

# Regulating Fishing Effort: The Jamaican Experience

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## ABSTRACT

A brief review of the fisheries highlighting those issues and problems which are critical to the effective regulation of fishing effort is presented. A critical examination is made of the progress made in regulation of the fisheries since the introduction of the Fishing Industry Act of 1975.

The fisheries are characterized by increasing fishing effort, overcapitalization, declining catch rates, declining real income to fishermen, negative trends in species composition/value, reduction in fish mean size and increasing conflict between fishermen. There is now a relatively large body of scientific information which presents findings on the poor state of resources and offering recommendations for management.

Enforcement of conservation measures, *e.g.*, for lobster has been practically non-existent and subsidies have helped to attract more persons into the open access fishery. A number of recent developments include the submission to the Government of a management plan for fisheries (Aiken and Haughton, 1987), the recommendation by a recent coastal resources workshop that fisheries management involving the control of fishing effort is vital to marine parks for tourism, a fisheries improvement project involving a revolving scheme of small fish sanctuaries and a project to collect current fishing effort data on which to base further management. The urgent implementation of the existing management plan is suggested, along with other plans regarding catch monitoring, new job opportunities and the eventual dismantling of the subsidies to fishing.

All Jamaican fisheries activities are essentially small scale and conducted within the territorial waters of 12 miles but include some off-shore activities based on small cays at two nearby oceanic banks. The primary fishing gear is the antilean fish trap or Z-trap but other gears such as gill nets, beach seines, hook and line and spearfishing are also used.

The greater part of the fishing fleet operates on the island shelf which is less than 1.5 km on the north coast but at its widest point which occurs on the south coast it measures 24 km. A very intensive fishery occurs on the entire coastal shelf.

## THE PROBLEMS OF RAPID GROWTH

Like many other developing countries small scale and artisanal fisheries are important as labour-intensive sources of employment and as the major sources of fresh fish within these countries. The Jamaican marine fishery sector has grown in size from approximately 2,500 canoes and 7,500 fishermen in 1962 to approximately 3,000 canoes and 12,000 commercial fishermen in 1986. This

increase has resulted largely from the natural population increase in coastal fishing villages where there is little alternative to fishing for a livelihood. Also a relatively high national unemployment rate has resulted in increased pressure on the coastal fishery resources.

One over-riding factor which has indicated that there were problems in the fishery was that analyses of the existing catch and effort data have shown that despite the increase in numbers of fishing craft there has been a decline in catch per vessel. Further, the inshore catch since 1962 has averaged approximately 7,260 - 7,710 tons (16 17 million pounds) and in particular, since 1970 has produced a mean catch of 7,000 tons (15.4 million pounds) with only slight variation.

Fuel prices have increased greatly since 1974 until some stability was restored in about 1984. Although partly subsidized by the Government additional increases at the end of 1983 served further to modify the cost-efficiency of long-distance trips to offshore banks and other distant (>200 km) banks such as Pedro Bank, the largest offshore fishing ground. What this situation may imply is that further additional fishing pressure on the island shelf may have resulted from the decision of fishermen not to fish offshore. Fuel price increases may have caused a redirection of fishing effort from offshore to nearshore resources as relative profitability in these sectors changed.

The increased use of fine meshed traps and beach seine nets is another factor which has resulted in low catches of small immature fish. The initial high yields to fishermen from the relatively restricted shelf quickly produce drastic reductions.

#### MANAGEMENT POLICY

As pointed out by several authors, including Gulland (1979), the scope of management is essentially economic and certainly not entirely biological. It is generally speaking a planning problem and the decisions to be made which can guide the system towards a desired stage, demand knowledge of, among other things, the biology of fish stocks, the fisheries themselves, the economy of fishing operations and related industries, and the influence of the benefits from the fisheries on other parts of society (Hoydal, 1985). The main problems that exist in the Jamaican fishery may be attributed to a lack of proper plans to provide for effective management and controlled expansion of fishing effort.

No means of managing the fishery existed before the introduction of the Fishing Industry Act of 1975, which actually came into full effect in November, 1976. Prior to that, management was on an ad hoc basis in that the decisions were made in a crisis management situation that is to solve problems as they arose rather than planning ahead. However, to a large degree management is today not very different.

Historically, there have been Five Year Plans prepared by the Fisheries Division of the Ministry of Agriculture. These documents however, addressed general issues such as fishing beach infrastructure improvement and subsidies to the industry, for example fuel and fishing materials. Perhaps the most critical factor was the absence of a good data base from which appropriate planning could result. This resulted from the lack of properly trained persons whose job it would be to routinely collect biological and catch data for management purposes. Even today there is no permanent system for the routine gathering of data from the fishery.

The Fishing Industry Act of 1975 essentially brought about for the first time the following:

Licensing of all fishing vessels, licensing of all fishermen and the provision of sections of the law under which biological resources can be protected.

There was for instance provision under Section 25 of the Act for the protection of spiny lobsters. There is a minimum size specified and females bearing eggs are protected.

#### AVAILABILITY OF INFORMATION FOR MANAGEMENT

The success of fishery management measures depends largely on the realization of the need for these measures by the politicians and those within the industry. Success depends heavily too on the effectiveness of enforcement.

The frequency of surveys of the fishing industry has been irregular. The record shows surveys of the industry in 1968, 1975 and 1981. The major types of data which were gathered included numbers of fishing vessels, fishermen, numbers of outboard engines, total catches, major species taken, value of the catch and seasonality of landings.

Detailed scientific information has been gathered by a series of studies carried out largely for resource assessment purposes. These surveys have been carried out by the FAO/UNDP Caribbean Fisheries Development Project between 1968 and 1973, by the UWI Zoology Department working in conjunction with the Overseas Development Agency of Great Britain between 1969 and 1983, various technical assistance programs by foreign governments between 1977 and 1980 and the Fisheries Division between 1974 and the present.

These surveys have all demonstrated that although there are many commercially important and valuable species their abundance is low and at best variable especially for the valuable pelagic species. There is a considerable body of information that shows that the coral reef fish stocks are fully exploited in most areas and in others approaching full exploitation. Several of these reports especially those of Munro (1974), recommended certain management measures for the inshore fishery. Most of these management measures have been extensively discussed in the literature (Munro, 1983; Aiken, 1985; Ross, 1982;

**Table 1.** Scientific papers which mention status and management of Jamaican reef fish stocks involving fishing effort.

| <b>Paper</b>                          | <b>Main Emphases</b>                                    |
|---------------------------------------|---|
| Munro, J. L. 1974.                    | Status/management of reef fisheries.                    |
| Ross, F.E. 1982.                      | Juvenile fish distribution, nurseries.                  |
| Hartsuijker, L. 1982.                 | Status of Pedro Bank and south coast fishery resources. |
| Munro, J.L. 1983.                     | Reef fish resource status, management measures.         |
| Nicholson, W.E. & L.Hartsuijker 1983. | Pedro Bank resources, management                        |
| Aiken, K.A. & M.O. Haughton 1987a.    | Reef fish stocks, management.                           |
| Aiken, K.A. & M.O. Haughton 1987b.    | Reef fish stocks, management.                           |
| Haughton, M.O. in press.              | Reef fish status, management.                           |
| Koslow, <i>et al.</i> 1989.           | Reef fish stocks, management                            |

Aiken and Haughton, 1987a; Hartsuijker, 1982; Nicholson and Hartsuijker, 1983; Haughton, in press; Koslow, *et al.*, 1989; Aiken and Haughton, 1987b; See Table 1).

It may be said that there is a considerable body of scientific information which has been used to formulate management measures and these measures have been submitted to the responsible agencies. The biology, occurrence and abundance of many of the various species of scalefish, crustaceans and other resources that are commonly caught are well known due to some of these research projects.

Now, although there is a large body of information on the fishable stocks regarding biology and fishery parameters such as mortality, growth, and recruitment, there remains a need for other types of studies. Some areas for which there is need for much additional information include an economic study of the fishery and the economic factors which control profitability. Another area is up to date information on the spiny lobster fishery which presently supports a large relatively intense fishery primarily for the export market. More information is needed for an economic assessment of the effects of limiting fishing effort and efforts to organize such studies are underway.

In large part therefore, although there is the scientific information available for management and although various recommendations have been formulated, the majority of the recommendations have not been implemented. Lack of information could not be blamed for this by-passing of management measures.

Instead the fishery administrators chose to postpone the decisions on restriction of fishing effort as these have always been politically sensitive decisions. Thus it is our view that in order to maintain political stability, management decisions were put aside indefinitely.

The fishery has continued to expand with new entries allowed without any apparent control in what is a true open access situation, despite the evidence of declining catches for several years.

#### FINANCIAL SUPPORT AND SUBSIDIES TO FISHING

One major impediment to control and regulation of the fishery is the lack of adequate funding and often the complete absence of funds to support research and management. This results mainly from Jamaica's status as a developing country but also in our view, from the relatively low priority of fisheries in national matters. This latter is despite the fact that fisheries support almost entirely, many coastal communities.

There is some Government support to the industry in the form of subsidies to fuel and some selected fishing materials, but financial aid to research has been limited indeed.

The subsidy programme for the fisheries sector began in 1970's with support for outboard engine fuel. There has, since 1976, been a small subsidy on meshwire for fish traps and for diesel fuel for larger decked vessels. These subsidies were curtailed in the 1980's. The Fisheries Division also operates a revolving loan scheme for canoes and engines.

Fishermen purchase outboard motor fuel mixture for less than one-half the market value. Most of the equipment used by the fishermen is imported *e.g.*, engines, nets, lines, meshwire, hooks, ropes. All enter Jamaica duty free. In 1986 the fisheries was subsidized by some J\$15 million (US\$2.7 million). Several years ago when these subsidies were introduced as an incentive to stimulate growth and expansion of the fisheries. By effectively lowering the operational cost of the fishermen, the subsidies enable them to stay in fishing.

One other result of these subsidies on boats, engines, fuel and gear is the constant attraction of persons to the fishery and their subsequent entry to the already aggravated situation of excessive investment and fishing effort. These subsidies therefore have the effect of exacerbating the already deteriorating situation in the fishery regarding the decline of the biological resource and the downward trend in catch per unit of fishing effort.

#### THE PROBLEM OF ENFORCEMENT

One of the most difficult areas facing fishery managers is the problem of enforcement or in Jamaica's case, the lack of it.

Since 1976 the Fisheries Division has utilized for basic management its Fisheries Instructors, who although they carry out mainly administrative duties

connected with the sale of outboard fuel, were asked to monitor and enforce regulations for spiny lobsters. This they did quite well for several years but since about 1980 the conformance by fishermen with the regulations has deteriorated seriously and there are common breaches of the lobster regulations.

Aiken and Haughton (1987a,b) have reviewed the status of the fishery and have recommended the use of a new Fisheries Warden programme which will replace the now defunct Agricultural Warden Scheme.

Over the last several years, the Fisheries Division has been assisted at sea in enforcement by the Jamaica Defence Force Coast Guard. With a recorded increase in incursions into territorial waters around Pedro Bank by foreign fishing vessels, the Coast Guard has increased its vigilance against these interlopers. These vessels come mainly from Central America and there have been several well published high seas seizures of some of these vessels. During 1985 and 1986 a total of 5 vessels (averaging about 25 m) have been seized in local waters. Catches on board were mainly lobsters taken by free and SCUBA-diving methods using teams of minimally trained juvenile divers.

However, the small fines imposed have not seriously deterred other vessels and these foreign intruders are still sighted underway regularly near Jamaican waters. Until the existing penalties in local law are increased, these illegal foreign vessels will probably continue to be a problem, especially for the lobster fishery.

A major part of the lack of control of fishing effort is the fact that enforcement officers in the field do not really exist per se. The persons who normally are the ones interacting with the fishermen are the fisheries instructors who unlike their nomenclature do not instruct but deal with sales of subsidized outboard fuel mixture and the accounting process associated with the activity.

When the Fishing Industry Act of 1975 was introduced, there was a concentrated effort to use the Fisheries Instructors to help to enforce conservation regulations for spiny lobsters (*Panulirus*) and for registration and licensing of boats and fishermen. At the present time they carry out no enforcement functions. We suggest that when the regulations controlling fishing effort by limitation of numbers of fishermen and canoes come into effect at some future date, that the fisheries instructors be utilized for enforcement. This arrangement does not exclude the possibility of introducing other persons such as Fisheries Wardens, specially appointed for the purpose, to assist the instructors.

#### RECENT DEVELOPMENTS IN REGULATING FISHING EFFORT

In September, 1987 the Government of Jamaica through the Ministry of Agriculture was formally presented with a management plan for the Jamaica

fisheries produced by the present authors (Aiken and Haughton, 1987). This document sets out the background of the fishery and traces its development setting out the need for fishery resource management. It examines the reasons for declining catches, the effects of rising fuel prices since 1974 and looks at the consequences of the use of fine-meshed fishing gear. It sets out management guidelines and objectives and suggests various strategies for managing the fishery.

The major management recommendations set out are shown in Table 2: a) gear limitations, b) fishing effort regulation through alteration of its spatial distribution through creation of twelve fish sanctuaries and one scientific reserve, c) a resource enhancement programme using artificial reef, d) catch monitoring, e) an education and publicity campaign, and f) the establishment of a fisheries management council. Further, it sets out steps for enforcement of fishery regulations.

The document incorporates the practical experiences of Jamaican fishery researchers and has selected only those measures which would be both worthy of implementation and offering the least difficulty in enforcement. This is not to suggest that there will undoubtedly be some opposition to some of the measures, especially those limiting mesh size in traps and nets and banning of spearguns.

The document was well received by Ministerial level officials and initial steps are being taken to implement parts of the management plan. One of the first steps is the formation of a Fisheries Management Council with

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**Table 2.** Desired objectives and management measures chosen for Jamaica.

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| <b>Objectives</b>  | <b>Management Measures</b>                          |
|--|---|
| Protection of juvenile fishable stocks.  | Gear limitations.                                   |
| Alteration of fishing effort distribution and protection of juvenile fishable stocks.        | Fishing effort regulation by sanctuaries.           |
| Increase in fish populations in coastal waters.  | Resource enhancement programme of artificial reefs. |
| Detection of fluctuations in production.   | Catch monitoring.                                   |
| Appreciation of conservation measures and co-operation with management measures.             | Education & publicity campaign.                     |
| Monitoring of management measures, adjustment in existing policy, formulation of new policy. | Establishment of fisheries management council.      |

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representatives from the main groups.

Among other problems foreseen are initial token action and medium term sluggishness in implementation due to what may best be termed lack of political will and genuine commitment

At a September, 1987 workshop on the management of coastal resources held in Kingston the important role of fisheries in coastal ecosystems was pointed out along with the suggestion that more proper and urgent management of fisheries is necessary if the full tourist potential of marine parks is to be realized. It was also recognized that in the development of marine parks there was need for the creation of alternative jobs for the displaced principal users of reef areas which are fishermen (See Table 3).

The creation of more marine parks which are part of the new attractions planned for tourists to Jamaica has direct implications for fishing effort regulation. New marine parks, when properly enforced, will result in some reduction of available fishing area and possibly increased fishermen on remaining grounds, if alternative jobs are not found for displaced fishermen.

Another recent development which is currently underway is the Fisheries Improvement Project which has among its objectives the enhancement of fish stocks and fish catches at one part of the north coast with the intention of later spreading this to other parts of the island. The project hopes to achieve these objectives through several methods including the introduction of a series of

**Table 3. Summary of Recent Developments in Fishing Effort Regulation.**

| Event   | Consequences   |
|---|--|
| Presentation of fisheries management plan to Ministry responsible for fisheries in September 1987.  | Management objectives, guidelines and strategies available for implementation.   |
| September 1987 Coastal Management Workshop in Kingston identifies fisheries management as urgently needed especially as it related to certain marine parks. | Increased pressure on the Government to implement management of fisheries especially regulation of fishing effort.                           |
| Fisheries Improvement Project involving small rotating fish nurseries catch monitoring, increased mesh sizes for traps begins September 1987.               | Gradual recovery of selected reef fish populations within sanctuaries on north coast; involvement of fishermen in regulating fishing effort. |
| Fishing Effort Project collecting data for management use begins September 1987.  | Assessment of actual levels of fishing effort and determination of optimal levels using a simple surplus production model.                   |



small alternating fish sanctuaries, monitoring of fish catches and the modification of fish traps to use larger meshes. A major part of this project involves a campaign to gain the confidence of the fishermen who will participate in the project and to educate them in conservation.

The fish sanctuaries will be chosen from sites on the already heavily overfished reef which is located close to shore. These sanctuaries will be chosen with the co-operation of fishermen who operate in the region and then after a certain period of time other sites will be selected allowing the first areas to become open to fishing in a rotating fashion. An important part of the project is involving fishermen to co-operate in respecting the fish sanctuaries and in agreeing to fish in designated areas with traps having slightly increased mesh size.

The project is scheduled to last for three years and is being carried out by the UWI Discovery Bay Marine Laboratory in St. Ann parish and was organized by the University of the West Indies (UWI), Canadian International Development Agency (CIDA) and Trent University, Ontario, Canada and is headed by Dr. J. D. Woodlye, UWI. One interesting footnote to this project is that the whole project originally came about as part of a response to the complaints by local fishermen about the very depleted stocks of reef fish along the north coast and especially in the Discovery Bay area. One result of this is the close co-operation between the fishermen and project workers. It is eventually intended that this management system of rotating small fish sanctuaries and the use of slightly larger mesh sizes for fish traps may be introduced to other areas around Jamaica (See Table 3).

There is another research project whose major objectives include the development of a management plan primarily based on the regulation of fishing effort. This project began in September 1987 and operates on the principle suggested by Munro (1983) that the reef fisheries can be managed, based on a simple surplus production model, the assessment of current fishing effort and calculation of optimal fishing levels of fishing density per unit area of reef. The status of current fishing effort is being studied by a series of beach questionnaire surveys conducted at selected fishing beaches around the country. The project is thus islandwide in its coverage and the eventual objective is the proper management of fishing effort in Jamaica.

The project aims to provide current information on which management regulations limiting the number of fishermen and boats may be based. The project is organized and headed by Dr. J.A. Koslow, Dalhousie University, Canada working in conjunction with the Marine Sciences Unit, UWI, Mona. This latter study is very important in that there is not current reliable fishing effort data on which to base management measures. This project will fill an information gap with valuable information for use by managers who wish to regulate the reef fisheries which are now plagued with problems.

### CONCLUSIONS

Although there have been several researchers who have looked at the fisheries status and made suggestions for the management of them *e.g.*, Munro (1974), Aiken and Haughton (1987a,b), and others, there has been virtually no control over fishing effort in real term

Several reasons have been identified for this apparent lack of concern. We therefore suggest the following policy measures be considered (see Table 4): a) development of the political will to modify the status quo of the fishing industry despite its perceived political risk. The benefits accruing, we feel, far outweigh the multiple consequences of allowing the unmanaged fishery to strangle itself. Fishermen will benefit in the medium and long run; b) the introduction of a system for the regular sampling of the fishing industry even every two years to produce data such as Sahney (1983) which may be used to monitor and enable

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**Table 4.** Fisheries management policy changes affecting fishing effort, recommended for Jamaica.

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- a. Development of the political will to modify the *status quo* despite perceived political risk.
  - b. Introduction of a system for regular sampling of the catches.
  - c. Expansion of the duties of Fisheries Instructors to include enforcement of regulations.
  - d. Generation of new employment opportunities for any displaced fishermen.
  - e. Gradual phasing out of subsidies to fishing.
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management decisions to be made; c) the expansion of the duties of present fisheries instructors to include the enforcement of fishery regulations on a routine basis; d) the generation of new employment opportunities, possibly in the tourism sector, for fishermen affected by management measures; and e) the gradual removal of subsidies to fishing, which have been attracting new fishermen to fishing industry resulting in overcapitalization and excessively high numbers of men, boats and gear. "Buy-back" schemes have been examined by researchers but found not to be appropriate under present circumstances.

The Jamaican experience in fishing effort management has been one therefore which has not been a good one due to continued intense effort despite the warnings from researchers that collapse of the fishery is imminent. The government is now just beginning to accept that some measures must be introduced to avert serious socio-economic consequences in the industry.

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