

A Review of Fisheries Management in the Dominican Republic

JEANNETTE MATEO and MILTON O. HAUGHTON

CARICOM Fisheries Unit

Princess Margaret Dr. P.O.BOX 642

Belize City, Belize

ABSTRACT

The Dominican Republic shares the island of Hispaniola with Haiti. The country has a total area of 48,442 km², a narrow insular shelf of 9,484 km² and an EEZ of approximately 238,000 km². Around 10,000 artisanal fishers with a fleet of 3,750 boats, operate from the 1,575 km of coastline to exploit the fisheries resources of the country. The fisheries sector is made up mainly of artisanal fishers, with high levels of import accounting for more than 50 % of local fish consumption. With average annual production of 11,600 MT, the fishery is believed to be exploiting the traditional resources at or beyond their maximum sustainable yields. The main threats identified in the coastal zone include: overfishing, degradation of critical habitats; poorly managed boating, recreational diving, increased tourism, and stress from coastal development and population growth.

In June 2000 the CARICOM Fisheries Unit, in collaboration with the Government, initiated a program to improve management of fisheries. Preliminary assessments confirmed that there are major deficiencies in the institutional and organizational system for sustainable development and management of the fisheries and aquaculture resources. Significant improvements are needed in: the institutional arrangements and capacity for planning and policy formulation; the systems and capacity for research and collection of data; and the arrangements for extension services, monitoring, control and surveillance. There is also a need for greater organization and involvement of fishers in fisheries planning and decision-making regarding the fisheries. On the positive side there is strong political will to improve the fisheries sector with the support of national and international partners. In this paper a review of past and current management measures is undertaken and recommendations are provided for strengthening the sector.

KEY WORDS: Fisheries management, Dominican Republic

Una Revisión del Manejo Pesquero en la República Dominicana

La República Dominicana comparte la isla de La Hispaniola con Haití. El país tiene un área total de 48, 442 km², una plataforma insular estrecha con 9, 484 km² y una zona económica exclusiva de aproximadamente 238,000 km². Cerca de 10,000 pescadores artesanales, con una flota pesquera compuesta por unas 3,750 embarcaciones, operan desde los 1,575 km de línea costera para explotar los recursos pesqueros del país. El sector pesquero esta formado principalmente por pescadores artesanales, mientras el alto nivel de importación alcanza mas del 50%

del consumo total de pescado. Con una producción anual promedio de 11 600 TM, se considera que los recursos pesqueros están siendo explotados hasta o más allá de su rendimiento máximo sostenible.

Las principales amenazas identificadas en la zona costera incluyen: sobrepesca, degradación de habitats críticos, manejo inadecuado de las embarcaciones, buceo recreativo, incremento en el turismo, y estrés debido al desarrollo costero y al crecimiento de la población. En Junio del 2000 la Unidad de Pesca del CARICOM, en colaboración con el Gobierno, inició un programa para mejorar el ordenamiento de las pesquerías. Evaluaciones preliminares confirmaron que hay grandes deficiencias en el sistema institucional y organizativo para el desarrollo y manejo sostenible de los recursos pesqueros y la acuicultura.

Un mejoramiento significativo se hace necesario en lo siguiente: los arreglos institucionales y la capacidad para la planificación y la formulación de políticas; los sistemas y la capacidad para investigación y colecta de datos y en los arreglos para los servicios de extensión, monitoreo, control y vigilancia. Hay también una necesidad de una mayor organización y involucramiento de los pescadores en la planificación y en la toma de decisiones con respecto a las pesquerías. En el lado positivo, hay un deseo político fuerte de mejorar el sector pesquero con el apoyo de agencias de colaboración internacional. En este documento se lleva a cabo una revisión de las medidas de manejo pasadas y presentes y se proveen recomendaciones para el fortalecimiento del sector.

PALABRAS CLAVES: Manejo pesquero, República Dominicana

INTRODUCTION

The Dominican Republic (DR) is located in the Caribbean (19° 00' N, 70° 40' W) occupying the eastern portion of the volcanic island of Hispaniola (the second largest island on the Antilles) which it shares with Haiti. The total area of the country is 48,442 km² and the total population has been estimated at 8.5 millions. The Dominican Republic is bordered by the Atlantic Ocean to the North, the Caribbean Sea to the South, Haiti to the West, and separated from Puerto Rico by the Mona Passage to the east. It has a continental platform of 9,484 km², an Exclusive Economic Zone of 238,000 km² and a coastline of 1,575 km. The biological diversity of the Dominican Republic includes broad areas of coastal lagoons, mangroves, sea grass beds, coral reefs, soft bottom areas and sandy beaches.

Under the fisheries component of the European Union funded Integrated Caribbean Regional Agriculture and Fisheries Development Programme (ICRAFD) in June 2000 the CARICOM Fisheries Unit (CFU) initiated a program to improve fisheries management, in collaboration with the government of the Dominican Republic. As part of the initiation process a fisheries country profile was prepared based on the literature available on the web and at the CFU library. A team of fisheries professionals from the CFU then visited the Dominican Republic in July

2000 to assess the situation on the ground, meet key stakeholders and gather information to prepare a five year work plan to strengthen fisheries management in the DR. The team gathered information through literature review of existing documents, discussion sessions with the Director and staff of the fisheries department, and meetings with policy makers and other stakeholders in the fisheries sector. Information was also collected through a multi-disciplinary survey, which was initiated during the mission. As a result of the review, consultations and survey, a 5-year work plan was prepared, jointly signed by the Minister responsible for fisheries and the CFU, and is in the process of implementation.

SURVEY AND LITERATURE REVIEW RESULTS

The fisheries sector contributes approximately 0.5 % of the country's GDP. The sector is made up mainly of small-scale operators with an average annual production of 13,000 MT and imports accounting for more than 50 % of local fish consumption. The most important problems in the coastal zone and in the fisheries sector in the Dominican Republic are: coastal development and population growth, inadequate monitoring, control and surveillance; poorly regulated boating, diving and tourism related activities, lack of economic support for fisheries management, overfishing, and environmental degradation resulting in stock depletion due to pollution and the use of destructive fishing gears and practices; lack of funds to acquire suitable equipment and accessories to experiment with innovative, and sustainable fishing techniques; lack of effective participation of resource users in fisheries governance; lack of appropriate technology and infrastructure for fish handling, storage and distribution of the catch, and problems with marketing the produce during certain seasons of the year.

Fishing Activities and Fishing Fleet

According to the fisheries department, there were around 10,000 artisanal fishers in 2000 who operated from a fleet of 3,750 boats [Dories: 2,136 (59 %), Kayak: 1,418 (37.8 %), *Bote*: 117 (3.1 %), *Pivote*: 19 (0.5 %), and *Ship*: 62 (1.6 %)] (Colom, et al. 1993; Department of Fisheries, 2002) and are involved in the exploitation of the marine fisheries resources of the country. The labor force in the secondary sector has been estimated at 2,500 while 46,500 persons are employed indirectly in the fishing sector. About 50 % of fishers have attained primary level education. Although fishing activity is mainly artisanal, there are also small semi-industrial and industrial fisheries that take place in the EEZ, on the high seas or in the waters of neighboring countries.

Marine fishers land their catch at approximately 200 landing sites in 16 coastal provinces. Silva (1991) reported that 324 species of fishes (287 bonefishes), crustaceans and mollusks have been identified in the coastal-artisanal fishery of the southwestern Dominican Republic. The main species groups targeted by the commercial fisheries are lobsters, conch, shrimp, shallow shelf and deep-slope reef fishes and coastal pelagic fishes.

According to the fisheries department statistics, from 1992-2000 the average annual production was 13,000 MT. For 1999 the import value was US\$ 87,592,840. During 2001 the DR imported 39,637.80 MT of seafood products (36,172 MT of finfish, 970 MT of crustaceans, 1,538 MT of mollusks, 957 MT of fish food, and 23,877,163 units of other specimens (nauplius, larvae, turtles, etc). During the same year, the DR exported 393 MT of sea food plus 245,972 units of crabs, ornamental fishes, coral pieces, turtles, conch shell, etc. (Table 1)

Table 1. Reported total production from 1992-2000

Year:	Production (MT)
1992	13,169.0
1993	12,949.0
1994	13,028.6
1995	18,661.6
1996	13,192.6
1997	14,538.1
1998	10,069.2
1999	8,518.1
2000	13,153.6
Total for the period	117,277.8
Mean	13,030.9

Aquaculture operation is making a small but increasingly important contribution to the economy of the Dominican Republic. There are 167 hectares of aquaculture ponds in operation, 127 hectares of which are managed by the private sector. The main species cultured are tilapia, carps, and marine and freshwater shrimps. The aquaculture production is aimed at supplying both internal and external markets. The government operates a twenty hectare research and hatchery facility to produce juveniles to replenish dams, rivers and lakes, and also for the promotion of rural aquaculture. Aquaculture production in 2000 was approximately 488 MT.

Ornamental fishery is a small sub-sector of the marine fisheries. Three establishments located in Montecristi capture and export approximately 33 species of ornamental fishes. From 1996 - 2002 the average number of ornamental fishes exported from the Dominican Republic was 34,317 each year.

STATUS OF THE FISHERIES AND FISHERIES MANAGEMENT

The fisheries of the Dominican Republic are multi-species in nature. As a consequence, there is limited flexibility for managing individual species, except for conch, lobster and large pelagics. Management necessarily will have to be aimed at optimizing yield from the entire shelf and not on a species-specific basis (Appeldoorn and Meyers 1993). Overfishing, the use of destructive fishing techniques, rapid growth in fishing effort (number of fishermen, boats and fishing gears) are together driving a steady reduction in the abundance of commercially important species such as lobster, conch and finfish.

The queen conch (*Strombus gigas*) was up to the year 2000, the most important

fishery resource of the Dominican Republic in terms of volume of catch. It is exploited for both local consumption and export. Local stocks are believed to be overfished. Until 1995 the only specific regulation in place for the queen conch was Decree 312 of 1986, establishing a syphonal length of 25 cm as the legal minimum length. As a consequence of recommendations made by studies conducted by Appeldoorn and Meyers (1993), Tejada (1994, 1995) and Posada and Mateo (1998), another Decree (No. 269-99) was promulgated in 1999 to strengthen the management framework for *Strombus gigas*. The decree introduced several specific measures to protect the stocks and regulate harvesting and sale, including establishing a nation-wide close season for fishing from the 1st of July to the 31st of October each year. The decree also prohibits the traffic, sale and export of conch meat during the close season, and the capture of queen conch, on a permanent basis, in certain critical habitats, including the Catuano Channel, situated between Palmillas and Catuano, and between Punta Aljibe and Punta Balajú, Parque Nacional del Este. Similarly, the decree prohibits conch fishing within the Southeast coast of Beata Island from the tide line to a depth of 50m.

Although Decree No. 269-99 came into force in 1999, it has not been adequately publicized and assimilated by the fishers and vendors. Neither the government nor the local NGO community has conducted public awareness and education programs to sensitize resource users and other stakeholders of the provisions of Decree 269-99, and consequently the level of compliance with this Decree is very low.

With lobster tail being sold in the local supermarkets for the equivalent US\$12.00 per pound, and around 2,000 fishers involved in the fishery, the spiny lobster is the single most valuable fishery resource of the Dominican fishery. From January to May 2002 the landings of the spiny lobster amounted to 1,696 MT (Dirección de Recursos Pesqueros, 2002). The main lobster fishing ground is the southwest shelf around the area of Pedernales. There are decrees and law (Law 5914 of 1962; Decree 1345 of 1967; Law 565 of 1970; and law 64-00 of 2000) for the management of *Panulirus argus* and other fisheries in the Dominican Republic. These statutes are designed to regulate the fishery by controlling the harvesting, possession and sale of female lobster from March 1-August 31 each year, establishing a minimum size for catch of 24 cm TL; and nation-wide close season from April 1st -July 31st.

The shrimp fishery in Samaná Bay is considered the most important unit of the coastal fishery in the Dominican Republic due to the large number of fishers (3,000) from the surrounding areas who are dependent on this fishery. Shrimps are caught using gill, dragging and circular nets. The use of dragging and gill nets are prohibited in Samaná Bay (Decrees 343 of 1987 & 334 of 1989), but are still commonly used in the shrimp fishery.

The main finfish families in the catch are Lutjanidae, Serranidae, Scombridae, and Haemulidae. The capture of groupers during the spawning season from January to June is prohibited by Decree 2099-84; however, groupers are common in the catch around the year. Also, the sale of barracudas, (*Sphyræna barracuda* and *S. picudilla*) and the jack, (*Seriola rivolana*) is prohibited by Decree 313 of 1986.

These regulations are largely ignored and the target species can generally be found in the local markets and restaurants throughout the year.

Fisheries Management Institutions in the Dominican Republic

There are several institutions in the Dominican Republic with overlapping responsibility for fisheries development and management, including the following:

- i) The Directorate of Fisheries Resources (DOFR) is a part of the Ministry of Environment and Natural Resources which was created by Law 64-00 of 2000 after the establishment of the new government in August 2000.
- ii) The Director of the DOFR reports to the Sub-secretary responsible for Coastal and Marine Resources. The Fisheries Department, Ministry of Agriculture is responsible for fisheries surveillance, aquaculture production, extension and promotion. This department is headed by a director of fisheries.
- iii) The Office of a National Coordinator of Fisheries and Aquaculture who is responsible for overseeing and coordinating all projects and activities being undertaken by the 2 main fisheries departments mentioned above.
- iv) The Department of Conservation and the Department of Environmental Education of the Ministry of the Environment are two other government departments which are involved in management of the fisheries sector.
- v) The Navy is responsible for monitoring, surveillance and enforcement of fisheries laws and regulations.

The fragmented and overlapping responsibilities of these public sector agencies tend to create inefficiencies and even confusion in some cases. There is clearly a need for rationalization and improved coordination of actions among these agencies.

The DOFR appears to be the main fisheries management agency. The stated policy priorities are: sustainable management, fisheries development, full employment and environmental protection. The DOFR has a staffing of 30-40, and two main sub-divisions, the Department of Fisheries and the Department of Aquaculture. In addition there are two specialized regional agencies PROPESCAR-SUR in the Southwest, and CEDEP in the Northeast, which are responsible for extension and data collection activities in their respective locations.

The main functions of the Directorate of Fisheries include:

- i) Licensing and registration of fishers
- ii) data collection and monitoring of the fisheries
- iii) research
- iv) development of cooperatives
- v) aquaculture development
- vi) management of the ornamental fishery
- vii) provision of extension services to the fisheries sector
- viii) post-harvest technology, and
- ix) quality assurance.

The DOFR is currently involved in the establishment of "Stations of Service and

Fisheries Administration” at different geographical areas across the country. The purpose of this new organizational system is to decentralize management and administration to improve sustainable development of fisheries and aquaculture. These new administrative units are expected to assist with mapping of habitat and resources within the areas under their responsibility, collecting basic statistical data and providing extension services to the community.

Legislation, Monitoring, Surveillance and Enforcement

The main legislation under which fisheries operate is the Fisheries Law 5914 of 1962. Fishermen and fishing boats are required by the law to be licensed and registered with the Ministry of Agriculture but only about half of the fisher and boats are believed to be so licensed and registered.

Fisheries surveillance and enforcement is under the responsibility of both the Fisheries Department and the Navy. Both organizations have Fishery Inspectors who are responsible for monitoring and enforcement. The stakeholders recognize the role and authority of both the military and the Fisheries Department in respect of surveillance and enforcement. They, however, consider the Fisheries Department ineffective in executing this responsibility. The military is considered more effective in enforcement but is also considered unnecessarily violent and arbitrary when handling offenders. Violators of the fisheries statutes are generally prosecuted under Article 47 of Law 5914 of 1962, but corruption, lack of equipment, insufficient logistical support, and very low fines, undermine the effectiveness of the legislation and management regulations. Enforcement of fisheries regulations is generally weak and compliance of resource users and traders with the regulations is also generally low.

Illegal and unregulated fishing and non-compliance with the laws and regulations designed to protect and conserve the resources in the Dominican Republic is regarded as a major problem that needs to be resolved in the near future to ensure long-term sustainability of the fish stocks.

The scarcity of resources to devote to monitoring, control, surveillance (MCS) and enforcement activities underscores the need to enhance involvement of fishers and their community in development and implementation on measures designed to protect and manage fisheries. Enforcement personnel should work more closely with resource users and their communities to ensure that they share greater responsibility for resource protection and management. Community policing techniques should be encouraged and promoted throughout the region (Haughton 2003).

In March 2000, a proposal for a new Fisheries and Aquaculture Law for the Dominican Republic was discussed by stakeholders. The main objective of the proposed law is the establishment of sustainable fisheries systems based on the principles of responsible fishing. With this purpose in mind, the legal and administrative arrangements related to exploitation of the fisheries resources should be based on the best available scientific information, using the best available technology and environmental practice, in order to guarantee the sustainability and

conservation of the ecosystem (COSERENAMA 1999).

The creation of a new organization, the Dominican Institute of Fisheries and Aquaculture, has been proposed to strengthen the national capacity for sustainable fisheries development. The proposed law also provides for the following measures and procedures:

- i) Regulation of fishing activities and access of foreign fishing boats to Dominican Republic waters,
- ii) Designation of areas for aquaculture development,
- iii) Modification, suspension, and denial of fishing permits,
- iv) Payment of taxes,
- v) General measures for management of lakes,
- vi) General prohibitions and measures for conservation and protection of aquatic and biological resources,
- vii) Administration of protected and no-take reserves,
- viii) Limitation of fishing effort,
- ix) Protection of species,
- x) Close seasons,
- xi) Minimum length for capture, and
- xii) Other measures to protect the fish stocks.

The new proposal seems to lack, clear definitions about what resources need to be protected and what specific resources should not be captured or commercialized. The proposal has been criticized for not providing enough detailed information about legal minimum sizes, close seasons to adequately protect and conserve key species, and, lack of specifications with respect to fishing gear permitted. This may be due to limitations and uncertainty regarding the biological and technical aspects of the resources in question. In any event such details could be addressed by subsidiary statutes made under the main law.

Policies and Plan for the Fisheries Sector

Government policies and plans for development and management have been articulated in the legislation and national plans. Several national fisheries plans have been prepared for the Dominican Republic since the early 1980s.

Fisheries Development Limited (1980) in coordination with the Instituto Dominicano de Tecnología Industrial (INDOTEC), prepared a comprehensive report on the fisheries with recommendations for development, addressing socio-economic and technological issues, harvesting, and research. ONAPLAN (1983) provided recommendations for scientific and technological policies for the sector.

The Japan International Cooperation Agency (JICA), in collaboration with the Ministry of Agriculture conducted a basic study of the coastal fisheries and prepared projects to address some of the issues identified (JICA/SEA 1992). The most recent work plan designed for the fisheries of the DR was prepared by CFU (2000) in collaboration with the Directorate of Fisheries Resources of the Ministry of Environment and Natural Resource. This plan addresses some of the necessary actions to improve fisheries management in the DR.

With the exception of the on-going CFU supported work plan the other plans have focused more on fisheries development rather than on management, and in consequence, the fisheries have experienced rapid growth during the past two decades. It is necessary to prepare and implement clear policies for the sector, based on knowledge of the status of the resources and their natural limitations, with full involvement of resource users and other stakeholders in the process.

Regional Organizations/Institutions of Fishery Cooperation

The Dominican Republic participates either as a member or observer in the activities of several fisheries cooperation organizations including: CARICOM, COPESCAL, IOCARIBE, ACS UNEP, PNUMA, COPACO, OLDEPESCA and WECAFC. The participation of the Dominican Republic in ICCAT would also be of great interest to fisheries management and to the protection of pelagic resources in Dominican waters, the Wider Caribbean and Atlantic Ocean (Rodríguez and Herrera 2001).

Policy Priority Areas

According to the results of the multidisciplinary survey conducted by the CFU, the policy priority areas for the fisheries authorities can be summarized as: sustainable management, fisheries development (including food self-sufficiency and full employment) and environmental protection.

Food self-sufficiency and full employment would tend to shift strategies in policy in favor of fisheries development, while environmental protection and sustainable management would lay emphasis conservation. The problem is how to balance these two apparent contradictory positions in the process of implementation. Strong managerial skills of the fisheries administrators, and the support and involvement of the resource user groups and stakeholders is critically needed (Brown 2001).

There are some transnational issues that the fishing sector of the Dominican Republic has to resolve. For example, a number of boats from the DR fish in foreign waters. Fishermen and fishing boats from the DR operate in the waters of The Bahamas, Turks and Caicos Islands, Jamaica, and the Saba Bank (Appeldoorn and Meyers 1993, CFU 2000). In some cases dozens of fishermen and other fisheries workers from the Dominican Republic are legally employed on Bahamian and Jamaican fishing boats. Unfortunately, that is not always the case, and the Dominican fishers are known for IUU fishing. Likewise fishermen from Haiti operate illegally in the Dominican Republic. Conflict resolution among stakeholders of the Dominican fishery industry and other CARIFORUM member states has been identified as a priority activity to be resolved through consultations and the establishment of bilateral agreements. The CFU has facilitated preliminary meetings between government officials from the DR and Turks and Caicos Islands, DR and Jamaica, and DR and The Bahamas. These meetings represent a good starting point to improve cooperation among the countries and reach formal agreement to fight IUU fishing.

The CFU Project

The CARICOM Fisheries Unit and the Directorate of Fisheries Resources prepared a five-year work plan in 2000, which is being implemented under the European Union funded Fisheries Component of the Integrated Caribbean Regional Agriculture and Fisheries Development Project (CFU 2000). The Work Plan is being implemented and is seeking to address some of the critical issues affecting the fisheries sector in the Dominican Republic by focusing on:

- i) Development of clear and adequate planning and policies framework,
- ii) Improving the fisheries database, information management systems and flow of information to stakeholders for planning and management decision making, and
- iii) Strengthening human and institutional capacities for administration, fisheries research, resource management and conservation;

As a first step of the ICRAFD work plan for the Dominican Republic, a strategic review of the organizational structure of the DOFR was completed in 2001 (Rodríguez and Herrera 2001) and resources to assist with the implementation of the agreed recommendations have been provided. Also, a comprehensive review of the fisheries data collection system of the DOFR was conducted in 2001 (Medley, 2001) and support provided for implementation of the recommendations, including the provision of computer systems and training of data collectors. Long and short-term trainings scholarships have been provided to University students and fisheries officers of the Dominican Republic. A scholarship was provided to a DOFR fisheries officer to undertake a M.Sc. in Management of Coastal Resources in Spain and two university students are currently conducting of a review of historical fisheries data of the Dominican Republic. Several short-term training workshops have been delivered to fisheries field officers and other stakeholders covering topics such as capacity building workshops on socioeconomic aspects of fisheries, data collection and statistics, resource assessment, and resource management. At present, CFU in collaboration with the Directorate of Fisheries of the DR is in the process of finalization of a fisheries management plan with includes individual plans for the major fisheries resources. Other on-going activities include a nation-wide census of conch and lobster fisheries, arrangements for an underwater survey of lobster and conch, establishment of a national fisheries dialogue group involving stakeholders in the fisheries sector (CFU 2001, CFU 2003).

DISCUSSION AND CONCLUSION

The current situation of fisheries management in the Dominican Republic is still a challenge due to the overlapping functions among several governmental agencies and limited resources. Even though there is goodwill from the government authorities to develop the country's fisheries sector, these efforts need to be coordinated within a national management program; that will necessarily require improved knowledge of the status of the resources, capacity building and awareness

campaigns, empowerment, and greater involvement of the resource users and others stakeholders in all levels of fisheries management.

Nowadays, in many coastal areas tourism is replacing fisheries and agriculture by providing a new source of income for coastal communities. Yet, the low level of development, widespread poverty, lack of basic services and infra-structure, and environmental degradation characterize the situation of many of the Dominican coastal communities where large numbers of persons depend on the exploitation and commercialization of fisheries resources for survival. In many cases, fisheries continue to be their only source of livelihood.

This situation is further compounded by the lack of:

- i) Adequate fisheries legislation, lack of capability for monitoring and enforcement; lack of financial resources for fisheries programs,
- ii) Organization and institutional capability for fisheries development and management, and
- iii) Physical office space and facilities.

The budgetary allocation of the Dominican Directorate of Fisheries is not enough to allow the fisheries administrators to undertake the necessary programs to improve fisheries resource management. On the positive side, however, the Dominican Republic is developing closer links with regional and international missions and organizations that are supporting the fisheries sector with technical and financial resources through specialized projects.

Fisheries managers need to continue to develop and implement carefully targeted programs to gradually improve the national and local capability for sustainable fisheries development and management, and consequently enhance the contribution of fisheries and aquaculture to the economic development of the country.

Interventions in the fisheries sector by themselves will not solve the problems unless they form part of a larger sustainable development program seeking to address the larger issues of improved governance, improved productivity, improved environmental management, and human development. Improvement in the basic socio-economic conditions and living standard are needed to reduce the heavy dependence on the already over-exploited fishery resources for survival.

LITERATURE CITED

- Appeldoorn, R. and S. Meyers. 1993. Marine fisheries resources of Puerto Rico and Hispaniola. Pages 100-152 in: *Marine fishery resources of the Antilles*. FAO Fisheries Technical Paper 326. 234 pp.
- Colom, R., Z. Reyes, y Y. Gil. 1991. Censo comprensivo de la pesca costera de la República Dominicana. Paginas 3-1 en: Secretaría de Estado de Agricultura. Sub-Secretaría de Recursos Naturales. Proyecto de Promoción de la Pesca Costera Artesanal del Litoral Sur. "Reportes del PROPESCAR_SUR: contribuciones al conocimiento de las pesquerías en la República Dominicana. Vol.1/PROPESCAR-SUR.- Barahona, R. D.: PROPESCAR-SUR, 1994,

- 264pp.
- CFU. 2000. Five year work programme for the Dominican Republic, April 2000 to March 2005. Integrated Caribbean Regional Agriculture and Fisheries Development Programme - Fisheries Component. Project No.7:ACP:RPR:385. CARICOM Fisheries Unit, Belize City, Belize, Sept. 2000. 42pp.
- CFU. 2001. Progress and Financial Report. No 8. April 1999 – December 2001. Fisheries Component of the Integrated Caribbean Regional Agriculture and Fisheries Development Programme. Project No.7:ACP:RPR:385 CARICOM Fisheries Unit, Belize City, Belize. 71pp
- CFU. 2003. Progress and Financial Report, No. 12. Fisheries Component of the Integrated Caribbean Regional Agriculture and Fisheries Development Programme. Project No.7:ACP:RPR:385. CARICOM Fisheries Unit, Belize City, Belize. 72pp
- Comision coordinadora del Sector Recursos Naturales y Medio Ambiente (COSERENAMA). 1999. Anteproyecto de Ley General de Proteccion Ambiental y de Recursos Naturales. 99pp
- Brown, D. 2002. Report of multi-disciplinary survey of the Dominican Republic. Integrated Caribbean Regional Agriculture and Fisheries Development Programme - Fisheries Component CARICOM Fisheries Unit, Belize City, Belize. 84pp.
- Dirección de Recursos Pesqueros. 2002. Informe de Actividades de la Dirección de Recursos Pesqueros. Secretaría de Estado de Medio Ambiente y Recursos Naturales. Sub-Secretaría de Recursos Costeros Marinos. Santo Domingo, Julio 2002.
- Fisheries Development Limited 1980. Desarrollo pesquero en la República Dominicana. Informe preparado por Fisheries Development Limited, 435 pp.
- Haughton, M.O. 2003. Compliance and enforcement of fisheries regulations in the Caribbean. *Proceedings of the Gulf and Caribbean Fisheries Institute* 54:188-201
- JICA/SEA 1992. Informe del estudio de diseño básico del proyecto de desarrollo de pesca costera en la República Dominicana. Agencia de Cooperación Internacional de Japón/ Secretaría de Estado de Agricultura/ D & A Engineering, Co. Ltd.,150 pp.
- Medley, P. 2001. Review of the data collection system of the Dominican Republic. Integrated Caribbean Regional Agriculture and Fisheries Development Programme - Fisheries Component. CARICOM Fisheries Unit, Belize City, Belize.
- ONAPLAN. 1983. Estudio de base del sector pesquero. Secretariado Técnico de la Prseidencia. Oficina Nacional de Planificacioón, 111 pp.
- Posada, J., and I. Mateo. 1998. Distribution and abundance of juveniles of queen conch in Parque Nacional Jaragua waters, Dominican Republic. *Caribbean Journal of Sciencies*.
- Rodriquez, L. and A. Herrera. 2001. Strategic review of the organizational structure and operational capability of the directorate of fishery resources in the

- Dominican Republic. CARICOM Fisheries Unit. Belize City, Belize. 37pp.
- Tejeda, J.C. 1994. Resultados Preliminares de los Niveles de Captura y Distribución de Frecuencia de Tallas del Lambí, *Strombus gigas* (L), en el Parque Nacional Jaragua, Barahona, República Dominicana. En: Secretaría de Estado de Agricultura. Sub-Secretaría de Recursos Naturales. Proyecto de Promoción de la Pesca Costera Artesanal del Litoral Sur. 22 pp.
- Tejeda, J.C. 1995. La Pesquería del lambí *Strombus gigas* en el Parque Nacional Jaragua. Pags. 04-01. En: Secretaría de Estado de Agricultura. Sub-Secretaría de Recursos Naturales. Proyecto de Promoción de la Pesca Costera Artesanal del Litoral Sur. "Reportes del PROPESCAR-SUR: contribuciones al conocimiento de las pesquerías en la República Dominicana. Vol.III/PROPESCAR-SUR.- Barahona, R.D. PROPESCAR-SUR, 1995.
- Silva, M. 1991. Especies identificadas en las pesquerías costeras artesanales del suroeste de la República Dominicana. Pagina 1-1 in: Secretaría de Estado de Agricultura. Sub-Secretaría de Recursos Naturales. Proyecto de Promoción de la Pesca Costera Artesanal del Litoral Sur. "Reportes del PROPESCAR-SUR: contribuciones al conocimiento de las pesquerías en la República Dominicana. Vol.I/PROPESCAR-SUR. Barahona, R.D. PROPESCAR-SUR, 1994, 264 pp.