FISHERIES AND CORAL REEFS: A JAMAICAN TRAGEDY

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INTRODUCTION:

This article is about what has happened to the Jamaican north coast artisanal fisheries and coral reefs. It is a story of the interrelated destruction of fisheries, coral reefs, coastal vegetation, and terrestrial forests. It is a story of rapid decline which was unforeseen by most of the users and which happened largely by accident. Something similar is probably happening in the Maldives.

Jamaica is in some important respects similar to the Maldives. The coast houses the majority of the population and most of the economic activity. The principal foreign exchange earner, in recent years, has been tourism. This is concentrated in the north coast of the island, and depends heavily on the attractive natural environment: benign climate, clear blue water, coral reefs, sandy beaches and green hillsides.

In addition to tourism, there is a nearshore artisanal fishery yielding about 7,000 tons per annum. 30% of Jamaican fishermen live on the north coast, operating out of about 70 designated fishing beaches.

Thus, north coast communities depend on the coastal marine environment for tourism and fishing. But this system has been severely degraded by a combination of human and natural causes, which were largely not recognized by users until large scale damage was done.
HUMAN DISTURBANCES TO JAMAICAN CORAL REEF AND FISHERIES

Human activities readily disturb coral reef ecosystems and degrade the resources, as has been observed throughout the tropics. The principle agents of disturbance to coral reefs are set out below with reference to Jamaica.

Suspended Material

Increased turbidity reduces illumination, starving corals, while precipitated sediment further stresses or chokes them. Dead corals usually become overgrown by algae.

In Jamaica, it is well known that deforestation of the watersheds has led to erosion and the loss of thousands of tons of soil to the sea. It is less well known that this process, along with the destruction of mangroves and other coastal sediment traps such as sea grass beds, has also degraded the coral reefs; stressing or killing corals with sediment and turbidity. This impact is greatest near the mouths of rivers, but it has increased turbidity (reduced water clarity) in inshore waters all round the coast. Other local sources of sediment damage are bauxite ship loading points (e.g. Ochos Rios and Discovery Bay) and coastal construction projects (typically tourist resorts) especially where they include dredge and fill work, and removal of mangrove forests and seagrass beds.

Small algae suspended in the water can also increase turbidity, and increased nutrient levels can encourage this.

Nutrient Pollution

Elevated nutrient levels stimulate the growth of plants, which may overshad and kill corals, both adults and newly settled juveniles. Terrestrial run-off and sewage discharge both contribute to nutrient pollution in Jamaica. It is most severe in the vicinity of towns but is a problem wherever the nutrient removing mangroves and sea grass beds have been destroyed.
Removal of Predators and Herbivores

Removal of predators and herbivores from the community will cause changes in the abundance of their food and this can disturb natural balances.

The intensity of fishing in inshore waters has increased in the last twenty years. Pelagic fish, which were once abundant, are now scarce so that nearly all fishing is for reef fishes. On the north coast, the island shelf is very narrow, never more than a kilometre wide and often much less. As a result, fishing effort is more concentrated, and its impact greater, than on the south coast, where the shelf extends for 10km. Resident coral reef fish populations show all the signs of over-fishing. All fish are scarce and small. The large fish and predators are very scarce and less esteemed fish such as parrot fish and surgeon fish are now commanding premium prices. The average size of a fisherman's daily catch is several kilograms, and the average size of a landed fish is 0.08 kg.

This over-fishing situation has a number of negative aspects:
1) from 1987 to 1989 the price of fish doubled, going from US$2.00/kg to US$ 4.00/kg for fresh whole fish;
2) the amount of work a fisherman must do to survive increased substantially;
3) the removal of herbivorous fishes encourages the growth of algae at the expense of corals; another negative for tourism and for normal reef ecology.
4) the absence of large or abundant fishes detracts from the value of reefs for tourism.

Collection and Breakage

The collection of specimens by tourists, or for sale to them, can have an acute effect at popular sites. Accidental damage occurs due to people walking, wading, swimming, snorkeling or diving and due to boat anchors.

The greatest concentrations of tourist activity in the sea occur at Ocho Rios and Montego Bay. Both sites clearly show the impact of the collection of souvenirs; corals, sea fans and shells have been removed, and on some stretches of seaside road it appears that whole reefs are up for sale on stands by the roadside. The effects of accidental damage by divers are more subtle and seem to have been hidden by larger scale human and natural factors.
NATURAL DISTURBANCES TO JAMAICAN CORAL REEFS

Hurricanes

In the last ten years, coral reefs of the north coast of Jamaica have been struck by two severe hurricanes. Hurricane Allen (1980) greatly changed their appearance and fish carrying capacity by smashing the extensive stands of Acropora sp that had grown up in the previous thirty-six years. Hurricane Gilbert (1988) remobilised the rubble and set the recovery back to where it was in 1981. Both hurricanes killed corals and created new substrate on which algae quickly settled and grew.

Diadema Die-off

By 1983, free living algae had become very abundant in deeper water, but remained relatively scarce in shallow water. There, the long-spined black sea urchin Diadema antillarum had become more common over the years, possibly due to the removal of its predators. It had become the single most important herbivore (to about 20m depth) and was maintaining a low biomass of free-living algae, to the benefit of corals. But in 1983, there occurred a Caribbean-wide epidemic disease that all but eliminated Diadema.

The consequence, in Jamaica, of the combination of hurricane damage and Diadema die-off, was a rich bloom of algae that persists to the present. There has been very little recovery in the Diadema population, herbivorous fishes are still scarce, and eutrophication and siltation continue to increase as more terrestrial and coastal forests and sea grass beds are removed. Surface cover by corals is decreasing as they become overgrown by algae.

Bleaching

In 1987, many corals in Jamaica, and elsewhere in the Caribbean, dramatically showed what is believed to be a sign of stress; they lost their zooxanthellae and "bleached", becoming very pale or stark white. Indications were that this was related to unusually high sea temperatures, but only limited and intermittent temperature records were available for previous years. In late 1989, when temperatures were again high, another severe
outbreak of bleaching occurred. It is cause for concern because, although many corals recovered when temperatures fell in late 1987, others died. Nothing like bleaching on this scale has occurred in the previous thirty years (we don’t know about temperature). It raises speculation that we might be seeing an early sign of global warming or that other stressors are reaching critical levels, limiting the ability of the corals to tolerate higher (but not unusual) temperatures.

THE PRESENT STATE OF JAMAICAN REEFS

The coral reefs of the north coast of Jamaica were described by Prof. T.F. Goreau, only 25 years ago, as among the best in the world. Today, they are in a sad state; smashed by hurricanes, degraded by sedimentation, deprived of fishes, conch and lobster, and overgrown by algae. It is quite remarkable how rapidly they have deteriorated and many people still diving in Jamaica can bear witness to the changes. The loss of economic value in the fishery is already evident, and the level of hardship among fishermen is high. Jamaican reefs lack interest to tourist divers and few return. Eventually the number of diving tourists will decline. Lack of coral growth will result in a loss of breakwater function, thus causing local beach erosion.

WHAT ARE THE LESSONS FOR THE MALDIVES?

The Jamaican example is relevant to the Maldives. In both the Jamaican north coast and the Maldives fishing and tourism are important interdependent economic activities, and the reefs and the fishes are important interdependent ecological components. If the fish are depleted, both tourism and the reefs will suffer. If the reefs are degraded, the fish stocks will be degraded as well, and tourism will again suffer. Jamaica is fortunate in being inexpensive to reach and being close to a major market, and in having a diverse countryside which is itself a tourist attraction. One need not be a diver to enjoy a Jamaican vacation. Diving and fishing are central to the Maldives.

The Maldives is so far not exploiting its reef fishery to any great extent (but this is increasing as tourism increases), and still has well developed reefs and spectacular diving sites. In both places suspended material and nutrient pollution (sewage in the Maldives, especially near Male') are problems, and in the Maldives breakage in the form of coral mining is occurring on a scale which
dwarfs anything in Jamaica. In addition, the Maldives face the Crown of Thorns and much heavier diving usage, with its suspected but as yet unverified consequences.

There are two alarming aspects of the deterioration process that deserve mention, it is incremental and it is rapid. In Jamaica the problems began as local problems, much like they seem here. A bit of destruction here, a bit there, it doesn’t seem to add up to much. But it grows incrementally and is hard to detect for that reason, and soon the local problems have multiplied and fused into a national problem and by then if solutions are possible, they are very costly. In Jamaica this process of deterioration happened very rapidly, in the space of 20 or 30 years.

The economic fortunes of both Jamaica and in the Maldives depend on a healthy ecosystem. A major difference is that Jamaica is a decade or two further along the path of decline (but there are some Maldivian sites which are as bad or worse than anything in Jamaica), and the Maldives can take action now to avoid going the same route. We can’t afford a wait and see stance here, we must act now, on a local scale. Contact Marine Research Section for more information and with your ideas.