Fisheries Management in the Lesser Antilles

BISESSAR CHAKALALL
FAO Regional Fisheries Officer
FAO Representation
17 Keate Street
Port-of-Spain, Trinidad & Tobago

ABSTRACT

The Lesser Antilles comprises one of the most compact and diverse aggregations of nations in the world. This island chain, which extends from the Virgin Islands in the north to Grenada in the south, includes seven dependent nations, dependencies of France, the Netherland Antilles and the United Kingdom, and territories of the United States of America. This paper provides a description of the fisheries management techniques used in the sub-region during the last five years. It includes a summary of the achievements as well as the failures of the fisheries management programmes, and the main constraints faced by these island states. A number of observations and suggestions for improvement, based on these constraints, are presented.

1. INTRODUCTION

The Lesser Antilles is composed of a number of territories, each of which is an island or group of islands that lie between the high seas of the west central Atlantic Ocean and the eastern reaches of the Caribbean Sea, Figure 1. The sub-region was defined by Western Central Atlantic Fisheries Commission (WECAFC) as extending from and including the Virgin Islands in the North to Grenada in the South and including Barbados. This island chain comprises one of the most compact aggregations of nations in the world. It includes seven independent nations (Antigua & Barbuda, Barbados, Dominica, Grenada, St. Christopher and Nevis, Saint Lucia, and St. Vincent and the Grenadines) dependencies of the United Kingdom (Anguillla, British Virgin Islands, Montserrat) dependencies of France (Martinique, Marie Galante, Guadeloupe, St. Martin, St. Barthelemy); dependencies of the Netherlands (St. Eustatius, St. Maarten) and territories of the United States of America (US Virgin Islands).

Physically the island states of the Lesser Antilles are generally small, sometimes being comprised of a number of tiny islands. Their populations are also small but quite often the population density is very high (from 72 persons per km^2 in the British Virgin Islands to 590 persons per km^2 in Barbados). They have few natural resources and their economies are centered mainly around agriculture, tourism and light industry. Comparative studies of the Caribbean by Gajraj (1978), Putney (1978) and UNEP/ECLAC suggest that the living natural resources in the Lesser Antilles are under greater stress than anywhere else in the region. The resource base of the islands is so limited that virtually all their resources are critical to the maintenance and development of their human populations.

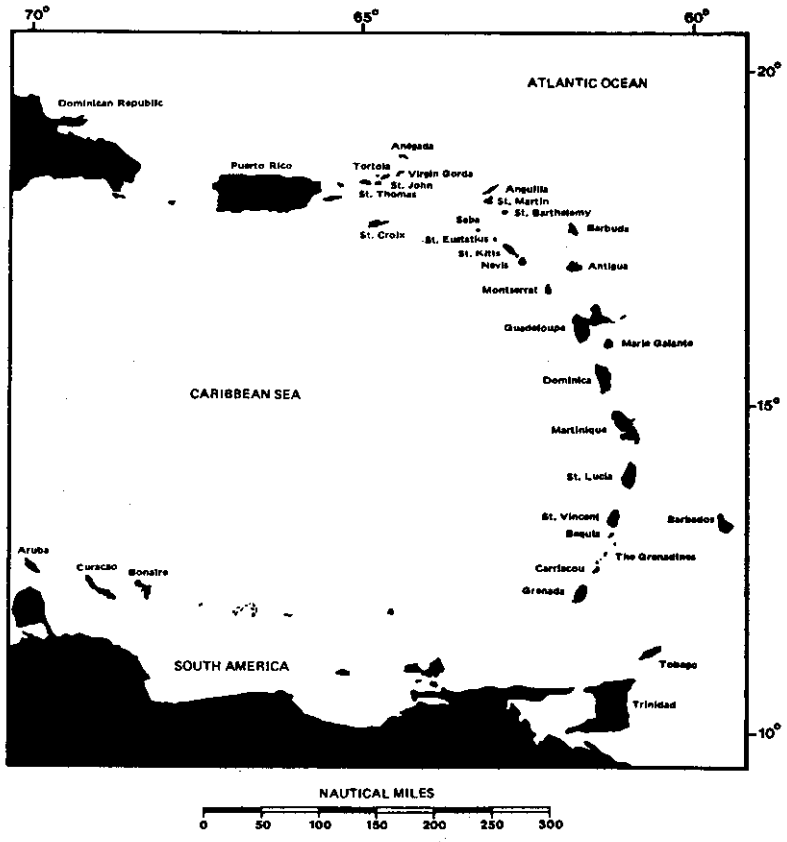

Figure 1. The Lesser Antilles Sub-region (Putney, 1982).

The people of the Lesser Antilles are big consumers of fish, about 25 kg per capita per year. In comparison, per capita consumption in the Greater Antilles (Cuba, Haiti, Dominican Republic and Jamaica) is 12.5 kg per year. As in the past, a large part of this high demand is met by imports since local production cannot satisfy this high demand. An estimated 14,000 – 16,000 t was imported in 1980 at an estimated cost of US$ 26 – 28 million (WECAFC, 1983b).

1.1 Characteristics of the Fisheries

Most of the islands of the Lesser Antilles have relatively narrow shelf areas. However, substantial shelf areas exist around the Virgin Islands, Anguilla, St. Martin/St. Maarten/St. Barthelemy, Saba, Antigua/Barbuda and between St. Vincent and Grenada (The Grenadines). The shallow areas are characterized by coral reefs and sea-grass beds. There are also several banks scattered through the region. The general oceanic productivity of the region is low since there are no important upwellings or currents; and wetlands (mangroves), bays, estuaries and lagoon areas are small. Water exchange takes place between the Caribbean Sea and the Atlantic Ocean through the channels existing between the islands thereby concentrating food and pelagic fish in the vicinity.

As a result of their small continental shelf areas the islands do not have abundant demersal fish, mollusc or crustacean stocks. In most islands these resources are fully exploited or even overfished. The most abundant stocks are offshore pelagics most of which are migratory and move through the islands on a seasonal basis.

The fishing industry of the area is relatively simple consisting of primary harvesting and tertiary marketing with little or no secondary processing, although some capacity has been developed in Barbados, Saint Lucia, Grenada, British Virgin Islands, and Antigua and Barbuda. Harvesting is primarily artisanal with fishermen operating from small boats utilizing relatively simple gear consisting mainly of fish traps, handlines, trolling lines, gillnets, trammel nets, beach seines and longlines (palang). There have been no successful attempts to develop industrial fisheries.

Larger boats with specialized equipment are being introduced to the industry through foreign vessels, mainly from the USA, which are targeting specific species such as swordfish. With assistance from FAO, Grenada recently (June 1989) introduced a 10 m fishing catamaran that will be used for pole and line live bait fishing, trolling for tuna, and pelagic and demersal longlining. The catamaran can achieve a speed of 12 knots required for tuna trolling in addition to having a shallow draft. Such a speed is difficult to obtain with an inboard engine in a displacement boat and at a reasonable price that artisanal fishermen can afford.

At present, in the Lesser Antilles, anyone who chooses to fish may do so (with the exception in some cases of expatriate residents who may need special permits) and as such is classified as an open-access fishery. Since there is no control of fishing effort, and coupled with the fact that demand highly exceeds supply, overfishing of the nearshore demersal resources, and especially of the economically important species such as conch and lobster, is quite probably the case. Background data on fisheries are given in Table 1.

Table 1. Background data on the fisheries of the Lesser Antilles.

Islands	Status[1]	Land Area km²	Population	LANDINGS 1985[2] mt	LANDINGS 1985[3] mt	LANDINGS 1986[4] mt	DEMAND[5]	NUMBER[6] OF FISHERMEN	NUMBER OF BOATS[7] 5-10m	NUMBER OF BOATS[7] 11-17m
Anguilla	UK	91	8,000	0	485	0	1,400(incl. St. Martin & St. Barthelemy)	350	129	-
Antigua/Barbuda	I	442	77,226	2,246 R	1,300	2.246 R	2,000	800	250	80
Barbados	I	431	254,000	3,915	3,100	4,227	4,300	1,500	500	80
Dominica	I	750	80,300	446	950	450F	2,000	1,700	630	11
Grenada	I	344	100,000	1,584	1,100	2,328	5,600 (incl. St. Vincent & the Grenadines)	1,255	580	12
Guadeloupe (incl. Marie Galante, Ile des Saintes)	F	1,779	344,000	8,390 F	8,400	8,500	9,100	1,596	1,000	30
Martinique	F	1,101	350,000	4,604 F	4,600	5,000 F	9,100	855	1,140	26
Montserrat	UK	102	13,000	111 R	100	111 R	300	200	70	3
Netherland Antilles (Aruba, Bonaire, Curacao & St. Martin)	N	1,204	260,000	1,030		1,060 F				
St. Christopher & Nevis	I	262	44,700	1,500	1,500	1,500 F	1,000	850	315	2
Saint Lucia	I	616	140,000	1,052	1,200	840	3,100	2,000	650	1
St. Vincent & the Grenadines	I	388	110,000	547 R	1,700	547 R	5,600 (incl Grenada)	2,050	740	1

Table 1. Continued.

Islands	Status[1]	Land Area km²	Population	LANDINGS 1985[2] mt	LANDINGS 1985[3] mt	LANDINGS 1986[4] mt	DEMAND[5]	NUMBER[6] OF BOATS[7]	NUMBER OF FISHERMEN 5-10m	NUMBER OF FISHERMEN 11-17m
Virgin Islands (UK) (Tortola, Anegada, Virgin Gorda)	UK	153	11,000	318 R	760	318 R	2,000 (incl. US Virgin Islands)	180	120	
Virgin Islands (US) (St. Croix, St. John, St. Thomas)	US	342	120,000	600	519	640 F	2,000 (incl. UK Virgin Islands)	480	325	10

[1] F = French, I = Independent, N = Netherlands, UK = United Kingdom, US = United States

[2] (FAO, 1985) where F = FAO estimate, O = less than half metric ton, R = repetition of data previously reported by country

[3] (Anonymous, 1986; OECS/ICOD, 1987)

[4] (FAO, 1986)

[5] (WECAFC, 1983)

[6] Includes part-time fishermen.

[6&7] (Chakalall, 1986; Anonymous, 1986; OECS/ICOD, 1987; WECAFC, 1983)

1.2 Ecosystems and Species

Coral reefs, sea-grass beds and mangroves are the three major ecosystems responsible for much of the nearshore and shelf fishery resources of the Lesser Antilles. These habitats are sites of high biological productivity, serve as nursery areas and also provide shelter for the larvae and juveniles of many economically important species.

The importance of these habitats to fisheries has been widely acknowledged. In the Lesser Antilles these habitats are being exposed to the impacts of coastal developmental activities related mainly to urbanization, tourism, agriculture and light industry.

The fishery resources of the region can be grouped into the following eight major species groups:

1. **Conch:** *Strombus gigas* is seldom found in depths exceeding 30 m and being relatively sedentary are easily exploited by divers. It is the most important edible mollusc in the Lesser Antilles and is considered to be overfished. It was declared an 'economically endangered species' by the International Union for the Conservation of Nature and Natural Resources (Wells *et al.*, 1983).
2. **Spiny Lobster**: *Panulirus argus* is the most common species even though other *Panulirus* and *Scyllarus* spp. are occasionally landed. Adults, marketable before sexual maturity, can be found in depths ranging from 2 – 200 m and being relatively sedentary are easily exploited. *P. argus* has a long planktonic larval life (6 months or more) which makes it difficult to determine the origin of the stock. In the easily accessible areas of the region lobster stocks have been severely depleted. Putney (1982) described it as an 'economically endangered species'.
3. **Sea Urchins**: White sea urchin (*Tripneustes esculentus*) is harvested as 'sea eggs' in a number of the islands of the Lesser Antilles. It has a planktonic larval stage of about four weeks during which its distribution is unknown. The adults are sedentary and can be found in shallow habitats which makes them vulnerable to overexploitation as demonstrated by the collapse of the fishery in Barbados.
4. **Algae**: *Gracilaria* sp. (sea moss) has been traditionally harvested in most of the islands even though several other species occur in the region. *Gracilaria* has been successfully cultured in Saint Lucia and the technology is being transferred to other Eastern Caribbean Islands.
5. **Turtles**: All marine turtles are acknowledged to be endangered species. Green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) are commonly found and captured throughout the Lesser Antilles. Marine

turtles are long-lived and late maturing and must return to the beach where they were hatched to lay their eggs. These characteristics make them vulnerable to overharvesting. Green, hawksbill and leatherback turtles have been declared 'economically important and endangered species' by the International Union for the Conservation of Nature and Natural Resources (Groombridge, 1982).

6. **Nearshore Demersal/Reef Fishes**: The majority of nearshore demersal fishes in the Lesser Antilles are associated with coral reefs. Traps are the main gear used for harvesting reef fishes and catch many species simultaneously. The multispecies nature of reef fishery makes it difficult to use traditional single species assessment and management methods. The trap fishery is probably the most economically important in the region in that it employs the majority of the fishermen and vendors and accounts for about 50% of the fish consumed. Most of the trap fishermen fish part-time and land their catch at a large number of sites thereby facilitating distribution. It has been widely accepted that there is overfishing of nearshore demersal resources. The marked absence of large individuals from the catch and the scarcity of some species (*e.g.* parrot fishes) and low catch rates on traditional fishing grounds are indicators of overfishing.
7. **Deep Water Demersal Fishes**: These are mainly snappers and groupers which are often found on the edge of the shelf or on deep banks (145 – 270 m). Depending on the depth, handlines or traps are used to exploit these species. It is generally felt that these fisheries are probably underexploited although there are reports of localized depletion. The habitat of these species (crevices, holes, steep rocky slopes) make them difficult to fish.
8. **Pelagic Fishes**: Pelagic species can be divided into two groups. Coastal pelagics which include a variety of small pelagic fishes such as schooling clupeids, jacks and ballahoo are exploited primarily by beach seines, gillnets and cast nets. Although there is no documented evidence on the state of exploitation of the fishery a few islands have reported a decline in catches.

   The oceanic pelagics include tunas (bluefin, yellowfin, and skip jack), billfishes, dolphin, kingfish, jacks, flyingfish and sharks. These species move through the Lesser Antilles on a seasonal basis (November – June) and account for a major part of the fish landings in most of the islands. These resources are generally considered to hold the greatest potential for increasing production in the region even though information on their current state of exploitation is lacking. These species are at present exploited by boats ranging from canoes with outboard engines to large (12 – 17 m) launches with ice storage facilities.

Table 2 National limits relating to territorial seas, exclusive fishing zones and EEZ's.

Country	Territorial Sea	Fishing Zone	EEZ
Antigua & Barbuda*	12 mi (1982)	200 mi (1982)	200 mi (1982)
Barbados*	12 mi (1977)		200 mi (1978)
British Virgin Islands (UK)	3 mi (1878)	200 mi (1977)	
Dominica*	12 mi (1981)	200 mi (1981)	200 mi (1981)
Martinique & Guadeloupe(France)	12 mi (1971)	200 mi	200 mi (1977)
Grenada*	12 mi (1978)		200 mi (1978)
Montserrat	3 mi (1878)	200 mi (1983)	
Netherland Antilles	12 mi (1986)	200 mi (1981)	
St. Christopher & Nevis*	12 mi (1984)		200 mi (1984)
Saint Lucia**	12 mi (1984)		200 mi (1984)
St. Vincent & the Grenadines*	12 mi (1983)		200 mi (1983)
US Virgin Islands	3 mi	200 mi (1977)	200 mi (1983)

* Country is a signatory to UN Law of the Sea Convention.
** Country has ratified UN Law of the Sea Convention.

2. LEGAL FRAMEWORK FOR FISHERIES MANAGEMENT

2.1 The Law of the Sea Convention and Living Marine Resources

The Law of the Sea Convention has made it necessary for most countries to revise their fisheries legislation. The Convention accords to all coastal states the jurisdiction to exploit, conserve and manage the living marine resources within their exclusive economic zone (EEZ). It should be emphasized that this right includes certain responsibilities which are stipulated in the Convention. As appropriate, the Convention requires the coastal state to cooperate with competent international, regional and sub-regional organizations to determine proper management and conservation measures and their implementation. National limits relating to territorial seas, EEZ's, and fishing zones on the islands of the Lesser Antilles are given in Table 2.

2.1.1 Conservation Management and Utilization of Living Marine Resources

The core of the Law of the Sea Convention on fisheries are Articles 61 and 62 which deal with the conservation, management and utilization of the living

resources within the EEZ. Article 61 specifies that the living resources in all economic zones must be managed and conserved so as to prevent over-exploitation and maintain sustainability. It requires the coastal state to take measures to maintain or restore populations of harvested species at levels that can produce a maximum sustainable yield and to determine the "allowable catch of the living resource". The coastal state is required to take "into account the best scientific evidence available" to determine management and conservation measures.

In relation to fisheries management, Article 62 promotes the "optimum utilization of the living resource" and states that where a state is not capable of harvesting the entire allowable catch of living resources within its EEZ, it should give other states access to the surplus through agreement and other arrangements. Article 64 (4) gives a non-exhaustive list of measures which a coastal state is permitted to proclaim and enforce in order to achieve the stipulated management and utilization objectives. These include, *inter alia*: licensing (of fishermen, vessels, gear), fixing catch quotas, determining species to be caught, regulating fishing effort, seasons and areas, regulating fisheries research programmes, placing observers and trainees on board vessels, specifying information to be provided, training and transfer of fisheries technology, stipulating terms and conditions of cooperative agreements and enforcement.

Since coastal states retain the primary responsibility to explore, exploit, conserve and manage the living resources within the EEZ, they have the obligation to ensure that conservation measures and regulations are complied with. Article 73 allows the coastal state to board, inspect, arrest and take judicial action against foreign fishermen, within important limitations, to ensure compliance with its laws and regulations.

2.1.2 Regional Cooperation

The Law of the Sea Convention also raises the question of regional cooperation with regard to fisheries and for other EEZ functions as well. Article 123 of the Convention calls for regional cooperation in enclosed or semi-enclosed seas to "coordinate the management, conservation, exploration and exploitation of the living marine resources of the sea" and to "protect and preserve the marine environment". Given that the definition of an enclosed or semi-enclosed sea (Article 122) is applicable to the Caribbean, it provides the basis for regional cooperation in fisheries matters in the Lesser Antilles.

Other references to regional cooperation can be found in Article 63, which deals with straddling stocks; Article 64, which deals with highly migratory species; and Articles 69 and 70, which pertain to the rights of landlocked and geographically disadvantaged states.

2.2 EEC Common Fisheries Policy

The common fisheries policy of the European Economic Community (EEC), which came into effect in January 1983, covers Martinique and Guadeloupe as overseas departments of France. The policy calls for common rules for fishing in the maritime waters, and coordination of structural policies of Member States to promote the harmonious and balanced development of the fishing industry (EEC, 1972). Member States could have exclusive fishing access to waters up to six nautical miles or in some cases twelve miles from their shore. Provision is made for the European Council to adopt the necessary conservation measures for fish stocks in the maritime waters of one or another Member State. These measures could include restrictions to the catching of certain species, to areas, to fishing seasons, to methods of fishing and fishing gear.

Even though EEC regulation may apply, the Member State could pass legislation concerning the conservation and management of its fishery. These include, *inter alia*, temporary bans or regulating the fishing of certain species to limit volume of catch by vessel and by species or by species groups, determining minimum size, regulating mesh size, and technical characteristics of vessels. Member states of the Commission will have to be notified of these laws, regulations and administrative rules.

2.21 Marine Fishing Act Covering Guadeloupe and Martinique

The Marine Fishing Act of January 1852 with amendments, the last of which was made in 1986, provides the guidelines for fishery regulations in Guadeloupe and Martinique. The Act takes into consideration the EEC Common Fisheries Policy concerning conservation and management of the fisheries resources.

Article 3 of the Act deals with conservation and resource management. It allows for regulations concerning open and closed seasons, protected species, marine parks and reserves, licensing of vessels, gear and fishermen, size of catch per vessel and size of the species and the provision of data. As shown in Table 3, the fishing regulations of Guadeloupe and Martinique are different even though they were guided by the same fishery legislation.

2.3 Organization of Eastern Caribbean States

The Organization of Eastern Caribbean States (OECS) as a sub-regional grouping within the Caribbean Community (CARICOM) became a reality in July 1981. It grew out of the need to review the operations of the West Indies Associated States Council of Ministers, as its members, being "Associated States", moved towards political independence. The main purpose of the OECS is to promote cooperation, to seek to achieve the fullest possible harmonization of foreign policy, and to promote economic integration among Member States.

Table 3. Conservation Measures.

a) Technical Specifications for Fish Traps/Pots.

Country	Minimum Mesh Size	Remarks
Barbados	1 1/2 ins (38 mm)	measured across narrowest part
Dominica	1 1/2 ins (38 mm)	measured across narrowest part
Guadeloupe	45 mm	From 1 Dec. 1987; In waters North of 16°50'N parallel of more than 50 m depth
	45 mm	From 1 June 1989; In waters more than 50 m in depth North of 16°50'N.
	38 mm	From 1 Dec. 1987; In waters South of 16°50'N parallel and less than 50 m in depth
	38 mm	From 1 June 1989; In waters South of 16°50'N.
		Note: All measurements are taken as the longest distance between two parallel sides of a hexagon.
Martinique	30 mm, square mesh (x2) 40 mm, triangular mesh (x3) 17 mm, hexagonal mesh (x6)	Represents measurement of each side of mesh.
Virgin Islands (UK)	1 1/2 ins (38 mm)	measured midway along the aperture of the mesh
Virgin Islands (US)	1 1/4 ins (32 mm)	-measured across narrowest part -must possess a self destruct panel and/or self destruct q door fastening -owner identification and marking

Table 3. Continued.

b) Technical Specifications for Nets

Country/Net	Minimum Mesh Size	Remarks
Dominica		
-cast net	1/4 in (5.4 mm)	All nets measured
-beach seine	1/2 in (12 mm)	diagonally at full stretch
-bottom gill net	3 ins (76 mm)	
-flying fish net	3/4 in (22 mm)	
-trammel net	prohibited	
Guadeloupe		
-fixed nets	20 mm (stretched 40 mm)	Note: All nets measured wet
-trawl nets	prohibited	
-trammel nets	centre net 40 mm (stretched 80 mm) outer nets 200 mm (stretched 400 mm)	
-For specific species:		
'Colas' -Fr (*Ocyrus chrysurus*; lane snapper-En)	20 mm (stretched 40 mm) sides 35 mm (stretched 70 mm) bottom/pouch (length 200 m, width 10 m)	
'Coulisou'-Fr (*Selar crumenophthalmus*; bigeyed scad-En)	20 mm (stretched 40 mm)	
Small fish**	14 mm (stretched 28 mm)	
Martinique		
-fixed nets	25 mm^2	
-trawl nets	35 mm^2	Permitted 3 miles offshore only
-cast nets	15 mm^2	
-seines	15 mm^2	Note: Special nets for certain types of small fish may be permitted.
St. Vincent & the Grenadines		
-seine	1 sq in	
-Ballahoo* net	1/2 sq in	Not to be drawn on land
-tangle net (trammel net)	prohibited	
Virgin Islands (US)	1 1/2 ins	-stretched mesh except for bait fish, may have smaller mesh

Table 3. Continued.

				-prohibited to take seines up to the shore or remove from water to withdraw fish

**Hemiramphus* sp. (Halfbeaks)
** Examples include:
-*Hemiramphus* sp. (Balaou - Fr.; Halfbeaks-Eng.)
-*Decapterus punctatus* (Quiaquia - Fr.; Scad-Eng.)
-*Ablenner hians* (Orphie - Fr.; Needlefish - Eng.)

c)Conservation Measures For Spiny Lobsters

Country	Minimum Length	Minimum Tail Weight	Minimum Total Weight	Other
Guadeloupe	210 mm[4]			(Ref.: Arrété du 16 Juillet 1987 portant réglementation de l'exercice de la péche en Guadeloupe)
Martinique	200 mm[3]			(Ref.: Decret du 05 decembre 1927 portant réglementation de l'exercice de la péche en Martinique)
OECS Countries[5]	250 mm[2] or 95 mm[1]	200g	680g	Prohibited to: -harm, catch, possess, sell and purchase undersize, moulting or berried lobsters. -capture lobsters other than by hand, loop, pot or trap. -remove eggs from lobster. -land lobster from a fishing vessel that is not whole. (OECS Harmonized Fisheries Act)
	Closed Season Minister has power to declare by notice inGazette(1April-31 October in some islands)			
Virgin Islands (UK)	3.5 in		1 lb	Prohibited to: -harm, catch, possess, sell and purchase undersize or eggbearing lobsters. -capture lobsters other than by hand, snare, tangle net, pot. (Government of the British Virgin Islands, 1982)

Table 3. Continued.

Virgin Islands (US)	3.5 in[1] (88.9mm)	Prohibited to: -retain eggbearing lobsters except in pots or traps until eggs are shed. -strip eggbearing lobsters of eggs -land and transport lobsters that are not whole. -use spears, hooks, drugs, poisons or other chemicals for catching lobsters. -import lobsters of less than 3.5 in carapace length or 6 oz total weight. Requirements: -reporting of catch and effort information -self destruct panel or door fastenings on traps or pots and owner identification marking of same. (CFMC, 1981).

Notes:
1. Carapace length.
2. Length from behind rostral horns to edge of telson.
3. Length from eyes to beginning of tail.
4. Length from tip of supraorbital spine to end of tail.
5. Antigua/Barbuda, Dominica, Grenada, Montserrat, St. Christopher/Nevis, Saint Lucia, St. Vincent & the Grenadines.

d)Conservation Measures for Conch (*Strombus gigas*)

Country	Closed Season	Minimum Weight	Minimum Size	Remarks
Guadeloupe		250 g cleaned fish		Shell with flared lip. Note: Restrictions only apply to marine reserve. (Arrété du 16 Juillet , 1987)
OECS Countries	Minister to declare by notice in Gazette	225 g (8 oz)	18cm in length	Prohibited to take conch which do not have a flared lip. (OECS Harmonized Fisheries Act)

Table 3. Continued.

Virgins Islands (US)			5 year moratorium imposed in January 1988, in St. Thomas and St. John. St. Croix in process of establishing separate regulations. (Tobias, Dept of Fish & Wildlife, personal communication)

e)Conservation Measures for Turtles*

Country	Closed Season	Minimum Size	Other
Barbados		30 lbs	No taking of turtles or eggs within 100 yds of the shore (Government of Barbados, 1967)
Guadeloupe	15 May - 15 September for Green and Hawksbill. Ban on fishing for Loggerhead and Leatherback	carapace length 80 cm	Taking of turtle eggs prohibited (Arrété du 16.07.1987 portant réglementation de l'exercise de la pêche en Guadeloupe, 1987)
Martinique			Taking of turtle eggs prohibited (Decret du 05.12.1927 portant réglementation de l'exercice de la pêche en Martinique, 1927).
OECS Countries ***	1 March-31 July**	Leatherback 350 lbs** Green 180 lbs Hawksbill 85 lbs Loggerhead 160 lbs	5 year moratorium on fishing of all species approved by OECS countries. General protection: no taking or sale of turtles or eggs or interfering with nests. (OECS Harmonized Fisheries Act).

Table 3. Continued.

Virgin Islands (US)	General protection: no taking or sale of turtles or eggs or interfering with nests. (Government of the USVI, 1982.). Federally listed endangered species.

* *Chelonia mydas*-green
Eretmochelys imbricata-hawksbill
Caretta caretta-loggerhead
Dermochelys coriacea-leatherback
**Specified in some islands only; in others Minister to declare by notice in Gazette.
*** Antigua&Barbuda, Dominica, Grenada, Montserrat, St. Christopher & Nevis, Saint Lucia, St. Vincent & the Grenadines

f) Conservation Measures for Sea Urchins (Sea Eggs) (*Tripneustes esculentus*)

Barbados

Only Barbados has regulations controlling the fishing of sea urchins (except black sea urchins).

Closed season	- 1 April to 31 August. A two year ban on fishing was instituted in August 1987 as an extension of the closed season until 31 August 1989.
Other	- No willful or wanton destruction or injuring of sea eggs lying in any bay or shallow water.
	(Government of Barbados, 1967)

Member States are Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Christopher and Nevis, Saint Lucia, and St. Vincent and the Grenadines; the British Virgin Islands has Associated Status and Anguilla has Observer Status.

With the objectives of the OECS in mind and in accordance with the Law of the Sea Convention, the Member States have agreed to coordinate, harmonize and pursue joint policies in matters relating to the sea and its resources and mutual defence and security. Three OECS/FAO sponsored fishery workshops held in 1983 and 1984 led to the preparation of draft harmonized fisheries laws and regulations for the OECS Member States. With minor changes, all Member States of the OECS have enacted the harmonized fisheries laws. Some OECS

Members have already enacted the harmonized regulations with minor changes while others are in the process of doing so. Anguilla (Stephenson, personal communication), Barbados (Willoughby, personal communication) and the British Virgin Islands (Smith, personal communication) are also in the process of changing their fisheries laws and regulations to be in harmony with that of the OECS countries.

With assistance from the Canadian International Centre for Ocean Development (ICOD), the OECS has established a fisheries unit based in St. Vincent and the Grenadines. The responsibilities of the unit include assistance to OECS countries in the development and management of their fishery resources and the preservation of their marine environment, assistance in preparing national fisheries development plans, establishing a regional fisheries information centre and assistance to OECS governments in monitoring the application of fisheries laws and regulations.

2.3.1 OECS Harmonized Fisheries Legislation

The harmonized legislation does not spell out in any detail the management and development objectives. Normally this is left to the administration to elaborate and is contained in the fisheries regulations. The legislative authority for fisheries management and development rests with the appropriate Minister. For example, Section 3(1) of the Antigua and Barbuda Fisheries Act (Government of Antigua and Barbuda, 1983) states: "The Minister shall take such measure as he thinks fit under this Act to promote the development and management of fisheries so as to ensure the optimum utilization of the fisheries resources in Antigua and Barbuda". The Minister "may appoint a Fisheries Advisory Committee to advise on the management and development of fisheries" and may also enter into arrangements or agreements with other countries in the region or with any competent regional organization concerning cooperation in fisheries management.

The legislation requires the fisheries officer to prepare and keep under review a plan for the management and development of fisheries. The harmonized fisheries legislation also provides for access agreements, fishing licenses (local and foreign), the establishment of fishing priority areas and marine reserves, fisheries research, conditions on fishing methods and gear and the formation of local fisheries management authorities. Provision is also included for the Minister to make regulations for the management and development of fisheries. A non-exhaustive list of regulations the Minister may make include: licensing regulations and management of a particular fishery; prescribing fishery management and conservation measures—minimum mesh sizes, minimum species size, closed seasons, prohibited fishing methods, schemes for limiting entry into specified fisheries, etc.; prescribing the functions of the Fisheries Advisory Committee; prescribing measures for the protection of

certain species *e.g.* turtles, conch, lobsters; providing for the registration of fishermen and fishing gear; regulating the landing, marketing and distribution of fish; and regulating the management and protection of marine reserves and fishing priority areas, the taking of corals and shells, the taking of aquarium fish and aquaculture development.

2.4 Magnuson Fishery Conservation and Management Act

The Magnuson Fishery Conservation and Management Act, Public Law 94265, approved by the United States Congress in April 1976, created eight Fishery Management Councils for the conservation and orderly utilization of the fishery resources of the United States of America (US). This federal legislation established a national Fishery Conservation Zone (FCZ) extending from seaward boundaries of the coastal states to 200 nautical miles, and exclusive US fishery management authority over fish resources within the FCZ with the exception of the highly migratory tunas. The Federal Government, through the councils, has managerial responsibility in the FCZ.

The Caribbean Fishery Management Council (CFMC) is responsible for the orderly utilization of the fishery resources in the FCZ of the Commonwealth of Puerto Rico, and the US Virgin Islands which is included in the Lesser Antilles region. The Council's major responsibility is the formulation of fishery management plans for single species or a group of species that can be managed as a unit, and does not engage in the enforcement of regulations contained in the management plans. Enforcement is the responsibility of the US Coast Guard and the National Marine Fisheries Service.

In preparing fishery management plans the Council is guided by the National Standards contained in the Magnuson Act. The standards require that the plans:

1. Prevent overfishing while achieving optimum yield
2. Be based on the best scientific information available
3. To the extent practicable, manage individual stocks as a unit
4. Conservation and management measures shall not discriminate between residents of different states
5. Where practicable, conservation and management measures should promote efficiency in the utilization of the fishery resources
6. Take into account and allow for variations among contingencies (risks) in fisheries, fishery resources and catches
7. Where practicable, conservation and management measures should minimize costs and avoid duplication

2.4.1 Other US Federal Legislation

The following Federal legislations are also applicable to fisheries

management in the US Virgin Islands:

1. **Endangered Species Act.** The Endangered Species Act protects particular species of marine life, for example, turtles, and lists endangered or threatened species known to occur in the US Caribbean FCZ.
2. **Marine Mammal Protection Act.** The regulations associated with this act make it a federal crime to kill, capture or harass any marine mammal. They prohibit the intentional killing of these mammals under any circumstances. All marine mammals are listed as endangered species.
3. **Coastal Zone Management Act.** The Coastal Zone Management Act places responsibility for comprehensive land and water management of the coastal zone with the Federally sponsored Office of Coastal Zone Management in the US Virgin Islands. The Coastal Zone Management Plan for the US Virgin Islands provides for the identification of territorial waters and onshore areas of "particular concern" or "especially productive" with respect to fishery resources and which are critical to marine life.
4. **Outer Continental Shelf Act.** Under this Act coral communities located on the outer continental shelf are protected. Regulations under this Act prohibit operations which directly cause damage or injury to viable coral communities. Viable coral communities are defined as living coral and all dead coral formations and associated reef organisms that are part of coral reef or other ecological communities containing living corals. Permits are required for operations such as dredging or oceanographic survey which disturb or damage coral or its environment.
5. **Federal Water Pollution Control Act.** Among the provisions of this Act are sections on the protection of estuaries, establishment of standards for marine sanitation, and prohibiting the dumping of hazardous substances into marine waters. These restrictions help to protect the marine resource.
6. **Marine Protection Research and Sanctuaries Act.** The Marine Protection, Research and Sanctuaries Act is administered by the Department of Commerce of the U.S. National Atmospheric and Oceanographic Administration which has the authority to designate ocean areas having distinctive conservation, recreation, ecological or aesthetic value as marine sanctuaries.

2.5 U.S. Virgin Islands Act 3330

The US Virgin Island Act 3330, approved in 1972, assigns commercial fishing promotion to the US Department of Commerce and all other fishery matters, including enforcement, to the Department of Conservation and Cultural Affairs of the US Virgin Islands.

The Act provides for jurisdiction of all waters out to a distance of either 12 miles from the shoreline or to any international boundary located within the 12 mile limit, whichever is shorter. All aquatic life and all waters, including inland ponds over 50 acres, are declared the property of the Virgin Islands and of common ownership and public use.

The Act also provides for conservation and management, regulation of vessels, issuance of licenses, certificates and registration, advice and assistance to fishermen, dissemination of information to the public, conduct and publication of scientific research, and enforcement. It establishes fishing seasons and minimum sizes for some species, certain conditions on gear and fishermen. It mandates catch reports and establishes penalties and rewards.

3. INSTITUTIONAL STRUCTURE FOR FISHERIES MANAGEMENT

In most countries of the Lesser Antilles the State itself plays a leading role in all aspects of fishery policy by regulating management and conservation of the resources and through direct intervention in the implementation of policies through development programmes. It is possible to identify different fisheries administrative structures. These range from the complex administration of the US Virgin Islands to the more simple, as in OECS countries.

In the OECS countries it is normal to find fisheries located within a wider Ministry concerned with Agriculture and other matters. For example, in St. Vincent and the Grenadines fisheries policy is in the hands of the Fisheries Officer who is part of the Ministry of Trade, Industry and Agriculture, while in Grenada fisheries form part of the Ministry of Education and Fisheries. Taking into account the population, size, existing manpower, present importance of fisheries and present economic circumstances in the OECS countries, it may not be practical to set up fisheries as a separate ministry in most of them.

Although the present situation may create problems for implementing fisheries policy, the relative smallness of the Ministries can itself be an advantage in that it may allow for direct access by the Fisheries Officer to the Minister or other senior government officers such as the Permanent Secretary. However, no matter where the fisheries sector is located within government's administrative system, it is very important that the sector be given its appropriate share of development resources. With the emergence of the extended fisheries jurisdiction under the UN Law of the Sea Convention the coordination of fisheries policy between governments and between governmental bodies responsible for scientific research, foreign affairs, cooperatives, marketing, merchant shipping, etc. in each country becomes more critical in the Lesser Antilles sub-region. The FAO Lesser Antilles Committee of the WECAFC and the recently established OECS Fisheries Unit are involved in the coordination of fisheries matters at the sub-regional level.

However, there is a general concern throughout the region as to the need for

inter-agency cooperation and coordination at the national level, and as to the means by which it can best be achieved. Under the OECS harmonized legislation this can be achieved by the establishment of a Fisheries Advisory Committee by the Minister. This Committee has no legal status as such but is important in formulating and coordinating government policy by advising the Minister on the management and development of fisheries. The Fisheries Advisory Committee includes the fishing industry and scientists, and may invite other government departments to participate in meetings on matters of mutual interest.

The Caribbean Fisheries Management Council is responsible for the preparation of a detailed fishery management plan for the US Virgin Islands, according to the guidelines set out by the Magnuson Act (Section 2.4). The plan is to ensure that the best scientific evidence available is used and the optimum utilization of the resource is achieved as well as to ensure, as far as possible, integrated management of individual and interrelated stocks. The plan has to take into account existing Federal and State laws concerning the marine and coastal environment (Section 2.4) which therefore necessitates inter-agency coordination. In preparing a plan the CFMC holds bimonthly meetings which are open to the press and the public. In addition there is provision for public participation and public hearings where comments are taken into consideration before the plan is drafted in final form.

In comparison, the OECS Harmonized Legislation makes provision for the establishment of a Fisheries Advisory Committee and for the Minister to designate an area as a "local fisheries management area" and "designate any local authority, (fishermen's cooperative or association or other appropriate body representing fishermen in the area as Local Fisheries Management Authority for the area)". Neither the legislation nor regulations spell out any details for implementing this management system. The fisheries sector in the Lesser Antilles does not generally receive a high place in government priorities and as such the organization of the fishermen into fisheries cooperatives can play a vital role in promoting the development of this sector. Generally the existing fisheries laws contain the necessary provisions which reflect the importance of this matter. However, in most islands fishermen cooperative societies are regulated by the Cooperative Societies Ordinance or Act and as a result are subject to the supervision of the Registrar of the Cooperatives who is assisted by a Fisheries Officer responsible for fishermen cooperatives.

It should be emphasized that, in the case of the small developing island states of the Lesser Antilles, fisheries administrative schemes should reflect the comparatively limited living resources in their EEZ and not be so elaborate that they utilize more bureaucratic resources than the resource itself is worth.

4. FISHERY MANAGEMENT OPINIONS

4.1 Fisheries Management and Development

Fisheries management embraces conservation measures, economic issues such as how to obtain maximum outputs, and the administrative structure for regulating fishing activities. Of course this overlaps with development.

In the Lesser Antilles only the US Virgin Islands through the Caribbean Fishery Management Council has published fishery management plans. Management plans for the spiny lobster, shallow-water reef fish, Atlantic billfishes (except swordfish) and sharks and coastal migratory pelagic fish resources have been published. Management plans under preparation include deep-water reef fish, molluscs (conch and whelk), bait fish, crustaceans (other than spiny lobster), corals and ornamental aquarium fish.

The OECS Harmonized Legislation provides for the Chief Fisheries Officer to prepare and keep under review a plan for the management and development of fisheries which "shall be submitted to the Minister for approval". The legislation identifies certain contents of the plan and provides for consultation with local fishermen, local authorities, persons affected by the plan and the Fishery Advisory Committee.

Determining Total Allowable Catch (TAC) and Maximum Sustainable Yield (MSY) requires substantial data, little of which are readily available in most islands. With the help of FAO and ICOD, efforts are being made to establish on-shore data collection systems for the OECS countries. In the absence of the data the TAC could be estimated using past catches as a guideline and using a higher or lower figure than past catches depending on whether the resource is considered underfished or overfished. However, this approach requires continuous monitoring and enforcement capability which is not presently available to most Fisheries Divisions in the sub-region.

4.2 Control of Fishing Effort

If it is correct to generalize that many of the coastal fishery resources in the Lesser Antilles are approaching full exploitation and some are probably already over-exploited, greater attention should be paid to the means by which effort can be controlled. This could be done by limiting the number of boats operating in a particular fishery including, perhaps, control over building or importing of boats, whether licenses should be transferable or replaceable, and the period for which licenses should be issued. Other forms of control may include regulation of types of fishing gear, including mesh sizes, the imposition of quotas, and restriction of fishing to certain areas or for certain periods.

Although provisions are made for most of these measures in the various fisheries legislations of the region, most countries are not enforcing them even though some islands like the US Virgin Islands possess relatively better

administrative and enforcement capabilities in the US Coast Guard and the National Marine Fisheries Service.

4.3 Control of the Quality of the Catch

This technique is applied to regulate the fishing of certain species or of individuals of certain species usually to allow the organism to reproduce at least once before being harvested and so lower the probability of recruitment overfishing.

Knowledge of the size of the organism at reproductive maturity and of its reproductive behavior is required for setting these limits. For most species this information is lacking, or is costly to determine. In addition, there are a large number of species to deal with in the Lesser Antilles. The fishing laws and regulations of the Lesser Antilles contain these types of measures for some species (*e.g.* conch, lobster, turtle, etc.). For example, it is prohibited in the OECS countries to harm, take, have in possession, sell or purchase any lobster carrying eggs, any lobster which is undersize (less than 25 cm in length when laid flat or a carapace length of less than 9.5 cm; less than 680 g in weight or having a tail weighing less than 200 g) and any lobster which is moulting.

Provisions for closed and open seasons for fishing, the type of fishing gear and methods to be used and the area in which they can be used and the minimum sizes for nets and pots are also included. There are also prohibitions on certain gear and methods, and on harvesting of coral. In Guadeloupe there are special conditions for the use of SCUBA gear for fishing, one of which is third party insurance.

Setting gear limitations is an indirect way of controlling the size of fish being caught, and is probably easier to enforce than size limitations by species. However, it is very difficult to set gear limitations for trap fishing, which is one of the major fishing methods in the Lesser Antilles, because several species are caught together which may have different minimum size limits.

Prohibiting fishing in areas where organisms aggregate to spawn or closing the fishery during the reproductive season are useful to reduce fishing mortality. However, these measures also reduce efficiency and result in higher priced fish. Prohibitions of this kind are normally included as conditions of the fishing. Minimum size of species, mesh size, closed seasons and other conservation measures are given in Table 3.

4.4 Licenses and Permits

Licensing is considered one of the most basic requirements of fisheries management as it can be used as a measure for controlling effort and access and serves as a source of revenue and data. This approach also gives the fisheries administration considerable flexibility in the application of conservation and management measures. The fisheries laws of the sub-region contain detailed

provisions establishing conditions for the granting of a license or permit. In addition to the nationality criteria and conservation and management measures, there are also requirements for the provision of information, fees and registration.

However, even though there is adequate provision for licensing in the OECS legislation and regulations, there is no effective licensing system in place for either local or foreign fishermen. There seems to be a general reluctance in most OECS countries to license the local fishermen and charge them the fees proposed in the regulations. In contrast, the US Virgin Islands, Barbados, Guadeloupe and Martinique have relatively effective licensing and registration systems. Licensing also requires that certain information and data be provided to the fisheries administration. Most legislation requires the vessel to keep a log book of detailed information on fishing area, effort, species and other relevant information which according to the OECS legislation must be submitted to the Fisheries Officer "not later than 45 days after the completion of the voyage to which the log book relates or at any other time at the request of the Chief Fisheries Officer". Such information, if reliable, is critical for the management and development of the fishery. In the OECS countries local fishermen are required to keep log books "if so required by the Chief Fisheries Officer". There is no log book system in place for local fishermen in the OECS countries and there are hardly any foreign vessels licensed to fish in waters under the OECS jurisdiction. It is not known whether this requirement is successful in obtaining reliable information in the US Virgin Islands and in the French Departments of Martinique and Guadeloupe.

Most legislation requires registration of the vessel in a special fisheries register, and sometimes even the crew, as a condition for the granting of a license to a local fisherman. Such information is another input into the fisheries data base required for the management and development of the fisheries. Most OECS countries do not maintain a register but are making efforts to do so. The OECS Fisheries Unit is also in the process of establishing a register of foreign fishing vessels operating in the region.

4.5 Stock Rehabilitation

Stock rehabilitation through restocking is receiving increasing attention as a management tool for certain fisheries where overfishing has severely depleted the breeding stocks. The effectiveness of this technique still has to be demonstrated in actual practice. However, this is an attractive prospect for conch and spiny lobster and merits further study. While the studies are incomplete, preliminary results of genetic studies of conch populations (Berg, 1983) in the Lesser Antilles suggest that some degree of genetic isolation exists and that distinct differences can be recognized in animals from different locations within the region. The significance of this is not very clear but it is possible that

seeding the region with hatchery-produced juvenile conch could result in undesirable effects within natural populations by mixing different gene pools and also lower overall genetic diversity.

5. POLLUTION AND ENVIRONMENT CONTROL

Fisheries management and conservation measures are very dependent on the existence of a wholesome marine environment. Generally the marine environment in the sub-region is considered to be comparatively healthy.

Although most fisheries legislation in the sub-region does not pay particular attention to environmental considerations there is a recognition of the interrelationship between fisheries management objectives and the need to protect the marine environment. For example, certain methods of fishing are prohibited because of their destructive effects on the marine environment and its resources. The prohibition applies to the use of explosives such as dynamite and other noxious and poisonous substances for the purpose of killing, stunning, disabling or catching fish. Sometimes, as in the OECS harmonized legislation, prohibition extends to the carrying on board or even the mere possession of these substances.

In the OECS countries the debate is whether fisheries legislation should make provisions aimed at the preservation of fish stocks or whether to enact separate comprehensive legislation covering all aspects of environmental protection including the preservation of fish stocks. There is no existing comprehensive legislation even though there are specific legislations that deal with environmental protection in the context of regulating the disposal of waste emission from factories, etc. and legislation concerning the preservation of the marine environment in the territorial sea. For example, the Barbados Territorial Waters Act, 1977 and the Grenada Territorial Waters Act, 1978 define non-innocent passage to include *inter alia* "any act of pollution calculated to or likely to cause damage or harm to the marine environment". In Guadeloupe the dumping, draining or depositing into the sea of substances harmful to the conservation of marine species is prohibited according to Law No. 64-1245 of December 1964, pertaining to the waters policy and prevention of pollution.

Often it is considered necessary to protect certain areas because of the sensitivity of their ecosystems or their importance in the biological and reproductive cycles as breeding or nursery areas. Accordingly, power is given in the fishery laws for the proclamation of marine reserves or marine parks where fishing and other activities detrimental to the flora and fauna are prohibited. Even though a number of marine parks and protected areas have been proclaimed, sometimes under national parks legislation, most of them are not managed nor possess management plans mainly because the necessary administrative arrangements do not exist in many countries. Table 4 gives a list of existing marine parks in the Lesser Antilles.

Table 4. Existing Marine Parks in the Lesser Antilles (IUCN, 1982; Wood, 1984). The abbreviations under status mean the following: NI = No information, L = Legally existing no government protection or management plans, P = Partially protected by government, F = Fully protected by government.

Name/Year	Area (ha)	Status	Noteworthy Marine Fauna	Administration
Antigua & Barbuda				
-Diamond Reef (Antigua), 1973	2000	L	Typical Caribbean coral reef fauna	Fisheries Department Ministry of Agriculture, Lands, and Fisheries
-Palaster Reef (Barbuda), 1973	500	L	Typical Caribbean coral reef fauna	
Barbados				
-Barbados Marine Reserve, 1980	250	P	Varied population of sponges, anemones, polychaetes, sea urchins and sea cucumbers. 35 species of coral, 400 species of reef fish, 3 species of marine turtles	Parks & Beaches Commission, Ministry of Housing, Lands and and the Environment.
Guadeloupe (France)				
-Parc National de la Guadeloupe, 1982; includes Marine parks - Ilet Fajou Grand Cul-de-Sac Marin.	21,500 (4,850 ha)	P	Marine area includes coral reef formations, sea grass beds and mangrove swamp. Includes a nesting site for turtles.	Mission pour la création du Parc National de la Guadeloupe.

Table 4. Continued.

Name/Year	Area	Status	Noteworthy Marine Fauna	Administration
Martinique (France)				
-Réserve Naturelle de la Caravelle, 1976	517	P	Beaches, reefs, sea grass beds mangrove & coastal vegetation	Parc Naturel Régional de la Guadeloupe.
Netherland Antilles				
-Bonaire Marine Park, 1979	2600	P	Extremely rich Caribbean coral reef fauna	Netherlands Antilles National Parks Foundation (STINAPPA)
-Curaçao Underwater Park, 1983	600	P	Typical Caribbean coral reef fauna	STINAPPA
-Washington-Slabaai Natural Park, Curaçao, 1969 (enlarged in 1977 by 400 ha)	5900	P	Caribbean coral reef fauna	STINAPPA
Saint Lucia				
-Maria Islands Nature Reserve, 1982	45	P	Caribbean coral reef fauna	Saint Lucia Natural Trust
St. Vincent & the Grenadines (OAS, 1987)				
-Tobago Keys Marine Reserve	NI	L	NI	NI
-Young Island and Callagua Reefs Marine Reserve	NI	L	NI	NI
-Petit Canouan Island Marine Reserve	NI	L	NI	NI

Table 4. Continued.

Name/Year	Area	Status	Noteworthy Marine Fauna	Administration
St. Vincent & the Grenadines (Continued)				
-Milligan Bay Marine Reserve	NI	L	NI	NI
-Petit Canouan Island Marine Reserve	NI	L	NI	NI
-Milligan Bay Marine Reserve	NI	L	NI	NI
Virgin Islands (UK)				
-Wreck of the Rhone, 1980 (incl. 14 ha. land.)	323	P	Typical Caribbean coral reef species	BVI National Parks Trust
Virgin Islands (US)				
-Virgin Islands Natural Park (St. John), 1956	6073	F	More than 50% Highland with some marine area	US National Park Service
-Buck Island Reef (St. Croix), 1961	356	P	Marine Caribbean coral reef fauna	

Table 5. Status of the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region and the Protocol Concerning Co-operation in Combatting Oil Spills in the Wider Caribbean Region, as at 15 January 1987. (United Nations Environment Programme, 1983).

STATE	CONVENTION signed	PROTOCOL ratified	signed	ratifies or acceded [1]
Antigua and Barbuda	-	-	-	-
Bahamas	-	-	-	-
Barbados	5 Mar. 84	28 May 85	5 Mar. 84	28 May 85
Belize	-	-	-	-
Colombia	24 Mar. 83	-	24 Mar. 83	-
Costa Rica	-	-	-	-
Cuba	-	-	-	-
Dominica	-	-	-	-
Dominican Republic	-	-	-	-
European Economic Community	24 Mar. 83	-	-	-
France (Martinique & Guadeloupe)	24 Mar. 83[2]	13 Nov. 85	24 Mar. 83	13 Nov. 85
Grenada	24 Mar. 83	30 May 85	24 Mar. 83	-
Guatemala	5 Jul. 83	-	5 Jul. 83	-
Guyana	-	-	-	-
Haiti	-	-	-	-
Honduras	24 Mar. 83	-	24 Mar. 83	-
Jamaica	24 Mar. 83	-	24 Mar. 83	-
Mexico	24 Mar. 83	9 Apr. 85	24 Mar. 83	9 Apr. 85
Netherlands (N. Antilles)	24 Mar. 83	16 Apr. 84	24 Mar. 83	16 Apr. 84
Nicaragua	24 Mar. 83	-	24 Mar. 83	-
Panama	24 Mar. 83	-	24 Mar. 83	-
St. Christopher & Nevis	-	-	-	-
Saint Lucia	24 Mar. 83	30 Nov. 84	24 Mar. 83	-
Saint Vincent and the Grenadines	-	-	-	-
Suriname	-	-	-	-
Trinidad & Tobago	-	24 Jan. 86	-	24 Jan. 86
United Kingdom (Virgin Islands, Montserrat)	24 Mar. 83	28 Feb. 86	24 Mar. 83	28 Feb. 86
United States of America (Virgin Islands)	24 Mar. 83	31 Oct. 84	24 Mar. 83	31 Oct. 84
Venezuela	24 Mar. 83	-	24 Mar. 83	-

[1] Date when instruments of ratification or accession deposited with Government of Colombia ;

[2] Signed with reserve

A number of countries in the sub-region have signed and/or ratified the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean and the Protocol Concerning Cooperation in Combatting Oil Spills in the Wider Caribbean Region (Table 5). The Convention, which is a comprehensive umbrella agreement for the development and protection of the marine environment, was sponsored by UNEP under its Regional Seas Programme. It lists the sources of pollution that require control, identifies environment issues that require cooperative efforts and areas of scientific and technical cooperation. The Convention provides the legal framework for cooperative regional and national actions to protect the marine and coastal environment and by ratifying the party accepts obligations to control pollution from a discrete source or to cooperate in a specific aspect of environmental management.

The Protocol Concerning Cooperation in Combatting Oil Spills applies to oil spill incidents that result in or pose a threat of pollution to the Wider Caribbean Region. It calls for cooperation in taking the necessary measures, both preventative and remedial, for the protection of the coastal and marine environment of the Wider Caribbean Region, particularly the coastal areas of the islands, from oil spill incidents.

The Convention and Oil Spill Protocol together with the Law of the Sea Convention provide the framework for the harmonization of legislation concerning the protection of the marine and coastal environment in the Lesser Antilles sub-region. The Regional Coordinating Unit of the UNEP Caribbean Action Plan, based in Jamaica has initiated activities in this direction by preparin lists of environmental laws of the Commonwealth Caribbean.

6. ENFORCEMENT

Fishery laws and regulations are only likely to be effective if they are adequately enforced. Most laws of the sub-region make detailed provisions for the powers of competent authorities to enforce the law and for punishment for breaches of the law. Unfortunately, the fisheries administration in most OECS countries lack the required resources, both human and material, for an effective surveillance and enforcement programme and, as a result, there is very little inspection at landing sites, etc. For example, legislation protecting turtles has been in place for over 15 years or more yet the sale of turtle meat, eggs, shell products and stuffed juvenile turtles still takes place in public.

In many cases there is reluctance to enforce laws for which there is local empathy. One of the main reasons for the countries not applying the regulations is because issues related to fisheries management are usually complex, comprising socioeconomic and political issues as well as biological ones. This is particularly applicable in the Lesser Antilles where authorities sometimes avoid taking decisions in view of the unpopular nature of regulatory measures

motivated by the precarious economic and social situations of small-scale fishermen in most of the islands. The coastal communities which these fisheries resources support seem particularly exposed to social and economic problems, and as a result the political will to enforce these regulations is usually absent. Under such circumstances, the best the Fisheries Officer can hope for is to reduce some of the negative aspects of an uncontrolled fishery so that the fishery is somewhat better off than an unmanaged one.

Taking into consideration the difficulties faced by most fishery administrations in enforcing fishery regulations, and the importance of their implementation to conserve the resources, responsibilities of control could be assigned to fishermen or fishermen groups. However, the cooperation of the resource users (fishermen, vendors, hotels etc.) is essential for voluntary adherence to fishery regulations. They have to be consulted and their opinions sought in framing of regulatory measures since their involvement is essential for voluntary adherence to regulations.

Mechanisms for the continuous review of management plans and involvement of fishermen should be established. Such mechanisms are being utilized in some islands (Saint Lucia, Dominica, British Virgin Islands) for the management of natural areas. Attempts could be made to introduce them in fisheries management.

Most fisheries administrations of the sub-region acknowledge that a primary role could be played by the police, coast guard and various defence organizations in enforcement, and the OECS countries have initiated dialogue to work out an acceptable national and regional mechanism. This relates to national inter-agency and regional cooperation as described in Section 3. In the US Virgin Islands enforcement is the responsibility of the US Coast Guard, the National Marine Fisheries Service and the Department of Conservation and Cultural Affairs.

It should be emphasized that the principal issue in enforcement and surveillance is cost-effectiveness in the light of the value of the islands' marine resources and whether other tasks need to be undertaken concerning defense, patrol of the territorial sea, etc. However, enforcement should not be seen in terms of physical control of the EEZ, but to encourage compliance with the fisheries laws and regulations through measures that are relatively cheap. For example, such measures could include port inspections, inspections at sea, regular communication with fisheries authority while fishing is in progress, issuing of licenses and an education programme for fishermen whose cooperation is vital.

The degree to which management measures prove effective will vary in direct proportion to the extent they are applied and accepted by the users. Enforcement and acceptance of fishery regulations involve a number of variables which include resource user perceptions and participation, education,

economic need and government enforcement capabilities. Thus it requires a programme that addresses these variables simultaneously.

7. ACHIEVEMENTS AND CONSTRAINTS

7.1 Regional Cooperation

The forum provided by FAO through WECAFC and its associated Lesser Antilles Committee has contributed significantly towards regional cooperation and dialogue. Also, the establishment of the OECS Fisheries Unit and the adoption of harmonized fisheries laws and regulations by OECS countries are major achievements towards regional cooperation in the management and development of fisheries in the Lesser Antilles sub-region.

Cooperation is being achieved through these bodies by exchanging information on living resources and on conservation and management measures being applied, the harmonization of collecting statistical data and efforts to establish a regional database, and discussions on the management of shared resources. The activities and projects of FAO and WECAFC Working Parties on fishery resources and statistics, have contributed immensely towards cooperation in the above-mentioned areas.

A possible combination of interlocking zones after the delimitation of maritime boundaries, straddling stocks and the presence of highly migratory species could pose some difficulties for regional cooperation. Cooperation regarding highly migratory species such as tuna may be more complicated because the US does not view these resources as being within the control of the coastal state within whose EEZ the resources may occur while the other states of the Lesser Antilles hold the opposite view.

The OECS countries have also taken initiatives to cooperate in exchanging information on suspected illegal foreign fishing, establishing a registry for all foreign vessels, formulating guidelines for the fisheries joint ventures and developing a common approach to negotiation of access by foreign vessels, including the terms and conditions that could be applied to such access. Such forms of cooperation are particularly useful for the small island states of the sub-region and allow for implementation of regionally agreed measures concerning the conservation and management of the living marine resources.

7.2 Fisheries Management Plan

The new Law of the Sea Convention has provided developing countries with the basis for proper management and more beneficial use of their marine resources. Most of these countries are trying to rationalize their fishery development efforts and allocate more efficiently their natural, human and financial resources. Sound planning of fisheries management and development is of utmost importance as was stressed by the 1984 FAO World Conference on Fisheries Management and Development. The conference established strategies

and a five point "Plan of Action" aimed at increasing their production while conserving the resources upon which the production depends. Special attention was given to the development of small-scale fisheries.

The Caribbean Fisheries Management Council has prepared management plans for some of the fishery resource types of the US Virgin Islands and is in the process of preparing others. The main limitation of these plans is that they concentrate mainly on biological aspects to the neglect of the socio-economic aspects. Many small-scale fishermen continue to fish although the activity generates marginal profits or is sometimes uneconomical, even with government subsidies. Such issues should be addressed in the management plans.

Generally, fisheries administrators have given great attention to biological information while the acquisition of social and economic information has been somewhat neglected. This has been one of the most serious impediments to effective policy making and planning especially in case of small-scale fisheries. The involvement of the resource users (fishermen, vendors etc.) and the community in the preparation of management plans is also important.

7.3 Data and Information

Most islands of the Lesser Antilles have some type of data collection programme. The most common is the periodic collection of catch landings from selected landing sites. Many of these efforts were stimulated by the FAO workshop on fisheries statistics held in Saint Lucia in 1979. However, on-site follow-up has been sporadic and in some cases data have accumulated for years without being analyzed. This has caused some administrators to question the allocation of resources to collect data which are of no apparent use.

One of the major constraints in preparing fisheries management plans is the paucity of reliable biological, social and economic data and information. Without adequate data it is difficult to give good advice on managing the fishery. The collection and or improvement of data should therefore be of high priority. Generally in the Lesser Antilles, and especially in the OECS countries, the resources (trained personnel, transport, finance, etc.) available for data collection are limited. At the same time, the fisheries are scattered, which suggests that data collection is likely to be more difficult and expensive than collecting data from an industrial fleet landing the same amount of fish.

Given these difficulties, it is more important to identify management objectives (for species or species groups, etc.), decide on which items of data are of maximum importance to meet these objectives, and establish how these items could be collected in a cost effective way, rather than to make attempts to collect all the data that would be desirable to have, even if that were possible. It is not necessary to collect data in a comprehensive census type manner. For example, it is unnecessary and impractical to have records of the landings by all boats at all landing sites on a daily basis. A well designed sampling system will produce

data that are sufficiently accurate. With the limited human and financial resources in the small islands this approach is recommended. An on-going data collection programme is necessary for monitoring the effectiveness and the measurement of achievement of management objectives. Based on this principle, and with the assistance of FAO and ICOD, a harmonious on-shore data collection system for the OECS countries, Anguilla, Barbados, British Virgin Islands and Montserrat was recently (July 1987) initiated. The effectiveness of this system will depend on the commitment of the fisheries administration as it was designed by taking into consideration the existing constraints. A similar system was introduced in Martinique and is being evaluated after one year of operation (Gobert, personal communication).

7.4 Staffing and Training

Most Fisheries Divisions in the Lesser Antilles are staffed by less than half a dozen individuals, including clerical personnel. They lack the required technical and support staff to administer and manage their respective fisheries, and to act as counterparts for projects financed and partially staffed by external agencies.

The economies of most of the islands cannot afford the luxury of employing professionals in every discipline. For this reason, fisheries officers and assistants should be trained as "general practitioners" rather than specializing, and should be supported by "middle-technicians", who should be involved in basic data collection and extension. The objective of the fisheries division should be to make the optimum use of available resources by selecting priority management activities and do this well rather than spreading the resources too thin as is presently the case.

The sub-region needs experts and specialists in various subject areas related to fisheries but governments may not be able to employ and keep them for reasons mentioned. One suggestion is that the universities should play a more active role by employing such persons who could be available to assist the islands and at the same time be involved in problem oriented research. The university environment is probably the only one that may be able to attract and keep a pool of specialists that could be shared within the region.

8. OBSERVATIONS AND OPTIONS

In the Lesser Antilles, due to the nature of the fisheries, management is very complex and involves social, political and biological issues. Even though there are adequate legislation and regulations for managing the fisheries, there is very little effective management. In most of the islands fishing is uncontrolled. Fishing (and agriculture) is seen as the buffer to unemployment. This, coupled with the social and economic problems of the fishing communities, makes enforcement of regulations very difficult without the political will. Under these

circumstances the best a fisheries officer (manager) can hope for is to reduce some of the negative aspects of an uncontrolled fishery.

The fisheries officer has a wide array of management tools (Section 4) at his disposal, each with its advantages and disadvantages. Most of these tools are applicable to the fisheries of the sub-region but the choice of tools must take into account the local conditions and resources in order to be effective.

One technique that could be effective in the Lesser Antilles is the preparation of fisheries management plans. Such plans do not need additional legislation for implementation by the administration. In cases where legislation is needed they can be implemented as policy. One of the big advantages is that the plans would provide an overview of the fisheries and the many issues facing administrators. This is very useful in a situation with limited human and financial resources. Against this background and as part of the plan, specific conservation and management measures and development plans can be formulated. Plans of this kind will not only assist in coordinating the different sectoral and bureaucratic interest that could play a role in fisheries management and development but also provide for a degree on continuity in fisheries policy. Fisheries management problems in the sub-region are complex and long term and cannot be resolved within the fisheries sector alone, given the realities and constraints that exist. Inter-agency coordination and cooperation and regional cooperation are essential for managing the fisheries. Another advantage of these plans is that they could prove very useful in seeking development aid. These plans, if reviewed regularly, would give a continuous picture of the status of the fisheries and would allow for preventive action to be taken before fishing has reached a critical level.

The need for stock assessment is usually emphasized as one of the main limiting factors to fishery management in the Lesser Antilles. However, the determination of TAC may not be a realistic short or medium term objective as the demands for data are great in relation to the resources available to the islands. Also, the stock assessment models developed for industrial fisheries of the northern temperate waters may not be applicable to tropical nearshore fisheries for obvious reasons. Therefore, in a situation with limited resources it will be better to continuously monitor the fisheries rather than focus on stock assessment. This does not mean that stock assessment should not be attempted if the resources are available. In any case monitoring the fishing industry is the foundation for stock assessment . For example, time series of catch and effort data are required for over seven years to calculate and analyze TAC.

Several approaches could be applied. One is to look at the overall species composition in the markets. Comparisons could be made between areas at the same time or between different years in the same place. Changes could be taken as indication of an effect of fishing. Such information coupled with relative prices and scarcity or abundance of certain species on the market could give an

indication of the level of the stock. Also, monitoring relative abundance of "indicator species" (*e.g.* parrot fishes) on fish markets can also provide an indication of whether or not the stocks are heavily fished. In addition, examination of the sizes of fish on the market could be interpreted as an index of fishing intensity.

Monitoring the rate of entry or exit from the fishery by both fishermen and boats can give an indication of the success of the fishery. A visit to the boat-yards to check on the volume of orders for new boats can provide an indication of levels of profit in the industry and can serve as an early warning of the problem of over-capacity in the years to come, if there is a backlog of orders.

Discussions with fishermen may also provide an invaluable insight into the state of the fishery and of the resources. For example, a short fishing trip resulting in enough fish without using much gear is probably a sign that the resources are in a good state while the opposite could be a sign of a depleted resource.

In the Lesser Antilles continuous monitoring of the industry is probably a more realistic short term and cost-effective objective rather than stock assessment. However, whatever the objective, reliable data are essential for effective management. In the small island states of the Lesser Antilles, with limited living marine resources in their potential EEZ, one should guard against elaborate administrative schemes and management measures that may utilize more resources than the resource itself is worth.

Countries planning fisheries development for the first time, and countries with planning experience but who wish to improve their efforts should consider including fisheries management and resource protection as integral components of fisheries plans or programmes to achieve optimum benefit for their fishery resources.

LITERATURE CITED

Anonymous. 1986. WECAFC Fishing Landings, 1985. FAO/WECAFC Working Party on Fisheries Statistics, 1986.

Berg, C.J. 1983. Genetic Studies on Conch Populations in the Lesser Antilles. Progress Report to the World Wildlife Fund-US.

Caribbean Fishery Management Council. 1981. Environmental Impact Statement/Fishery Management Plan and Regulatory Impact Review for the Spiny Lobster Fishery of Puerto Rico and the U.S. Virgin Islands.

Chakalall, B. 1986. Perspectives and Alternatives for Fisheries Development in the Lesser Antilles. *Proc. Gulf Carib. Fish. Inst.* **39**:154-168.

EEC. 1972. Council Regulation No. 101/76 of 19 January 1972. Laying down a common structural policy for the Fishing Industry.

FAO. 1985. *Yearbook of Fishery Statistics.* Vol. 60. Senior Fishery Statician

Fishery Information Data and Statistics Service, Fisheries Department. 461 pp.

FAO. 1986. *Yearbook of Fishery Statistics.* Vol. 62. Senior Fishery Statician Fishery Information Data and Statistics Service, Fisheries Department. 479 pp.

Gajraj, A.M. 1978. Background Information on the Wider Caribbean Area. CEP/Info.1. Joint UNEP/ECLA Caribbean Environment Project.

Government of Antigua and Barbuda 1983. Fisheries Act No. 14.

Government of Barbados. 1967. Fisheries Legislation Act Cap. 131 S.2(1))

Government of the British Virgin Islands. 1982. Fisheries Rules of the British Virgin Islands (UK), Statutory Rules and Orders No. 31 of 1982.

Government of the U.S. Virgin Islands. 1982. The Virgin Islands Code, Vol. 2B, 1982, ed. Title 12, Conservation S.318.

Groombridge, B. compiler. 1982. *The IUCN Amphibia-Reptilia Red Data Book. Part 1. Testudines, Crocodilia, and Rhynchocephalia.* IUCN, Gland, Switzerland. 426 pp.

IUCN. 1982. IUCN Directory of Neotropical Areas. Tycology Pub. Ltd.

OECS/ICOD. 1987. Draft Report on Data Collection in Eastern Caribbean , OECS Fisheries Unit.

Organization of American States (OAS). 1987. List of Existing Caribbean Marine Park-like Protected Areas.

Putney, A.D. 1982. Survey of Conservation Priorities in the Lesser Antilles. CCA Technical Report No. 1.

Putney, A.D. 1978. A strategy for Marine Conservation in the Wider Caribbean. Report to IUCN, Project 1462.

United Nations Environment Programme. 1983. Action Plan for the Caribean Environment Programme. UNEP Regional Seas Reports and Studies No. 26. UNEP/IG.67/3.

WECAFC. 1983a. Cigatera in Eastern Caribbean. WECAFC/83/Info. 10.

WECAFC. 1983b. Current Fisheries Situation and Opportunities for Cooperative Action in the Lesser Antilles. DM/LA/83/3.

Wells, S.M., R.M. Pyle, and N.M. Colins. 1983. *The IUCN Invertebrate Red Data Book.* IUCN, Gland, Switzerland. 632 pp.

Wood, J., ed. 1984. Proceedings of the Workshop on Biosphere Reserves and Other Protected Areas for Sustainable Development of Small Caribbean Islands. U.S. Dept. of Interior, National Parks Service.