High value and overexploitation: a need for better management of sea cucumber fisheries

Smart Fiche 13

This SmartFiche describes the background and outputs of the programme's on-going efforts to improve the management of sea cucumber fisheries in the Western Indian Ocean (WIO) region and support innovative aquaculture systems.

Commercial size of Holothuria Scabra (sea cucumber) © Michel De San RECOMAP

BACKGROUND

Sea cucumber (beche de mer) fisheries are one of the top non-finfish income streams for coastal peoples throughout the Indian Ocean, Southeast Asia and the Pacific. They are fished from coastal waters of all Indian Ocean nations and in some countries they are an important export commodity. Key producers were or are the Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Tanzania, and Zanzibar. All countries are generally struggling to keep harvests within sustainable levels with reports of widespread overfishing, declining catches and reducing prices. In fact, the value per kg of final products has been reduced drastically because of: (i) overfishing of the high value species, (ii) capture of small size with little value and (iii) fishing effort oriented towards less valued species. Box 1 summarises prices paid to the exporter to give an idea of how value can vary. Pricing therefore encourages the harvesting of large high value species which is a strong incentive to support a value-chain co-management approach. Furthermore, current African beche-de-mer production is estimated to have fallen by at least 70 percent from a peak in 1996 at 7 113 tonnes to a stable 1 000–2 000 tonnes between 2003 and 2008. The WIO nations have contributed to about 75 percent of the African catch over the past 10 years. Understanding fully the level of exploitation is also hampered by a lack of reliable export data from most countries.

The fishery in the WIO is multi-species, with over 20 commercial species known to exist, with sandfish constituting an important part of the catch. The fishery targets habitats in the entire seascape and fishing is carried out by men, women, and children. The positive socioeconomic impact that the fishery has on communities is believed to be substantial. Recent studies on social and ecological elements of sea cucumber fishery in the WIO suggest that overfishing generally is a result of weak management, knowledge gaps about species ecology from which to formulate sound management, and the generally data poor situation. Despite the contemporary fishery being active for nearly half a century, many nations still lack well formed policies or capacity to monitor and control and many fisheries operate without effective management, sometimes in a clandestine manner. It is in the context of depleted fisheries, high export demand and weak governance that the development of sea cucumber aquaculture is gaining momentum in the region.

Box 1: Beche de mer value

To better understand the value of beche de mer it is important to know the price range for quality product of the three to four high value species :

- Less than 20 dry individual per kg: 300 to 350 US $ per kg
- 20 to 30 dry individual per kg: 175 to 250 US $ per kg
- 30 to 50 individual per kg: 50 to 70 US $ per kg
- 50 to 100 individual per kg: 20 to 40 US $ per kg
- Above 100 to 120 individual per kg: 10 to 20 US $ per kg

For low value species the price varies from 1 to 20 US$ per kg

Post-harvest activities engage both men and women in processing and first point of sale. All the harvested animals are processed in some way, usually by a combination of boiling, drying and smoke drying. The end products are destined for export to Asia, particularly to China and South East Asia via Hong Kong and Singapore. Selling prices depend on the size of the individual animal, the species and quality of the finished product. But the products tend to have a high value with some species retailing for up to US$300 per kg (see Box 1). It is not known how many people depend on post-harvest activities, but clearly the sector is labour intensive and an important aspect of the livelihoods of some coastal communities.

Unfortunately, sea cucumbers are vulnerable to overfishing if not carefully managed. Pandemic overfishing to critical levels currently threatens the persistence of sea cucumber fisheries and the important role they play in the livelihoods of coastal fishers. In many WIO nations, sea cucumbers are a key resource for poverty alleviation because they are one of the few commodities that can be easily stored and exported. However, recent reviews have shown that sea cucumber fisheries in the Indian Ocean, Southeast Asia, the Pacific Islands and Latin America are suffering unsustainable levels of exploitation, to the point of local extinctions of some species.

In the Indian Ocean, all beche de mer fisheries are overexploited. The fisheries tend to develop without adequate management plans in place. Institutions and research present at the recent

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Cage de grossissement de concombres de mer à Tuléar, Madagascar
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7th WIOMSA Symposium in Mombasa, Kenya, illustrated a severe situation with widely depleted resources and an expansive fishery and trade. This situation calls for regional governance partnerships and cooperative management efforts.

At a global scale, FAO have supported the development of improved management systems for sea cucumber fisheries through a multifaceted programme. Two outputs from the programme have been a technical manual on the ecosystem approach to managing sea cucumber fisheries (Purcell, 2010) and a simpler guidebook on putting the approach into practice (FAO, 2010). The documents provide a "roadmap" for developing and implementing better management of sea cucumber fisheries, and complement the previous ACIAR "toolbox" manual (Friedman et al., 2008). These guidebooks have been distributed widely already and the responses from the sea cucumber fishing nations have been very positive. The next task is to assist fisheries agencies to use these outputs to help them design new and practical management plans to restore sea cucumber fisheries and foster sustainable exploitation practices. Experience shows that fishery managers need personal assistance in navigating through the many potential regulatory measures and management actions. To meet this objective, FAO recently supported a regional workshop in the Pacific, jointly with other regional organisations. The workshop format was based on the recent pragmatic fisheries manuals and targeted senior management officials on how to implement the management guidance in their local fisheries.

As with fin fish, and in light of the levels of over exploitation and market high value of the processed products, there is an increasing interest in the farming of sea cucumber. Although certain species lend themselves to aquaculture, others do not. One of the opportunities in the WIO region is to develop systems of commercial interest tailored to native species in the region and implement such initiatives in parallel with village out growers.

SMARTFISH INITIATIVES

In the Western Indian Ocean region a MASMA Programme (Marine and Coastal Science for Management) funded sea cucumber project was the first concerted effort in the region to gain a comprehensive understanding on a range of aspects relating to this resource (Conand & Muthiga 2007). Building on the success, in 2012 late SmartFish supported WIOMSA to run a 5-day workshop in Zanzibar to train and mentor Indian Ocean fisheries managers in applying an ecosystem approach to managing sea cucumber fisheries. The workshop centred on the principles within the Australian Centre for International Agricultural Research (ACIAR) and FAO guidebooks and the outputs included an agreed set of management regulations for each fishery and case studies elaborating on governance and how to address constraints in implementation. It also helped facilitate the development of a regional research agenda and promoted networking, cooperation and information exchange. The report of the workshop was published by FAO and following the workshop, SmartFish were approached by stakeholders from Seychelles and Madagascar requesting support to improve sea cucumber fishery management.

The Seychelles has a compressed air dive fishery operated exclusively by men. It's national fishery management plan includes the licensing of fishermen, processors and traders. The private sector, represented by the sea cucumber private sector association (ANSSI) and the Seychelles Fisheries Authority both expressed the urgency to improve management of the sea cucumber fishery and their need of external support on specific issues. At the time nobody knew exactly what the situation of the sea cucumber multi-species fishery in Seychelles was. The Seychelles Fishing Authority (SFA) was collecting data but not able to fully analyze them because of cost and staff expertise. Furthermore, a stock assessment in 2012 had not been able to conclude on the status of the main sea cucumber stocks. In addition the private sector were worried about the shift towards lower value species and the indiscriminate harvesting of all sea cucumbers irrespective of size. So whilst overall tonnage harvested was relatively constant, the overall value was decreasing. There appeared to be no control of fishing effort with the 3 month closure being more due to natural bad weather than a proper management measure.

There was also concern expressed for divers' health. Increasing fishing effort often meant more and deeper dives and when on shore some divers are known to be vulnerable to alcohol and drug abuse. Unfortunately, the crew and the divers are also usually hostile to whatever rules are used to reduce their immediate

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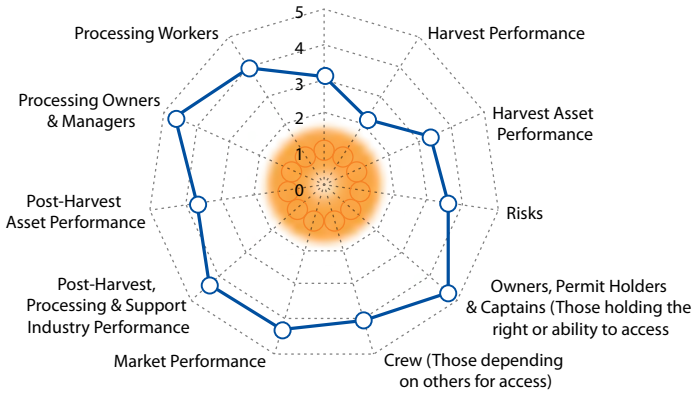
revenue and hence it was important to bring them on board to any long term sustainable management plan for the fishery.

The World Bank had recently also undertook a survey of fishery performance indicators, both inputs and outputs to help assess the ecological standing or sustainability of the fishery. The results gave an understanding of harvest sector performance as well as post-harvest sector performance. The aim was to develop a monitoring system to assess status, trends and performance of the fishery. This could be pick-up by the economic intelligence unit being developed at Ministry level with the support of SmartFish.

OUTPUT

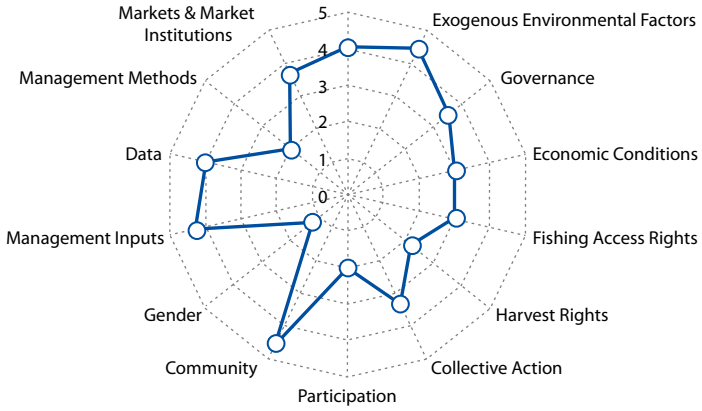
Fish Stock Health & Environmental Performance



Source : World Bank

INPUT

General Environmental Performance



Source : World Bank

Examples of Fisheries Performance Indicators (FPI) for Seychelles developed by the World Bank

SmartFish is supporting SFA and AMSSI with the development and implementation of a Memorundum of Understanding (MOU) signed by both parties to improve Sea Cucumber Management based on a three years programme. The MOU integrates concrete actions and steps to improve monitoring of the fishery, to introduce new management measures and to improve safety at sea and working conditions of divers.

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The monitoring of the fishery is then expected to improve by helping SFA to develop and implement a new fisheries data collection system which is training skippers and vessel Owners to provide regular data via logbooks which is feds into a MS Access Database for use as a management tool. At the same time research is being conducted to support stock assessment and to evaluate management options. The safety of fishermen is also of paramount concern due to the nature of the fishing method and the length of time divers spend underwater. Efforts are underway to introduce a mandatory medical examination programme for all divers and issue them with medical certificates. Training in good dive practice as well as, subject to confirmation of donation, the introduction of a decompression chamber on Mahé are also key activities and steps in this process.

An important baseline study was conducted in Madagascar that has mapped out the value-chain and clarified some of the governance issues related to the Malagasy fishery (Andrianaivojaona 2012). Support is also being provided to Madagascar where village-level consultations have been conducted within the Bay of Assassins area as part of a participatory resource mapping initiative aimed at supporting sea cucumber conservation and management. Focus groups and questionnaires were used to guide the mapping process and collect site- and season-specific data regarding resource use sites for each stakeholder group. The results identified at least eleven commercially fished species. The data is being analysed for validation with communities before being used for management decision making. Particularly for the development and implementation of management measures such as partial fencing of areas and fisheries on an annual rotating basis (Randrianandrasaziky 2013).

In Madagascar efforts are also under way to develop a suitable protocol for stocking ponds and pre-fattening *Holothuria scabra* using the *Phaeodactylum tricornutum* a phytoplankton diatom. The research is comparing the survival and growth of sea cucumbers according to different diatom supply conditions as well as strengthening the actual diatom culturing system. Experimentation with different sand substrates within the growing environment is an important aspect of the work which is ultimately aim-

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ing to increase the growth rate of sea cucumber. Support to the associated Malagasy Research Unit (polyaquaculture) on improving economic viability of sea cucumber aquaculture is complementary to efforts on wild stock management.

CONCLUSIONS

The multi-species sea cucumber (beche de mer) fisheries are one of the top non-finfish income streams for coastal peoples throughout the Western Indian Ocean region. Yet despite the fishery being active for nearly half a century, many nations still lack well informed policies or capacity to monitor and manage their fisheries. Unfortunately, sea cucumbers are vulnerable to overfishing if not carefully managed and many fisheries are overexploited. As well as a need for better management systems, the development of sea cucumber aquaculture is gaining momentum in the region.

In response SmartFish is building on global initiatives by FAO and others to support an ecosystem approach to fisheries management through participatory and scientific research, as well as capacity building for both fishery managers and the private sector. This is complemented by research into innovative aquaculture solutions and support for community out growers. The results of the work so far in the Seychelles and Madagascar are likely to have wider positive implications for other WIO nations.

Processor exporter Madagascar © Conand

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