Fish for the Future

A calendar showcasing the efforts of Lakshadweep’s live-bait pole and line tuna fishermen in monitoring their fishery.
Lakshadweep’s live-bait pole and line tuna fishery is one of the last remaining examples of a sustainable fishery in India. It targets oceanic skipjack tuna (*Katsuwonus pelamis*) via the use of small planktivorous reef and lagoon fish as live-bait. This skilled technique is highly species specific and results in very little by-catch, has minimal habitat impact, and provides employment to a large number of individuals.

As an archipelago of coral reef atolls, Lakshadweep is highly dependent on the health of its diverse but fragile coral reef ecosystems. Safeguarding the pole and line tuna fishery is essential to reef health, as this fishery helps divert fishing pressure off the sensitive coral reef resources. Unfortunately, the tuna fishery now faces severe threats from rising costs and declining catch. Lack of information on this fishery further confounds management decisions.

In an effort to fill data gaps and increase stakeholder participation, a community-based catch monitoring programme was initiated in the islands of Agatti, Kadmat, Kavaratti and Minicoy in early 2014. Boats shown in this calendar have shown an exceptional interest in catch monitoring, regularly participating in the programme and helping generate detailed records of the fishery.
Pole and line tuna fishing has been practised in the Maldives for over 2000 years. From the Maldives, this technique reached the island of Minicoy 200-300 years ago. Seeing commercial potential in this traditional practice, the Lakshadweep fisheries department systematically introduced the pole and line tuna fishing technique to the rest of the Lakshadweep Islands in the late 1950s and early 1960s. Many traditional management practices associated with this fishery are still practised in Minicoy and such practices need to be adopted by other Lakshadweep islands before they are permanently lost. The main product of the pole and line fishery is dried skipjack tuna or mas - a favourite among these islanders, Sri Lankans and Japanese. Today, the demand for pole and line caught tuna is on the rise in western markets due to the sustainable nature of its harvest.

Map not drawn to scale.
Tuna caught by pole and line fishing boat from Minicoy.

Tuna caught by pole and line in the Lakshadweep islands constitutes only a small portion of India’s total tuna landings. Despite its low volume, this fishery is very important as it targets fast growing, early maturing tuna species in a manner that has little to no ecosystem impact. Additionally, the pole and line fishery helps divert fishing pressure off Lakshadweep’s sensitive coral reefs, safeguarding ecologically significant reef fish like groupers and snappers from overharvest. Promoting and preserving this traditional practice is in the best interest of the fishing community and Lakshadweep’s marine ecosystems.

Source: Vijayakumaran & Varghese report to the IOTC, 2010
Fishermen frequently engage with the sea and are capable of providing a wealth of information that can otherwise be difficult to access, both logistically and financially. Thus, fishing communities represent a large potential for natural resource monitoring and can help reduce reliance on the scientific community for generating data necessary for decision making. With an aim to improve and better manage their fishery, the Lakshadweep fishing community has shown great initiative in maintaining fisheries records. Detailed data on fishing effort, fish catch, species population dynamics, weather, wind and market issues have been generated and maintained by the community.
Today, the Lakshadweep fishery faces significant threats from declining catches, rising costs and poor market access. Lakshadweep fisher maintained records provide details on limitations to fishing including limited diesel supply, engine issues, weather conditions, etc. For example, such records from a boat in Agatti show that, for nearly a quarter of the time, it was unable to go fishing due to limited access to diesel.

Daily fishing data collected by a boat in Agatti
Fishers document their effort in terms of time spent fishing, fuel usage and distance covered. These indicators of daily fishing effort when compared to daily tuna catch, help reveal patterns of tuna availability. Maintaining reliable fishing data on a regular basis provides a wealth of information to fishers, scientists and managers, and can help guide decision making.

Daily account of time spent fishing and total weight of tuna caught by a boat in Agatti over a period of 8 days.
The Lakshadweep pole and line fishery harvests a variety of tuna species including skipjack, yellowfin and little tunnies. The community-based catch monitoring effort is revealing interesting differences in species composition between islands. Kavaratti has a higher diversity of catch than Agatti and Kadmat, often landing large sized yellowfin that commonly occur in its surrounding waters. Although globally of high value, yellowfin have little demand locally and are also undesirable for mas making. Enabling the transport of pole and line caught tuna in fresh or frozen form can help open better markets for this best practice fishery.

Average species composition of pole and line catch calculated from data generated by Lakshadweep pole and line boats.
Skipjack tuna take 1.5 years to reach adulthood i.e. 45 cm body length or 1.7 kg in weight. Daily record of the proportion of sizes caught can inform our understanding of the targeted populations. Between January and May 2014, a Kavaratti boat involved in the community-based catch monitoring programme mostly caught 2 – 3 kg skipjack tuna.

Number of skipjack caught as a function of fish size by a boat from Kavaratti
Sprats
Hondeli/Manyachala/Rahi

Fusiliers
Muguram

Pomacentrids
Nila mahi

Apogons
Bodi

Silversides
Madam chała

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- Agatti: 95.6% Sprats, 1.5% Fusiliers, 0% Pomacentrids, 1.5% Apogons, 1.5% Silversides
- Kadmat: 38.5% Sprats, 41.5% Fusiliers, 0% Pomacentrids, 0% Apogons, 0% Silversides
- Kavaratti: 36.7% Sprats, 37.8% Fusiliers, 34.4% Pomacentrids, 3.3% Apogons, 7.8% Silversides

The catch monitoring programme is revealing interesting interisland differences in baitfish use. Kavaratti utilises a wide variety of baitfish, while Agatti and Kadmat depend on only a few. Regularly recording baitfish catch and effort data can inform fishers, managers and scientists about baitfish availability, a critical resource for the pole and line tuna industry.

Frequency of baitfish used, separated by island, as recorded by Lakshadweep catch monitoring boats.
Conserving baitfish stocks and reducing wastage is important to sustainably manage baitfish resources. In most cases, baitfish get left over at the end of the fishing day. At times fishermen discard the baitfish stock at sea while at other times, it is kept in in-water tanks for use the next day. In Minicoy, these in-water tanks, called labiri, have been used for years to conserve baitfish resources.

Fate of baitfish used by a pole and line boat in the catch monitoring programme
The pole and line fishery utilises small planktivorous fish from island lagoons and reefs. Islands that have access to other atolls for baitfish collection, like Kavaratti and Agatti, cover a wide area in search of baitfish. Isolated islands like Minicoy on the other hand are entirely dependent on their own stocks and thus take additional care in managing them.

Baitfish fishing locations for boats from Agatti and Minicoy, respectively, as indicated by the community-based catch records.
Lakshadweep fishers use man-made fish aggregating devices (FADs) to supplement their catch in this time of rising costs, as they help reduce fuel expenditure and ensure catch. The community-based catch monitoring is revealing that FADs tend to attract a larger number of undersized mixed species of tuna as compared to the open ocean, where free swimming schools are mono-specific and larger in individual size.

* Differences in tuna caught at FADs and in the open ocean by Kavaratti catch monitoring boats
By maintaining supplementary data, fishers aid in understanding the factors that affect tuna populations. Kadmat fisher recorded wind direction data is showing interesting relationships with catch, where winds from the north, northwest and west are associated with higher catch. Being a highly migratory species, skipjack distributions are under the influence of wind and currents. Regularly recording both environmental and anthropogenic metrics such as weather, wind, sea condition, external fishing pressure, etc. can help tease apart factors that affect this fishery.

Average tuna catch as a function of wind direction for catch monitoring boats from Kadmat
In addition to the boats showcased in this calendar we would also like to acknowledge the monitoring work of Muhjib of Quamarul Ulama, Abdu Samad of Jiddah Queen, Abdul Shukoor of Thurisina, Abu Backer of Karthika, Naushad of Dinnoraini, Umar of Bairuha and Muthu Koya of Mohammed Suhail.

Other boats recently involved in the community-based catch monitoring programme include Jeenathul Bahar, Malooty, Rahmathul Jazayir, MD Iqbal, Marhaba, Kaosar and Ganjularsh of Agatti and Sayed Musafir, Assayyed Aboosalih, Sunni Markaz, Imam Basari and Ahamadiya 2 of Kavaratti.
The Lakshadweep community-based catch monitoring project is a part of Dakshin Foundation's Biodiversity and Resource Monitoring Programme. Dakshin Foundation is a non-profit, non-governmental organisation that works towards natural resource conservation and management via approaches that are based on sound science and support sustainable livelihoods, and social and environmental justice. Our interdisciplinary approach draws from the fields of ecology, conservation biology, sociology, economics, and law. In Lakshadweep, our work aims to generate knowledge towards and empower local communities in natural resource monitoring. By encouraging stakeholder participation, we hope to increase stewardship as well as provide a platform for policy-making and management.

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