Small Scale Fisheries Management and Administration

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Even though fishery resources are generally accepted as being renewable they are by no means inexhaustible, as the numerous cases of stock depletion in many parts of the world clearly show. The primary aim of management of any fishery should be to utilize the particular stocks so that, while attempting to derive maximum benefits, adequate conservation measures are observed and the future of the resource assured. However, before any meaningful attempts at formulating a management plan for a particular fishery can be made, a certain amount of basic information, which provides a basis for managerial thinking and decision making, is needed. Earliest efforts should be geared towards obtaining, at least, some rough determinations of, *inter alia:* (1) abundance and distribution of the stock; (2) size (or age) composition; (3) age at sexual maturity – reproductive age; and (4) economic and cultural value of the fishery.

For descriptive purposes, management decisions can very conveniently be divided into three categories: (1) those aimed at allocating and conserving the fishery resource; (2) those aimed at maximizing the benefits derived from utilizing the resource; and (3) those aimed at maintaining the resources for the future.

Allocation and Conservation

Generally, the relationship between effort and catch (or value) for a fishery can be simply shown (Fig. 1).

One of the fundamental decisions to be made by the fishery manager involves the establishment of objective priorities; that is, should the management of a particular fishery seek principally conservation, economic, or social goals. Indeed, the whole pattern of management is influenced in large measure by this decision. If conservation is the prime goal, then the margin of effort should be limited to the E_2 level so that overfishing and consequent stock depletion may be avoided. If the primary goal is to maximize economic returns the level of effort should be limited to E_1 . In many uncontrolled fisheries the level of effort may well increase beyond the E_3 level.

The question now arises as to what factors influence this decision making in dealing with a small-scale fishery? If maximum benefits are to be obtained, factors other than conservation and economic returns must be considered. The fisheries manager is forced to think in terms of optimum rather than maximum benefits. This in turn necessitates the development of criteria for these optimums. However, these criteria can only be determined on the basis of available biological, economic, and cultural information. It follows, therefore,

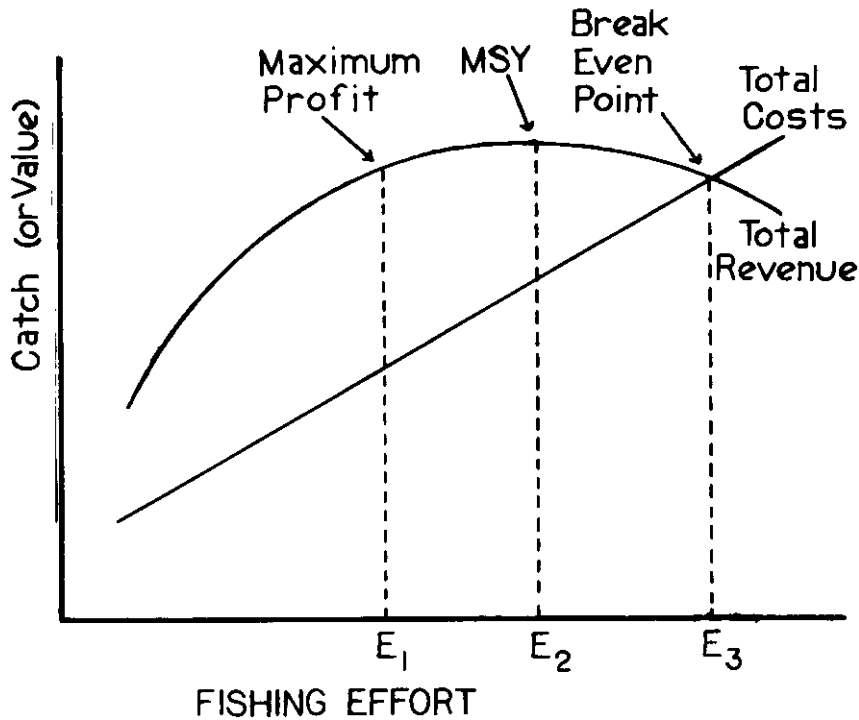

Fig. 1 Relationship between effort and catch (or value) for a fishery.

that the maintenance of an up-to-date data base of these various types of information is necessary for effective fishery management.

Determinations of allowable catch or level of fishing effort are among the first steps in formulating any fisheries management program. A brief look at some of the fisheries of Belize may clarify some of the problems with which a fishery manager may be faced and suggest possible solutions to such problems.

The spiny lobster fishery of Belize is very lucrative. Since 1965, despite cyclical fluctuations, annual landings have remained fairly constant at approximately 640 metric tons of whole lobsters. Most of the commercial lobster fishermen (more than 95%) are members of one of five fishermen cooperative societies.

Information collected from tagging and statistics collecting programs initiated in 1965 have enabled the optimum level of fishing effort to be determined permitting the establishment of: (1) an export quota for each cooperative; (2) an annual 4-month closed season; and (3) a minimum legal size which has served to regulate effort at a level which closely approximates the MSY. Incidentally, the statistical programs in addition to providing information on gear used and catch-per-unit-of-effort gave much useful information on fishing habits and cultural patterns in different parts of the country.

Exploitation of many fin fisheries of Belize is still at a level well below MSY. As a result, currently enforced conservation methods limiting mesh size allow the escapement of younger year classes.

For many small-scale fishery operations in highly localized areas, cultural factors could exert a significantly greater influence on decision making. In remote areas where economic and other factors have forced most residents to depend on catches of fish for the animal protein, it would probably be in order to limit commercial fishing to levels well below the MSY so that residents may obtain supplies with relative ease and fairly simple gear.

In many underdeveloped regions the classicial biological assessments may be difficult to carry out because of limitations of trained personnel, the high costs involved, or other reasons. Here the amount of fishing effort may be determined by reviewing records of past catches. Thus, the permitted level of effort may be that which was applied to the smallest annual stock or run without detrimental effects on the stock. Generally this method achieves an effort below MSY and thus ensures stock continuity.

Decisions once made should be carried out. Fisheries regulations should be promulgated and effective means of enforcing them determined. In many countries of the Caribbean area, and indeed in many developing countries throughout the world, where the emphasis is on small-scale fisheries, the fisheries department is without a law enforcement division. The fisheries manager or administrator working in close coordination with the recognized enforcement agencies such as police, customs and supplies control would be able to effectively enforce the fisheries regulations.

Both the fisheries regulations and the methods of enforcing them should constantly be reviewed in the light of changing conditions within the fishery and the community in general.

Utilization

For the exploitation of a fishery resource, boats, gear for harvesting the target species, and equipment for processing the catch are primary needs. As simple as these needs may appear to be, very often financing could be a problem. An effective administrator should take steps to investigate possible sources of financing and bring these to the attention of the fishermen involved. Here again, the most economical methods of harvesting and processing should be determined and efforts made to finance the equipment necessary. Managers of the fishery should be aware of the dangers of over-capitalization, which tends to lead to gear congestion and overfishing.

Often it has been found that organizing the fishermen into fishing cooperatives leads to a very effective way of exploiting a fishery resource. Indeed, fishing cooperatives have had very good success in Belize. However, before attempting to organize a fishing cooperative a thorough investigation of not only the stocks to be exploited, processing to be done, market potential and other related matters, but also cultural patterns and way of life of the community should be undertaken. A look at the distribution of fishing cooperatives in Belize reveals that four of the five successful ones are in the northern half of the

country. The only successful one in the southern half of the country is in the village of Placencia, whose residents have a long tradition of fishing and of being excellent skin divers. Attempts at organizing a fishing cooperative in Punta Gorda have resulted in failure. Here residents are traditionally subsistence farmers-fishermen-odd job workers and generally contribute very little to the general economy. The attempted organizations of a fresh water fishermen's cooperative in the Rancho Dolores area also failed, partly because of the unwillingness of the residents to devote the time fully to fishing. Assuming that fishery resources are available for exploitation, it seems that fishing cooperatives have a better chance of proving successful in communities where residents tend to engage in a single occupation, for example fishing or farming, and there is no division of effort among competing occupations.

The fishery manager should also concern himself with gear efficiency. In order to maximize the returns from a particular fishery resource the most efficient harvesting and processing methods must be used. It has been found, for example, that handlining for fish on the outer "edge" of the Belize Barrier Reef has proved a lot more efficient than trapping or longlining.

The handling and processing of the product are as important as the harvesting. The fishery manager should determine and seek to enforce suitable quality standards for boats, processing plants, and market outlets thus assuring a product of optimum quality.

Efforts should also be directed towards utilizing as fully as possible the entire catch. In many fin fisheries, only a few species are generally regarded as being desirable. Snappers, king mackerels, and some groupers are totally acceptable in Belize, while porgies, grunts, and mullets are often little esteemed. Greater utilization of hitherto under- or unutilized species may be effected by: (1) a consumer education program showing alternative methods of preparation and ways of turning these underutilized species into acceptable dishes; and (2) the finding of alternative markets generally outside the country.

In a small-scale shrimp operation, the additional income derived from the utilization of the by-catch could make all the difference between success and failure. Although, the lobster fishery of Belize is a very lucrative one, until recently only the tails were utilized. Ways of utilizing the lobster head meat are currently being investigated with a view to maximizing the returns to the fishery.

A good working relationship between the fishermen and the fisheries administrative personnel assists in making the small-scale fishery a successful one. The administrator gets the benefit of the fishermen's first-hand observations and in turn is able to pass to the fishermen in simple terms the results of biological investigations, thus giving information on the spatial and temporal location and life cycle characteristics of target species.

Managerial decisions about the harvesting of a fishery resource can be implemented only by the fishermen. An effective method of obtaining this cooperation is to involve fishermen in decision making.

In Belize, representatives of the fishermen's cooperatives are appointed to the National Fisheries Advisory Board, which discusses all matters pertaining to the welfare of the fishing industry. Fishermen are generally willing to carry out a fishing policy if they know that they were a part of the decision making process.

Maintaining the Resource

Many countries in the Caribbean have expanding tourist industries and a number of coastal development projects have been, and are currently being, undertaken. Estuaries and mangrove areas which are vitally necessary for maintaining ecosystem productivity are being destroyed with a resultant decrease in fish stocks. The fishery manager should attempt to establish standards or guidelines for maintaining ecosystem productivity and recommend the necessary safeguard action to the responsible agencies. Indeed, within the limits of his resources, the fishery manager should attempt to obtain as often as possible information on ecosystem status and requirements.

Fishery managers, however, must realize that many coastal development projects are necessary for a country's economic growth. The emphasis here should therefore be on attempting to minimize the damage to fish habitats by the proposed projects. It does the fishery no good to discover the harmful effects after the project has been completed. An effective means of evaluating anticipated or potential damage to essential habitats should be sought.

SUMMARY AND CONCLUSIONS

(1) For the effective management of a small-scale fishery, basic biological, economic and cultural information are necessary for providing a basis for decision making.
(2) A management plan should attempt to focus on the following: (a) allocation and conservation; (b) utilization, including determination of allowable catch; and (c) maintaining productivity of habitats.
(3) Alternative methods may be used in the determinations of allowable catch.
(4) Fishery regulations should be promulgated and the most effective way of enforcing them should be sought.
(5) The fishery manager should aim at maximizing the benefits derived from fishing operations through optimum utilization.
(6) The cooperation of fishermen is necessary for the implementation of management decisions.
(7) The maintenance of aquatic ecosystem productivity depends, in large measure, on the protection of essential fish habitats such as estuaries and mangroves.

Dirección y Administración de la Industria Pesquera en Pequeña Escala

RESUMEN

Para una administración pesquera eficaz, proporcionando la mejor decisión a tomar, se necesita una información básica biológica, económica y cultural.

Un plan administrativo debe atender los siguientes puntos:

1) Asignación y Conservación.
2) Utilización, incluyendo la determinación de la reglamentación pesquera.
3) Fomentar la productividad en lugares de reproducción de vida marina.
4) Emplear métodos alternativos en la determinación de la reglamentación pesquera.
5) La reglamentación pesquera debe ser promulgada, y la forma más efectiva de ponerla en vigencia debe ser buscada.
6) El director de la oficina de pesca debe tener el propósito de lograr el máximo de beneficios derivados de las operaciones pesqueras mediante la utilización óptima.
7) La cooperación de los pescadores es necesaria para la implementación de estos reglamentos.
8) El mantenimiento de un sistema ecológico acuático depende de la protección de los lugares de reproducción, lo cual es esencial para la pesca.