NATURAL RESOURCES SYSTEMS PROGRAMME

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Policy and management brief 2: Value of the Soufriere reef fishery.

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Appendix A2.2

Brief 2: The fishery value of coral reefs

Coral reefs are valuable assets to the St. Lucian economy, but just how much are they worth? This brief examines the value of coral reef-dependent fisheries. Reefs provide a source of food and income for some of the country's poorest people. The Soufriere Marine Management Area was established to improve the livelihoods of reef fishers and to reduce conflicts with other industries like tourism. The brief also examines how successful has the SMMA been in meeting these objectives.

KEY FINDINGS

In 1995, the Soufriere Marine Management Area (SMMA) was created and encompasses an 11km stretch of coastline centred around Soufriere. At the core of the SMMA is a network of four marine reserve zones that are closed to all fishing. These zones include around 35% of the coral reef habitat. The design of the SMMA developed out of three years' consultation with users and other stakeholders.

One of the main objectives of the SMMA was to rehabilitate the severely overexploited reef fishery. In this the SMMA has been an outstanding success. Reserve zones are designed to protect commercially important species so that they live longer, grow larger and become more numerous. Scientists from York measured the amount of fish in reserves and fishing grounds annually from 1994 to 2002, using underwater censuses. Over this period the amount of fish present in marine reserve zones of the SMMA rose dramatically, increasing fourfold over the amount present at the outset of protection. Protected stocks in reserves produce many times more eggs than exploited stocks do and their young can be carried into fishing grounds on ocean currents. There is also movement of adults and juveniles from reserves to fishing grounds, supporting nearby fisheries. In adjacent fishing grounds, fish stocks increased three times over the same period.

At the outset of protection, the University of the West Indies made a study of the local reef fishery. Over a six month period, catches were weighed, and recordings made of what species had been caught using what gear, where the catch had come from and how long it had taken fishers to catch it. After the marine reserves had been protected for 5 years the study was repeated by a team from the University of York working with the St. Lucia Department of Fisheries and SMMA.

Compliance with reserve protection and enforcement by the SMMA have been good. The amount of illegal fishing in marine reserves measured in 2000/1 was five times lower than fishing effort in designated fishing areas. After five years of reserve protection, catches per trap per trip increased by 90% for fishers using small traps and by 46% for those using big traps. As well as improving average weight of catches, good landings became more reliable. Between 1995/6 and 2000/1, the number of people fishing remained virtually unchanged, so overall landings are likely to have increased by similar amounts to the figures above.

Annual monitoring of reef fish catches by St Lucia's Department of Fisheries shows that the most difficult period for Soufriere's fishers is now over and that marine reserves will continue to bring benefits. Figure 1 shows how catches per trap per trip initially declined in the first two years after reserves were established. This is because it takes time for fish stocks to increase in reserves and then for benefits to spillover into the fishery. However, after 1997, catches rose rapidly to become more than double the size they were in 1995. In response to the initial fall in catches, the St. Lucia Government gave compensation to some of the most badly affected reef fishers. Many of these men had no engines on their boats, and so would have had to row extra distance when they couldn't fish inside reserves. Such a prospect is very daunting when you are in your 60's and 70's, and these people needed financial help until the

reserves could bring them benefits. Compensation strengthened fishers' support for marine reserves at a critical time, and the investment has clearly paid off.

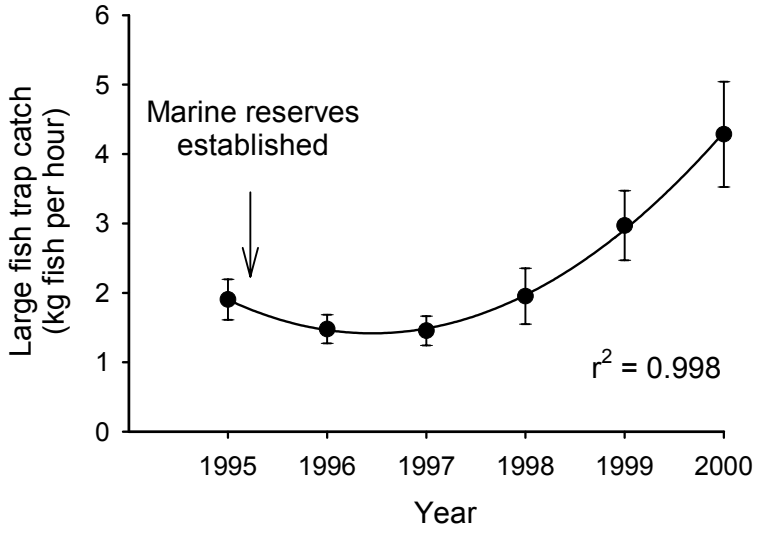

Figure 1: Change in catch-per-unit-effort in the Soufriere reef fishery from 1995 to 2000. Data collected and analysed by the St. Lucia Department of Fisheries.

Interviews were made with Soufriere reef fishers in 2000/1 to estimate the value of catches landed and the costs of fishing. Two different estimation methods were used to calculate the value of landings from fishing grounds in the SMMA. For 1995/6 estimates for the total value of the SMMA fishery varied from a lower bound estimate of EC$141,000 to an upper bound estimate of EC$270,000. For 2000/1 estimated values lay between EC$233,000 and EC$356,000. If we use the lower bound estimates for both years the value of the fishery has increased by EC$126,000, an increase of 91%. Using the upper bound estimates the value of the fishery has increased by EC$87,000, an increase of 32%. The upper bound estimate is in line with change in catch-per-unit-effort and may be the most reliable figure.

The costs of fishing include gear, bait, boat fuel, boat maintenance and the capital costs of buying boats and engines. Depending on the method of estimation used, profitability of the fishery (catch value minus costs) increased between 28% and 189% from 1995/6 to 2000/1. Although this is very encouraging news, with annual incomes ranging between EC$3,922 and EC$8,412 in 2000/01, St Lucia's fishers still live well below the island's poverty line. If marine reserve protection continues, catches continue to improve at current rates, and rises in the cost of fishing remain at the current rate of 16% every 5 years, it will take another 15-20 years for a family of four to rise above the poverty line.

During the fishery survey of 2001, 38 of Soufriere's 45 regular fishermen participated in a formal interview which examined their attitudes towards marine reserves. After answering a series of questions they were asked to raise any other issues that concerned them. The same information was also sought from other fishers in a less formal way while their catches were being sampled. Several fishers commented that life had been very difficult during the early years of the SMMA, confirming that they recognised that their catches were decreasing after the reserves were first established. However since catches later recovered, people generally felt that the reserves were worthwhile, and only 13% of those interviewed wanted them re-opened to fishing.

Despite support for marine reserves, some illegal fishing continues. Much of it is done by casual fishers from locations on the shore. They are generally people that normally do other jobs, or who come in from the countryside to fish at weekends. Such people usually did not know about marine reserves or didn't care about them.

MANAGEMENT OPTIONS

Maintain strong protection of marine reserves: Soufriere's marine reserves have improved catches for reef fishers. To sustain these benefits, it is essential that reserves continue to be protected from fishing over the long-term. Reopening reserves to fishing will lead to a short-lived boom and then to a long-term bust in the fishery.

Maintain the area of marine reserves: At the time of this research, reserve zones protected 35% of reef habitat in the SMMA. Theoretical research indicates that the maximum fishery benefits from reserves will come when between 20 and 40% of fishing grounds are protected in marine reserves, the exact value depending on fishing pressure. A separate study has determined that the optimal area of protection for Soufriere's reef fishery is 36%. Reducing the area under protection can be expected to reduce fishery benefits.

Increase compliance with marine reserves: The best way to prevent poaching is to make people not want to do it. This can be achieved by educating people about why reserves exist and the benefits that they will bring if everybody in the community refrains from fishing in them. Compliance may increase if rangers inform offenders about the law and provide them with an opportunity to meet with the SMMA manager to learn more about the reserves.

Expand education efforts: Education about marine reserves is so vital it needs to be undertaken at every opportunity. Hiring a full time education and outreach officer would strengthen the success of the SMMA. Efforts to inform people about marine reserves need to be targeted widely. People may travel a long way to fish. In the past, most education effort has focussed on Soufriere. There is a need to expand outreach to other coastal communities and to people who come from inland areas to fish, as well as people from all walks of life and income brackets, since some fish for necessity while others do it for pleasure.

Strengthen enforcement of marine reserves: In addition to education, the threat of punishment is also necessary to stop illegal fishing, and the law must be properly enforced if people are to take it seriously. Enforcement could be improved if SMMA rangers patrol marine reserves at unpredictable times during both day and night, and always challenge illegal fishing. If patrols are predictable, fishers avoid fishing in reserves only when they expect a patrol to pass. Fining or confiscating the gear of repeat offenders, or both, will encourage compliance by others. Offenders could also be required to attend a class informing them about the objectives of the SMMA and the importance of marine reserves in achieving this.

Monitor performance of marine resource management and regularly report results to stakeholders: It is very important that fishers and other stakeholders receive regular updates about how well marine reserves are performing. There is a continued need for collection, analysis and reporting of catch statistics by the Department of Fisheries. This is part of the ongoing educational process. While fishers know how good their own catches are, information about the fishery in general helps maintain their interest and commitment to reserves.

Expand SMMA style management to other areas and fishing communities around St. Lucia: Benefits from marine reserves and the zoning scheme of the SMMA are gained most by locals. Fishery benefits are delivered close to reserves, and those directly using the area experience the advantages of zoning to separate competing or conflicting activities. The demonstrated success of the SMMA now warrants expansion of marine reserves and management areas to other parts of St. Lucia so that all coastal communities can benefit.

Consider compensation for inshore fishers in the initial stages of implementation of new management areas: A year after reserves were set up in Soufriere, compensation for loss of fishing grounds was given to Soufriere's oldest fishers and helped them through a difficult period. Compensation was popular, helped gain support for reserves, and was important in reducing levels of poaching. If new reserves are set up elsewhere in St Lucia, paying fishers compensation for a short period of 1-3 years, perhaps with reducing levels over time, is a strategy that will help reserves become effective quickly.

Introduce and enforce a legal minimum mesh size for fish traps, and require escape gaps and biodegradable panels: Fish traps are such unselective gears that they have been completely banned in some countries (e.g. Bermuda) Ongoing research under a separate project in St. Lucia shows that fish traps in use capture many immature fish due to their small (2.5-3cm) mesh size. Research in Jamaica has shown that increasing mesh sizes will increase yields in the fishery. Furthermore, introducing vertical escape gaps will also reduce rates of capture of immature fish, and biodegradable panels will reduce rates of ghost fishing by lost traps. These measures will continue the rehabilitation of the reef fishery that has been initiated by marine reserves in the SMMA.

Reduce sediment pollution to coastal waters: Gains in the size and value of fish catches have been made against a background of serious reef degradation in St. Lucia. Half of the coral that was present at the establishment of the SMMA has died. Causes of death include storms, coral diseases and sediment pollution. Sediment pollution comes from soil erosion from land, coastal construction works and dredging. It causes stress and can kill corals, and it can impede recovery of reefs from disturbances like storms. If land-based sources of sediment pollution are not reduced, improvements in fish stocks and fisheries are in jeopardy.