

Trawling the shorelines

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WE love fish. Fish is good for us. High in Omega-3 fatty acids, fish plays a vital role in brain development and in maintaining a healthy heart. The Indian coastal cuisine is replete with an extraordinary diversity of seafood recipes. Incomes from fishing support entire coastal communities. Fish is big business, and ensuring that our love for the meat is satisfied requires an increasingly efficient harvesting of the ocean to maximize its production.

We love fish. Yet somehow we love fish in a way slightly different than we love other species of wildlife. While every acre of the country's human dominated landscape is either owned or managed in some way, its species bounded within protective pickets of restrictions, fines and jail sentences, all but the most charismatic of marine species are fair prey to the already bountiful seafood platter. We may loathe the slaughter of wildlife for bushmeat, but still want to ensure that seafood is harvested at rates that allow those calamari rings not to cost the earth.

Hunting and fishing are, of course, of the same genus. In fact, marine hunters employ the most advanced technology available to chase down their prey. Today fishing vessels the size of small cruise liners, often working in pairs, using nets several kilometres long, drag their nets along the ocean floor and scrape up everything in their path. Many of these fishing trawlers come equipped with freezers and other facilities to process their catch at sea according to customer specifications which also allows them to stay out at sea for extended periods and helps reduce costs. This is hunting all right, but at a scale unimagined by the artisanal fisher stalking his evening meal with a bamboo trap or wooden harpoon. And no terrestrial hunting has ever matched the sheer industrial quantities of daily offtake gathered from the sea.

Increasingly, in India, this has little to do with satisfying our hankering after fish curry and rice. It is an industry adapting to its own economic impulses, keeping itself afloat – quite literally – by responding to changes in supply and demand, seeking new markets, repackaging its products and by-products to woo these new markets, reinventing itself constantly in order to survive. The upshot of this industrial inventiveness is that a system of production that should have been designated unsustainable years ago, continues to persist at an increasing ecological cost. And since all of this happens beneath the waves, it

largely escapes the noisy debates over the vanishing wilds.

In this paper we present a potted history of trawl fishing along the Indian coastline, and trace its ecological and economic fallout to coastal communities, both human and marine. We discuss the factors currently driving the economics of trawling within the Indian scenario, and explore potential directions towards a more meaningful management of this harvest. Our discussion focuses on fishery off the Coromandel coast, since that is the area we are most familiar with, but it is indicative of much of the rest of the Indian coastline.

The growth of the fisheries sector in India came as part of the five year plan post-independence with the key goal of achieving self-sufficiency in terms of food production in the shortest possible time through agricultural and fisheries development. However, these down to earth ambitions rapidly evolved to industrious ones like maximizing foreign exchange earnings from the fisheries sector in particular.

The introduction and initial trial experiments to test the effectiveness of trawl fishing came about through aid provided by the Indo-Norwegian project and the Food and Agricultural Organization. Along the Coromandel coast, trawlers were first introduced in Chennai. Before the introduction of trawlers, the sea off the Coromandel was largely fished by sail-propelled catamarans, which were basically made up of a couple of logs bound together. Limited by this lack of sophistication, these artisanal fishers primarily employed passive (stationary) gear and predominantly targeted fish. As a consequence, they had no storage space or facilities. Trips were short and within close vicinity of the beaches where they would land their boats, and the catch was either supplied to local markets or self-consumed.

When trawling began in earnest in the 1960s, it was not fish, but shrimp that was the main revenue provider. Such was its value that the noble aim of developing our fisheries to achieve self-sufficiency and to make available a cheap source of protein to the country's poor was all but forgotten as trawlers for the most part tapped the export markets. In fact, the growth of the trawling sector in India coincided with the development and growth of the export markets for shrimp. The shrimp caught was exported to the developed world, mainly the US, Europe, Australia and Japan.

Shrimp are among several species of crustacean that live on the sea floor where they generally feed on small plankton and invertebrates or scavenge on dead creatures. In a marine system they belong to the

lowest rung of the trophic pyramid. To capture shrimp, the trawler's net is designed to make close contact with the sea floor. Consequently it is conical in shape and the mesh size decreases from the mouth to the codend (the tapered end of the net where the catch is concentrated). Large otter boards help weigh the net down while aiding its contact with the sea floor.

The combinational use of floats and weights at the margin of the roof and the floor respectively, together with the otter boards, keeps its mouth open wide. The targeted shrimp in turn can range in size; however, the most commonly caught species are generally a few centimetres long and a couple of millimetre in width. As a result, to catch even the common mid-sized shrimp requires a very small mesh size, resulting in the indiscriminate capture of large quantities of non-target (bycatch) species, often in quantities far higher than the target catch.

In the beginning trawlers dragged their nets freely through near-virgin territory and relatively unexploited resources, given that artisanal fishers primarily fished in sail-propelled crafts and employed gear that was stationary rather than dragging it over the sea floor like trawlers did. What's more, the artisanal fishers mainly targeted pelagic fish (fish that swim near the surface) rather than shrimp. So, for the first few years when trawling began, they were witness to glut catches. The catches of shrimp in particular were high and fetched good prices, primarily in the export market.

Moreover, since the main export demand was for shrimp, cephalopods and a few other fish species (as desired by developed countries), trawl fishers primarily reserved their storage space for this target catch. The remaining bycatch, always in far higher proportions than the target catch, was generally dumped overboard, by this stage usually dead. For every kilo of shrimp, a trawler captures approximately 10 kilos of bycatch. The global estimate of fisheries discards is currently around seven million tonnes per year.¹

The tropical trawl bycatch includes a large diversity of species. Along the Coromandel coast, each trawl rakes up a sad taxonomic cornucopia that includes everything from sponges, starfish, sea cucumbers, corals, a large diversity of fish species, marine reptiles (sea snakes and sea turtles) and the occasional dolphin. Since trawlers fish the near-shore shallow grounds, which are preferred spawning grounds for many of the coastal species, they end up capturing large quantities of juveniles (including target species), larvae and eggs. A considerable portion of the bycatch is suitable for human consumption and is sold to local markets and can be regarded as a commercial bycatch. The rest of the bycatch is generally made up of small, undersized marine species which for various reasons such as their small size, noxious nature and low commercial value are collectively known by the term 'trash fish'. When trawling started, trash fish as well as significant quantities of commercial bycatch, were

discarded as trawling was primarily an export driven venture.

The initial trawling experiments carried out in various coastal states through aid provided by the Food and Agriculture Organization and the Indo-Norwegian Project clearly demonstrated that trawlers were undoubtedly the finest seafood harvesting machines.² The most productive grounds for shrimp also happened to be the nearshore shallow areas of the continental shelf, the domain of the by-then vulnerable artisanal fishers.

By dragging their nets in these shallow regions where the target catch was abundant, trawlers damaged the passive gear (lines, gill nets, beach seines and traps) employed by artisans, and brought about significant reductions in their catches. Trawlers posed a major threat to the livelihoods and food security of coastal communities as they wastefully exhausted the most accessible source of protein – fish. The introduction of trawlers to this coastline was soon followed by heated coastal conflicts between the artisanal and the mechanized sectors, an uneasy relationship that continues till today.³

The sustained dragging of mobile gear (the nets with all their paraphernalia of weights, otterboards and chains) across the sea floor has been likened to the clear felling of tropical rainforests. These nets can disturb the seabed and alter its complexity, reduce benthic production and lead to substantial changes in benthic community structure and habitat.⁴ Moreover, these disturbed soft-bottom habitats may never return to their original pristine state and are often taken over by weedy species, similar to those that take over the clear felled patches in tropical rainforests.

In India, the damage trawling has inflicted on the sea bottom and its potential ecological impacts on marine species are open questions since there are few studies that quantify the direct impacts of trawl fishing on species and habitats. Interestingly, while the target groups such as shrimp and cephalopods possess life history traits that allow their populations to recover quickly after they are fished, this contrasts starkly with several other species caught as bycatch in the trawl.

Many bycatch species are long-lived, grow slowly, are late to mature sexually and produce few offspring. These traits make their populations much more susceptible to fishing pressure, and could even be driven to local extinction. Moreover, because bycatch is rarely monitored, these declines (and sometimes extinction) often go unnoticed. In India there has been a loss of species at the apex of the food web (sharks, groupers, snapper and the like), followed by a sequential replacement by lower trophic groups; trawl catches today are largely devoid of large predatory fish.⁵ This so called ‘fishing

down the food web', is a signature of overexploited fisheries worldwide, and leaves the benthic community vulnerable to small disturbances that could trigger catastrophic shifts in ecological state. Yet this can go easily unnoticed if, on the face of it, target catches do not appear to have reduced much over the decades.

Fishers are an adaptable bunch. When catches become difficult to haul, they employ several other strategies to make ends meet. For instance, the geographical area trawled has increased drastically since trawlers were first introduced. Besides trawling near shore grounds in violation of the Marine Fisheries Regulation Act 1983, small fleets of trawlers, mainly in Nagapattinam and a few other bases, are now (over the last decade) towing their nets approximately 600 m below the sea level, where they target deep sea shrimp resulting in the capture of considerable quantities of other deep sea species of bycatch for which little information is available. In the Palk Bay and the Gulf of Mannar, after largely overfishing their nearshore resources, trawlers now drag their nets on the apparently more productive grounds of neighbouring Sri Lanka. This has often flared fishing conflicts between the two countries, resulting in the persecution of trespassing fishermen.

In parallel, the artisanal fisher has not been sitting idly by as the trawlers took over, watching his craft and trade become increasingly insignificant. The stereotype of the marginalized artisan hides a more complex tale of constant adaptation, as traditional fishers too have modernized and upgraded their boats with motorisation and more efficient fishing gear.⁶ Along the Coromandel coast, this gained a huge impetus soon after the tsunami in the form of aid (national and international) and the consequent large-scale replacement of the traditional technology with more modern crafts and gear.⁷ The new fibre-reinforced plastic boats now employed by the artisanal fishers are equipped with storage space and efficient engines, are able to venture and spend longer durations at sea, and are thus regarded as stiff competition for trawler fishers.

Gone are the days of plenty. With consistently rising fuel prices and steadily declining target catches, discarding bycatch of even the lowest quality (i.e. trash fish) is a luxury of the past. The once discarded trash fish has now spawned an industry of its own, including transporters, sorters and processors. In Chennai, the artisanal fishers whose near shore fishing grounds had been swept clean by trawling, now act as courier agents of trash fish for the Chennai trawlers. These trawlers now make longer fishing voyages (generally up to seven days) to the apparently more productive waters of Andhra Pradesh.

By heading out to these trawlers, loading up the trash fish and bringing it back to shore on their behalf,

this trash fish does not take up the trawlers' fish holds, nor do trawl fishers risk it spoiling rapidly if left exposed on the deck. Once landed, trawler owners sell trash fish to trash fish dealers for an average price of 3.50 per kilo. This price is subject to variation depending on its composition. Trash fish predominantly composed of actual fish is more valuable than that with high proportions of crustaceans and shell.

Trash fish dealers employ transporters, who make use of bicycles with attached carts to transport trash. Manual labour is also utilized to tend to the trash fish. This involves firstly spreading out the wet trash fish on drying fields, specially reserved for this purpose. In Tamil Nadu, as in many other parts of the Indian coastline, it is not uncommon these days to see acres of land adjoining fish landing sites being used to dry low value trash fish bycatch. Once dried, the trash is heaped in piles before sieving off the mud and grit. This is followed by packing it into jute bags.

From bases such as Nagapattinam, trucks laden with these dry trash fish in jute bags leave every day, making a beeline inland to a district called Namakkal, located approximately 200 km away. Namakkal along with Chittoor (located in the neighbouring state of Andhra Pradesh) are considered the poultry capitals of southern India. Protein forms a small but important part of a chicken's diet, and fishmeal offers this very protein at a reasonable cost. India's economic boom and the resultant increase in affluence is also fuelling a change from vegetarianism to carnivory. Unlike beef or pork, fish and chicken are among the more kosher of all meats in India, and the country is witnessing a massive growth in their consumption. This, in turn, increases demand for trash fish, and the fishing industry, already in the doldrums because of declining profits, is happy to repackage its discards to supply the chicken factories.

There's no doubting the fact that the prior practice of discarding bycatch was bad. So on the face of it, it appears encouraging that trawlers are discarding far less than they earlier did. The improved utilization of bycatch would also appear to improve livelihoods of trawl fishers and generate employment for people who work in the trash fish industry. However, our work along the Coromandel coast shows that the 'pleasant' picture of judiciously utilizing marine resources actually masks the collapse of target species and can thus push a fishery beyond the commercial extinction of its target stocks.⁸ Our work shows that the trawl fishery today is sustained not so much by the increasingly scarce lotteries that a bumper crop of shrimp or cephalopods may provide, but rather by the remarkably predictable harvest of cheap trash fish. The trawlers are fishing for chickenfeed in more ways than one.

Fisheries in India, like in so many other parts of the world, are managed so as to sustain yields and profits rather than meet conservation goals. To this end, research institutions such as the Central Marine Fisheries Research Institute (CMFRI), Department of Animal Husbandry and Dairying (DAHD) and the Marine Products Exports Development Authority (MPEDA) have been monitoring fish catches over the last 60 years, presumably with an eye to establishing quotas and sustainably managing the stock. Not surprisingly, the species that are part of this monitoring protocol happen to be target groups – species that were deemed to be economically important when the monitoring programmes were first implemented.

From the point of view of managing single stocks it made good sense, since it was easy to implement and uncomplicated to measure and understand. However, as discussed earlier, species that were once ‘trash fish’ or ‘bycatch’, and were considered unimportant to monitor, are today perhaps the main economic drivers maintaining fishery; yet they pass completely under the radar. Trawl fisheries along the Coromandel capture over 200 species and a monitoring protocol that either ignores these species or lumps them into broad categories is ecologically nonsensical and one from which little information can be gleaned.

The situation is complex and demands ever more complicated solutions, especially since it involves making redundant many whose jobs are already in the doldrums. We are not the first – several countries have been swept by the overfishing crisis way before India. A 2006 study predicted a collapse of all major fisheries in the next 50 years and also heralded that this could seriously hinder the ecosystem services they provide us with.⁹ However, a more recent study suggests that conservation efforts are on and that in as many as half of the world’s major well-studied ecosystems, exploitation has reduced to a level which definitely points in the right direction.¹⁰

Although India has hardly created a ripple on the marine conservation front, there are important lessons we can learn from successfully managed fisheries. Precisely because of the easy double standard with which we view the ocean and its species, we are perhaps able to avoid the unhelpful conservation discourses that pit humans against the wilderness as violator and victim. Freed from this, it is possible to explore strategies for effective management that are economically functional and ecologically acceptable as well.

On the face of it, terrestrial and marine strategies for conservation do not appear very different, since among the most effective management tools is the marine protected area, a designated area from which no offtake is allowed. Yet, unlike our terrestrial national parks, such areas are often designed as a way to maximize fish and seafood production, protecting seed stock and spawning areas from exploitation,

and creating a spillover zone that can be harvested. There is conservation happening here, but as a happy collateral (a bycatch, if you will) of a fisheries management action, delivering conservation benefits while augmenting fishers' catches and incomes.

We do not as yet have working models within the country of a fisheries reserve that works to this design. At least part of the reason for this lies in the bipolar bureaucracy within which marine resources are managed – a fisheries department that focuses on maximizing exploitation and a Ministry of Environment and Forests that is still weighed down by its heavy terrestrial paradigms of conservation. Between these two approaches lies our best way forward for ocean management, if we are to continue enjoying our fish curry and rice in the decades to come.

Footnotes:

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