

**Linking Science and People: Applying Socioeconomic and Governance Science to Solve Problems and Create Opportunities in Caribbean Fisheries**

**Vinculando la Ciencia con la gente: Aplicando Socioeconómica y la ciencia de Gobernanza para Solucionar Problemas y Crear Oportunidades en las Pesquerías del Caribe**

**Associer la Science et les Populations: Application des Sciences Socio-économiques et de Gouvernance pour Résoudre les Problèmes et Créer des Opportunités dans les Pêcheries des Caraïbes**

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**INTRODUCTION**

*The general conditions of poverty characteristic of traditional fishing communities around the world have increasingly drawn the attention of governments and other change agents in recent years, and have led to the initiation of development programs of varied hue and form. These programs, although expressing a variety of specific objectives, implicitly if not explicitly, the raising of the standard of living of these communities.*

This statement could have been written yesterday, but it was written over thirty-five years ago by the late Ian Smith as an introduction to his manuscript *A Research Framework for Traditional Fisheries* (1979). As we have learned, traditional or small-scale fisheries play a crucial role as a source of livelihoods, food security, and income for millions of people around the world in both developed and developing countries. In spite of the important role that small-scale fisheries play in national and local economies, the sector—as compared against other sectors of the world food economy—is poorly planned and regulated, inadequately funded, and marginalized and neglected by all levels of government. Small-scale fisheries around the globe are frequently overfished and overexploited as a result of not only weak governance, but, to name just a few issues, of poor management, perverse subsidies, corruption, unrestricted access, and destructive fishing practices. Therefore, reforming both the governance and the management of these critical natural resources is essential to stable and long-term economic development, continuation of the ecosystem goods and services provided by these natural resources, the conservation of biodiversity and in some cases may be essential to overall peace and security.

In the introduction to his 1979 publication, Ian Smith further wrote:

*There is an explicit link between development programs and supportive research endeavors. If the goal of development programs is to raise the standard of living of traditional fishing communities, the goal of research should be to expand and clarify the alternative choices available to decision makers, be they government policy makers or project managers, private entrepreneurs, or fishermen themselves.*

The words of Ian Smith still hold true. The importance of science and research to inform development and management in order to address the multitude of problems and opportunities faced by small-scale fishermen and fisheries cannot be underestimated. Recently, donors have been providing more support for development project activities rather than science and research since they themselves are being required to show more impact from their financial support. While this is understandable, it has reduced the available support for research and the ability to both address problems and evaluate outcomes.

This paper has multiple purposes. The first is to review the literature on the major issues affecting small-scale fisheries and the science and research agenda's established to address these issues over the last forty years. The second purpose is to assess the current issues affecting small-scale fisheries today. The third purpose is to propose a new science and research agenda for addressing these issues and to make recommendations to solve problems and create opportunities. Two points of clarification on this paper. First, although small-scale fisheries are important in both developed and developing countries, this paper will focus on small-scale fisheries in developing countries globally, with a specific focus on small island development states (SIDS) in the Caribbean region. Second, this paper will focus on socioeconomic and governance science and research on small-scale fisheries rather than biological research; while acknowledging the need for an integrated and multidisciplinary approach.

## AN HISTORICAL PERSPECTIVE OF ISSUES, RESEARCH AGENDAS, AND OUTCOMES

To develop a new research agenda for small-scale fisheries, it is important to review and understand research and research agendas undertaken on small-scale fisheries in an historical perspective. Research on small-scale fisheries has historically been primarily focused on resource biology and stock assessment and technology development, with only a small amount of economic and social research (Williams 1996). Fisheries science has been devoted to assessments of fish stocks and their potential productivity (Pauly 1979, 1994). Stock assessments have been particularly difficult for small-scale fisheries due to the multi-species, multi-gear nature of the fisheries, difficulty and expense to collect data, and complexity of the marine ecosystems. Williams (1996) points out that scientific advice on safe exploitation levels, when available, is not implemented adequately because countries lack political will and effective management policy instruments and because social and economic factors intervene.

It is interesting to note that considerably less socioeconomic literature exists for the Caribbean islands than other parts of the world. Studies identified include Antigua, Barbados, Barbuda, Cuba, Dominican Republic, Grenada, Guyana, Jamaica, Martinique, St. Lucia, Trinidad and Tobago, and the Virgin Islands, although only a few documents were found in each case.

### The 1970s and Before

Social science research on small-scale fisheries has developed more recently than fisheries biological research (Charles et al. 1993). The earliest published research work on small-scale fisheries in developing countries is available from anthropologists such as Malinowski (1918, 1922) in the Pacific. There was a proliferation of studies by anthropologists, sociologists, and geographers on different aspects of small-scale fisheries in the 1960s including Raymond Firth's classic work on Malay fishermen (1966), Alkire (1965) on a Pacific atoll fishery, Fraser (1966) on fishers in Southern Thailand, and Hamlich (1967) on social and economic factors related to technology development. Most studies were academically oriented ethnologies or studies of social systems that provided a better understanding of fishers, fisher households, and fishing communities, and served to drive a new research and development agenda on small-scale fisheries.

Interest in small-scale fisheries increased significantly in the 1970s as more was beginning to be known about the sector and concerns about poverty, low income, low standard of living, and overfishing became better understood. Much of the focus in the 1970s was on fisheries development, carried over from the 1960s, and new boats, gear, and supporting infrastructure and improved economic efficiency to address these problems (Bardach 1976). There was an expansion of a broad range of research studies from several social science disciplines on small-scale fisheries at

this time as well. Research was increasingly being undertaken not just for research sake but to inform development and management programs.

Some of the leading researchers in this decade include Rowena Lawson (1972, 1974a, 1974b, 1975, 1977, 1978), G.A. Baum and J.A. Maynard (1976a, b, c, d, e), D.K. Emmerson (1975, 1980), J.C. Marr (1971, 1973), Pollnac (1976, 1977, 1978a, 1978b, 1978c), Christy (1973), Szanton (1971), Lockwood and Ruddle (1976), and Alexander (1975). The focus of a great deal of this research was on describing the socioeconomic aspects of small-scale fisheries. This included studies on marketing of fish, credit sources, livelihood strategies, economics of production (cost and earnings studies), technology adoption, and fisher's problems. Blake (1969) highlighted the marginalization of small fishers in Madras state in India. There was a good deal of research on fishermen's cooperatives (Digby 1973; FAO 1971; Pollnac 1977). Much of the research output during this decade was generated from Asia.

The United Nations Food and Agriculture Organization (FAO) expanded its research and development activities on small-scale fisheries globally (1970, 1975). This included such joint programs with the United Nations Development Program as the South China Seas Development and Coordinating Program which undertook studies on stock assessment, economic analysis, marketing, and fishing communities and included Hong Kong, Indonesia, Cambodia, Malaysia, Philippines, Thailand, and Vietnam (Allsopp 1985). It also included the Bay of Bengal Program which undertook research and provided technical support in Bangladesh, India, Malaysia, Sri Lanka and Thailand. The Committee for the Eastern Central Atlantic Fisheries (CECAF) was a regional learning program for West African countries. In the mid-1970s, the International Center for Living Aquatic Resources Management (ICLARM) was established to play a leading role in multidisciplinary research on small-scale fisheries worldwide. Another major research center, established with support from the United States Agency for International Development, was the International Center for Marine Resource Development (ICMRD) at the University of Rhode Island in the United States which focused on multidisciplinary research on tropical small-scale fisheries. A 1977 ICMRD report on *Socioeconomic Research Issues in Fisheries Development* identified several major research areas for small-scale fisheries:

- i) Investigation of costs and earnings
- ii) Studies of market processes and demand
- iii) Analysis of political and institutional problems and their effect on the establishment of effective fisheries management.

The research agenda for small-scale fisheries in the late 1970s and into the 1980s can best be defined by Ian Smith's seminal work (1979). The primary problem identified by Smith in traditional or small-scale fisheries

was a low standard of living, or more specifically, low incomes. The major contributing empirical problems to low standard of living were identified as:

- i) Limited fisheries resources,
- ii) Inadequate vessels and gear,
- iii) Lack of alternative income sources,
- iv) Lack of market power, and
- v) Inflation.

Smith (1979) had identified a general trend towards biological and economic overfishing among the stocks targeted by small-scale fishers, especially in Southeast Asia. This finiteness of the resource was a result, in part, of the open-access nature of the resource. Associated issues identified by Smith (1979) related to limited fisheries resources were:

- i) Low productivity per fisher (low catches along with,
- ii) Low prices contribute to low incomes),
- iii) Surplus fishers and lack of alternative income sources, and
- iv) Conflicts between small-scale and industrial fishers, including conflict over the resource base, competition with factor (input) markets, and competition in the marketing of the product.

Smith (1979) stated that the majority of fishers do not own vessels and fishing gear, but rather work as share or wage laborers. This inadequacy of vessels and gear is a major contributing factor to the low productivity of the individual fisher. Another contributing factor is the low price received from the sale of the catch. Fishers were felt to have little, if any, control over marketing outlet and prices due to the dependence of fishers on middlemen for credit.

Smith (1979) stated that fishery-centered solutions that can be sought to these complex problems are:

- i) Increase catch
- ii) Increase prices received for the catch,
- iii) Lower the costs of fishing. In addition, solutions can be sought outside the present capture fisheries through
- iv) Create alternative employment opportunities.

Four possible methods were presented to achieve these solutions:

- i) vessel and gear upgrading,
- ii) Restricting effort or subsidizing the fishing industry,
- iii) Improving marketing and postharvest technology, and
- iv) Rural development.

Smith (1979) concluded that rural development programs that provide alternative sources of income to fishers and their families represented the only method that reduces fishing effort and, thus, the only long-term solution

that offers any chance of raising the standards of living of those who remain in the small-scale fisheries sector.

Smith (1979) concluded by suggesting four general research areas:

- i) Assessment of stocks exploited by small-scale and industrial fishers and estimation of maximum sustainable yields,
- ii) Development of management tools and programs appropriate for limiting fishing effort in the multispecies fisheries exploited by small-scale and industrial fishers,
- iii) Reduction of waste in the distribution system and exploration of ways in which resulting benefits can be channeled to small-scale fishers, and most importantly,
- iv) Development of alternative and supplementary income sources for small-scale fishers and their households.

Smith (1979) went on further to state that complementing these priority areas is the requirement to develop an understanding, on the one hand, of the resource/fisher/distribution continuum, and on the other hand, of the linkages among fisheries, fishing communities, and other rural sectors and institutions, including government.

The outcome of research in the 1970s on small-scale fisheries was a more complete understanding of small-scale fishers and fishing households and communities. The diverse research provided knowledge about markets and marketing, production technology, livelihood strategies, social and cultural characteristics, and credit. The focus was on conducting research to gain basic knowledge and to support development programs rather than for management programs.

Similar to the rest of the world, in the Caribbean region, anthropologists such as Richard Price (1966) and George Epple (1977) were studying fishing and fishers. Richard Price (1966) wrote that the historical roots of Caribbean fishing communities are relatively recent, when compared to other parts of the world, and have been shaped by the slave-based plantation economy of the region. The plantation system did not support the establishment of local organizations nor the development of a sense of community cohesion among fishers. Gerald Cecil (1972) refers to geographic characteristics of fisheries in selected Caribbean islands. The Southeastern Caribbean fishery system involves myriad interactions between heterogeneous elements. The heterogeneity is most evident in the boats and equipment that make up the fishing units. The patterns of spatial distribution influence the island's fish production capacity. Fishing units are owned by many types of individuals, with three broad groups identified. Their personal attributes are important variables within the industry. Fish landings were increasing in the region during this period. As was going on globally, the focus of science

and research was in support of fisheries development. In the 1970s and 1980s, governments encouraged increases in fleets as a way of generating jobs and food for coastal communities (Thorpe et al. 2000). Fisheries development projects, such as the UNDP Caribbean Fisheries Development Project in the late 1960s/early 1970s, did assess social, cultural, and economic conditions of fishers and fishing communities, especially markets and marketing. National fisheries development plans and policies were being developed to exploit inshore fisheries resources. Riva Berleant-Schiller (1981) and Clarence Idyll (1971), among others, were writing about the potential for fisheries development in the region. Berlant-Schiller (1981) wrote that development plans of the era had more to do with the political environment than to the economic and social environment of most fishers. Cooperatives were being promoted to organize fishers and encourage 'peasant' savings, however, many failed and were not revitalized. Fisheries management was "top down", and no stakeholder participation in fisheries development or management was being pursued.

### The 1980s

The research on small-scale fisheries in the 1980s increased greatly and moved in new directions from the previous decade. The biological studies conducted in the 1970s brought an increased understanding and concern about overexploitation of fisheries and degradation of coastal ecosystems. This led, in the 1980s, to more research in support of sustainable resource management rather than development programs (Smith 1979, Indo-Pacific Fisheries Council 1980, Panayotou 1982, Lawson and Robinson 1983, Christy 1986). Associated with this focus on management was research on fisheries socioeconomics (Pollnac 1981, Pollnac and Morrissey 1989, Troadec 1989), the sociocultural aspects of small-scale fisheries (Pollnac 1981, Cordell 1989), fisher organizations (Bailey 1981, Kurien 1988), territorial and exclusive use rights (Christy 1982, Dahl 1988), traditional knowledge (Johannes 1981, Ruddle and Johannes 1985), monitoring and evaluation (Pollnac 1989), and alternative employment opportunities (Allsopp 1985). The integrated nature of fisheries resources, aquatic ecosystems, fishers, fishing communities, politics, and institutions was recognized. Integrated approaches to management of coastal ecosystems, both natural and human, through integrated coastal zone management were studied and applied and this continued into the 1990s (Scura et al. 1992, Chua 1993, Burbridge 1994). Research also emphasized post-harvest activities such as fish-handling, storage, processing, packing, and distribution systems (Ben-Yami 1980, Allsopp 1985). There was also increasing attention being paid to the acquisition of socioeconomic fisheries information (FAO 1985).

Much of the published research output in the 1970s was from Asia. In addition to Asia, more research output

was generated from Africa (Everett 1986, Lawson and Robinson 1983, Gaudet et al. 1986) and Latin America (Sutinen and Pollnac 1981, Aquero 1989) in the 1980s. The Programme for Integrated Development of Artisanal Fisheries in West Africa (IDAF) was initiated in 1983 to help some 20 coastal states from Mauritania to Angola to develop and manage their artisanal fisheries through participatory and integrated approaches. The program supported a range of research activities from livelihoods to co-management (Satia 1993).

Economists became more active in studying small-scale fisheries and this led to more studies on cost and earnings of production; markets and marketing studies; and fiscal policies and measures (Kurien and Willman 1982, Willmann 1983, Lawson 1984, Panayotou 1980, 1982, 1985, Campell et al. 1989).

Socioeconomic research, to complement the ecological research, on marine reserves began to emerge in the late 1980s (White 1986, 1989). Research on traditional management systems (Ruddle and Akimichi 1984; Weigel 1985) and community-based coastal resource management (Ferrer 1992) began to emerge. In the late 1980s, there was an awareness of the immense number of different disciplines working on common property and collective action in fisheries around the world and the creation of a common property network (McCay and Acheson 1987, Martin 1989).

There was a focus in the 1980s on more comprehensive and multidisciplinary research on small-scale fisheries based on a more complete understanding of the complexity of issues and problems in these fisheries that required multidisciplinary approaches to research and to solutions (Smith and Pauly 1983). Emmerson (1980) began the decade by stating that, ... *a combined sensitivity to marine resources and maritime communities will prove most conducive to optimal fishery policies in developing countries...* (p. ii). This statement set the tone for the multidisciplinary research conducted through the 1980's. Three outputs from the early 1980s best illustrate this multidisciplinary research. These include the San Miguel Bay, Philippines studies conducted by ICLARM (Bailey 1982(a), 1982(b), Smith and Mines 1982, Yater 1982) and the work in Central America conducted by ICMRD (Sutinen and Pollnac 1981, Stevenson, Pollnac and Logan 1982).

The outcome of research in the 1980s was a clearer understanding that problems and solutions in small-scale fisheries required a multidisciplinary approach to research and management. As Royce (1987) stated,

*Clearly, such development must be approached as a long-term process of social evolution, rather than merely programs of conservation supported by fishery science and directed by fishery scientists.*

Royce (1987) further stated,

*The prevailing long-term development issue is how to establish trusted institutions that can allocate and manage the right to fish with acceptable social benefits.*

This statement was right on target, as research in the 1990s brought a new focus on fisheries governance arrangements and institutions.

In the Caribbean region, there was an increased focus on small scale fisheries by FAO and other agencies during the 1980s. While the interest of donor activity was still on fisheries development through provision of technology and better physical infrastructure, there was a growing interest in the social and economic aspects of fisheries. The results of economists of the Pole de Recherche Oceanologique et Halieutique Caraibe are synthesized by de Miras (1989). Martinique's fishing sector is characterized by: high market demand locally, nonselective public fisheries subsidies, developmental policies lacking suitable economic integration, a long-standing shortage of suitable fishery information, and in particular the link between open access resource use and low levels of economic profitability in Martinique's fishing units. As part of fisheries development, FAO supported socioeconomic and cultural studies of the fishing industry in several countries (FAO 1984). A Fishery Sector Assessment for the Eastern Caribbean (1985) provided an overview of social, cultural, and economic issues in the region highlighting low incomes of fishers, their multi-occupations, their independence, and inadequate marketing systems. McGoodwin (1984) presents the findings of a socioeconomic study of the fisheries of St. Lucia, analyzing:

- i) Socio-economic, attitudinal and cultural characteristics of fishing industry participants,
- ii) Factors associated with variations in income levels derived from various categories of participation in the fishing industry,
- iii) The role of fisheries cooperatives,
- iv) The social impact of fishery changes, and
- v) The various fishing methods currently in use.

Murray and d'Awergne (1990) present preliminary results of a 1989 survey carried out by the Department of Fisheries of St. Lucia to provide information on socioeconomic aspects of the fishing industry; the paper itself analyzes the significance of apparent socio-economic relationships. Benjamin (1988) provides an insight into the experiences of Antigua and Barbuda in relation to the effect of government imposed price controls in the development of the fishing industry in the country. The author reviews the work of a 1980 committee set up to examine the question of price controls on fish and argues for a change in the present system of price controls. Manickchand-Dass (1986) analyses the 10-year fisheries program of the Government of Trinidad and Tobago, 1980 - 1989. The specific objectives of the program were to

increase domestic supply, per capita consumption of fish, and the income of fishermen. He also examined the socio-economic and ecological impact of Government policies. Koester (1985) provides an overview of fishing along St. Lucia's southeast coast, and describes a community-based and initiated fisheries development project, the conditions under which the fishermen carry out their activities, the labor and market conditions, as well as the living conditions. Due to the importance of intra-island, inter-island, and island-to-mainland marketing structures for fish and other commodities, there were several studies on food marketing strategies and development (Sentongo-Kabuka 1984). Throughout the region there was increasing discussion of integrated approaches to fisheries and coastal resource management and managing small island sustainability (sustainable development approach) (Berkes and Shaw 1986). Conflict between fishers and coastal development was increasing which required a broadening of approaches to how managers thought fisheries management. The modernization of fisheries authorities included more attention to fisher participation in management planning and data collection arrangements. A growing regional-scale appreciation of fisheries management issues saw several regional fisheries organizations developed including the OECS fisheries unit (and harmonized fisheries legislation), Caribbean Fisheries Resource Assessment and Management Program and West Central Atlantic Fisheries Commission (Renard and Chakalall 2010). Berkes (1987) analyzed the common property resource problem and the fisheries of Barbados and Jamaica. The book by Taconet (1986) describes the beach seine fishery of Martinique. Section 1.3 discusses the historical bases and current operations of the self regulatory mechanisms developed by seine fishers to systematically allocate space and fishing opportunities amongst themselves on fishing grounds. The need to modernize fisheries management authorities saw increased attention to capacity building through more training of fisheries officers. Atherley (1988) analyses the involvement of women in the fishing industry in the English-speaking Caribbean. The extent of this involvement is surveyed in the different aspects of the industry including fish catching, processing, and research and development. Although similarities and differences exist in the different countries, the case of Trinidad and Tobago is used to make recommendations for providing opportunities for women to contribute to the industry.

### **The 1990s**

The 1990's began with a major effort directed towards fisheries research - A Study of International Fisheries Research (SIFR) (World Bank 1992). The SIFR was the result of a 1986 donor's consultation in which lack of research on fisheries was identified as one cause of the lack of fishery development project's success. The SIFR was overseen by the World Bank, the United Nations Development Program, the Commission of the European Union and

FAO. The SIFR set out to:

- i) Determine whether lack of basic information was a cause of failure,
- ii) Identify high priority research needs,
- iii) Assess the capacity of developing countries to undertake the research, and
- iv) Recommend ways to improve the impact of international aid in fisheries research.

As part of the SIFR, a working group on critical factors affecting and research needs for small-scale fisheries was established (World Bank 1991). The initial focus of the working group was on problems associated with the management of small-scale fisheries. This was felt to be the most critical problem to be dealt with and would lead to the identification of other significant characteristics of small-scale fisheries requiring attention. The working group, "... necessarily and essentially focused on people-related problems." (p.31). The working group stated that social science analysis of fisheries problems in developing countries had received insufficient attention and, while growing, there was still a considerable need for improvement. The working group reported that a critically important condition governing most fisheries, both small and large-scale, is the absence of satisfactory use rights. The direction for research was felt to be related to the establishment, re-enforcement or protection of satisfactory use rights. The working group identified three general subject matter research areas:

- i) The social organization of fisher groups;
- ii) The institutions within which groups operate, and
- iii) The forces and conditions affecting the way in which the group operates.

The improved management of small-scale fisheries was believed by the group to be among the critical areas needing research. The management areas identified were:

- i) Provision of exclusive use rights to small-scale fisher groups,
- ii) Broaden scope of development for fishing communities,
- iii) Control over other uses of the environment,
- iv) Fiscal policies and measures, and
- v) External measures influencing fisheries management.

Socioeconomic research on small-scale fishers exploded during the late 1980s and throughout the 1990s (Charles et al. 1994). Research on sociocultural issues in small scale fisheries continued (Poggie and Pollnac 1991). A range of new research directions developed during the 1990s. Major new research directions included gender and women in fisheries (Merriken 1990, Matthews 1995, Meinzen-Dick et al. 1997, Asian Fisheries Society 1998), social-ecological systems (Berkes and Folke 1998), marine protected areas (Fiske 1992, Kelleher and Recchia 1998),

enforcement and compliance (Kuperan et al. 1997), and small-scale fisheries policy and the interface between fisheries, food security, and environmental sustainability (Ahmed et al. 1999).

Governance of fisheries, with a focus on community-based management and co-management and associated tools and methods, became a major area of research throughout the 1990s. This included a broad range of research on technical, methodological, theoretical, analytical, institutional, and policy aspects. Research on common property and collective action in fisheries continued to increase and there was cross-fertilization of ideas from different disciplines working together (Pomeroy 1994, Hess 1996). Research in indigenous and indigenous knowledge (Ruddle 1993, Hviding and Baines 1996) and traditional management systems (Ruddle 1994, Dyer and McGoodwin 1994) also continued to increase. Research on community-based management and co-management was on-going around the world (CANARI 1999, DeCosse and Jayawickrama 1998, ICLARM/IFM 1996, Normann et al. 1999, Sverdrup-Jensen and Nielsen 1998, White et al. 1994, Pomeroy 1995). Tools and methods to support co-management were being developed (IIRR 1998, Townsley 1996, Pido et al. 1996).

As in other parts of the world, a major focus of science and research in the Caribbean in the 1990s was on governance. The FAO Code of Conduct for Responsible Fisheries, Convention on Biological Diversity, International Plan of Action on Illegal, Unreported and Unregulated Fishing, and other international agreements and instruments influenced perspectives on fisheries management and governance in the region. Research was undertaken on institutional reform, developing partnerships and participation, and strengthening regional fisheries organizations (Chakalall, Mahon, and McConney 1998). Many researchers were examining the potential of co-management and community-based management approaches for the region (Chakalall 1991, Brown 1996, Brown and Pomeroy 1999, CANARI 1999). This included research on institutional and cultural barriers to co-management (Sandersen 1996), organizing fishers (McConney 1999), and consultation processes (CANARI 1994, Jeffrey 1998). Stakeholder participation was incorporated into CFRAMP sub-projects and there was increasing interest among fisheries authorities to organize fishers. Marine protected areas and marine reserves were being planned and implemented with stakeholder participation and co-management arrangements (CANARI 1999). Research began on tenure aspects of fisheries (Christy 1997). Community-based fisheries management was relatively common throughout the region, and it was customary for small fishing communities to have a sense of tenure over near-by resources. Many countries, some with support from CFRAMP and the Integrated Caribbean Regional Agriculture and Fisheries Development (ICRAFD) Program, developed fisheries management plans with increasing public participation and

review (Trinidad and Tobago Fisheries Division 1994). Espeut (1994) produced one of the most comprehensive socioeconomic baseline surveys of thirty fishing communities in twelve CARICOM countries. Integrated approaches to resource management, introduced in the 1980s, such as integrated coastal management, became increasingly mainstreamed through support from the Inter-American Development Bank and OECS, among others (IADB 1998, OECS 1998). Economists were concerned about the provision of financial transfers (subsidies) to the sector and impacts on structural imbalances in the sector (Steenbank and Munro 1999). Economists and fishery managers were also looking into marketing and trade due to increased globalization of fisheries. Research focused on obtaining more benefits for fishers, improved quality control requirements, value-added, export market access and the complexities of market structure (Salas et al. 2007). The issue of conflicts, both international and intraregional, were studied (Christy 1997). International conflicts included delimitation of boundaries, illegal foreign fishing, shared stocks, and trade barriers. Intra-regional conflicts included between and among different user groups, large and small scale, and alternative uses of the coastal zone. Studies of traditional ecological knowledge were undertaken (Mahon 1997, Gomes et al. 1998, Grant and Berkes 2004).

### The 2000s

The governance of fisheries continued to be a major area of research throughout the 2000s. Research focused on governance reform through decentralization, co-management, participation, and accountability (Bene and Neiland 2006). Studies were undertaken on implementation and the impacts of co-management (Thompson, Sultana and Islam 2004). The World Bank/FAO (2009) report, *The Sunken Billions – Economic Justification for Fisheries Reform* called for a substantial reform of the world's fisheries. The fisheries reform narrative has been supported by a number of international institutions and organizations such as the World Bank, OECD, FAO, the fishery academic community, environmental NGOs, and private foundations. Most call for rights-based fisheries (access rights) to provide wealth. Over the last few years, there has been a convergence of thinking within the marine conservation community that combining community-scaled protected areas (i.e., no-take zones) with limited access regimes that allow those communities to benefit from the protections (i.e., TURFs) is the most promising solution to coastal fisheries depletion in the developing world. These systems, often called TURF-reserve systems. Fishery improvement projects use the buying power of seafood markets to promote reform in a few problematic but fixable fisheries. Typically, NGOs coordinate the purchasing power of groups of engaged buyers, effectively delivering an ultimatum to fisheries to improve or lose the market. Research examined the poverty and food security implications of small-scale fisheries (Bene 2003, Bene et al. 2007)

and on a restructuring of global fisheries to improve sectoral economic performance through capacity reduction and rights-based management. Research on the social and governance dimensions of marine protected areas became a priority. Research suggests that social factors, not biological or physical variables, are the primary determinants of MPA success or failure. It is often more difficult to get the social components of an MPA *right* than the biological or physical components. A large body of work which began in the late 1990s developed showing the importance of good governance, policy and practice to realize the full potential of fisheries for food security and nutrition (Ahmed et al. 1999). Studies have explored fish trade and the links between trade and food security (Kurien 2004, Bene et al. 2010, Gillett 2009, Smith et al. 2010). In 2008, the *Global Conference on Small-Scale Fisheries* identified several critical ways forward in securing sustainable small-scale fisheries that integrate social, cultural and economic development, address resource access and use rights issues guided by human rights principles, and recognize rights of indigenous peoples. This included sustaining livelihoods and creating wealth, sustainable local management, access and use rights, securing post-harvest benefits through the value chain, recognizing and strengthening women's roles, human rights, and improving working and living conditions. A number of new approaches to small-scale fisheries developed:

- i) The sustainable livelihoods approach (Allison and Ellis 2001, Allison and Horemans 2006, Thorpe et al. 2007),
- ii) Ecosystem approach to fisheries (FAO 2003, Charles 2001, De Young et al. 2008),
- iii) Resilience (Berkes and Seixas 2005, Andrew et al. 2007, Olsson et al. 2004),
- iv) Social-ecological systems (Berkes et al. 2001),
- v) Wealth-based approaches (World Bank),
- vi) Well-being in developing countries (Gough and McGregor 2007), and
- vii) Human rights and human security (ICSF).

Research has focused on the need to embed fisheries governance within a broader perspective of human rights to enhance the chances of achieving both human development and resource sustainability outcomes in small-scale fisheries of developing countries (Allison et al. 2012). Market research continued on the increasing global and local demand for seafood, analysis of potential tradeoffs, and on market-based approaches such as certification. In addition, there was a focus of research on value chain analysis of fisheries. Gender research focused on reducing gender disparities in access to and control of resources and decision-making. Climate change was in the forefront in the 2000s, and research focused on strengthening the ability to monitor the impacts of climate change and to develop strategies to adapt to the impacts that are relevant to local circumstances. The development of fisheries

information systems received attention to bridge the gap between research and action and for examining the needs, processes, inputs, and outputs of different user groups. Efforts were also underway to better understand the contribution, relevance, and importance of small-scale fisheries to national economy and livelihoods. Informed by the outcomes of the 2008 Bangkok Conference and of three regional workshops held in 2010, the 29th session of the Committee on Fisheries agreed on the development of international guidelines that address both inland and marine small-scale fisheries, are of a voluntary nature, focus on the needs of developing countries, draw on relevant existing instruments and complement the *Code of Conduct for Responsible Fisheries*. The overarching goal of the Guidelines is to enhance the contribution of small-scale fisheries to food security and nutrition and to support the progressive realization of the right to food. Promoting a human rights-based approach, they aim to achieve poverty eradication, equitable development and sustainable resource utilization. The Guidelines seek to achieve this by empowering small-scale fishing communities, including both men and women, to participate in decision-making, enjoy their human rights, and assume responsibilities for sustainable use of fishery resources.

Through the 2000s there was a continued focus on governance and sustainability. The Caribbean Regional Fisheries Mechanism (CRFM) agreement was signed and CRFM was established as a major fisheries governance institution for the region. The Caribbean Community Common Fisheries Policy (CCCFP), a regional treaty on conservation, management and sustainable utilization of the region's fisheries resources, is drafted through a highly participatory process. Stakeholder participation increases nationally and there is a more active role for fisherfolk organizations as a result of the newly formed Caribbean Network of Fisherfolk Organizations. The Caribbean Large Marine Ecosystem (CLME) project developed a Regional Ocean Governance framework for the Wider Caribbean Region. The CLME project focuses on EBM/EAF for the Caribbean LME and adjacent areas as a basis for ensuring the sustainable use of region's shared living marine resources with a focus on governance. In addition, FAO promotes EAFM in the region. The development of the Caribbean Sea Commission is undertaken under the auspices of the Caribbean Sea Commission. Research continued on supporting the establishment of co-management arrangements in the region (CANARI 2002, McConney et al. 2003, Begossi and Brown 2003). The use of MPAs continues to be increasingly popular in the wider Caribbean region. CaMPAM provides capacity building support. The project *Diagnostic Study to Determine Poverty Levels in CARICOM Fishing Communities* is completed. The objective of the project is to determine poverty levels of fishing communities in selected CRFM members States, and its effects on quality of life and structure, so as to identify suitable planning models and

implement alternative livelihood and poverty alleviation programs in these communities. SOCMON Caribbean provides a methodology for gaining a greater understanding of the human dimension of coastal and marine resource management (Bunce and Pomeroy 2003). The Caribbean Regional Fisheries Mechanism (CRFM), assisted by the Food and Agriculture Organization (FAO), carried out case studies in Belize, Dominica, Jamaica, Saint Lucia, Trinidad and Tobago, and the Turks and Caicos Islands on the consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning (FAO 2006). Most recommendations focused on actions to be taken by national governments, such as promoting the development of fishing communities through fishers' and community-based organizations, review by each country of its legal framework and establishment of task forces comprised of government agencies, industry and other stakeholders, policy direction to promote economic and social development of fishing communities and community-based organizations, and creation of fisheries development units under the fisheries departments. There was increased interest on the impacts of fisheries subsidies due to World Trade Organization negotiations. Research examines the establishment of equitable access and rights to fisheries resources among stakeholders, impacts of globalization on fishers, climate change, and the need for alternative livelihoods.

#### **APPLYING SOCIOECONOMIC AND GOVERNANCE SCIENCE TO SOLVE PROBLEMS AND CREATE OPPORTUNITIES**

The theme of the 67<sup>th</sup> GCFI conference is *Small Islands, Big Issues: Applying Fisheries and Marine Science to Solve Problems and Create Opportunities* as the UN has declared 2014 the International Year of Small Island Developing States (SIDS). As such, I would like to provide two examples of how socioeconomic and governance science has been applied in the region to solve problems and create opportunities.

#### **Caribbean Network of Fisherfolk Organizations**

People are central to the fisheries management decision-making process and are the agents for change. As such, stakeholder participation and involvement is integral to the success of fisheries management. Increased stakeholder participation and involvement in the resource management decision-making process has gained acceptance worldwide.

Fisher folk organisations (FFOs) were introduced to many locations in the English-speaking Caribbean (now the Member States of CARICOM) during the British colonial period, often in the early 1960s and 1970s. Many of the early organisations failed in various places after only a few years for various reasons (McConney 2007). The problem is that within the Caribbean region there is a lack of fisherfolk participation in policy processes and fisheries



management. The solution is through improving stakeholder participation. Increased interest in stakeholder participation in policy processes and co-management in the 1990s renewed interest in institutional strengthening of fisherfolk organizations in the Caribbean. Research and guidelines since the 1970s have supported the important role that fisher's organizations and cooperatives can play in the fisheries management and development process. A needs assessment of Caribbean fisherfolk organizations in 2004 recommended the formation of a regional network of National Fisheries Organizations (NFOs) to strengthen the capacities of fisherfolk organizations. A 2005 meeting produced a *Strategy and Medium Term Action Plan for the Institutional Strengthening of Regional Fisher Folk Organizations - 2006 to 2010*. The overall objective is "to contribute to improved income earnings, higher standards of living of fisher folk and sustainable use of fishery resources in the Caribbean". The more specific purpose is to have "institutional capacities of fisher folk organizations developed at the regional, national and community levels" (McConney 2007). The Caribbean Network of Fisherfolk Organizations (CNFO) was created. Two regional programs (CRFM/CTA/CERMES and CANARI) and two regional research programs (CLME and MarGov) have supported the creation of the CNFO and building the capacities of fishers and fisherfolk organizations in leadership, management, livelihoods, and advocacy. Fisherfolk participation has been formalized primarily through state-led national and regional strengthening of organizations. Levels of national fisheries authority support for fisherfolk organizing vary, as do the preferred forms of organization.

### Caribbean Large Marine Ecosystem

The *Problem* is that most ocean space in the Wider Caribbean Region has been overexploited, with declining catches and major shifts in biodiversity. These impacts arise primarily from a variety of anthropogenic factors. Weak governance is seen as the root cause of these problems. The *Solution* involves a shift in thinking towards appreciation of the full range of goods and services that ecosystems can provide.

This has led to a new focus on ecosystem-based management (EBM) at appropriate scales. In the marine environment, large marine ecosystems (LMEs) have been established as ecologically rational units of ocean space in which EBM can be applied. The Caribbean LME and Adjacent Areas (CLME) is one of four LMEs within the Wider Caribbean Region (WCR). The CLME Project Area region includes 26 countries and 19 territories that are Dependencies of France, the United Kingdom, the United States, and The Netherlands. The CLME Project aims to improve management of shared living marine resources in the WCR.

The emphasis is on examining governance arrangements for trans-boundary issues. The project approach is

based on the science of governance of complex systems, specifically the "adaptive governance model" in which control is decentralized and response flexibility is emphasized, similar to that proposed for the Arctic Ocean by Young (2010). The result is a multi-networked approach of transboundary management which can be viewed as regional ocean governance. The regional ocean governance regime was approached in two stages:

- i) A conceptual framework at the LME level based on a wide range of governance research and theory, and
- ii) Use of the conceptual framework to guide the assessment of the governance arrangements and piloting governance-specific activities.

The Regional Ocean Governance Framework allowed for the Caribbean Sea Commission to be identified to take the lead role in ocean policy coordination at the level of the WCR.

### THE CHALLENGE

I was asked to challenge the GCFI participants with new ideas and concepts on the sustainability and conservation of marine resources in the Caribbean. To fulfill this challenge I will propose a new socioeconomic and governance science and research agenda for the Caribbean region to solve problems and create opportunities. This agenda is not meant to be comprehensive, but to present some topics which I feel need greater attention in the region.

- i) *Livelihoods and economic development* – Moving toward improved fisheries management may require a reduction or redirection of fishing effort, making it necessary for fishers and their households to find alternative, supplemental, or enhanced livelihood activities. Having alternatives to fishing that locally generate income and food can reduce the pressure to exploit local resources. When fishers and communities have few if any economic alternatives, it will be difficult to institute effective fishery management involving constraints on fishing, since the impacts of such decisions may be unacceptably severe. Efforts to develop livelihood opportunities must not be seen as a panacea to solving fishery problems. Nevertheless, the broadened perspective inherent in improved fisheries management, such as EAFM, requires a holistic approach to addressing the needs of individuals, households and communities and should support their development of sustainable portfolios of livelihood sources.
- ii) *Resilient coastal communities* – Socio-ecological resilience can be defined as the capacity of linked social-ecological systems to absorb recurrent disturbances, such as storms or fluctuations in fish catch, so as to retain essential structures, processes, and

feedbacks (Hollings 1973, Walker et al. 2004). Fisheries resources scarcity and conflict may erode the social-ecological resilience of coastal communities who have a high dependence on coastal ecosystems to meet daily food and household income needs. Thus, the challenge is building and strengthening the social-ecological resilience of coastal nations and communities.

- iii) *Ecosystem approach to fisheries management (EAFM)* – An ecosystem-based approach to fisheries management (EAFM) is geographically specified fisheries management, an approach that takes account of knowledge and uncertainties about and among living marine resources, their habitat, and human components of ecosystems, and strives to balance diverse societal objectives. EAFM supports increased stakeholder participation in management, improved information, and improved institutional capacity. Regional and national governments and organizations in the region have begun to move toward adopting and implementing EAFM principles and approaches. Increased, meaningful engagement by the private sector is necessary for EAFM to succeed regionally.
- iv) *Fisheries, food security and poverty* – Fisheries play an important role in providing food and income in many Caribbean countries, either as a stand-alone activity or in association with crop agriculture and livestock rearing. There is a need to identify how these contributions of fisheries to poverty reduction and food security can be enhanced while also addressing the need for a sustainability transition in over-exploited and over-capitalized capture fisheries.
- v) *Addressing Maritime Security Issues* – Increasingly, non-traditional threats to security are linked to the issue of resource scarcity. Effective maritime governance and a smoothly functioning infrastructure ensure the viability of the ocean commons, whereas gaps in maritime security can enable the proliferation of security threats. In the absence of effective maritime governance, state and non-state actors can engage in piracy, illicit commerce (smuggling and human trafficking), illegal fishing, environmental pollution, support for insurgency, or acts of terrorism, while exploiting a country's territorial waters and exclusive economic zone. Thus, illegal fishing, now commonly combined with unreported and unregulated fishing, generates diplomatic, territorial, military, food, fisheries, and environmental security threats across the region, while perpetuating human rights abuses. In order to address such transnational threats, law enforcement authorities and civil society partners must work together to more deeply investigate and analyze regional maritime security issues in order for targeted interventions to be tested, refined, and deployed sub-regionally.

## A FINAL WORD

Ian Smith (1979) wrote:

*... the goal of research should be to expand and clarify the alternative choices available to decision makers,...*

There is a need to ensure that we balance science and action. We, as managers, resource users, and scientists, must make sure that the donor community continues to understand the important contribution that science plays in solving problems and creating opportunities.

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