The Sea around Us

In an innovative attempt, researchers in India have roped in traditional fishers to help them prepare a biodiversity register of the sea

The south Indian State of Kerala has about 38,828 sq km of land and 13,000 sq km of sea (up to 22 km) under its jurisdiction. As early as two centuries ago, studies have been done on the specific characteristics of this area and the natural resources in it.

Although minute details are available of the types of land in Kerala, that is not the case with the sea. There are many difficulties involved in doing a detailed study of the sea.

However, generations of traditional fishers, who earn their livelihood from the sea, know the environmental specificities of each nook and corner of the sea because of their work experience. This knowledge has been transferred down the generations not in any written form, but orally.

It is in this context that we should examine the call given by the United Nations (UN) to its member countries to take steps to collect and store information on the biodiversity of the sea, based on traditional knowledge.

Realizing the importance of this, the first step taken in India to

and biodiversity of the sea on the basis of the traditional knowledge of fishers was initiated in Kerala.

A sea area of around 440 sq km, along a 20-km-long coastline from Puthukurichy to Valiyathura in Thiruvananthapuram District, was chosen for the pilot study.

Protsahan, a community-based research initiative, undertook the work at the request of the Kerala State Biodiversity Board (KSBB).

The study had three major objectives:

- to prepare a register of the ecology and biodiversity of the sea based on fishers' traditional knowledge;
- to identify and prepare, with the help of fishers, location maps of the natural reefs in the seabed, which are the natural dwelling areas of marine living organisms, and enhance the sea's productivity; and
- to collect information on the living organisms in the area, classify them with the help of experts and prepare a register of them. Apart from these, information would also be collected on coastal vegetation, beach-based living organisms, shore-line changes, sea birds, estuaries, sea pollution and so on.

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The methodology of the study was to collect data directly by travelling together with traditional fishers to their specific working spots in the sea, while also interviewing them en route. The research team members, who are also from the coastal fishing community of the study area and could thus understand the many colloquial terms and local names that fishermen use to describe what they see, sought the active collaboration of skilled fishers with deep knowledge of the hidden artefacts of the sea. Oral documentation of the traditional knowledge related

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to the bio-ecosystem of the seabed was done.

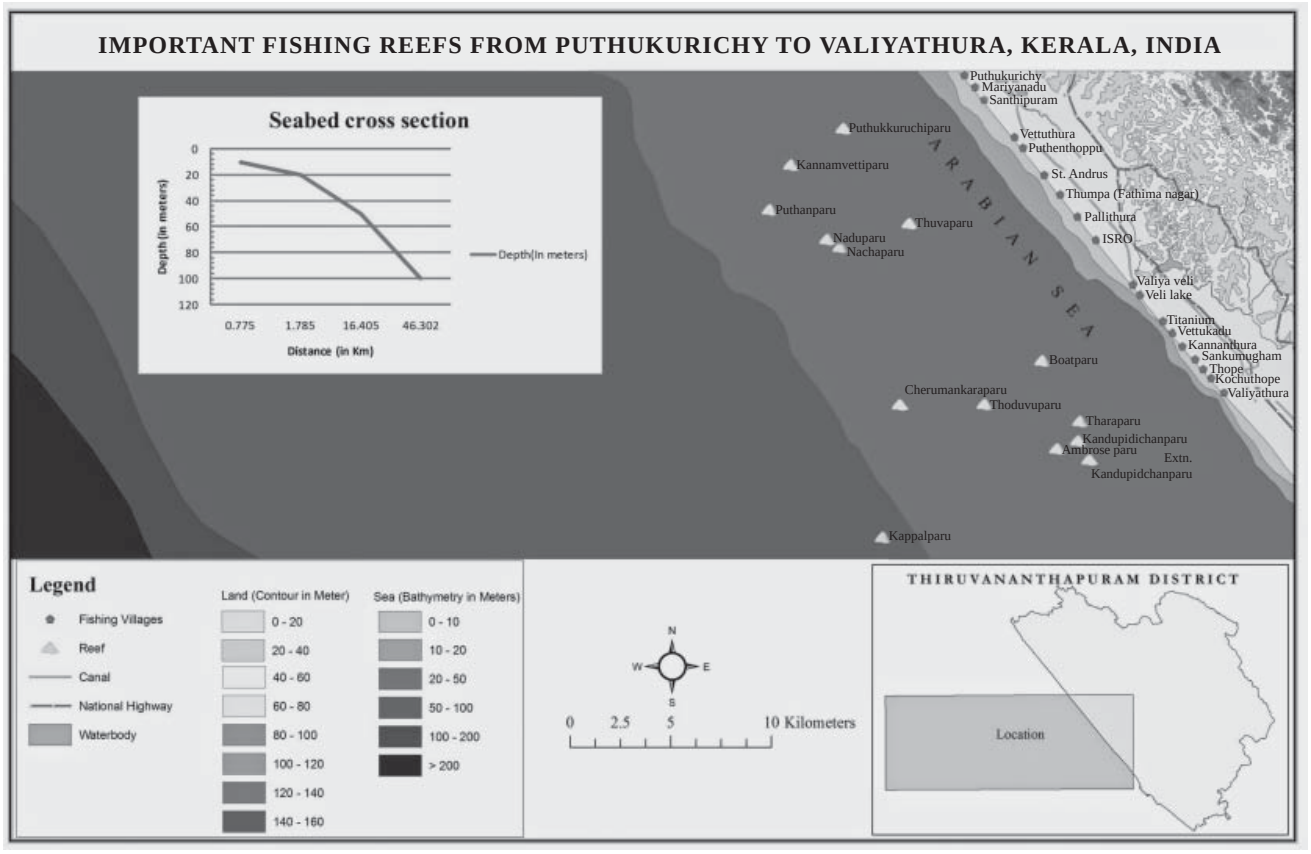
The study team undertook many sea voyages with fishers. Data was collected on the shoreline changes and the different species of fish caught in various seasons at different depths and areas. Data on beach creatures, vegetation and seabirds were also collected. The KSBB Chairman, Oommen V Oommen, the Head of the Department of Aquatic Biology of Kerala University, Biju Kumar, and Protsahan members also came along on some trips.

The study revealed the deep knowledge that traditional fishers have about the different ecosystems of the seabed area of the coast. For example, it was possible to classify, on the basis of specific features, the seabed into 'sandy seabed' (locally called *madakal*), 'clayish seabed' (*chenikal*), 'hard floor seabed' (*tharapparukal*) and 'high-surface areas' (*parukal*). The Marine Biodiversity Register (MBR) that resulted from the study also incorporated visual documentation, including paintings and pictures.

Perhaps the most interesting traditional knowledge of fishers in the area is their navigation skills that help them seek out the exact locations of various reefs without the aid of any sophisticated devices. This traditional knowledge is called *'kanicham'* (triangulation method). The study area, which has 13 important reefs with unique features, was documented using Global Positioning System (GPS). The results are so vivid that even a layman can understand the features of the hidden seabed and also locate them.

Floor reefs are flat, hard grounds in certain specific areas of the seabed that form the habitat of diverse vegetation and small living organisms as well as varieties of medium- and large-sized fish species. On the basis of the fishers' traditional knowledge of the sea, floor reefs can be considered an important habitat for many types of marine species.

During the period of the study, around 50 floor reefs were identified, of which 15 were studied in detail and used as specific locations for collection of materials. Twelve species of black corals and soft corals and 10 types of sea fans were identified.



An interview with Robert Panipilla

Can you tell us briefly about the hook-and-line fishers in Thiruvananthapuram District, in the context of your own parents' in-migration from Kanyakumari?

Most of the hook-and-line fishers in Thiruvananthapuram District (in Kerala State) had their origin in Kanyakumari District (in Tamil Nadu State), though before 1950 both Kanyakumari and Thiruvananthapuram were part of the erstwhile Travancore kingdom. There are two categories of hook-and-line fishers. One is the more skilled reef fishers who target large species like perches, sharks and rays in deeper waters with the help of large-sized hooks. The other targets small- and medium-sized varieties like horse mackerel, mackerel and squid, usually in inshore waters, with the help of small-sized hooks. My father came from Kanyakumari to Valiyathura, close to Thiruvananthapuram city, in the early 1950s. He was a skilled deep-sea hook-and-line fisherman. Even before him, some hook-and-line fishers had already come and settled inThiruvananthapuram.

My father was the first fisher in Valiyathura to introduce artificial baits. But he and his colleagues faced stiff opposition from other fishers, including those who had come from Kanyakumari earlier and were using only natural baits. The opposition was more out of jealousy, as my father and the new group of fishers were getting good catches. Some of the fishers even said that the use of unnatural methods was against the tenets of God. But good sense ultimately prevailed and others began using artificial baits.

The introduction of new innovative techniques in fishing invariably results in conflict and opposition. The introduction of nylon nets is a case in point. These days, though, the introduction of new techniques often leads to overfishing. This year, some fishers introduced use-and-throw baits, in the form of glass tubes with luminescent liquid inside, to attract and catch ribbon fish in deeper waters. Some old hook-and-line fishing methods (such as '*mattuchoonda*' i.e. Longline) have disappeared as the target species, like some varieties of sharks and rays, have been overfished and are more or less extinct.

Can you point out the landmark changes or developments among the hook-and-line fishers in terms of technology used?

First of all, the introduction of '*chillamaram*' (*Albizia* sp.) as the wood for *kettumarams* (catamarans) was a major change in the 1950s. It increased the size, capacity and life of the *kettumarams*. Then came the introduction of three-cornered sails for propulsion of fishing crafts. They helped to make use of multidirectional winds. The latest major change, which is a continuing one, is the introduction of artificial baits in hook-and-line fishing.

Can you describe the special traditional skills of hook-and-line fishers? There is a saying that a good hook-and-line fisherman has eyes on his fingertips. How far is this true?

It is not just one or two skills that these fishers possess. Most of them have a variety of complex skills, which include navigation and fishing techniques, as well as an understanding of the nature and characteristics of the sea and seabed. Most of the traditional fishers have a good understanding of the different types of winds, currents, waves, breaking of waves, fish shoals and so on. But the complex skills of the hook-and-line reef fishers is a class above these ordinary fishers. First of all, they have the skill to locate the reefs with ease and precision, even though today's fishers have started using GPS.

However, the skill of the hook-and-line fisherman to identify the particular fish that just got trapped on his line is something unique, which cannot be replaced with modern technology. These fishers can identify the exact species of fish caught by observing its reaction to the bait and the hook. They can almost feel the reaction on the tips of their fingers.

I will explain this with a recent experience. During one of our study trip voyages into the sea, Dr Oommen, the Chairman of KSBB, accompanied the fishers. After reaching a specific reef, the fishers started fishing with their hooks-and-line. After a few minutes, a fisherman announced that a medium-sized *kozhuva para* (*Carngoides gymonostathus*) has probably been caught by his hook. We could see him testing the line and paying it out in a particular manner. Dr Oommen asked him how he knew the fish caught was a *kozhuva para*? The fisher replied that he could sense it from the way the fish was struggling with the bait, which he could feel in his fingers. When the line was pulled up, the fish caught turned out to ba a *kozhuva para*. Though impressed, Dr Oommen doubted whether the fisherman could predict his next catch with equal accuracy. His next catch, the fisherman announced before reeling in his line, seemed to be a kalava (rock cod or grouper). He was spot on.

The fisherman explained that different fishes respond differently to the bait. Some come near it and spend time nuzzling against it or feeling it up before gulping it down, which is when they get caught. Some species are particularly greedy and swallow the bait immediately. The struggles put up by different species after taking the bait vary too. It is from these longtime observations and felt experiences that the fishers have learnt to predict the particular species of fish caught in their hooks, relying on the sensory feelings in their fingertips.

You had some experience in the introduction of new types of artificial reefs some decades ago. You also tried to involve some scientists and government institutions in that exercise. Can you share your experiences and insights about this?

A few decades ago, the traditional hook-and-line fishers tried on their own to create artificial reefs as fish aggregating devices (FADs). These were collectively made and managed by fishers' groups. Stems and leaves of coconut trees were largely used for the FADs. When I was working in an NGO in the late

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1980s, we interacted with these fishers and helped create larger and better structures of artificial reefs. Various types of triangular-shaped concrete models were tried which proved successful. Two scientists from the CMFRI centre at Vizhinjam collaborated in the effort. We also tried to assess the changes in and around these artificial reefs over the period, and the varieties of fish using these structures as their habitat. But we realized that the ability of the local scientists were limited, as many of them did not even know how to swim or dive. I remember some of them were so afraid of the sea that they forced us to take them back to the shore in the midst of a trip. Fortunately, we managed to get the help of two marine scientists from the United Kingdom (UK) who documented the changes over different time periods with the help of underwater cameras.

I think many of our marine scientists are interested only in land-based research inside laboratories. They do not wish to interact with the fishers and learn from them.

Providing artificial reefs is now part of the official programme of the Department of Fisheries in Kerala. However, implementation is poor because of the skewed attitude of officials towards the fishers.

What was your experience in preparing a biodiversity register of the marine environment of part of Thiruvananthapuram District?

For me, the work was not something totally new, but more or less a continuation of my longstanding involvement with fishers and fishing communities. Documenting the traditional knowledge of our small-scale fishers is a passion for me. I also realize that it may not be possible to do this a few years from now, as the situation on the ground is changing very quickly and we are in a transitional period. That is why I have been spending time, for a few years now, documenting the traditional knowledge and skills of our fishers. Hence, when Protsahan and KSBB asked me to prepare a biodiversity register as a pilot programme, I was really happy and jumped at the opportunity.

In the vast and complex world of sea fishing there are several opportunities to observe new things and gain fresh insights. This particular study helped me to learn more about the importance of '*tharapparukal*' (hard floor seabed) for the productivity of our seas. Earlier, my focus was only on the rocky reefs and their characteristics. I believe there's still a lot more to learn about our sea and the life in it, and I'm convinced that one can do it only with the help and involvement of our traditional fishers.

In this particular study, my colleague was a girl from the fishing community, who is also a college student pursuing a degree course in biotechnology. I am very glad to report that her involvement in the study was an enriching experience for her too. She got an opportunity to present a paper on fishers' traditional knowledge at the National Biodiversity Congress held in Kerala. From an ordinary student, she soon became an exemplary product of the college, whose authorities conferred on her an award for 'innovative initiative'.

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Nearly 100 molluscs, 30 to 35 crabs, mandy shrimps, star fishes, murray (locally called *vlanku*), eels, sea snakes, 30 *manthals* (*Crossorhombus azureus*), *kadanthal (Choridactylus multibarbus, Thysanichthys* sp.*, Pterois russelli)* and *petha (Antinnariusnummifer* sp.*)* were also identified, apart from many common fishes. All these species were classified with the help of the Department of Aquatic Biology, University of Kerala.

Perhaps the most important outcome of the study was the identification of six new marine species (five of which were found for the first time in Kerala and one for the first time in India). About 15 species were submitted to the University of Kerala for further study and analysis. Apart from some endangered fishes, other rare species of fish, sea birds, sea snakes, beach crabs and soft corals were also identified.

On the whole, the study reconfirms the value of the traditional knowledge of fishers. Our traditional fishing communities, just like forest-dwelling tribals, are a rich storehouse of traditional knowledge acquired over eons and passed down through generations. They, and their precious knowledge, need to be preserved.

For more

http://keralabiodiversity.org
Kerala State Biodiversity Board (KSBB)

www.nbaindia.org
National Biodiversity Authority