents either directly export chilled fish (fish stored in ice) to mainland India through daily flights operating from Port Blair or sell it to local markets or restaurants. In certain cases, these fish are also sold to large aggregators with freezing facilities, which ship frozen fish to the mainland through large containers carrying more than 10,000 kg of fish.



Schematic representation of the fisheries value chain in the ANI from input (fish caught) to the consumer through a network of agents, traders and exporters.

Trends in seafood export from the ANI

To understand the trends in export, we accessed daily fish export data over two decades maintained by the ANI Department of Fisheries in the form of hand-written registers to understand trends in seafood exports.

Analysing these trends on a species-specific level was challenging due to the lack of detailed species breakdowns and inconsistency in the fish names used. Our data shows most of the fish exported from the islands is in the form of chilled fish, where fish are stored in ice to increase their shelf life. Some portion of the catch also includes dried and processed fish and fish products (e.g.: eel bladders) and a part of the catch is exported as frozen fish.

While fish export trends show a gradual increase, over time they have been shaped by key social, ecological, and environmental events. Prominent amongst these is the Indian Ocean Tsunami which hit the Andaman Islands in December 2004. Immediately after the tsunami, fish exports dropped from nearly 250 tonnes per year to less than 100 tonnes per year. Subsequent post-tsunami

rehabilitation efforts led to a rapid increase in fishing capacities, mechanisation, connectivity and the development of policies and subsidies to facilitate commercial fishing operations, leading to a spurt in exports. Fisheries exports have also benefited from recent technological and infrastructural support including the introduction of GPS and fish finders after 2015,

increasing flight connectivity, and the introduction of large-scale fishing gears such as ring seines (around 2018) and long-lines.

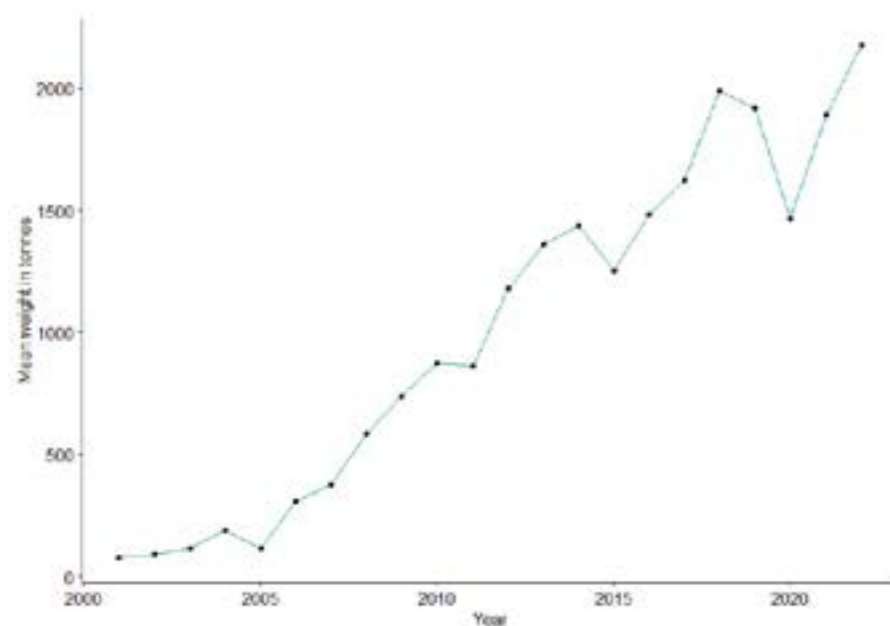
Fish export suffered a significant drop once again during Covid-19 (2020-21) when trade was temporarily stopped and all fishing operations were banned during different stages of the nation-wide lockdown. During this time, most small-scale fishers were unable to conduct any commercial fishing operations

and fishing was limited to near shore subsistence operations. Exports dropped by nearly 40% from around 2000 tonnes annually to less than 1500 tonnes in 2020. However, exports have since then bounced back. In 2022, nearly 2500 tonnes of fish was exported from the ANI, suggesting that the export markets have recovered.

The initial phase of the project focussed on building up on our previous knowledge to get a broader overview of the current on-ground status of fisheries in the ANI. The primary outcome of this activity was to develop a digitised database on the exports of fish from the ANI and a copy of this database has been shared with the ANI Department of Fisheries. Digitising the data from hand-written registers and distinguishing between different species groups was particularly time consuming. We are currently in the process of formulating a more efficient strategy by which the data collection and entry can be streamlined, and the accuracy and resolution of the data can be improved. A portion of this data is currently being analysed to understand the impacts of distal and proximal drivers on the fate of seafood export, to be published as a peer-reviewed manuscript. Going forward, we aim to develop an online dashboard that has real time data on fisheries exports which can be used by stakeholders to identify trends and local drivers that influence exports. In combination, these can allow for identifying areas that need specific management attention and allow agencies and stakeholders to pre-empt potential consequences of various fisheries related developments.

Fisher perceptions towards catch declines and management needs

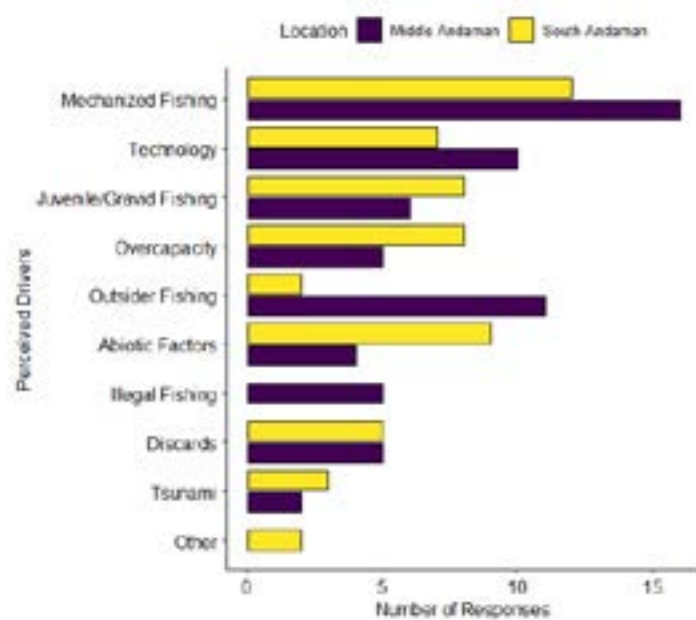
Interestingly, while exports continue to show rising trends, small-scale fishers share concerns over the scale of fishing operations with many reporting declines in fish stocks. Fisheries in the ANI are highly heterogeneous and data-poor. Fisheries are multi-species, and multi-gear, have different end-uses, and are carried out by communities having different settlement histories, traditional knowledge, values and ethnicities. This has made understanding changes in fisheries management and perceptions imperative to ensuring that resource governance is participatory, equitable, and inclusive towards the rights of small-scale fishers. To this end, we conducted semi-structured interviews with small-scale reef fishers with varied fishing experience to understand the perceptions of change with the emergence and development of



Seafood export from the ANI highlighting the significance of important events

commercial harvest and management solutions for sustainable harvesting. Initially, these interviews were conducted exclusively with fishers targeting *P.leopardus* (amongst other grouper species) using small-scale handlines. These interviews were carried out at four villages in the two districts of the Andamans: South Andaman (N=15) and North and Middle Andaman (N=15), which are comparable in terms of key fishery variables: fishing craft and gear, fishing technique, target species, and end-use. However, they differ in terms of their access to markets and resources, which have been identified as critical drivers shaping fisheries globally

(Cinner et al., 2012)

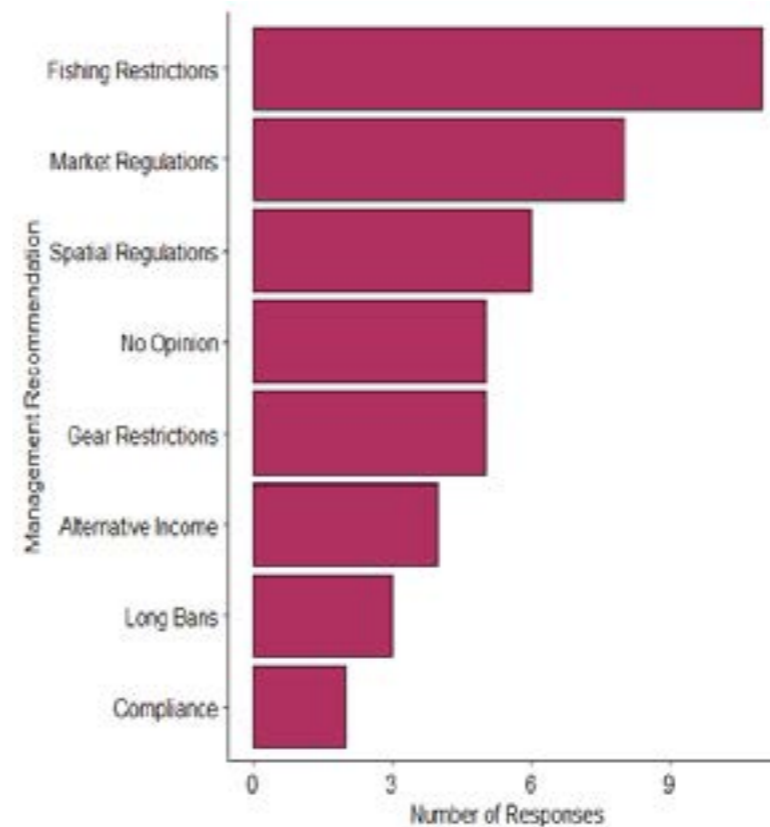


The introduction of mechanised fishing practices (93.3%), increased use of technology such as fish finders (56.6%) and fishing of gravid females and juveniles (46.6%) were perceived as the most critical drivers of grouper declines across the two districts in the ANI. While there were commonalities in the perceived drivers for declines across the districts, there were also a lot of regional differences in these perceptions. For fishers

in the South Andaman district, abiotic factors (such as erratic rainfall, rising temperatures, reef habitat declines, etc.), overcapacity due to increased

boats and fishers and removal of juvenile fish and gravid females by non-selective fishing gear were perceived as the major drivers of Grouper declines. In contrast, for fisheries in North and Middle Andaman district, the declines in catch were mainly attributed to fishing by fishers from Port Blair and other parts of the islands, and illegal fishing by large-scale mechanised gear in inshore areas of less than 6 nm, which they are legally prohibited from doing.

The recommendations towards management are dominated by the perceived need towards restricting fisheries through breeding regulations, gear restrictions



Recommendations for management on fish decline

management recommendations have been discussed in greater detail in the forthcoming sections.

A part of this analysis is currently being written as a peer reviewed manuscript targeted towards understanding the nature of grouper trade, the perceptions towards decline, and the management recommendations towards improving fisheries management.

Similarly, in terms of the outcomes, it was evident that collective and decentralized fisheries management, certain regulatory measures (e.g., breeding restrictions, gear modifications, etc.) and market-based management activities are the critical starting-points for sustainable fisheries management. One of the key lessons from this activity was that fisheries management have a multi-species focus. This was also validated through the interactions with fishers on ground, where many fishers occasionally shift their targets from fully-reef based grouper fisheries to more demand or season-based approaches. Hence, in the

(especially large-scale active gears) and seasonal restrictions. Fishers also highlight the need to have market-based regulations (including direct access to export markets, improved prices for fish, and transparent pricing systems) as well as spatial regulations in terms of access to fishing grounds. Interestingly sources of alternate income (from skill building, knowledge about using different gears, education, and alternate jobs) also emerged as a key solution to reduce fishing pressure and in turn managing fisheries better. These perceived drivers and

following activities, we focused on fisheries as a whole rather than limiting the scope of our work on Grouper fisheries alone.

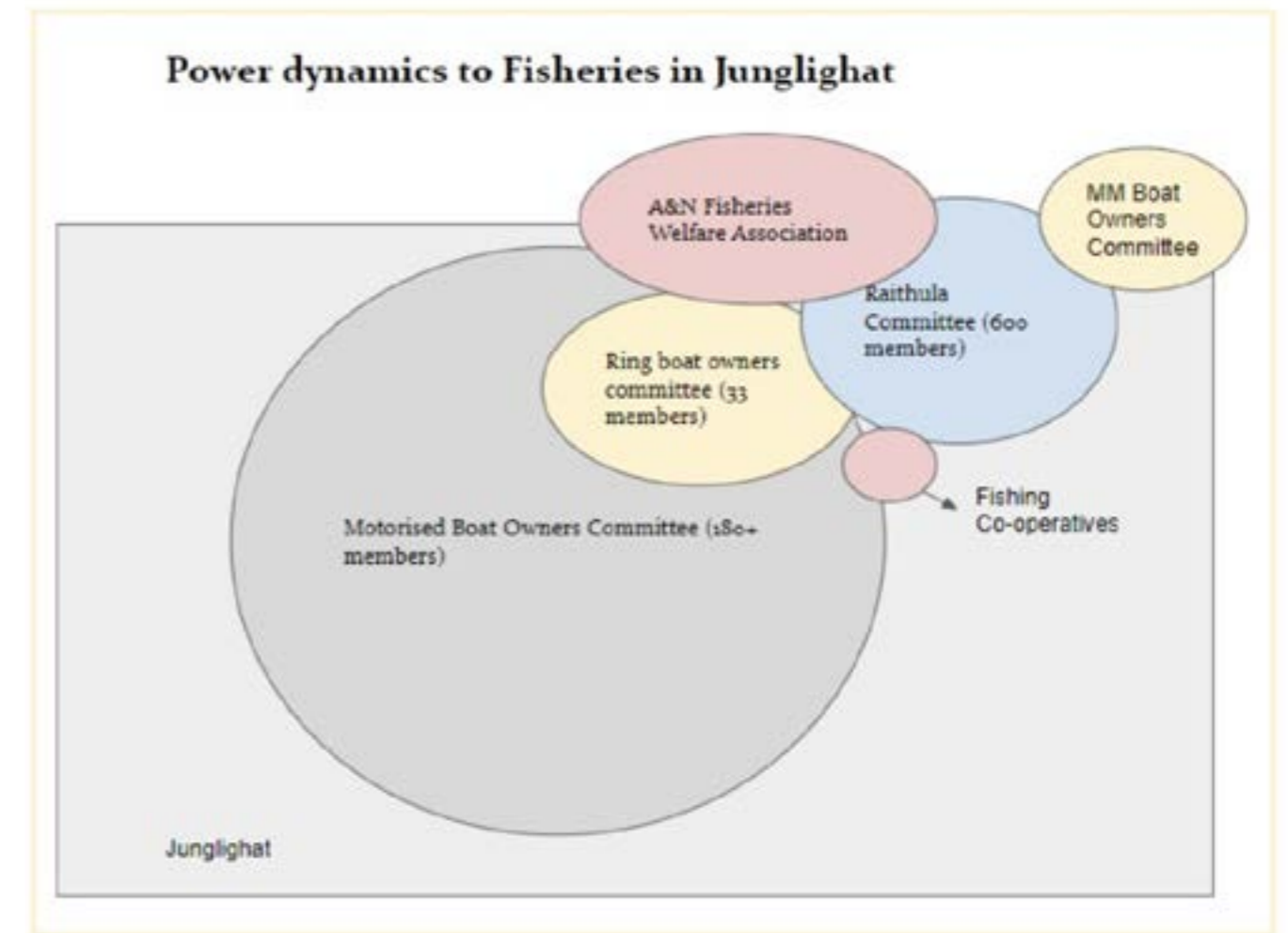
Co-creation and launch of a community-based fisheries monitoring system

Fisheries management in the ANI is severely challenging due to the vast and scattered spread of the fisheries and the lack of data on fisheries populations and landings. Using our previous success in the Lakshadweep Islands and based on our work in the ANI, we initiated a process of participatory fisheries mapping and monitoring in South Andaman.

Towards this, we conducted several meetings with the fishers and fisher leaders in the Junglighat fishing community to build trust and collaboration with fisheries institutions and stakeholders. Alarming fish declines despite rising fishing efforts emerged as a key concern. On highlighting the need for improved data to make better management decisions, most fishers showed willingness towards participating in logging their data and working with us to co-develop a monitoring mechanism.

The first part of this process was to conduct participatory fishing ground mapping exercises to understand fishing areas used, documenting different craft and gear over different seasons along with the fishing intensity in each zone. These maps are useful for discussions on fisheries monitoring and making management decisions. We also mapped out the important stakeholders, community and fisheries institutions and their power dynamics within Junglighat. These informal community-based fisheries institutions are key to managing fisheries sustainably in ANI.

Over the next few months, through a series of meetings, feedback cycles, and iterations, a catch monitoring logbook was developed and translated in Telugu, a language widely spoken by fishers in Junglighat. The first round of participatory monitoring was piloted with few key informants. However, we observed that data entry was challenging due to the multi-day nature of trips, different species caught, and the challenging weather conditions that made data logging extremely difficult. Also, some fishers were not able



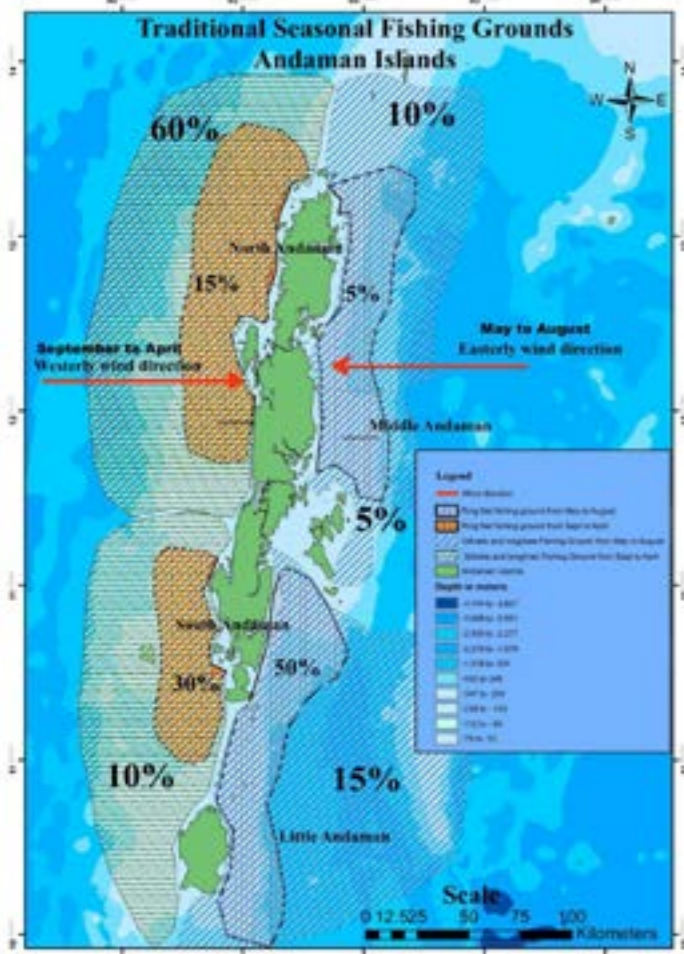
Mapping of informal community-based fisheries institutions of Junglighat

to provide information due to limited literacy.

To overcome this challenge and assist the fishermen in recording the catch data, we hired community field staff from Junglighat in September 2023. Along with aiding in data collection, being part of the local community, the staff also supported our efforts towards capacity building and improving the wellbeing of the community. Initially, we started collecting regular catch data from seven boats in Junglighat. Eventually, we extended catch monitoring with five more boats which included mechanised boat (trawler) and non-motorised boats using gillnet and hook and line gears.

Parallely, we also explored and understood the way the fishers maintained the records of their fish-sale data, which would offer valuable insights into

historical fish catches. This was done through accountants who help boat owners maintain the sale data in record books called 'Paddula book'. The Paddula book has data on the fishing trip, fish type, quantity caught, crew-size and the vendor the fishermen sold to. Thus, along with catch monitoring, we are now digitising data maintained in these books to analyse historical trends in catch and effort. We have digitised the data for 187 fishing trips of two motorised boats in three years so far.



Fishing ground map of Junglighat fishers

The graph represents the fish catch trends in ANI, in the past three years for two motorised boats. It shows the change in average catch per unit effort (CPUE) through the years. Preliminary data shows that CPUE (kilograms of fish caught per day) has marginally decreased over the years. While this may indicate decline in fish stocks, additional data points are required to support these findings.

Through this experience of participatory catch monitoring over a year with fishers of Junglighat, we observed that data entry for multi-day and multi-species fisheries is extremely time consuming and difficult to

remember. Thus after a few months, we observed that interest to collect this data had waned, prompting us to hire a community representative to ensure continuity. Similarly, the catch sale data books do not have information on trip duration, making it challenging to estimate past CPUE. However, through our follow-ups we found out that fishers were still keen on collecting catch data and acknowledge its importance. Thus, we are currently in process of developing a simplified protocol

Fisheries Catch Monitoring Logbook/ఫిషరీస్ కో-మానిటరింగ్ లాగ్ బుక్

Name of the boat owner/దోల యజమాని పేరు:	Contact No. of boat owner/మొబైల్ నంబర్:
Boat Number/దోల సంఖ్య :	Boat Type/దోల రకం:
No.of Crew Members/రైతుల సంఖ్య:	Engine Capacity/ఇంజన్ సామర్థ్యం:
Date of departure/బయలుదేరే తేదీ:	Date of return/తిరిగి వచ్చిన తేదీ:
Total Trip Investments/ మొత్తం ట్రిప్ పెట్టుబడులు:	

Fishing Zones/ఫిషింగ్ జోన్లు

<input type="checkbox"/> Junglighat to Baratang/ జంగ్లిఘట్ నుండి బరాతంగ్	<input type="checkbox"/> Junglighat to Barren Island/ జంగ్లిఘట్ నుండి బారెన్ ఇలాండ్ వరకు
<input type="checkbox"/> Baratang to Mayabunder (west)/ బరాతంగ్ నుండి మాయాబందర్ (పశ్చిమ)	<input type="checkbox"/> Port Blair to Strait Island/ పోర్ట్ బ్లైర్ నుండి స్ట్రైట్ ఇలాండ్
<input type="checkbox"/> Mayabunder to Diglipur (west)/ మాయాబందర్ నుండి దిగ్లిపూర్ (పశ్చిమ)	<input type="checkbox"/> Straight Island to Billi Ground/ స్ట్రైట్ ఇలాండ్ నుండి బిల్లిగ్రౌండ్
<input type="checkbox"/> Port Blair to Little Andaman/ పోర్ట్ బ్లైర్ నుండి లిట్టి అందమాన్	<input type="checkbox"/> Billi Ground to Diglipur/ బిల్లి గ్రౌండ్ నుండి దిగ్లిపూర్
<input type="checkbox"/> Port Blair to Wandoor/ పోర్ట్ బ్లైర్ నుండి వందూరు	<input type="checkbox"/> Little Andaman to Nicobar Islands/ లిట్టి అందమాన్ నుండి నికోబార్ దీవులు
<input type="checkbox"/> Wandoor to Colingpur/ వందూరు నుండి కొలిన్పూర్	

Clockwise: Template of the catch monitoring logbook for Andaman and Nicobar Islands, Data template to record fish catches both participatory and historical

Sl	Boat name	Boat type	Trip id	Gear	Day	Month	Year	Village	No. of crew	Trip duration	Weight	Data Collector	Unique id
1	EVR	Motorised	EVR1	ringnet	18	2	2021	Junglighat	13	0	430	Receipt	2021JunglighatEVR1
1	EVR	Motorised	EVR1	ringnet	18	2	2021	Junglighat	13	0	230	Receipt	2021JunglighatEVR1
1	EVR	Motorised	EVR1	ringnet	18	2	2021	Junglighat	13	0	5	Receipt	2021JunglighatEVR1
2	EVR	Motorised	EVR2	ringnet	25	2	2021	Junglighat	14	0	3300	Receipt	2021JunglighatEVR2
3	EVR	Motorised	EVR3	ringnet	2	3	2021	Junglighat	13	0	396	Receipt	2021JunglighatEVR3
3	EVR	Motorised	EVR3	ringnet	2	3	2021	Junglighat	13	0	620	Receipt	2021JunglighatEVR3
4	EVR	Motorised	EVR4	ringnet	4	3	2021	Junglighat	15	0	1995	Receipt	2021JunglighatEVR4
5	EVR	Motorised	EVR5	ringnet	6	3	2021	Junglighat	15	0	256	Receipt	2021JunglighatEVR5
5	EVR	Motorised	EVR5	ringnet	6	3	2021	Junglighat	15	0	3770	Receipt	2021JunglighatEVR5
6	EVR	Motorised	EVR6	ringnet	10	3	2021	Junglighat	15	0	2100	Receipt	2021JunglighatEVR6
6	EVR	Motorised	EVR6	ringnet	10	3	2021	Junglighat	15	0	1060	Receipt	2021JunglighatEVR6
6	EVR	Motorised	EVR6	ringnet	10	3	2021	Junglighat	15	0	4.5	Receipt	2021JunglighatEVR6
7	EVR	Motorised	EVR7	ringnet	12	3	2021	Junglighat	15	0	443	Receipt	2021JunglighatEVR7
7	EVR	Motorised	EVR7	ringnet	12	3	2021	Junglighat	15	0	312	Receipt	2021JunglighatEVR7
8	EVR	Motorised	EVR8	ringnet	15	3	2021	Junglighat	14	0	660	Receipt	2021JunglighatEVR8
8	EVR	Motorised	EVR8	ringnet	15	3	2021	Junglighat	14	0	1800	Receipt	2021JunglighatEVR8
9	EVR	Motorised	EVR9	ringnet	16	3	2021	Junglighat	14	0	780	Receipt	2021JunglighatEVR9
9	EVR	Motorised	EVR9	ringnet	16	3	2021	Junglighat	14	0	425	Receipt	2021JunglighatEVR9
9	EVR	Motorised	EVR9	ringnet	16	3	2021	Junglighat	14	0	0	Receipt	2021JunglighatEVR9
9	EVR	Motorised	EVR9	ringnet	17	3	2021	Junglighat	14	0	3156	Receipt	2021JunglighatEVR9
10	EVR	Motorised	EVR10	ringnet	17	3	2021	Junglighat	14	0	125	Receipt	2021JunglighatEVR10

modify their record books to log their effort information as well. This way it will be easier to measure the trends of population over years using the existing system without creating an additional burden on the fishers.

Engaging with multiple stakeholders and developing an outline for fisheries management in the Andaman

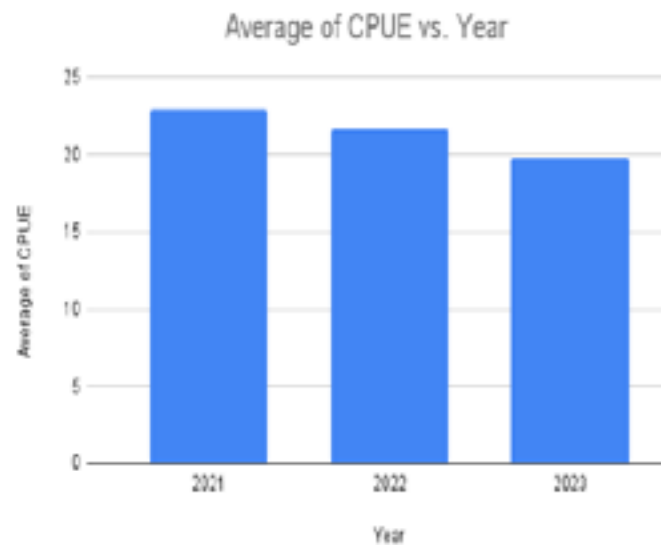
The initial deliverables were:

- To facilitate preliminary multi-stakeholder consultations to co-create a grouper fisheries management road map for the Andaman islands,

- Based on the above, develop a detailed implementation plan with clear roles for different stakeholder groups
- Work closely with the local fisheries departments to action the plan

- Monitor and evaluate the ground-level implementation of the fisheries management plans
- Identify key hurdles or challenges and undertake course corrections if needed.

We have further redefined the deliverables to engage with multiple stakeholders in Andaman to develop an outline for fisheries management in the islands. The interventions and progress achieved under this deliverable are described



below:

Community-led sustainable fisheries management in the ANI

Though small-scale fishers (SSF) are a majority in ANI, they remain poorly represented in fisheries decision-making. The plans for increasing fisheries production in the islands do not take into account the ground realities, challenges and aspirations of SSF. Many fishers also believe that the current schemes for fisheries do not address the needs of SSF and focus on either culture fisheries or deep-sea fishing. With decline in fish catch over years and introduction of more intensive fishing crafts and gears, competition over resources have increased. There are multi-dimensional conflicts between various fisher groups over resources & fishing grounds. Lack of compliance with marine fisheries regulation fuels some of these conflicts. Income fluctuation and fisher wellbeing are priority issues which need to be addressed. This highlights the need for effective fisheries management in the islands where small-scale fishers are equitably represented and empowered.

CPUE calculation of last three years fishing trips by two motorised boats

Dakshin Foundation's initial conversations on fisheries management were targeted at the stakeholders of Wandoor and Junglighat fishing villages. We chose these villages due to our history of engagement in these regions, the diversity of fishing practices they offer, and their significance to fisheries management outcomes. While we had proposed to focus on grouper fisheries in this project in all the sites, subsequent engagement with fishers in these sites have compelled

us to look at fisheries management from a multi-species perspective. In Wandoor, where fishing is primarily driven by the grouper export market, the discussions on livelihoods and fish catch decline were geared towards the need to manage Grouper and other reef fisheries. However, Junglighat, which is the main fishing hub in ANI, does not have an exclusive focus on grouper fishery and there are multiple species of commercial importance. Due to



Community meeting with fishers at Junglighat Fish Landing Centre

this, the meetings on fish decline and the need for management in Junglighat focused on the multi-species fisheries system. Through exercises like participatory fishing ground mapping, we understood the multiple overlaps in fishing practices and grounds of different fishing villages and the various underlying conflicts between fishing groups. In 2022-23, Dakshin undertook a comprehensive mapping of different fisheries stakeholders which includes fisher leaders, community institutions and market players involved in the fisheries, focussed on Wandoor and Junglighat fishing villages. This was followed by an in-depth assessment of the local institutions present in the fishing community. The team also documented the range of fishing practices, the different crafts, gears, target species, fishing grounds and trade practices. This comprehensive assessment of the fisheries system in these villages has helped in understanding

different issues and challenges from multiple perspectives.



Stakeholder consultation meeting in Wandoor cluster

Parallely, the team engaged with fisheries officials and other stakeholders to understand their agendas and priorities, and identify potential collaboration opportunities. In addition to working with community institutions like village and boat committees, we built strong relationships with the officials of the fisheries

department and the administration. In 2022-23, Dakshin Foundation developed a partnership with the Wandoor Gram Panchayat to work towards the overall development of the area, through which we were able to include fisheries-specific issues in the village development plan.

Multi-stakeholder workshops to improve cluster-specific fisheries management across South Andaman

Along with our learnings from Wandoor and Junglighat, we realised that dialogue on fisheries management with a few villages was not sufficient as the marine system is open access, and management plans, rules, and regulations have to take into consideration the entire landscape. Thus, in 2023-24, Dakshin Foundation scaled its engagement to all fishing villages across South Andaman. We undertook a rapid assessment of all 26 Gram Panchayats in South Andaman to identify and document their priority issues. Following this, South Andaman was divided into seven different clusters of fishing villages based on their geographic location and shared fishing grounds and practices, with the aim to have cluster

level stakeholder consultations to arrive at a common understanding of the issues and chart out a way forward for better fisheries management.

In each village, the team conducted extensive field visits to identify the major issues of fisheries and fisher leaders from these areas. Based on the insights of these field visits and in-depth stakeholder analysis, the relevant fisheries stakeholders from the villages under each cluster were invited to participate in the consultation meeting. We ensured that these meetings had adequate representatives from different groups -- non-motorised boats, motorised boats, fish vendors, traders, etc. The consultation meetings were structured into two group discussions--the first to arrive at a common understanding of the priority issues faced by the fishers in the area -- and the second to explore the potential solutions and collective way forward.

The team completed fisheries stakeholder consultations in five clusters, covering 24 fishing villages of South Andaman district. Fish catch decline and its subsequent impact on the fishing practices and incomes of fishers emerged as one of the key issues from all the consultations. Overfishing, increasing competition, and different unsustainable fishing practices were identified as potential reasons. Fishers from villages which are more intensively dependent on grouper fisheries, like Wandoor and Guptapada discussed the need for a grouper fishing ban for three months every year during the Grouper breeding season, with the government providing adequate compensation during the ban. Fishers from other clusters also echoed the need for a seasonal ban for all fishing, along with the need of financial support to small-scale fishers during this period. However, due to the lack of existing knowledge of breeding seasons, we are currently in the process of designing studies that would allow us to identify seasons or periods that would be the most appropriate for any fisheries restrictions.

Multiple unsustainable fishing practices were highlighted during these consultation meetings. Despite clear zone demarcations in the Andaman Nicobar

Marine Fisheries Regulations Act (ANMFRA), fishers have pointed out that mechanised boats, trawlers, and ring seiners continue to operate within 6 nm from the coast leading to a decline in the catch for small scale fishers. Similarly, use of monofilament (plastic) nets was highlighted as an extremely destructive fishing practice which is continuing in the nearshore waters of South Andaman despite it being completely banned. Fishers also have regular conflicts with ring-net fishermen as they catch juveniles and discard a lot of by-catch. Their fishing grounds overlap with fishers practising hook & line and other net fishing methods.

Fishers also brought up multiple issues related to their relationship with the Fisheries Department and the ANI administration. They pointed out a mismatch between their needs and the schemes which the administration is focussed on promoting. Multiple groups also highlighted a need to strengthen monitoring and enforcement of fishing regulations to deter unsustainable fishing practices. Other issues like need for infrastructural development around fish landing sites, threat of crocodile attacks, and conflicts around marine protected areas came up during these consultations.

From collectivisation to collective action

Lack of unity and cohesion within SSF was a common issue which emerged throughout the South Andaman landscape, which also hindered their ability to voice their needs and negotiate with the administration. To initiate proper action on these issues, fishermen from Namunaghar and Mithakhadi fisheries cluster decided to form a collective immediately after the consultation and tentatively nominated members from among themselves. Similarly, the fishermen of Colinpur and Tirur cluster also nominated members from the consultation meeting to form a fisheries collective. We also identified potential fisher leaders from all the consultation in consensus with the participants who we would coordinate with in future and also focus on building capacities of. The engagement over the last three years have highlighted the different fissures and frictions which exist in the

fisheries systems of South Andaman, based on fishing practices, intensity, and fishing grounds. These divisions are further pronounced due to political, social and cultural differences among fishers. On the other hand, there is a sense of prevailing distrust and lack of constructive communication between the fishers and the administration. Mismatch in priorities for schemes and subsidies along with bureaucratic delays in implementation of activities have increased the gap between these two stakeholders. Lack of collectives of SSF in the islands is another reason for the lack of effective communication. Inclusive platforms, with strong fishers' representation are required to facilitate dialogue between fishers

and the administration on priority issues of SSF and build a participatory fisheries management plan for ANI.

After the completion of the fisheries consultation meetings in the last two clusters,



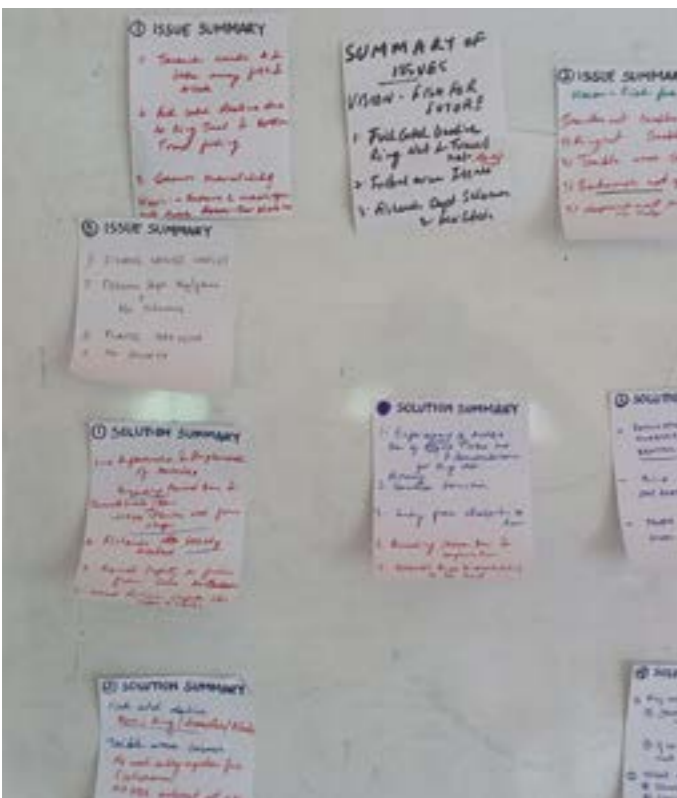
Participants after the consultation meeting for Mithakhadi & Namunaghar Panchayat

we plan to consolidate the outputs from all the cluster level consultation meetings and conduct a district level consultation involving fisher leaders and stakeholders from all the clusters of South Andaman. Based on the insights of all these consultations, we will develop a set of recommendations for the ANI administration to improve fisheries management in ANI, and the well-being of fishing communities in these islands. Meanwhile, we are working on developing modules on ANMFRA for the capacity building of fishers, so that they can come together with large scale fishers and the administration for inclusive planning.

Objective 3: To create and strengthen capacities for participatory fisheries management on the ground

(Intervention sites: Lakshadweep and Andamans)

Deliverables:



- Assess the capacity of key local resource management agencies such as the fisheries and forest departments and respective panchayats (local self-government units) governing the targeted fishing villages.
- Develop a series of stakeholder-specific training modules to address the gaps identified through the capacity assessment.
- Develop a series of stakeholder-specific training programs for capacity building at the local level.

Lakshadweep Islands

We have built a well-rounded understanding of the different fisheries stakeholders and actors that are key to working towards participatory fisheries management in Lakshadweep. This understanding has greatly helped us decide on the course of action that should be taken at each juncture of the project. However, current administrative changes in the form of top-down governance in the island restrict the capacity of local governing institutions to interfere in the fisheries management. Our conversations with the Fisheries Inspectors in Agatti, Kavaratti and Mincoy Islands and the Assistant Director of Fisheries indicated that the priorities of the department have also changed as the islands are going through a series of changes,

Issues and solutions identified through group discussions in Fisheries consultation meeting at Collinpur

and the focus is more on the commercialisation of fisheries rather than fisheries management. Also, the internal conflict between the different departments creates difficulties for the other departments, such as the environment and forest departments, in engaging in direct P&L tuna fisheries management. The administration has completely dissolved the island's Panchayat Raj (Local Self-Government units) system, and for the past two years, there has been no Panchayat in place.

Despite these challenges, we have implemented a diverse range of training programs to engage and empower the local community and stakeholders across Lakshadweep. Our goal has been to strengthen their capacity to sustainably manage marine resources, particularly in the context of P&L tuna fisheries. Here's a detailed breakdown of our activities:

Participatory Mapping

We initiated a participatory baitfish resource mapping activity that included the local community to introduce them to the concept of participatory mapping. Through the activity, we discussed the importance of mapping these resources with the right tools and methodologies, enabling them to actively monitor and manage their own fishing grounds. This process enhanced their understanding of resource management and fostered a sense of ownership and responsibility for sustainable practices. The participatory maps on baitfish resources serve as a strong supporting document for fishers and fisheries managers to develop monitoring and management measures in future.

In-Water Baitfish Resource Survey Training

We recognised the need to safeguard critical baitfish resources for the P&L tuna fishery. To this end, we trained local divers and youth on in-water survey protocols for baitfish resources. These hands-on training sessions provided participants with the necessary skills to conduct accurate and systematic surveys, ensuring the sustainability of baitfish stocks essential for the local fisheries. In the long run, we would like to include local dive centres in the long-term monitoring of baitfish. We have compiled a manual summarising the protocols for in-water baitfish monitoring that we have developed for the local diver community in Lakshadweep.



Capacity Building for Fishers' Societies.

Strengthening local fisheries institutions was another crucial focus of our efforts. We held multiple meetings and facilitated dialogues with members of fishers' societies in Agatti and Minicoy. The goal was to provide both legal and practical guidance on establishing and running a functional fishers' society. These sessions covered organisational management, bylaw revisions, and operational logistics. They also spread awareness of the importance of being united to manage fishery resources and attract more members to the society, to ensure that the societies were better equipped to manage their fisheries sustainably

Collaboration with Government Departments

Recognising the importance of multi-stakeholder involvement, we worked closely with various government departments, including fisheries, environment and forest, science and technology, and tourism. Our focus was on co-creating a platform that could collectively address the challenges faced by the P&L fishery in Lakshadweep. We conducted in-person presentations and discussions with government officials in Agatti, Kavaratti, and Minicoy to develop their capacity to manage fisheries and tackle critical issues effectively. The Department of Environment and Forest, in particular, collaborated with us during



a workshop on sustainable octopus fishing practices in Agatti.

Public Engagement

Since the Agatti Island Matsyolpanna Matsya Bandhanopakarana Vipanaana Sahakarana Sangham works under the fisheries department, the department supports the monitoring and management initiatives taken by the society in Agatti. We have conducted workshops on sustainable fishing practices for fishermen by collaborating with the environment and forest department. With the Department of Science and Technology, we collaborated for the Science Day celebration 2023 Global Science for Global Wellbeing at Pondicherry University campus, Kadmat, and organised a session on sustainable fisheries and science

for resource management.

Community Engagement and Capacity Building for NGOs and Women Self Help Groups

We expanded our outreach by engaging local NGOs, school students, and Women Self Help Group (SHG) members. Training programs were designed

to help these groups understand their role in local resource monitoring and management. During the celebration of Women's Day, we honoured the senior octopus fisherwomen to encourage women to be aware of the importance of sustainability in utilising marine resources. By involving a broad spectrum of the community, we ensured that stewardship for marine resources extended beyond fishers and government officials to include other key sections of the society.

Lagoon and Beach Cleanups

We trained local youth clubs in organising and conducting lagoon and beach cleanups. These cleanups were aimed at maintaining the health of the lagoons, which are essential for sustainable fishing and tourism. By involving the youth in these activities, we cultivated a new generation of environmental stewards dedicated to preserving the marine ecosystems that support their livelihoods.

One of the most impactful community activities was the Lagoon Fest, which we organised as an experiential platform for learning about marine biodiversity, island resource protection, and sustainable livelihoods. We organised the four-day event, beginning with a beach throw ball competition for the women along with a swimming and tug of war competition for the fishermen of Agatti to highlight the importance of beach and lagoon-based sports activities. A live painting session for school students focused on the importance of beach and lagoons for living on the island. Students created artwork and showcased it to the public at the event itself. These events encouraged participants to express their relationship with the sea and marine biodiversity, fostering a more profound sense of stewardship for their natural environment. The fest brought together diverse community members, from fishers to school students. We organised a food fest along with the lagoon fest to highlight the local cuisines of the island, to attract outsiders to the event and learn more about our collaborative initiatives. It provided an opportunity for collective learning about the importance of protecting island resources and promoting sustainable fishing practices. It

served as a celebration of local marine life and a space for community members to engage with each other and share knowledge about preserving their unique



environment. We organised a well-planned closing ceremony to honour all the collaborative institutions and government departments with a cultural event at the government museum at Agatti.

Outreach and Training Materials

We have developed various training and outreach materials to bridge the

gaps in monitoring and managing P&L tuna fishery. In response to a request from P&L fishers, we have compiled outreach material containing information on the biology of the major species of baitfish used in the P&L tuna fishery. The compiled CBFM reports have been periodically submitted to the society to support the management conversation around P&L tuna fishing with various stakeholders. In addition to this, we are in the process of compiling and synthesising information and insights from our long-term engagement with fisheries stakeholders in the Lakshadweep Islands and preparing a comprehensive practitioner's guide that can be used by practitioners interested in working towards multi-stakeholder, participatory fisheries management.

As part of our outreach efforts, we produced and distributed various materials displayed in government offices and public spaces, including maps and educational content. Government workers used these resources during their engagements with fishers to promote sustainable fishing practices and raise awareness about the importance of responsible resource management.

The Annual Outreach Calendar: Fish for the Future

The Dakshin Foundation's journey with its calendar series, initiated in 2015, has grown into a significant community outreach activity. Initially conceived to share the findings of our research projects and fisheries monitoring programs, the calendar has evolved into a cornerstone of our engagement efforts, fostering deeper connections and promoting sustainable practices in the community. In recent years, the calendar series has embraced diverse themes and activities, making it a versatile platform for outreach. We organised photo contests and art competitions focusing on sustainable fisheries, inviting photographers and artists from the island to contribute their work. This highlights the importance of sustainable practices and showcases the island's rich cultural and natural heritage through captivating images and art. The selected artworks and photos are published in our calendar, adding a unique personal touch to each edition.

Annual outreach calendar with the theme of traditional seafood items



This competition fostered a sense of community and amplifies our message of sustainability through the powerful medium of art.

Another notable initiative was the edition's theme of traditional seafood items. To bring this vision to life, we collaborated with self-help groups involved in making and distributing these foods. By featuring these groups in our calendar, we aimed to celebrate and preserve the island's culinary traditions while providing them with a platform to reach a wider audience.

Today, the calendar series is one of the Dakshin Foundation's essential outreach activities. Its evolution from a research-sharing tool to a multifaceted platform for community engagement and creative expression underscores our commitment to sustainability and collaboration. It is a testament to the power of community, the importance of sustainable practices, and the innovative spirit of the island's residents. As we move forward, we remain dedicated to maintaining and expanding this vibrant tradition, ensuring that our calendar continues

to serve as a beacon of sustainability and community spirit.

These comprehensive activities have laid the groundwork for more robust, resilient fisheries management systems in Lakshadweep. Our focus has been on building local capacity, fostering collaboration, and encouraging sustainable

practices to ensure the community's long-term health and valuable marine resources.



Fish For the Future 2024 : celebrates the unique and sustainable pole & line tuna fishery in the Lakshadweep

Andaman Islands

Assessing the capacity of stakeholders and addressing gaps found is an important step towards participatory fisheries management. The team conducted a stakeholder mapping and analysis of different individuals, and formal and informal institutions during the initial phase of the project in Junglighat and Wandoor. Later, when we expanded our engagement in the entire South Andaman landscape across all the fishing villages, we conducted stakeholder mapping in these new fishing villages as well.

Through the fisheries stakeholder mapping and assessment of the fisheries institutions, we were able to understand gaps in the capacities of different stakeholders including fisher leaders and frontline workers like Sagar Mitras. We have also been able to identify potential leaders from different fishing villages around South Andaman whose capacities could be built so that they can play better roles in the dialogue around fisheries management in ANI.

There is a lack of clarity and significant knowledge gap among the fishers and department ground officials on the specific details of the Andaman and Nicobar Marine Fishing Regulation Act (ANMFRA), which leads to confusions, especially in times of conflict over fishing grounds and practices. To simplify the key clauses of the regulations, we intend to produce an easy-to-understand ANMFRA booklet which will be used to build the capacities of the fishermen and fisheries officials on the regulation. This will also ensure greater participation of fishers in consultations around future amendments to the ANMFRA. This will be aided by a comprehensive fishing-grounds map developed in collaboration with fishers, which can be aligned with the current ANMFRA regulations and identifies pressing conflicts between fishing groups. To enhance enforcement of the regulations, we plan to engage with fisheries stakeholders, such as the Marine Police and Coast Guard.

We identified the need for capacity building support for the formation and functioning of fishers' collectives and associations during our consultation meeting, and will be working with the fisher groups who wish to form or strengthen their collectives, providing them with technical assistance and training as required.

Additional Activities Undertaken in Project Sites

Lakshadweep

- We have conducted a workshop for the fishers in Agatti on sustainable octopus fishing practices in Lakshadweep. As a result of the workshop, we have created a collective of octopus fishers in Agatti for the first time to facilitate discussions on the management of octopus fishing on the island. We have also released a handbook on sustainable octopus fishing which covers various octopus harvesting methods and management practices worldwide.



- We strengthened our collaborations with the Women Self Help Groups in Agatti through the Lagoon Fest. They have been actively involved in the beach clean-up activities, food fest, sports and bringing women and children together for the lagoon health programs. We were also invited for a talk on their foundation day to speak about the role of women in

ocean governance and management.

- As part of our annual outreach, we designed and distributed the 'Fish for the Future' calendars specifically for showcasing our work and engagements with the community in Lakshadweep. In 2022, we showcased everyday life on the island through a photography competition for the islanders. In the next year, we documented the culinary culture and recipes of Lakshadweep. In



Fish for the future T-shirts for promoting sustainable fishing and management in Lakshadweep

fisheries management on the island, we launched an exclusive "Mathsyasampathu bhaviyilekku" (Fish for the Future) T-shirts in Malayalam and Mahal. The T-shirts were distributed to the fishers

and officials during our interventions in the island and was greatly appreciated by them.

Andaman Islands

- Our engagement with fishers from different villages and the Fisheries Department has grown over the last three years, which has opened up opportunities for different types of collaborations.
- We have built a partnership with the Junglighat Bonafide Boat Committee, which is a collective of 180 motorised boats operating out of Junglighat. The Boat Committee members also visited ANET, Dakshin Foundation's ANI field base in March 2023 to interact with our team and trustees during an Open Day event and discuss strategies for collectivisation and the development of the fishing community.
- Access to clean drinking water for fishermen and fish vendors at Junglighat Fish Landing Centre



RO based drinking water facility installed at Junglighat fish landing centre

2024, we organised an art competition in Lakshadweep on the theme of island conservation. The calendars were published in English, Malayalam and Mahal languages and received positive response from the islanders and the officials.

- To celebrate the participation of fishers in CBFM and promote sustainable

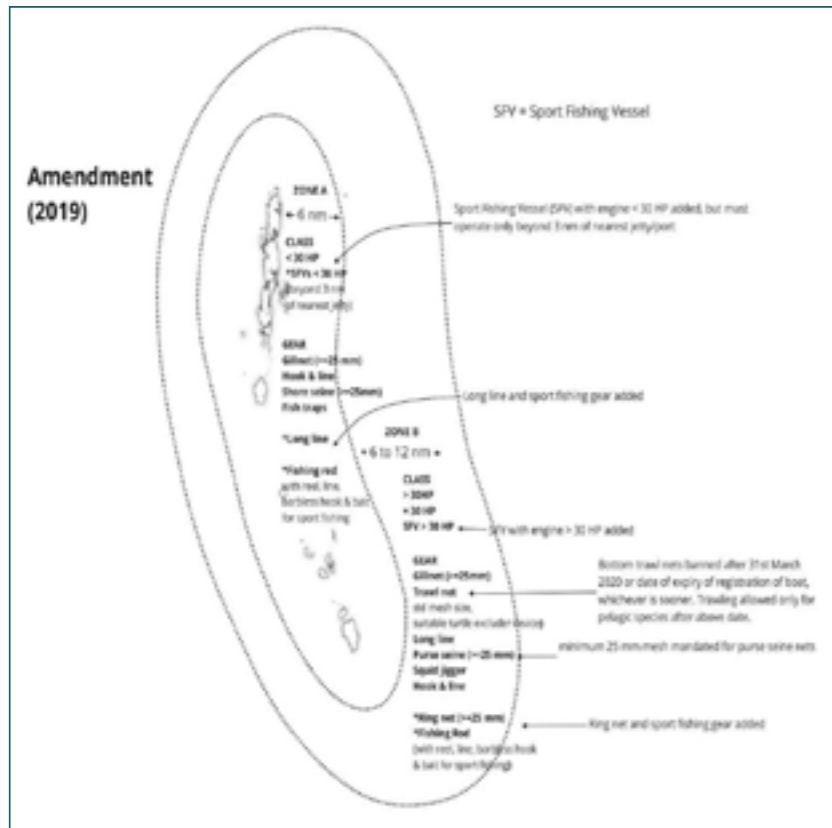
emerged as a priority issue during our field engagements. Following community meetings with representatives and discussions with Fisheries Department officials, we proposed and installed an RO-drinking water system at the jetty. This collaborative effort involved the Fisheries Department providing

water and electricity supply, while the Boat Committee took the responsibility for regular maintenance. This intervention not only addresses a crucial need of the fishers but also fostered collaboration between the Boat Committee and the Fisheries Department.

- Our engagement with fishers highlighted the importance of understanding the ANMFRA and all its subsequent amendments to be able to better comply with the existing regulations. In 2023,

we compiled the information on ANMFRA, detailing out the changes that have been brought about in it over the years since its adoption in 2004 through the various amendments, and how these changes in ANMFRA are placed in the changing context of fisheries in ANI over the years. We are now in the process of demystifying the laws and policies pertaining to fisheries management and translating them into simple, easily accessible content in vernacular languages.

- In Wandoor, we have been actively collaborating with the Gram Panchayat for improving the Solid Waste Management system in the villages. Our efforts have led to an increase in coverage of the system, improvement in user behaviour



Visual depiction of changes in Zonation (ANMFRA Amendment 2019)



Sagarmela event at Wandoor

like segregation & user fee payment, and improvement in workers' efficiency.

- We provided technical support to 10 fishermen from Wandoor who were facing problems in the operation of their GPS machine on their boats.
- In collaboration with the Fisheries Department and local fisher leaders in Wandoor, we organised Sagar Mela at New Wandoor jetty to celebrate fisheries, fishers, and coastal ecosystems of the ANI. The event was attended by over 140 people, including 60 fishers from three Gram Panchayats spanning six fishing villages. The Director and Assistant Director of Fisheries, along with Sagar Mitras and Panchayat officials from different villages also, participated. The program featured folk dance performances, skits on sustainability and co-management, community games, and a department stall providing information on schemes and entitlements. Sagar Mela served as a platform for officials and fishers to actively engage on issues of fisheries sustainability, livelihoods, and entitlements, fostering meaningful dialogue and collaboration.



Major Outcomes

Despite the various challenges faced in implementing the project activities, the project has seen some significant outcomes that are crucial for the future of the small-scale fisheries sector in India's oceanic islands.

Lakshadweep:

- **Development of baitfish monitoring protocols:** While our success in ensuring LMMA formations for baitfish management has been limited, we have been able to develop monitoring protocols and train the local diver community on in-water assessment.
- **Participatory maps for securing rights over fishing grounds:** We have developed and widely circulated participatory maps on baitfish resources in Agatti, Kavaratti, Kadmat, and Minicoy Island. In the background of the large development plans for India's islands, participatory mapping has been a powerful tool for island communities to gain formal recognition of their customary land rights.

- **Reviving community-based fisheries monitoring in Lakshadweep:** After a gap of two years, we have been able to resume CBFM in Lakshadweep. Despite the challenges in sustaining P&L fishing, we have brought new fishers on board to generate knowledge from the ground.
- **Strengthening fisheries cooperative societies as co-management institutions:** Our efforts to collectivise the island's fishers through the fisher society in Agatti have brought hopeful outcomes of collaborations toward resource monitoring and management. The Agatti Island Matsyolpanna Matsya Bandhanopakarana Vippanana Sahakarana Sangham Fishers Society in Agatti and Maluku Maserike Jamaath, Fishermen Society in Minicoy are supporting CBFM initiatives in these islands.
- **Reconciling traditional management systems with conventional management frameworks:** We have gained a detailed understanding of Minicoy's customary practices and traditional knowledge used in fisheries resource management, including their strengths and weaknesses. We are now, developing hybrid fisheries co-management models that integrate scientific fisheries management with traditional practices.
- **Reinitiated dialogues on participatory management:** Due to the Covid-19 associated lockdown and socio-political changes on the ground, our work at the grassroots had to pivot quickly to the changing needs on the ground. . During this period, we successfully reinitiated the dialogue we had established with the fishing community, reconnected with key stakeholders, and assessed the changing situation and needs on the ground. This will be significant for taking our work forward keeping ground realities in mind.
- **Publication of Fish for the Future: A 10-year Report:** We published a comprehensive report summarising our decade-long interventions in the Lakshadweep islands to create participatory and sustainable fisheries governance pathways. These co-management models are now being scaled and adapted to Dakshin Foundation's SeaChange sites.



Andaman Islands:

- **Analysed the impact of Covid-19 on fisheries:** A comprehensive analysis of the impact of Covid-19 on grouper harvest levels, trade, and exports was completed. Stakeholder interviews and secondary literature reviews helped map the grouper value chain in the ANI. Data from the last 20 years on fish exports are now digitised and submitted to the ANI Department of Fisheries. This is the first compilation of data on the extent of harvest and the contribution of the fisheries sector to the economy and growth of these islands.
- **Established community-based fisheries monitoring program:** A community-based fisheries monitoring program was introduced through meetings with fisher groups. This program includes participatory fishing ground mapping and the development of a logbook for monitoring fish catch, piloted in Junglighat with active participation from local fishers.
- **Stakeholder consultations:** Consultations with multiple fishing villages identified priority challenges in fisheries management. Fisher leaders were

engaged, and responsibilities were assigned for collective action, although conflicts between different fishing practices complicated coordination.

- **Strengthened Collaboration with fisheries department:** Strong relationships were established with the local Fisheries Department, facilitating collaboration on various initiatives, including community events like Sagar Mela, aimed at improving communication and addressing fishers' concerns.
- **Development of Action Plans:** An action plan was developed based on stakeholder consultations, focusing on priority issues. The implementation of this plan is ongoing, with follow-ups to identify challenges and course corrections needed.
- **Capacity Assessment:** The capacities of local resource management agencies, including the Fisheries Department and local panchayats, were assessed to identify strengths and weaknesses in fisheries governance and participatory management.
- **Training and Capacity Building Programs Initiated:** Training modules are being developed to address capacity gaps, focusing on simplifying fisheries regulations and enhancing local stakeholder engagement in sustainable fisheries management practices.
- **Community Engagement in Fisheries Management:** While collective action among fisher groups is challenging due to diverse practices and interests, efforts to foster cooperation and establish platforms for dialogue are ongoing.



Major Challenges Faced

The shift in community priorities toward the proposed high-end tourism development has posed a significant challenge to the sustainability of P&L tuna fisheries. Many fishers in Lakshadweep face a livelihood crisis due to market issues, logistical constraints, and insufficient prices for Masmin. The absence of a direct market linkages between fishers and traders, coupled with high operating costs, has led many boat owners to sell their vessels and seek alternative employment. Consequently, we had to strategically shift our focus to address these urgent livelihood concerns within local communities.

Fishers who previously participated in Community-Based Fisheries Monitoring (CBFM) and co-management discussions in Lakshadweep have increasingly gravitating toward tourism-related activities, with many transforming their boats for tourism services. While reinitiating discussions around participatory management presents challenges, it also opens doors to engage with a smaller, newer group of fishers who may be more receptive to co-management

approaches.

Political divisions and previous failures have obstructed efforts to unite fishers for collective action. Legislative changes implemented by the administration during gaps between field seasons further complicate the maintenance of momentum among the fishing community. Our consistent presence on the islands is critical, yet delayed research and entry permits have hindered our ability to engage effectively. The Covid-19 pandemic significantly disrupted engagement with both communities and authorities, presenting challenges to project continuity. Travel restrictions and shifts of officials slowed project activities, requiring adaptive strategies to maintain progress. The project sought alternative communication methods to sustain momentum during these challenging times. Frequent political and administrative changes, including officer transfers, have created obstacles to ensuring project continuity and progress. These changes necessitated ongoing advocacy and relationship-building efforts to keep project objectives aligned with community needs, requiring a persistent and adaptable approach to overcome these administrative challenges.

To facilitate future discussions in Lakshadweep, it is also essential to enhance the sustainability of P&L fishing by strengthening the market for tuna products and diversifying associated livelihood options. This focus will help address fishers' concerns regarding the long-term viability of their fishing practices.

Diverse interests and practices among different fishing groups have led to conflicts, complicating collective action initiatives. These challenges emphasize the importance of inclusive and participatory management approaches. The project has focused on mediating differences and fostering a unified strategy for sustainable fisheries management, which has required ongoing negotiation and engagement.



Important Learnings

Sustaining community engagement is essential for fostering interest and participation in fisheries management. Regular communication and responsiveness to shifting community priorities play a pivotal role in maintaining involvement. The project has demonstrated that being attuned to the community's needs builds trust and secures long-term support for management initiatives.

A significant lesson learned during this period is the necessity of adapting intervention plans to the dynamic nature of social-ecological systems, such as those in Lakshadweep. Given the influence of external shocks such as incompatible developmental models and urgent livelihood challenges, ongoing course corrections are essential. The project will remain vigilant and responsive to community needs while balancing sustainability concerns and fulfilling project deliverables.

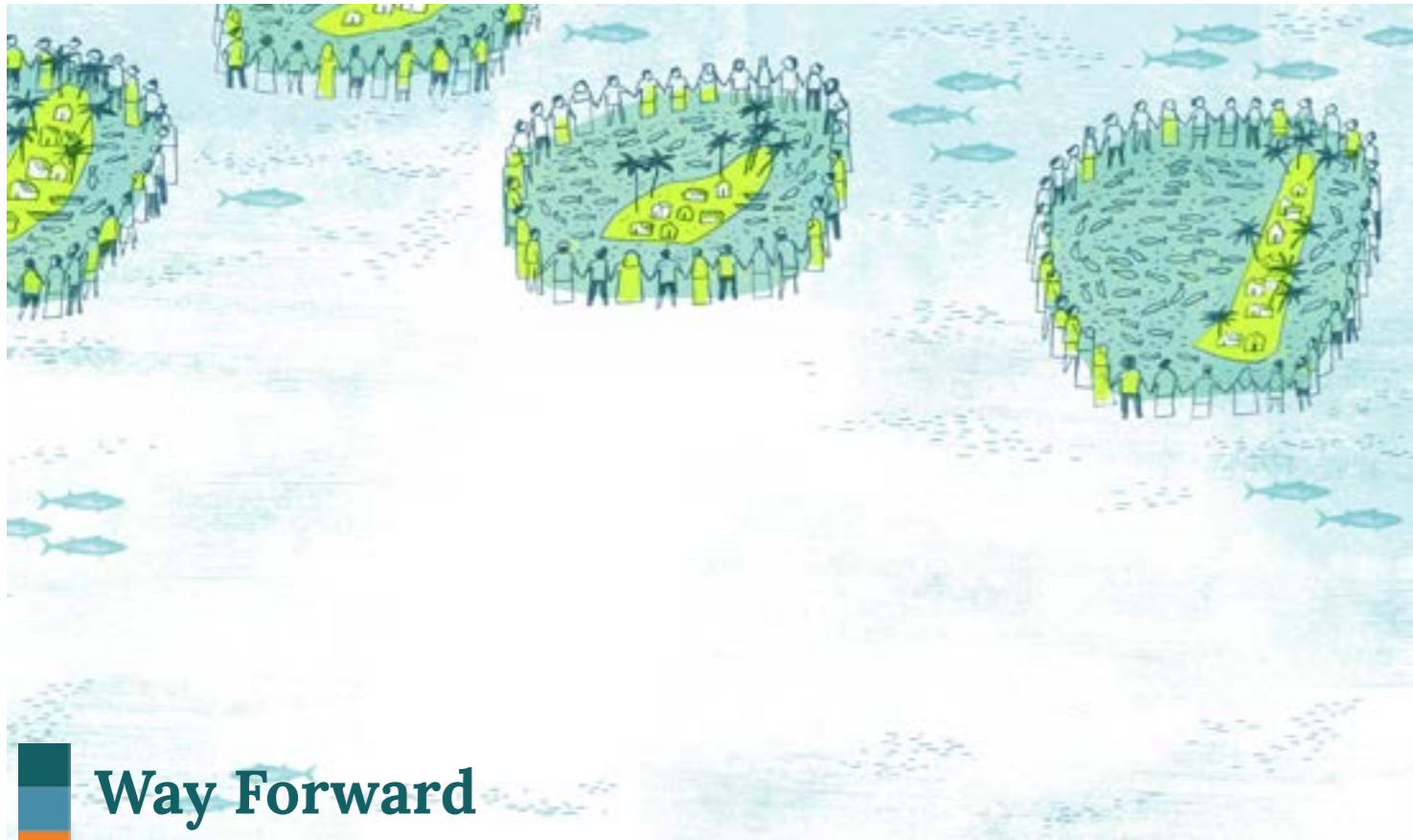
Strengthening existing institutional support and cooperative societies have proven more effective than establishing new entities. By empowering these

established structures, the project provides a stable foundation for sustainable management practices. Enhancing the capacity of these institutions is crucial for their leadership in ongoing fisheries management efforts.

Ensuring regular updates and adequate resource allocation for monitoring protocols is vital for maintaining robustness and reliability. Continuous evaluation and adaptation of these protocols are necessary to uphold the effectiveness of monitoring initiatives. The project emphasizes the importance of staying informed about best practices and investing in resources to facilitate successful implementation.

Collaborative efforts with local authorities and community leaders are critical for the success of fisheries management initiatives. Building strong relationships with stakeholders fosters improved communication and cooperation. The project's achievements in regulatory changes and enhancing community-based monitoring underscore the value of these partnerships.

Adapting to external pressures, such as market uncertainties and political fluctuations, is essential for maintaining project momentum. Flexibility and resilience in project strategies are key to effectively navigating these challenges. The project has learned the importance of being prepared for unexpected changes and having contingency plans in place to ensure continued progress.



Way Forward

In Lakshadweep, our primary focus is on supporting environmentally sustainable P&L (P&L) tuna fisheries, particularly in developing a co-management governance model for these vital resources. Currently, P&L tuna fishers are facing a livelihood crisis, driven not only by a changing developmental landscape but also by a lack of steady market opportunities and fair pricing for Masmin. Concerns regarding livelihood security have intensified, particularly about island baitfish management in recent years. The number of active P&L boats has diminished as fishers transition to tourism-related activities, migrate to the Maldives, or seek alternative livelihoods. Additionally, there has been a notable shift toward reef-associated fishing to meet the demands of local tourist resorts and mainland collection boats, raising significant concerns about the health of reefs and lagoons.

Fishers have expressed a willingness to return to P&L fishing if they can access improved markets and livelihood opportunities. Implementing sustainable fisheries management interventions that address these livelihood issues is essential for

ensuring the long-term viability of P&L fisheries in the islands. Societies with enhanced capacities can serve as primary units for these interventions. Our engagement with self-help groups (SHGs), local divers, organisations, and government departments over the years has fostered collaborations that can broaden the scope of these initiatives.

For the grouper fisheries in the ANI, a similar approach is crucial. The region's grouper stocks are under pressure from overfishing and habitat degradation, necessitating the development of effective management strategies. Collaborative efforts with local fishers and stakeholders are essential to promote sustainable practices, protect critical habitats, and enhance market access for grouper products. By integrating traditional ecological knowledge and modern management practices, we aim to build resilient grouper fisheries that can withstand external pressures.

Such collaborative efforts will not only help sustain the fishery and diversify livelihoods but also mitigate reef fishing pressures to maintain ecosystem health. By reinforcing traditional sustainable practices and enhancing access to shared resources, we aim to create participatory platforms that facilitate dialogue and decision-making processes. This approach will ultimately contribute to the preservation of traditional P&L fishing in Lakshadweep and ensure the future sustainability of grouper fisheries in the Andaman and Nicobar Islands.



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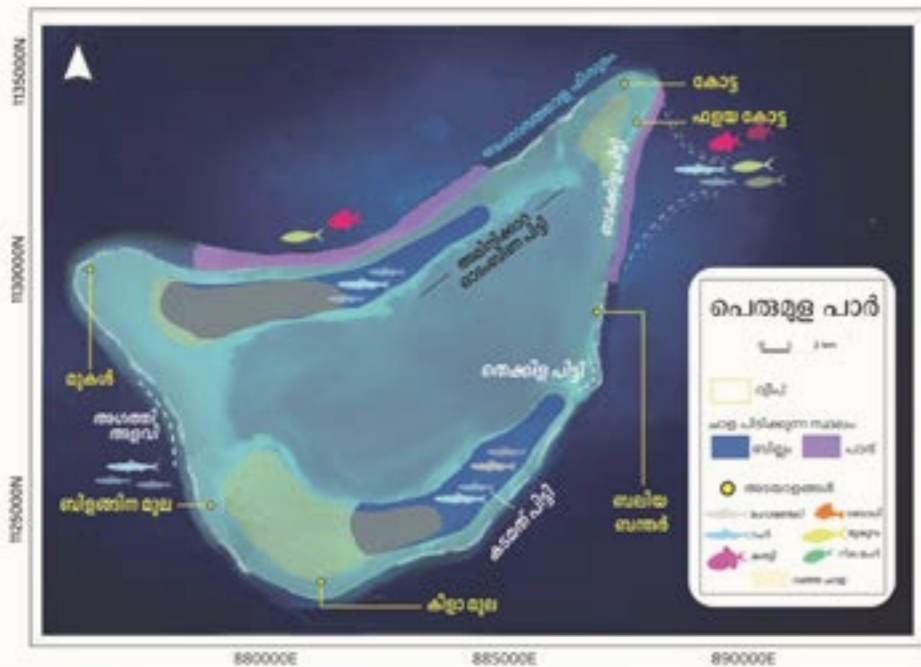
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Annexure 1. Participatory maps of baitfish grounds in Lakshadweep

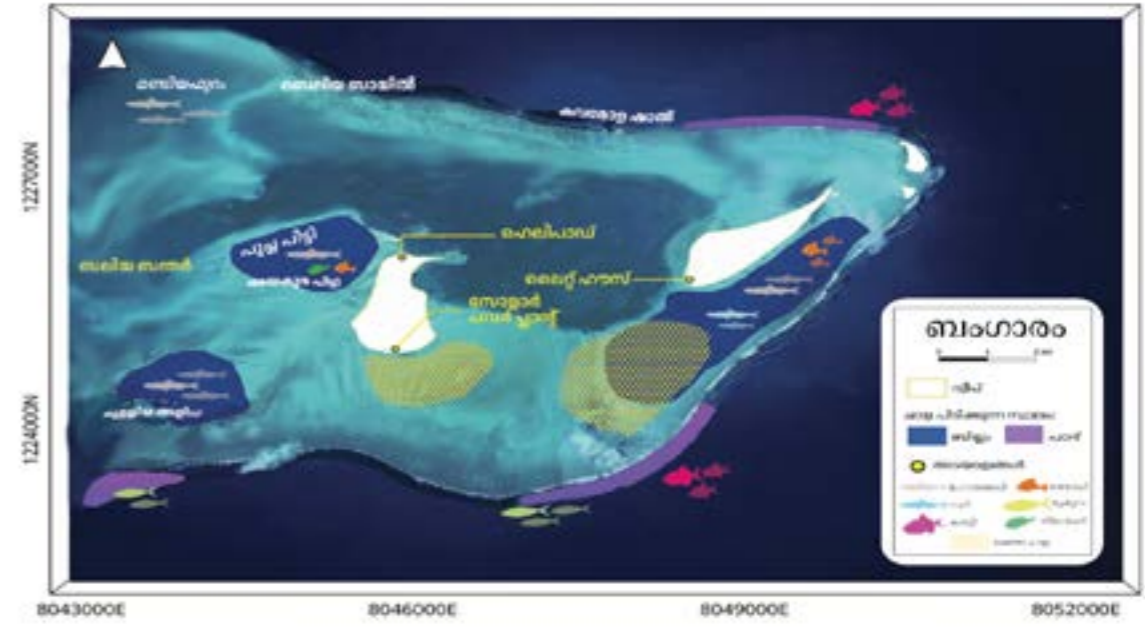
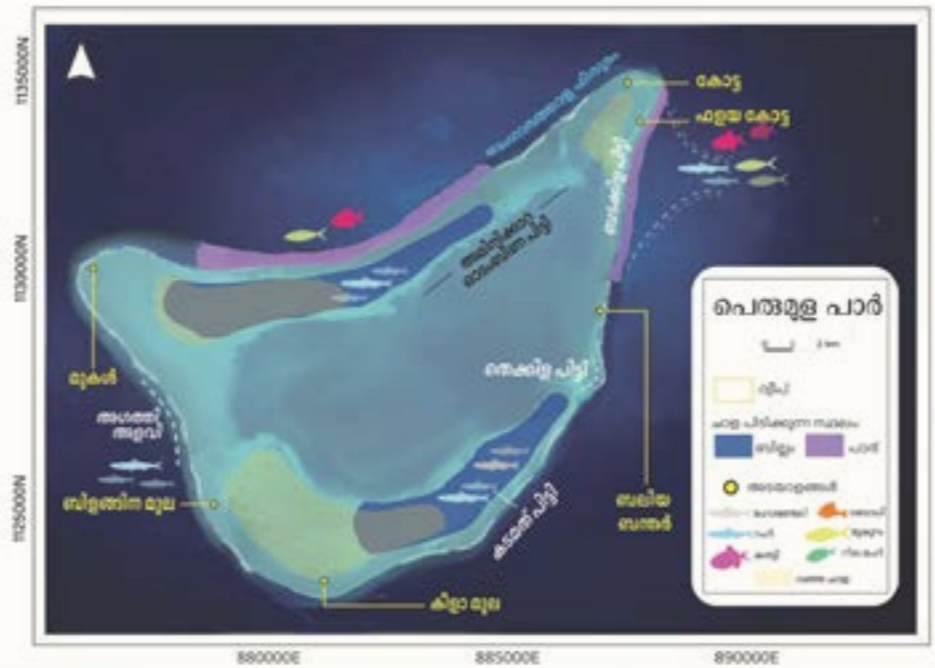


Participatory maps showing baitfishing grounds on Perumal par island



Participatory maps showing baitfishing grounds on Suheli Island

Participatory maps showing baitfishing grounds on Perumal par island



Participatory maps showing baitfishing grounds on Bangram Island



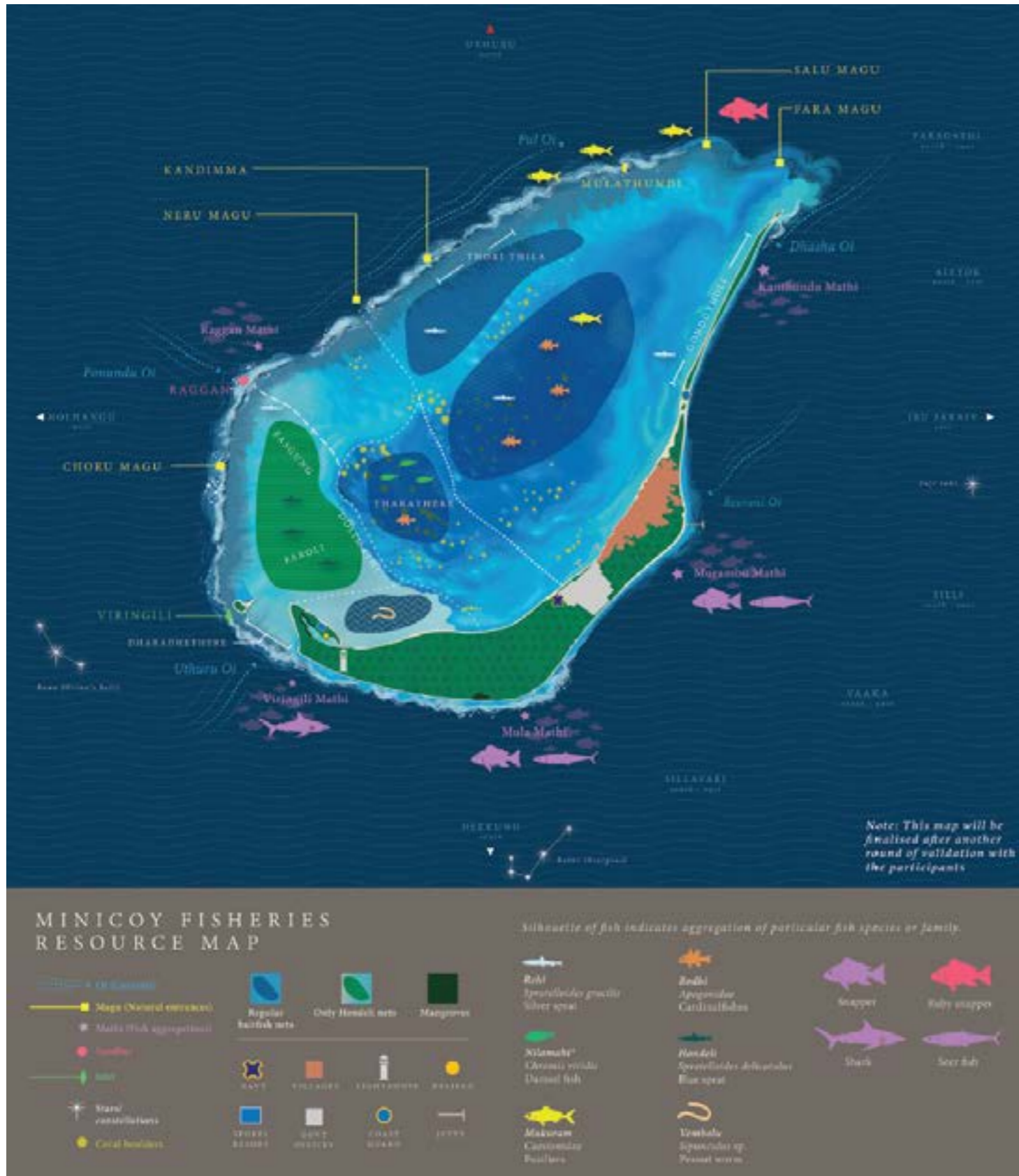
Participatory maps showing baitfishing grounds on Kadmath island



Participatory maps showing baitfishing grounds on Agatti island

Participatory maps showing baitfishing grounds on Agatti island





A detailed map capturing the TEK and marine resource management practices followed on Minicoy Island

BAITFISH RESOURCES OF LAKSHADWEEP

Key biological features

- Maximum Length
- Spawning process & season
- Life-cycle, sexual maturity
- Number of eggs
- Fishing gear

Hondeli

Delicate round herring
Spratelloides delicatulus

- About 10.5 cm in total length
- Lifespan of about one year. *Hondeli* become sexually mature at about 3.7 cm in approx. 3-4 months.
- Hondeli* spawn in large aggregations at pre-dawn. Spawning is higher during new moon nights (*amāvāsī*). They reproduce beyond their spawning season, with multiple peaks throughout the year, especially around the southwest monsoons.
- Estimated 10500 eggs
- Nylon or polyvinyl chloride (PVC) encircling nets with a mesh size of 1mm (previously 6mm) with lead sinkers are used.

Rahi

Silver-stripe round herring
Spratelloides gracilis

- About 7 cm in total length
- Lifespan of maximum one year. They become sexually mature in 3-4 months, at a size of 3.5 cm.
- Spawning is similar to *Hondeli*. They reproduce multiple times in their lifetime and the spawning season is prolonged, with peaks around the southwest monsoons.
- About 6000 eggs
- Encircling nets with lead sinkers are used. Bamboo poles are used to keep the net well positioned in the water.

Nila mahi

Blue-green chromis
Chromis viridis

- Around 10 cm in size
- Lifespan of about 1-2 years
- Male and female *Nila mahi* spawn synchronously in aggregations on a semi-lunar cycle, on full moon and new moon nights.
- They have a high fecundity and the spawned eggs hatch in 2-3 days.
- Monofilament lift nets are used.

Boadhi

Cardinalfishes
Example: *Rhabdamia gracilis*

- Around 7.4 cm in length
- Lifespan of 4-6 months. They become sexually mature in 3-4 months.
- They spawn multiple times in their lifetime. After courtship & spawning, the female releases a mass of eggs. The male fertilizes the eggs & scoops them into its mouth until they hatch.
- About - 1500 to 3225 eggs
- Encircling nets made of PVC are used to catch the Bodhi hovering over coral heads.

Mukuram

Fusiliers
Example: *Caesio caeruleaura*

- About 35 cm in length
- Sexual maturity is attained quickly. They have a high fecundity and lay transparent pelagic eggs after an elaborate mating process.
- Mukuram* reproduce in large aggregations throughout the year, taking lunar cues on full moon nights (*pūrnachandran*). It starts at dusk, at specific sites on reefs.
- Lift nets of about 5 mm mesh size made of monofilament PVC material are used.

Images: John Hoover, Krolodiver, Fishbase, Prerana Gowde
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Annexure 2: Baitfish resources of Lakshadweep

Outreach materials produced by Dakshin Foundation

BAITFISH RESOURCES OF LAKSHADWEEP

Key biological features

- Abundance length
- Spawning process & season
- Life cycle
- Reproductive strategy
- Number of eggs
- Feeding

Hondeli

Sardinella longiceps

- About 80 cm total length
- Lifespan of about one year, should become sexually mature at about 37 cm at age 3-4 months
- Spawning is in large aggregations of pre-adults, spawning is higher during new moon nights (Amavasya). They reproduce beyond their spawning season, with multiple peaks throughout the year, especially around the full moon seasons
- Estimated 30000 eggs
- System or gear type: chikade (PVC) encircling nets with a mesh size of 3mm (previously 4mm) with lead sinkers are used

Rahi

Mora moro

- About 7 cm in total length
- 1 stage of maximum one year. They become sexually mature in 3-4 months, at size of 3.5 cm
- Spawning is similar to Hondeli. They reproduce multiple times in their lifetime and the spawning season is prolonged, with peaks around the full moon seasons
- About 2000 eggs
- Feeding: nets with lead sinkers are used. Bamboo poles are used to keep the net well positioned

Nila mahi

Chromis chromis

- About 30 cm in size
- Lifespan of about 1-2 years
- Males and females. Males have a high frequency in aggregation at a semi-lunar cycle, while females are more frequent
- They have a high fecundity and the smallest eggs hatch in 3-4 days
- Monoculture 20 cm are used


Boadhi

Centropyge



BAITFISH RESOURCES OF LAKSHADWEEP

Baitfish are small schooling fish used in Lakshadweep's pole & line (P&L) Fisheries as lures to catch larger fish like tuna. They are caught from the reefs and lagoons of the Islands and are indispensable to the sustenance of Lakshadweep's P&L Fisheries.



ലക്ഷദ്വീപിലെ പാളയിനങ്ങൾ

പാളയിനങ്ങൾ (P&L) മത്സ്യസംരക്ഷണ രീതിയിൽ ഏറെ പ്രാധാന്യം നേടിയെടുത്തു. പാളയിനങ്ങൾ കണ്ടെത്തുന്നതിനായി പാളയിനങ്ങൾ ഉപയോഗിക്കുന്നു. പാളയിനങ്ങൾ കണ്ടെത്തുന്നതിനായി പാളയിനങ്ങൾ ഉപയോഗിക്കുന്നു.

ഹണ്ടലി
Sardinella longiceps

റാഹി
Mora moro

നീല മാഹി
Chromis chromis

പാളയിനങ്ങൾ
പാളയിനങ്ങൾ (P&L) മത്സ്യസംരക്ഷണ രീതിയിൽ ഏറെ പ്രാധാന്യം നേടിയെടുത്തു. പാളയിനങ്ങൾ കണ്ടെത്തുന്നതിനായി പാളയിനങ്ങൾ ഉപയോഗിക്കുന്നു.

പാളയിനങ്ങൾ

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റാഹി
Mora moro

നീല മാഹി
Chromis chromis

ബോധി
Centropyge

ബോധി
Centropyge



Information on where a fish forages or reproduces throughout its life can help us look after baitfish populations. For example, knowing when a fish spawns can inform us when they are vulnerable to harvest. This information can translate into developing fish management strategies.

Key biological features

-  **Maximum length**
-  **Life-cycle, sexual maturity**
-  **Spawning process & season**
-  **Number of eggs**
-  **Fishing gear**



Rahi
Silver-stripe round herring

Spratelloides gracilis

-  About 7 cm in total length
-  Lifespan of maximum one year. They become sexually mature in 3-4 months, at a size of 3.5 cm.
-  Spawning is similar to *Hondeli*. They reproduce multiple times in their lifetime & the spawning season is prolonged, with peaks around the monsoons.
-  About 6000 eggs
-  Encircling nets with lead sinkers are used. Bamboo poles are used to keep the net well positioned in the water.



Hondeli
Delicate round herring
Spratelloides delicatulus

-  About 10.5 cm in total length
-  Lifespan of about one year. *Hondeli* become sexually mature at about 3.7 cm in approx. 3-4 months.
-  *Hondeli* spawn in large aggregations at pre-dawn. Spawning is higher during new moon nights (*amāvāsī*). They reproduce beyond their spawning season, with multiple peaks throughout the year, especially around the southwest monsoons.
-  Estimated 10500 eggs
-  Nylon or polyvinyl chloride (PVC) encircling nets with a mesh size of 1mm (previously 6mm) with lead sinkers are used.



Boadhi
Cardinalfishes
Example: *Rhabdamia gracilis*

-  Around 7.4 cm in length
-  Lifespan of 4-6 months. They become sexually mature in 3-4 months.
-  They spawn multiple times in their lifetime. After courtship & spawning, the female releases a mass of eggs. The male fertilizes the eggs & scoops them into its mouth until they hatch.
-  About 1500 to 3225 eggs
-  Encircling nets made of PVC are used to catch the Bodhi hovering over coral heads.




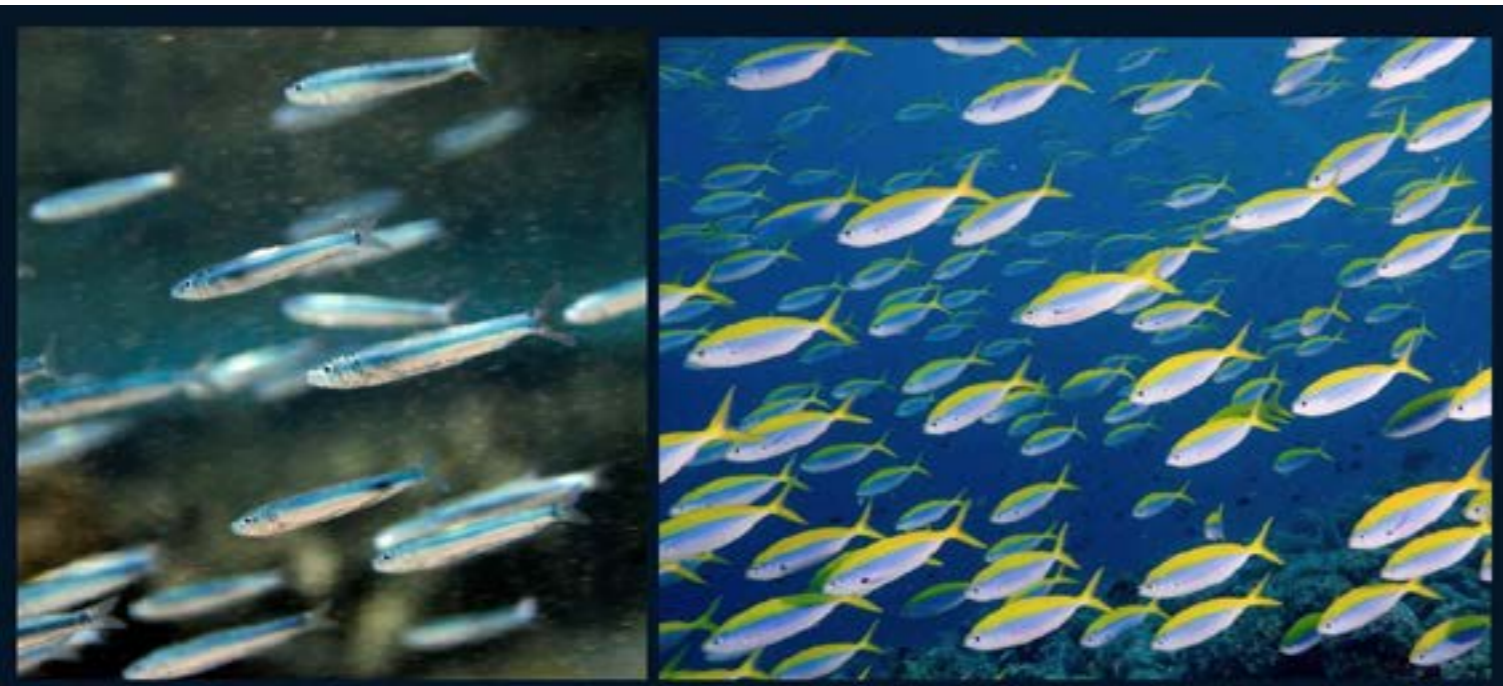
Nila mahi
Blue green chromis
Chromis viridis

-  Around 10 cm in size
-  Lifespan of about 1 - 2 years
-  Male & female *Nila mahi* spawn synchronously in aggregations on a semi-lunar cycle, on full moon & new moon nights.
-  Around 1300 - 1500 eggs are laid & the spawned eggs hatch in 2-3 days.
-  Monofilament lift nets are used



Mukuram
Fusiliers
Example: *Cassio ocellata*

-  About 35 cm in length
-  Sexual maturity is attained quickly. They have a high fecundity and lay transparent pelagic eggs after an elaborate mating process.
-  *Mukuram* reproduce in large aggregations throughout the year, taking lunar cues on full moon nights (*pūrṇachandran*). It starts at dusk, at specific sites on reefs.
-  Lift nets of about 5 mm mesh size made of monofilament PVC material are used.



BAITFISH RESOURCES OF LAKSHADWEEP

Baitfish are small schooling fish used in Lakshadweep's pole & line (P&L) fisheries as lures to catch larger fish like tuna. They are caught from the reefs and lagoons of the islands and are indispensable to the sustenance of Lakshadweep's P&L fisheries.

