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Introduction

Fisheries resources have special characteristics that distinguish them from most other natural resources. These special characteristics pose particular challenges for their management and development. These include:

- the diversity of the products and means of production;
- the natural limits to their supply;
- the mobility of the resources;
- the difficulty in determining potential yields and, most importantly,
- the absence of satisfactory property rights.

This lack of appreciation for the special characteristics of fisheries resources has led to fisheries management and development being treated for the large part as traditional agricultural produce. Decision makers tend to measure economic progress in terms of constant increase in production which is not the overarching goal of sustainable fisheries management. Additionally, the sole indicator of contribution to national economy is GDP which severely distorts the real contribution of fisheries to economic development.

This paper briefly describes the structure of the fishing industry and attempts to provide some brief insights of the social and economic importance of the sector. This paper also discusses selected issues of importance for the proper management of our fisheries resources.

1. The Jamaican Fishing Industry

The fishing industry is comprised of numerous components. The industry can be broadly divided into two main sectors, the processing sector and the productive sector. Both sectors are comprised of capture and culture fisheries components. That is, the processing sector can be divided into two categories, one that processes produce solely from the capture fisheries and the other from the culture fisheries. The productive sector can be similarly divided. Figure 1 provides a schematic representation of the Jamaican fishing industry.

There are currently some 20,000 artisanal fishers operating about 9,000 canoes from 184 fish landing sites and 3 offshore fishing cays. There is a relatively smaller but economically significant industrial fishery for conch (*Strombus gigas*) and the Caribbean spiny lobster (*Panulirus argus*). Additionally, there is a commercial sport fishery (charter boat and tournament) associated with tourism and a small recreational fishery.
With the exception of the industrial conch and lobster fishery, all other fisheries are operated on an open access basis. Although the power to grant licences is discretionary under existing legislation, the artisanal fishery is operated on an open access basis as a matter of government policy. All fisheries except the conch fishery are considered to be in a state of over-exploitation.

1.1 The Artisanal Fishery

The artisanal fishery is an open access multi-species fishery. Artisanal fishers use outboard motor powered open canoes (8.5 – 9.8 m) to exploit all fishing areas within Jamaican Maritime space.

The Antillean Z-trap is the dominant gear used while other gear such as various kinds of nets, handlines and spearguns are used to a lesser extent. Since the latter part of the 1980’s artisanal fishers have begun to use SCUBA and hookah gear to harvest conch, lobster and finfish. Ninety percent of the artisanal fishers fish in the inshore areas (i.e., the Island shelf and proximal banks). The remaining ten percent operate on the offshore banks. Approximately five percent of the latter resides on the Morant and Pedro Cays as a base for up to eleven months for the year. The Morant and Pedro cays are serviced by the so called “packer” boats (11.6 – 12.8 m) which ply between the mainland and the cays trading supplies and cash for fish.

1.2 The Lobster Fishery

Licensed artisanal fishers enjoy open access to the lobster fishery. Some artisanal fishers utilize special bait (cow skin) set in the traditional Antillean Z-Trap to target spiny lobsters. The frequency with which this is done and the number of artisanal fishers targeting spiny lobsters is unknown. The industrial lobster fishery is a limited entry fishery with the maximum allowed licences being twelve. The industrial Lobster fishery operates on the Pedro Bank and utilize steel hull, motor fishing vessels (25 – 30 m) equipped with 1,000 – 2,000 Florida wooden traps.

The 2001 total production of spiny lobsters (Panulirus argus) stood at an estimated 943.39 metric tones with a retail value of J$249,575,711.28 (US$4,456,709.13).

In addition to the above-mentioned limited entry system, management measures specific to the lobster fishery are:
- Prohibiting the landing of berried female lobsters
- Minimum size limits, and,
- An Annual closed season (April 1 to June 30).
1.3 The Conch Fishery

Jamaica is one of the largest producer and exporter of the Queen Conch. Total exports 2001 was 946 MT valued at J$138.4 M (US$2.5M).

The Jamaican Queen Conch Fishery is comprised of industrial and artisanal components. There are currently five licensed processing establishments and three licensed Motor fishing Vessels. Industrial conch producers utilize mostly foreign divers that use SCUBA or hoocha gear to harvest conch. These foreigners are sourced mostly from the Dominican Republic and Honduras.

1.4 Sports Fishery

Commercial sports fishery operations are linked to tourism and are largely concentrated on the north coast. This fishery targets pelagic species such as yellow-fin tuna, kingfish and marlins. At least six internationally famous fishing tournaments are held yearly which attracts large numbers of local and overseas participants. This fishery is currently inadequately regulated, however, sport fishers adhere to international regulations imposed by relevant international agencies. Besides two official studies carried out as part of research thesees, no official (and regular) data exists on the number of vessels involved or the quantity of catch taken.

1.5 Fish Culture.

The freshwater culture of the red hybrid tilapia is by far the most commercially important fish culture activity. In 2001 Jamaica produced some 5,000 MT of cultured tilapia. This species is cultured in earthen ponds by several medium to large scale commercial farmers operating fish farms of 50 to 200 pond acres. There is also a very small scale mariculture of the mangrove oyster (Crassostrea rhizophorae). The Oysterculture Unit of the Fisheries Division currently operates a facility at Bowden, St. Thomas where oyster spat (juvenile oysters) is collected and sold to farmers.

2. Social and Economic Contribution

2.1 Nutrition and Food Security

One of the most important roles of the fisheries sector in national development is its contribution to nutrition and food security. Fish is a vital source of both total and animal protein in Jamaica and contributes essential mineral and vitamins to the diet. It is a protein source that is available all year round, often when other sources of food are not. Additionally, fish occurs in sufficiently diverse forms to be available to the poor and rich alike and to provide a varied diet for all. It is particularly important in the diet of some of
the most vulnerable people in society such as those that may be in ill-health, pregnant or very young.

2.2 Poverty Alleviation

Many of the participants in the fisheries sub-sector are the poorest and most marginalized in society and may have little or no other economic activity available to them. Many people from other sectors may turn to fisheries seasonally, temporarily or permanently when faced with periodic cycles of unemployment and poverty.

2.3 Employment

The fisheries sector provides a wide range of employment opportunities for many in the community. These are the fish harvesters, processors, traders, pot-stick cutters, pot makers, boat builders, net makers and ice suppliers. There is even the person who earns money by scaling and gutting fish or those that help to load the boat before it goes to sea and off-load the fish, conch or lobster when it comes back to port. In many cases this is their only or major source of employment. The employment may be part-time and may be a vital complement to other activities such as farming or petty trading. Fisheries may also provide seasonal employment when other sectors are less busy.

2.4 Creating opportunities for Women

Many of the critical roles in fisheries are carried out by women, particularly, those on the shore side of the operation. In some areas there are women that go to sea and can hold their own with any of their male counterparts.

The fisheries sector gives women the opportunity to complement their household income from other sources. In some fisheries women are gear and boat owners and achieve considerable wealth and power in the community.

2.5 Foreign exchange Balance

Fisheries activities contribute directly to foreign exchange generation through the export of fisheries products (e.g., conch and lobster). Fisheries also contribute to the balance of foreign exchange by substituting for other protein sources which would otherwise need to be imported.
2.6 Support for alternative income generating opportunities

Fisheries provide critical support for alternative income generating opportunities. In most communities surplus income is generated by (fisheries simulated) non-fisheries related activities in secondary industries. The surplus provides a growth pole for alternative income generating activities. Many of the bars, shops and restaurants were developed with cash earned through fishing. Furthermore many of the support for these shops, bars, restaurants and other place of business come from monies earned through fishing. The critical importance of fisheries in coastal communities was underscored when one of the consultants working on the south coast sustainable development project said that the shop owners and bar owners remarked that they do not need to look at the sea to know if the weather is too harsh for fishing. This is because they know all too well when fishing is bad since they sell little or nothing.

3. Current Status of Traditional fisheries resources

The traditional fisheries resources (i.e., the reef and reef associated fishery) are currently in a state of over-exploitation. Generally, the amount of fish landed today is getting less and less and the size of fishes is getting smaller and smaller. In fact most fishes landed today are actually very young adults or juveniles. In addition, the percentage of the catch that is made up of the more expensive, high quality fishes such as the snappers and the groupers is very small if not non-existent whilst the percentage of the more in-expensive species such as the doctor fish and squirrelfish are increasing. All these factors constitute classical signs of over-fishing. In short, there are too many fishers chasing too little fish.

Having recognized that over-fishing is a problem, it must be quickly pointed out that the demise of our fisheries resources is not just caused by fishers. The destruction of the coral reefs, seagrass beds and mangrove forests, all of which are important nursery areas for our marine life, and pollution of the sea especially from sewerage are also responsible for the decline in our fish stocks.

4. Critical Fisheries Management Issues

The critical management issues in need of urgent attention include:

- Harvesting During Closed Seasons
- Harvesting Under Sized and Berried Female Lobsters
- Poaching by Foreign Nationals

4.1 Harvesting During Closed Seasons

There are currently two (2) annual closed seasons for both the queen conch (July 31 to January 5) and the spiny lobster (April 1 to June 30). Closed Seasons are set at the time
of peak spawning activity of the specific species and serve to allow for the species to reproduce and produce the next generation of fish. Additionally, closed seasons also reduce fishing pressure on resource.

4.2 Harvesting Under Sized and Berried Female Lobsters

Berried Females lobsters (i.e., female lobsters bearing eggs) continue to be landed by fishers. In many cases, the fishers attempt to wash and clean the eggs. Landing berried lobsters has serious implications for the viability of the fishery. Undersized lobsters are by definition juvenile lobsters. Currently the legal minimum limit is 76 mm Carapace Length (i.e., the head). Protection of the juvenile lobsters serves to allow each lobster to reproduce at least once before they are caught. Below is an estimate of the revenue lost as a result of landing four (4) berried female lobsters.

4.2.1 The Cost of Harvesting Berried Female Lobsters

- 4 females lobster tails (i.e., with head removed) bearing eggs weighing 2lbs
- The weight of the tails is one-third the total weight
- Therefore the total weight of the whole lobsters would be the weight of the tails multiplied by three (3), which is equal to 6 lbs.
- Female spiny lobsters produce an average of 830 eggs per gram of body weight
- 1 lb = 454g
- Therefore female lobsters weighing 6 lbs would have produced 830 x 454 x 6 = 2,260,920 eggs.
- After hatching out 1% would survived and recruited to the Jamaican lobster fishery. Thus 22609.2 spiny lobsters offspring would have been produced.
- These lobsters would take between 3.8 to 4.5 years to reach legal size of 7.62 cm weighing 1 lb each.
- Thus if the 4 berried lobsters were allowed to produce their offspring after 3.8 to 4.5 years 22,609 lobsters weighing approximately 22,609 lbs would have been available to Jamaican fishers.
- Recalling that lobster tails are one-third the whole weight the 22,609 lbs of lobsters would produce 22,609 divided by 3 = 7,536 lbs of tails
- At current prices at US$ 16.00 per lb of tails, Jamaica has lost earnings of 16 x 7,536 = US$120,576 (J$5,787,648 at US$1 = J$48) as a consequence of destroying 4 berried female lobsters.

4.3 Poaching by Foreign Nationals

Among the critical areas of concern is the problem of illegal, unreported and unregulated (IUU) fishing. With respect to our local industrial fisheries including that for finfish, lobster and conch, we have begun to address the problem of IUU fishing by
implementing a mandatory Observer programme. This Observer programme condition of licence for industrial vessels for sometime now was recently operat. in March this year and have proven to be highly successful so far.

With respect to our queen conch and spiny lobster resources, one of the most pr. problems is the scourge of illegal fishing by foreign nationals within our maritime s. Poachers target almost exclusively spiny lobsters and conch largely on the Pedro B. Not only are our management efforts severely undermined but we continue to lc. significant foreign exchange earnings and employment opportunities especially for o. very vulnerable artisanal fishers. This results in significant hardships especially in the many coastal communities where fishing is the main and indeed in some cases, the only means of economic activity.

Jamaica’s National Total Allowable Catch for conch was progressively reduced form a level of 2,000 Metric Tons in 1994 to a level of 502.45 Metric Tons in the current 2002 – 2003 conch fishing season. This progressive reduction the conch quota is in response to strict management, our commitment to fulfilling our obligations under the CITES Convention particularly Article IV of the Convention but moreover to ensure the sustainable utilization of the queen conch resources for the social and economic benefit of our people.

The most recent conch abundance survey of the Pedro Bank stocks was conducted in December, 2002. The results of this work showed that the potential sustainable yield could be set at the level of 900 Metric Tons. However, it was estimated that some 300 to 400 Metric Tons would be lost to poachers. Consequently, we were left with no other choice but to reduce the Total Allowable Catch available to our nationals to 502.45 Metric Tons. In effect, we have allocated some 400 Metric Tons, over 50% of the potential sustainable yield to the illegal poachers. This translates to US$3,174,624 being lost to poaching.

5. Fishing Vessel, Who is in Charge?

One issue deserving of some clarification is the question of who is in charge of fishing vessel. In the “formal” merchant marine sector the captain of a vessel has ultimate responsibility. However, authority on board fishing vessels differs and is recognized and accepted globally. On a fishing vessel, the operations can be divided into two (2) categories:

- General operations (i.e., navigating to and from a given fishing ground). For this operation the captain and chief mate will alternately have full responsibility.

- With respect to the actual fishing operations, the captain and chief mate have joint responsibility (e.g., locating a suitable fishing site) or sole control over discrete operations (e.g., deployment of fishers, handling and processing of product) integral to the overall fishing operations.
5.1 **Honduran Conch Vessel, Who is in Charge?**

On board a Honduran conch vessel, there are two (2) or three (3) persons with discrete responsibilities specific to the general or actual fishing operation of the vessel. These are:

- Captain
- Chief Mate
- Sacar Buzo
- On some vessels the Chief Mate also functions as the Sacar Buzo

The captain has specific functions these include:

- general control over all on board the vessel
- direct control over the chief mate, engineer(s), frozen men, 7 – 8 deck hands and one of the cooks.
- does not control the harvesting, handling processing and operations of the divers and dory men.
- 20% of value of catch goes to the captain who pays - chief mate, engineer, frozen men, deck hands and the cook.
- divers paid based on the quantity of conch harvested. Each diver pays the sacar buzo an agreed % of their earnings and the dory men and cooks an agreed sum.

The functions of the Chief Mate are:

- oversee and ensure that harvested conch meat is properly washed, processed, weighed and packaged.
- ensures that the packaged conch meat is properly stored in the freezer where they are set to freeze for at least 24 hours after which the frozen product is stored in the freezer hold of the vessel.
- in addition to being second in command of the vessel in terms of navigating to and from fishing grounds and general control of the crew functions as the processing manager.

The functions of the Sacar Buzo are:

- sources the divers (i.e., the buzo)
- Boat Owner pays the sacar buzo an agreed sum of money for advanced payment to the divers.
- ensures that all the divers report to the vessel and are on board for the fishing voyage.
- controls organize and directs the divers
- determines in conjunction with the captain where the divers will fish for conch and supervises the launching of the dories (i.e., the fishing canoes).
- keeps a detail record of the daily catch of each diver.
Based on the above it can be concluded that in the case of a Honduran conch vessel, the Captain, Chief Mate and Sacar Buzo has joint and discrete responsibilities that are integral to fishing operation of the vessel.
Figure 1. The Jamaican Fishing Industry