

# **Managing Caribbean Fisheries in the New Millennium**

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## **ABSTRACT**

Fishery resources have been an important source of food and livelihood for millions of people across the globe and in the Caribbean region. According to FAO almost 70% of marine capture fisheries are now considered fully or over-exploited. Many Caribbean fisheries, like others across the globe, are organized and conducted in ways which will inevitably lead to overfishing. The symptoms of overfishing, habitat degradation and loss of marine biological diversity are already present throughout the region. It is vitally important that the countries of the Caribbean find ways of developing and using the region's fishery resources in a manner that provide optimal benefits to society without compromising the long-term health and productivity of the fish stocks, biodiversity or the marine ecosystems. The traditional approaches to fisheries development and management alone are not going to transform our fisheries into sustainable, dynamic systems, capable of meeting future demands for food and employment. Fundamental changes are needed in our approach to fisheries management in the region. This paper explores new approaches to ensure that fisheries will make improved and sustained contribution to human development and socio-economic advancement of the Caribbean region in the 21<sup>st</sup> Century.

**KEY WORDS:** Fisheries Management, Caribbean, Marine Biodiversity

## **INTRODUCTION**

Many Caribbean fisheries, like others across the globe, are organized and conducted in ways which will inevitably lead to overfishing. The symptoms of the problem of overfishing, habitat degradation and loss of marine biodiversity are present throughout the region. The population of many species of fish have declined and are therefore not making optimum contribution to the social and economic development of the countries. Sustainable development of the fisheries sector in the CARICOM region is constrained by several of factors, a number of which translates to lack of proper management. These factors include: irresponsible fishing practices; inadequate data, information and long-term policies; inadequate human and institutional capacity for research, planning and decision making; inadequate participation of the resource users in planning and decision-making; inadequate monitoring, control and surveillance capability; inadequate knowledge of the fish stocks, the ecological processes and the social

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and economic conditions of the fishers; environmental degradation and pollution of the regions marine waters; and scarce financial resources.

It is vitally important that the countries of the Caribbean find ways of developing and using the region's fishery resources in a sustainable manner. We see a future in which fisheries make sustained contribution to the livelihood and sustenance for the people of the Caribbean region, contributing towards food security, poverty alleviation, employment, foreign trade, foreign exchange earnings, development of rural and coastal communities, recreation and tourism. To achieve this vision we must manage our marine resources in a way that provide optimal benefits to society without compromising the long-term health of the fish stocks or the marine ecosystems. Fisheries development must be based on sound ecological principles and preserve the integrity of the environment while contributing to social and economic advancement and human development (FAO 1995). The traditional approaches to fisheries development and management alone are not going to transform Caribbean fisheries into sustainable dynamic systems capable of meeting future demands for food and employment. A combination of traditional and new, innovative approaches are needed in the region for sustainable fisheries development.

### STRENGTHEN FISHERIES MANAGEMENT AND PLANNING

The management of fisheries is the single greatest challenge we face in order to achieve sustainable fisheries development. Management essentially involved the preparation and implementation of controls to maintain, restore or enhance the fish stocks to achieve stated goals. Traditional fisheries management approaches have failed partly because they have been too narrowly focused on conservation and protection of the fish stocks; were based largely on biological and technical considerations; and were largely top-down decisions made by biologists and government officials with little input from the resource users and other stakeholders.

It is now widely accepted that fisheries management requires the skillful blending of specialized inputs from a number of distinct but interrelated disciplines including biological, technical, environmental, ecological, economic, social, cultural and political, to produce a plan which when implemented will produce the desired results. Lane and Stephenson (1996) proposed a new discipline called Fisheries Management Science, which would integrate traditional fisheries science and fisheries management, with the scientific problem-solving approaches of operations/research and management science to improve decision making in fisheries. Fisheries must be managed within the framework of the principles of Integrated Coastal Area Management. Management measures must: regulate fishing effort; protect the fish stocks, the biodiversity and the ecosystem; protect the long term socio-economic

contribution of the resource to society; and, ensure equitable distribution of benefits to resource users.

Sustainable fisheries are possible only if management strategies are geared towards managing the resource within the context of the overall ecosystem. Management strategies must address not merely the management needs of the species targeted by the fisheries, but also the need to preserve the integrity of the environment within which the species exist (King 1995). Integrated management approaches focused on rebuilding depleted and maintaining the natural productivity, biodiversity and ecological integrity of the entire coastal and marine ecosystems are needed. In addition, management strategies must be based on a good understanding of the needs and perspectives of resource users (social, economic, political and cultural dimension). The process and relationships involved in diagnosis of problems and formulation of policy options are also very important and must involve all stakeholders. Such holistic and ecologically based approach must endeavor to preserve species, taxonomic, ecosystem and genetic diversity, in accordance with the Biodiversity Convention and national biodiversity strategies. This requires better understanding of the biodiversity and complex ecological processes which define the ecosystems at the regional level, i.e. the large marine ecosystems concept and at the local level.

The management of artisanal and small-scale tropical multi-species fisheries is a complex and challenging process. To be successful, however, the management measures must be easy to understand and easy to implement at a reasonable cost. Fisheries management is still relatively new to the region and there are not many successful cases of fisheries management that we can benefit from. There are even fewer documented successful cases of management of tropical multi-species fisheries.

Within the region we need to pay careful attention to both the process of management and the integrity of the measures we adopt. We need to ensure that adequate legal and institutional mechanisms are in place to provide the information needed, build public awareness and support, make management decisions, implement management measures, monitor and ensure compliance through enforcement. The management process must involve all stakeholders in the sector. A major constraint facing Caribbean countries is the weak institutional capacity of agencies responsible for fisheries management. Government fisheries departments throughout the region have been designed and organized to encourage fisheries development. The challenges of the 21<sup>st</sup> century require different types of skills and organizational arrangements to deal with the more demanding, dynamic and complex issues of fisheries management.

The fishery management organization is the focal point and driving force for successful fishery management (Bowen 1996). As such it must be equipped, organized and empowered to deal with the complex task of fisheries management mentioned above. Significant institutional reforms and capacity building are needed in the region. Chakalall et al. (1998) describes some of the reforms which are needed in Caribbean fisheries institutions to meet the new challenges. These include the need for government fisheries administrations to build a broader institutional base by developing partnerships and strategic alliances with non-governmental organizations such as fisherfolk organizations. Reforms in hierarchical structures and internal organizational systems are also needed to substantially improve efficiency and productivity (Boxill 1995) while accommodating the increased role of resource users, the knowledge workers and new technologies, particularly information technologies. There is need for greater openness and transparency in planning and decision-making. Finally fisheries organizations, both public and private, need to be more proactive, innovative and results oriented, while remaining flexible to be able to respond to the fast evolving concepts of fisheries management science.

#### RESEARCH AND INFORMATION FOR MANAGEMENT

Developing sustainable fisheries in the Caribbean requires comprehensive, coordinated policy and plans based on a good understanding of the fishery resource, the marine environment which supports the resource and on the social and economic conditions of the people and organizations that depend on the resource. Information on these issues is therefore one of the cornerstones for sustainable fisheries development. Not only is fisheries management a complex subject, the information needs are also complex and demanding. Although we have made significant strides in the Caribbean in recent years through initiatives such as CFRAMP, we still lack the necessary data and information needed for sustainable fisheries development.

Vakily et al. (1997) pointed out that a good starting point in improving understanding of the ecosystem is by mapping the biodiversity of living organisms in the system. The results of the mapping establishes present and past species composition, provides insights into the changes which have occurred and might take place in future. Improved understanding of biodiversity will permit development and application of more holistic, ecosystem based resource management approaches to improved and sustained contribution of fisheries and other coastal and marine resources to the socio-economic development of the region.

We must conduct research, collect analyze and interpret data and information in several fields and across traditional sectoral lines to fully understand the fisheries and develop comprehensive integrated policies and plans. This will

include statistical, biological, social, economic, ecological and environmental data on the marine ecosystem. We need to begin to study the Large Marine Ecosystems within the Caribbean basin to better understand the factors controlling the abundance and distribution of the living resources within the region (Christensen et al. 1997). We also need to develop and refine approaches, methodologies and mechanisms for integrated coastal area management within the region (Gibson et al. 1997). Without these types of data and information we can neither fully understand the fisheries, effectively plan for the future, make policy decisions or promote sustainable use and management of the resource. We must improve and broaden our data acquisition and monitoring systems to obtain the range and quality data we need to make rational resource management decisions.

Financing research and other initiatives designed to generate information for sustainable development is expensive. We must therefore seek cost-effective ways of acquiring the information we need. Priority must be given to improving self-reliance in research, information gathering, processing and dissemination, by building the capacity of national and regional fisheries research institutions and building human resource capability. We must also build strategic partnerships with researchers and research institutions in developed and developing countries as well as with local private sector operators to get them more involved, supportive and committed to research and information generating initiatives.

#### **HUMAN RESOURCE MANAGEMENT**

Human resource development and management is a key factor in ensuring that fisheries make sustained contribution to the livelihood and sustenance of the people of the region. At this time we still do not have the critical mass of fisheries technicians, scientists and managers that is needed in the Caribbean to achieve our fisheries developmental goals. Special attention is needed to develop adequate cadre of both specialists and managers to serve the needs of the region. According to Lemay (1998), these persons need to be equipped with the skills and ideas that will enable them to function as part of a multi-disciplinary team within the context of an integrated cross-sectoral approach to coastal and marine resource management. The issues and problems in Caribbean tropical multi-species fisheries require creative, innovative and systematic application of knowledge and skills within a framework this is compatible with our socio-cultural and physical environment. We must work to improve efficiency, effectiveness, productivity and overall success of fisheries administrations and to improve governance of fisheries in the Caribbean.

Our fisherfolks at this time are neither sufficiently aware of the biological, ecological, socioeconomic, environmental and management concepts and issues associated with sustainable fisheries, nor have the administrative and

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organizational skills to effectively participate in co-management arrangements with the government. Since in the future resource users must play a more direct and active role in fisheries planning and management, it is also necessary to improve their awareness of fisheries issues and capacity to work in partnership with governments to co-manage fisheries.

The central issue is the fact that it is the people (Nelson 1995) working in fisheries, their knowledge of the issues in fisheries and ability to build positive networks of stakeholders that are the real basis for achieving our developmental goals. The critical importance of the knowledge worker and his needs have been very skillfully articulated by Druker (1989). Our strategy for sustainable developmental must focus on the expansion and creative use of the knowledge base of our people. We will only succeed when more of our people received better training and education and are motivated to individually and collectively use their skills and knowledge in pursuit of our fisheries developmental goals.

Recognition of this fact has very serious implications for the structure and management of organizations in the Caribbean (Nelson 1995), including fisheries organizations. Professional and technical staff in particular, must be motivated to align their personal goals with the goals of their organizations and to willingly use their creative energy and knowledge in accomplishing the planned outputs. Policy makers need to recognize this and implement arrangements which facilitate and promote the expansion and creative use of the knowledge worker. We must put a premium on securing staff confidence and loyalty; improving access to information; promoting openness, transparency, greater staff involvement in planning and decision-making; staff training and development; recognition of achievement and excellence; providing opportunity for self-actualization; and facilitating emergence of stable cohesive teams to plan and deliver outputs. We need to embrace empowerment of staff and decentralization of day to day decision making to the lowest possible levels in our organizations.

We cannot avoid investing in building a capable, committed and motivated cadre of fisheries professionals, technicians and fishers if we want to rise to the challenge of achieving the goal of sustainable fisheries. We must continue to provide opportunities for education and training of our people and reform our organizations to operate on modern principles of human resource management which are compatible with the socioeconomic and cultural environment of the Caribbean.

### IMPROVED PARTICIPATION OF RESOURCE USERS

Achievement of our goal require greater cooperation among all stakeholders in the fisheries. This include: fishermen, fish vendors, fisher's organizations, other private sector investors in fish harvesting, processing and marketing;

providers of support services to the fisheries sector (boat builders, distributors of fishing gear, engines and fuel etc.) NGOs involved in resource conservation and management; researchers and government officials, sport fishers, tourism operators using the coastal marine resources, and other users of the marine environment whose activities have an impact on the fisheries. Resource users must be involved in a meaningful way in the planning and decision-making process and in implementation of initiatives designed to promote sustainable fisheries development. Sustainable development initiatives will only succeed when resource users are active participants. Fisheries managers, scientists and other professionals must invest more time and energy in building meaningful relationships, both formal and informal, with fishers and other stakeholders.

Nielsen et al. (1996) proposed the use of the Astakeholder satisfaction triangle, a popular model for conflict resolution, to improve fisheries management decision making. This model states that satisfactory decisions are based on three important factors as follows: substance, process and relationship. Substance refers to the factual and technical aspects of the matter; process describes the procedural steps that are used to arrive at the decision and relationship refers to the interactions and positive networking among the persons with an interest in the decision. Nielsen et al. (1996) argued that fisheries management traditionally emphasized substance and later added process as elements of the decision making process. For the future it will be necessary to incorporate building of positive relationships and the synthesis of all three element of the stakeholder satisfaction triangle to achieve success.

CFRAMP has been working with the national fisheries administrations in the region to strengthen their capacity to work with fishers and other resource users and to improve awareness of fisheries management issues at the community level. We have also been working to strengthen fishers organizations and their capacity to participate as partners with government agencies in resource management initiatives. We must continue to work with fishers and their community groups, including NGOs committed to sustainable fisheries, to empower them to more effectively participate in fisheries planning and management in partnership with governments institutions.

Further support must be provided not only to allow fishers to more actively participate in planning and decision making processes but also to build relationships between fishers and other stakeholders in the sector.

#### **ALLOCATION OF ACCESS RIGHTS AND PROPERTY RIGHTS**

The only way to resolve the types of problems that occur as a consequence of the common property nature of most fisheries, is to allocate access rights and property rights to resource users. A major issue that Caribbean countries must address early in the 21<sup>st</sup> Century is, therefore, the development and

implementation of acceptable systems of access that will ensure sustainable resource use. At the international level, significant attention has been directed at the fishery resource allocation issue through UNCLOS and the establishment of exclusive sovereignty over the resources within 200 miles of exclusive economic zones by coastal states, and more recently the UN Agreement on the Management of Straddling and Highly Migratory Species. UNCLOS effectively brought to an end the era based on the legal doctrine of *Afreedom of the seas* which had been in operation since the 17<sup>th</sup> Century (Saguiryan, 1992), by which countries with distant water fishing capacity roamed the worlds oceans and seas, plundering the offshore fishery resources adjacent to the coast of smaller, less developed states and on the high seas. The allocation of sovereignty to coastal states over the living and non-living resources within the 200 miles EEZ will go down in history as one of the most significant development in the law of the sea during the 20<sup>th</sup> Century. Over 80 percent of the fisheries resources of the world fall within the EEZ of coastal states. It must be emphasized that under UNCLOS states are not only given additional jurisdiction over the resources but are also obligated to use, conserve and manage the resources (United Nations, 1982).

This allocation of fisheries resources at the international level, however, is not enough to prevent the over-exploitation of fish stocks and achievement of optimum sustainable socio-economic benefits from the resources. Further action is needed to allocate the national fishery resources of a country to the people of that country including: groups of fishers, fishing communities, fishing companies or to individual fishers. According to Van der Elst *et al.* (1996), the fish resources of a countries is owned by the people and government's responsibility is to allocate the rights to these resources on an equitable, economically viable and biologically sustainable basis. Within the region, this is an area which, in my opinion, will receive significant attention early in the 21<sup>st</sup> Century. The fact that many fish stocks in the region are fully developed or over-exploited at a time when demand is growing make it more urgent that acceptable systems of access be developed and implemented. Van der Elst *et al.* (1996) cited four basic types of property rights as follows:

- i) Common property characterized by no ownership or property rights and unregulated access.
- ii) Private property characterized by exclusive allocation of rights to individuals or companies
- iii) Communal property in which the resource is controlled by a community of users.
- iv) State or national property which is controlled and managed by national or state government.



Some of the critical issues that we are going to have to address in developing access systems have been cited by Van der Elst et al. (1996) as: who should have access rights; transferability and divisibility of rights once allocated; tenure of rights and the initial process of allocating rights. In addition to these issues, we must also address the legal and institutional aspects of allocating access rights over fish and other marine resources; and the systems for monitoring and enforcing the access right systems once they have been implemented.

#### **PUBLIC EDUCATION AND AWARENESS BUILDING**

In most CARICOM countries fisheries have traditionally been accorded relatively low priority compared to other sectors in the economy. Although most people in the Caribbean eat fish and other fishery products on a regular basis very few really understand the potential, challenges and problems of the sector and how they can help to protect and improve fisheries. This is partly because of the special characteristics of fisheries and the fact that the role and potential contribution of fisheries to the economies of the region have not been adequately documented and presented to either opinion makers, decision makers or the public at large. To achieve our goals of sustainable fisheries development we need to have much more political, financial, institutional and broad based public support and commitment than we currently enjoy.

We need to improve public knowledge and understanding of fisheries in the region by building public awareness, conviction and support for activities designed to promote sustainable fisheries development. It is, therefore, necessary to develop and implement a campaign to market the concepts and benefits of sustainable fisheries and what it entails to various target audiences. Note that we need to not merely improve awareness of fisheries but go further to secure personal conviction and support for initiatives to improve conservation and management of fisheries. This will involve more careful attention to communicating the information, knowledge and outcome we wish to achieve. We need to more carefully identify and package the message we wish to communicate, the target audiences and the means by which we want to communicate the message. This would facilitate greater levels of sustained political and financial support for fisheries throughout the region as well as create a more receptive and favorable environment for some of the difficult short-term decisions that are required to transform fisheries into dynamic self-sustaining systems contributing to the well-being, social and economic advancement of Caribbean people.

### **PROTECTING THE MARINE ENVIRONMENT**

Pollution and environmental degradation is having a negative impact on fish production and distribution in the region and globally. The health and productivity of our coastal waters in particular and the Caribbean sea generally are declining as a result of the impacts of population growth and development in the coastal zone. The negative impacts can be directly linked to: destruction of the natural habitat, notably mangrove, wetlands and coral reefs; discharge of industrial, agricultural and household effluents; dumping and litter of plastics and synthetic materials; oil and gas spills and tarball accumulation; and the increasing demands of recreational use. Global climatic changes resulting from damage to the ozone layer may also have significant negative impact on Caribbean fisheries through changes in sea temperature and sea levels.

We should support efforts designed to protect the integrity of the Caribbean Sea such as the CARICOM Initiative to have the Caribbean Sea internationally recognized as a Special area in the context of sustainable development, in order to establish measures to protect, conserve and promote sustainable use of the marine resources for the benefit of the people of the region. In the future fisheries organizations must develop closer working relationship with organizations involved in environmental protection and management within the coastal and marine areas.

### **MONITORING, CONTROL AND SURVEILLANCE**

Fisheries management can only be successful if the harvesting and post-harvesting stages of fisheries can be effectively regulated and controlled. Most Caribbean countries still lack the basic competence to adequately monitor and control the harvesting of fishery resources under their jurisdiction. Monitoring, control and surveillance (MCS) systems need to be significantly improved across the region to successfully manage fisheries. Establishment and operation of MCS systems for fisheries normally require significant investment in equipment and personnel. Carefully developed cooperative arrangements among the countries making use of existing sources of information and MCS capabilities is necessary. Closer regional cooperation between fisheries departments, national coast guards and marine police divisions should be pursued to improve cost efficiency of MCS capacity for fisheries purposes. Technical and financial support is needed to develop and implement adequate MCS capability at the national and regional level.

### **IMPROVED REGIONAL AND INTERNATIONAL COOPERATION**

CARICOM states need to strengthen and expand economic and technical cooperation with: neighboring countries in the Wider Caribbean region, developed countries and their funding agencies, and developing countries with

common interest in sustainable fisheries development. In the emerging global village there is really no alternative path to sustainable fisheries development outside of improved cooperation among states sharing a common interest in the resource. There are significant benefits to be gained from such cooperation, including sharing of technical and management expertise, training of staff, transfer of technology, strengthening of infrastructure and institutional capacity, accessing financial resources, and economies in the use of limited resources.

CARICOM states, as a consequence of their small size and developing economies have limited human, financial and institutional resources to devote to the pursuit of sustainable fisheries development and management. We need to strengthen our regional cooperative and collaborative strategy to improve cost effectiveness in planning and implementing fisheries programs. Closer cooperation will also improve our influence at international fisheries fora to ensure that our needs, perspectives and concerns are not marginalized by larger more powerful states. The quality of our success in achieving sustainable fisheries will depend on the extent to which we are able to work together as a region. Through CFRAMP, the CARICOM countries are in the process of defining and establishing a permanent regional fisheries mechanism to facilitate management of shared fish stocks, sharing of expertise and information among countries, interaction with non-CARICOM states and institutions, and provision of technical consultative services to the countries. Political commitment, financial and technical support will be needed in the short and medium term to ensure that this regional mechanism is established, institutionalized and recognized as a competent body in fisheries development and management in the region.

We need to work towards development of new, more cost-effective, productive and mutually beneficial forms of collaboration between CARICOM states and developed countries, to replace the traditional donor recipient relationship for delivery of developmental assistance and the conduct of research for sustainable fisheries development. A partnership approach among fisheries institutions and researchers in the region and industrialized countries focused on priority themes of importance for the future, can strengthen our efforts at achieving sustainable benefits from aquatic resource systems (Anon. 1997). This would provide us access to technology and knowledge available in the best equipped and staffed fisheries research and fisheries management institutions in the developed world. The basic problems we face in fisheries in the Caribbean today are not restricted to the region but are faced by developed and developing countries globally. We need to continue to renew and strengthen our relationship with traditional allies and partners such as Canada, USA, UK, Holland, Germany, Japan and the European Union, taking into account their changing priorities in the emerging new world order. We also need to expand

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our collaborative relationship with other potential allies in the developed world. Japan recently launched two deep water research submarine vehicles and two ultra modern marine research ships. They have indicated an interest in collaborative research using these research platforms. We should explore these and other opportunities to study and improve our understanding of the physical, biological and chemical oceanographic processes within the Caribbean region.

We need to continue to support and actively participate in sub-regional, regional and international bodies whose operation and decisions impact on fisheries within the Caribbean region. These bodies include but are not limited to the following: OECS NRMU; WECAFC Lesser Antilles Committee; WECAFC Working Parties and Commission; CANARI; CFMC; OLDEPESCA; UNEP; UNECLAC; IOCARIBE; CCA; ICCAT; CITES; COFI; and IWC. WECAFC occupies a special position within the region. We should support efforts to restructure WECAFC to make its operation more cost-effective, better integrated and responsive to the needs of the members states. We should promote the idea of establishment of a CARICOM/WECAFC Working Group to ensure that the special needs, issues, concerns and priorities of the CARICOM Member States are not marginalized by the needs of the larger, richer and more powerful members of WECAFC.

We need to expand ATCDC type@ arrangements with other developing countries. This is a cost effective way of receiving and providing technical assistance, training, tackling common problems, building solidarity particularly in dealing with common issues at international fisheries fora and building trade relations. The Island states of the South Pacific and several African have several commonalities with us in the Caribbean. There are mutual benefits to be gained by building stronger working relationships and promoting exchange of technical and managerial personnel with each other.

### EXPAND AQUACULTURE AND MARICULTURE

In order to satisfy growing demand for fish at reasonable cost, create employment, earn foreign exchange and diversify our economic base CARICOM countries must expand into ecologically sustainable aquaculture. Capture fisheries will not be able to produce enough fish to meet growing demand because they are now at or beyond their sustainable limits. Any significant expansion in fish supply will therefore have to come from aquaculture production. In addition to producing fish, shellfish and aquatic plants (e.g. sea moss) for direct human consumption, aquaculture can provide other products for a wide variety of purposes such as aquarium industry, health products and food additive. For the long term future we must begin now to lay the foundation for significant expansion of aquaculture production. This requires development of aquaculture along the lines of livestock production, while rationalizing the use

of limited land and water resources which are needed for non-aquaculture purposes. Responsible development of aquaculture also requires development of appropriate legal, policy and administrative framework and capacity for planning, research, technology adoption and transfer, and monitoring of farming operations and their impact on the surrounding environment. Within the SIDS and small coastal developing states in the Caribbean it is necessary to adopt a balanced approach by promoting development of low-input integrated aquaculture systems that cater to the needs of small scale producers as well as larger scale commercial operations in fresh, brackish and marine waters.

Most Caribbean states have limited land and fresh water resources which will limit fresh water aquaculture. On the other hand most states have larger expanse of marine space than land space which offers potential for mariculture. The technology for cultivation of tropical marine species of fish in the sea is not well developed at this time but is receiving increased attention from developed and developing countries all across the globe.

Aquaculture operation can have negative environmental impact if not properly regulated. Special attention need to be given to this aspect of aquaculture in the Caribbean to mitigate ecological and environmental deterioration.

#### DISCUSSION AND CONCLUSION

It is the author's view that the level of support, in terms of personnel, funds, technical leadership and general institutional support, that has been provided by Caribbean countries, including initiatives such as CFRAMP, for fisheries management, has been inadequate to meet the existing and future needs within the region. As I indicated earlier radical and fundamental changes are needed in our approach to fisheries management, if indeed we wish to transform our fisheries into dynamic systems capable of meeting future demand for food, employment and foreign currency among others, in the 21<sup>st</sup> Century.

Sustainable development and management of the fisheries and marine biodiversity in the Caribbean region, particularly the small island development states, is constrained by a number of factors including: irresponsible fishing practices; inadequate human and institutional capacity for research and management of resource management; inadequate participation of the resource users and other stakeholders in planning and decision-making; inadequate knowledge of the fish stocks, marine biodiversity and their ecosystems and the social and economic aspects of the resource users; pollution of the regions coastal and marine waters and consequent habitat degradation and loss; and inadequate monitoring, control and surveillance capability among others.

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Globally there have been several positive developments in support of sustainable fisheries and marine biodiversity management since the crisis in fisheries became evident at the end of the last decade. Among the significant developments are the outcome of UNCED, in particular its Agenda 21; the Biodiversity Convention; the Agreement on the Management of Straddling Fish Stocks and Highly Migratory Fish Stocks; the elaboration and endorsement of the Compliance Agreement on High Seas Fishing; the elaboration by FAO of a Code of Conduct for Responsible Fisheries. The development and distribution of Fishbase, an electronic encyclopedia on fish (Froese and Pauly, 1997) by the International Center for Living Aquatic Resources Management (ICLARM) is also recognized as a significant and positive development. The special needs of Small Island Developing States (SIDS) have not been lost in these developments. Chapter 17 of Agenda 21 of UNCED and the SIDS Conference which was held in Barbados in 1994 explicitly recognized these needs. Article 5 of the Code of Conduct on Responsible Fisheries also recognizes the special requirements of fisheries of SIDS. In addition to these global initiatives, mention must be made of the ACP-EU Fisheries Research Initiative which was launched in 1993. The concepts of responsible fisheries; precautionary, multi-disciplinary and cross-sectoral approaches have been accepted globally as fundamental principle for achieving sustainable development and management of fisheries and other coastal and marine resources.

Caribbean countries must accord higher priority to improving management of the region's fisheries and to reflect this by allocation of more financial and dedicated human resources to the pursuit of fisheries and marine biodiversity management. Special attention should be focused on building human and institutional capacity at regional, national and local levels. Mechanisms for collection, analysis and disseminate of information need to be strengthened. Unless we begin to take these practical, bold steps to deal with the real, complex problems facing the fisheries we are not going to realize our vision for the sector of the region. The underlying principle behind most of the management measures being considered by the countries is the fact that the resource is limited and can support, in a sustainable manner, only a limited number of fishers and fishing boats. Many of these approaches are therefore designed to empower resource users and at the same time control fishing mortality. Others are designed to protect the environment and biodiversity, and the people who are dependent on the resources. Some of the key element for success are the building of human and institutional capacity, building of positive relationships among stakeholders and allocation of access rights to the resources.

CARICOM states need to strengthen and expand economic and technical cooperation with: regional and international organizations; neighboring countries in the Wider Caribbean region; developed countries and their funding

agencies; and other developing countries with common interest in sustainable fisheries management. In the emerging global village there is really no alternative path to sustainable fisheries development outside of improved cooperation among states sharing a common interest in the resource. There are significant benefits to be gained from such cooperation including sharing of technical and management expertise, training of staff, transfer of technology, strengthening of infrastructure and institutional capacity, accessing financial resources, and economies in the use of limited human and financial resources.

In conclusion, the traditional sectoral approaches to marine resource management and conservation are not going to transform our resources into sustainable, dynamic systems, capable of meeting future demands for food, employment and recreation while maintaining the region's marine biological diversity. New integrated management approaches focused on rebuilding and maintaining the natural productivity, biodiversity and ecological integrity of the entire coastal and marine ecosystems are needed.

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