



A research framework for traditional fisheries: Revisited



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ARTICLE INFO

Article history:

Received 6 November 2015

Received in revised form

7 May 2016

Accepted 11 May 2016

Available online 19 May 2016

Keywords:

Small-scale fisheries

Developing countries

Research

ABSTRACT

This paper revisits the 1979 seminal work of Ian Smith and the research agenda for small-scale fisheries which identified areas of research which would have the greatest potential for contributing to the solution of problems facing small-scale fisheries and their communities. The paper provides an historical perspective on the changing issues and research and development agendas for small-scale fisheries over the last fifty years. Several suggested research priorities on small-scale fisheries for the next decade are identified including overcapacity, livelihoods, markets and secure and resilient communities.

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1. 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* [1]. As we have learned, what Ian Smith referred to as traditional fisheries and as we now more commonly call 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 [1], 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 purpose is to revisit the seminal work of Ian Smith and the research agenda for small-scale fisheries which identified areas of research which would have the greatest potential for contributing to the solution of problems facing small-scale fisheries and their communities. The second purpose is to provide an historical perspective on the changing issues and research and development agendas for small-scale fisheries over the last fifty years. The third purpose is to identify several suggested research priorities on small-scale fisheries for the next decade. Three points of clarification on this paper. First, although small-scale fisheries are important in both

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developed and developing countries, this paper will focus on small-scale fisheries in developing countries globally. 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 multi-disciplinary approach. Third, it is not possible to reference every publication on a particular topic. Representative publications are referenced for each topic.

2. An historical perspective of issues and research agendas

To understand research priorities on small-scale fisheries for the next decade, it is important to review and understand science and research agendas undertaken on small-scale fisheries in an historical perspective. Research on small-scale fisheries has historically been primarily focused on fisheries biology and stock assessment and technology development, with only a small amount of economic and social research [2]. Fisheries science has been devoted to assessments of fish stocks and their potential productivity [3,4]. 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 [2] 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.

2.1. The 1970s and before

Social science research on small-scale fisheries has developed more recently than fisheries biological research [5]. The earliest published research work on small-scale fisheries in developing countries is available from anthropologists such as Malinowski [6] 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 [7], Alkire [8] on a Pacific atoll fishery, Fraser [9] on fishers in Southern Thailand, and Price [10] on the historical roots of Caribbean fishing communities. 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 [11]. 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 [12–14], G.A. Baum and J.A. Maynard [15,16], D.K. Emmerson [17], J.C. Marr [18,19], Pollnac [20–22], Christy [23], Szanton [24], Lockwood and Ruddle [25], and Alexander [26]. The focus of a great deal of this research was on describing the socio-economic 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 [27] highlighted the marginalization of small fishers in Madras state in India. There was a good deal of

research on fishermen's cooperatives [28,29]. 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 [30]. This included such joint programs with the United Nations Development Program (UNDP) 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 [31]. 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. The UNDP Caribbean Fisheries Development Project in the late 1960s/early 1970s assessed social, cultural, and economic conditions of fishers and fishing communities, especially markets and marketing. 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 world-wide. 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 [32]:

- 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 [1]. 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 [1] 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 [1] 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 [1] 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 [1] 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 [1]:

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

Smith [1] 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.

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 fisheries development programs. Fisheries management was primarily “top down” with limited stakeholder participation in fisheries development or management.

2.2. 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 [1,33–35]. Associated with this focus on management was research on fisheries socioeconomics [36–38], the sociocultural aspects of small-scale fisheries [36,39], fisher organizations [40,41], territorial and exclusive use rights [42,43], traditional knowledge [44,45], monitoring and evaluation [46], and alternative employment opportunities [31]. 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 [47–50]. Research also emphasized post-harvest activities such as fish-handling, storage, processing, packing, and distribution systems [31,51]. There was also increasing attention being paid to the acquisition of socioeconomic fisheries information [52].

Much of the published research output in the 1980s was from Asia. However, more research output began to be generated from Africa [53,54] and Latin America [55,56] in the 1980s. The Program 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 [57].

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 [58–60]. 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 [61–66].

Socioeconomic research, to complement the ecological research, on marine reserves began to emerge in the late 1980s [67,68]. Research on traditional management systems [69,70] and community-based coastal resource management [71] 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 [72,73].

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 [74]. Emerson [17] 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 1980s. Three outputs from the early 1980s best illustrate this multidisciplinary research. These include the San Miguel Bay, Philippines studies conducted by ICLARM [75–77] and the work in Central America conducted by ICMRD [55,78].

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 [79] 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 [79] 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.

2.3. The 1990s

The 1990s began with a major effort directed towards fisheries research – A Study of International Fisheries Research (SIFR) [80]. 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 [81]. 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.

In addition, the FAO Code of Conduct for Responsible Fisheries, the Convention on Biological Diversity, the International Plan of Action on Illegal, Unreported and Unregulated Fishing, and other international agreements and instruments influenced perspectives on research and fisheries management and governance.

Socioeconomic research on small-scale fishers exploded during the late 1980s and throughout the 1990s [5]. Research on socio-cultural issues in small scale fisheries continued [82]. Espeut [83] produced one of the most comprehensive socioeconomic baseline surveys of thirty fishing communities in twelve Caribbean Community (CARICOM) countries. A range of new research directions developed during the 1990s. Major new research directions included gender and women in fisheries [84–86], social-ecological systems [87], marine protected areas [88,89], enforcement and compliance [90], and small-scale fisheries policy and the interface between fisheries, food security, and environmental sustainability [91].

Economists were concerned about the provision of financial transfers (subsidies) to the sector and impacts on structural imbalances in the sector [92]. 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 [93]. The issue of conflicts, both international and intraregional, were studied [94]. 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.

Research on the governance of fisheries included a broad range of topics on technical, methodological, theoretical, analytical, institutional, legal 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 [95,96]. Research in traditional ecological and indigenous knowledge [97–100] and traditional management systems [101,102] also continued to increase. Research on community-based management and co-management was on-going around the world [103–109]. Tools and methods to support co-management were being developed [110–112].

The 1990s was really the decade of research on the governance of fisheries, with a focus on community-based management and co-management and associated tools and methods. The common property theories developed by Ostrom [113] were being applied throughout the world.

2.4. The 2000s

Continuing what began in the 1990s, the 2000s saw a surge in research and institutional interest, at international, national and local levels, on small scale fisheries. The governance of fisheries continued to be a major area of research throughout the 2000s

[114,115]. Research focused on governance reform through decentralization, co-management, participation, and accountability [116]. Studies were undertaken on implementation and the impacts of co-management [117].

Global development policies towards small-scale fisheries shifted to a focus on combating and eradicating poverty. Research examined the poverty and food security implications of small-scale fisheries [118,119]. Development interventions shifted from transferring technology and capital investments to more integrated interventions to deal with conservation, economic and social/equity objectives [120]. 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 [91]. Gender research focused on reducing gender disparities in access to and control of resources and decision-making and mobilizing women's groups for social change [121].

The World Bank/FAO [122] report, *The Sunken Billions – Economic Justification for Fisheries Reform* called for a substantial reform of the world's fisheries and on a restructuring to improve sectoral economic performance through eliminating subsidies, rights-based management, and wealth-based approaches. Research and development efforts supported reforms to bring about a more sustainable fisheries sector and to support the broader benefits obtained from small scale fisheries, especially to the poor [123]. In addition to policy and institutional reform, reforms were undertaken to raise the profile of small-scale fisheries in national and international policy and development agendas [120,124]. Concern over this wealth based approach of rent-maximization caused researchers to write about the welfare function of small-scale fisheries [125].

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 [126]. 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. During the decade, a number of new approaches to small-scale fisheries were presented and developed:

- i) The sustainable livelihoods approach [127–129]
- ii) Ecosystem approach to fisheries [130,131]
- iii) Management for resilience [132–134]
- iv) Social-ecological systems [135]
- v) Wealth-based approaches [122]
- vi) Well-being [136,137]
- vii) Human rights and human security [138,139]
- viii) Complex adaptive systems [115]

Research on the social and governance dimensions of marine protected areas became a priority. Research suggested that social factors, not biological or physical variables, are the primary determinants of MPA success or failure [140]. The expansion of locally managed marine areas (LMMA) spurred research on their contribution to sustainable marine resource management, lessons learned and replicability [141].

The globalization of trade created both opportunities and risks for small scale fisheries and, in most cases, decision-making was beyond the immediate reach of fishing communities and fishers [120]. Studies explored fish trade and the links between trade and food security [142–145]. Market research continued on the increasing global and local demand for seafood, analysis of potential tradeoffs, food and safety concerns, and on market-based approaches such as certification and ecolabelling. In addition, there was a focus of research on value chain analysis of fisheries to

increase livelihood and benefit distribution to small-scale fishers [146].

Climate change and its impacts on fisheries and coastal communities came to the forefront in the 2000s. Climate change projections strongly suggested that the effects on coasts, lakes and rivers, and on the fisheries they support, will bring new challenges for these systems and the people who depend on them [147]. Research focused on raising awareness and developing strategies to adapt to the vulnerabilities and impacts that are relevant to local context [148].

Efforts were also underway to better understand the contribution, relevance, and importance of small-scale fisheries to national economies and livelihoods and address sector marginalization [124]. 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. Research on gender and fisheries expanded the understanding of women's role in the supply chain and gendered employment [149–151].

While not an emerging issue, there was greater awareness and recognition of illegal, unreported, and unregulated (IUU) fishing. Research highlighted the economic, social and environmental impacts and the level and effectiveness of responses to IUU fishing [152,153]. Researchers continued to grapple with the factors surrounding enforcement and fisheries compliance [154].

There was an increased recognition that non-traditional threats to maritime security are linked to the issue of resource scarcity [155]. 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 [156,157]. Poorly governed or ungoverned maritime spaces also invite undue influence from predatory states seeking to exploit a country's offshore fisheries, energy, or natural resources.

Research on ecosystem services (ES) and payments for ecosystem (or environmental) services (PES) developed from the Millennium Ecosystem Assessment [158], which developed and promoted a widely applied conceptual framework [159,160] based on a definition of ES as '... the benefits people obtain from ecosystems' [158]. ES draws on disciplines including economics, ecology, conservation and development and social policy, and has evolved into a number of related, but somewhat parallel strands, including theoretical development of the ES concept [159], research on the generation and use of specific ES [161], monitoring and measurement of ES over time or space [162], valuation [163] and accounting [164], applications and studies of PES schemes, both in theory [165] and practice [166].

The role of civil society and non-governmental organizations in small-scale fisheries has always been important to governance, management and development and research documented this role and means to strengthen it [167–171]. Research networks, such as the Asian Fisheries Social Science Research Network and Too Big to Ignore, have supported the development and expansion of socio-economic and governance research on small-scale fisheries [172,173].

The decade of the 2000s was a period of broad expansion of research on small scale fisheries addressing the wide range of external drivers that affect small-scale fisheries with new approaches and perspectives and with new policy analysis on poverty, food security and nutrition.

2.5. The 2010s

Much of the research undertaken in the 2000s continued into the 2010s. However, several new areas of inquiry developed.

Between 2010 and 2013, FAO facilitated a global participatory development process that resulted in the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication which were endorsed by the Thirty-first Session of COFI in June 2014 [174]. The Guidelines were developed to provide complementary guidance with respect to small-scale fisheries in support of the overall principles and provisions of the 1995 FAO 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.

Research and policy expanded around the nexus of fisheries, poverty, food security and nutrition [175–177]. Policy studies addressed the challenge of how to maintain or enhance the contribution of fish to food security and nutrition and fisheries sector reform to reduce levels of poverty and hunger. Poverty studies provided a better understanding of what poverty means to fishers, households and communities; how they cope with it; and how to increase resiliency [178].

Research on governance 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 [138,179] and comparative analysis [180].

The fisheries reform narrative expanded through a number of international institutions and organizations such as the World Bank, OECD, the fishery academic community, environmental NGOs, and private foundations. Most call for rights-based fisheries (access rights) to provide wealth [181,182]. 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, are not new or innovative, as this approach has been around for twenty-five years [183], but have recently received considerable financial support. Concerns about rights-based fishing reforms brought about calls to abandon the approach for alternative solutions such as greater involvement of fishers in decision-making and a human rights approach [125,184,185].

Neoliberalism, with a focus on letting the 'market' address different social and economic problems and governance, emerged as an important topic in the analysis of small-scale fisheries [186–189].

Fisheries reform would also be undertaken through sustainable seafood market transformation. The recommendation for many small-scale, data-deficient fisheries in the developing world which are considered to be uncertifiable is fishery improvement projects (FIPs) [181]. The demand for sustainably certified wild-caught seafood brought about FIPs which uses the buying power of seafood markets to promote reform in a few problematic but fixable fisheries [190]. Research is being undertaken to better understand the effectiveness of FIPs, how costs and benefits are distributed through the value chain, and the social-ecological system in which they operate.

Research and development efforts turned to market-based policies and incentives to better align commercial and

conservation objectives and to financially transition to sustainable fisheries [191,192]. These strategies include certification schemes, eco-brands, small investment funds, and consumer marketing efforts to generate greater demand for sustainably sourced seafood. The development of impact investing strategies that utilize private, rent-seeking capital to support sustainable seafood is also being applied.

Marine spatial planning (MSP) emerged as an approach to implementing integrated management of coastal and ocean areas [193]. Many of the characteristics of MSP [194], are common to other planning approaches including integrated coastal management and ecosystem-based management. Research on MSP has been multi-disciplinary and reflects its ecological, institutional, economic and social components. Marine ecosystem based management also emerged as an integrated approach to maintain the health, productivity and resilience of marine ecosystems [195,196]. Research on EBM focused on development of an EBM framework, implementation of integrated strategies for EBM, and governance arrangements for EBM.

3. Discussion

Research and policy analysis on small scale fisheries has evolved over the last fifty years from disciplinary studies to multidisciplinary and holistic studies. From research to develop basic knowledge about fishers and fishing communities and to support fisheries development to research in support of improved fisheries management and governance. From research focused just on the fisheries sector to more integrated, multi-sector analysis. From research focused on a few problems such as inadequate technology and infrastructure and markets to a growing range of problems or drivers of change under the broad categories of weak governance, socioeconomic conditions and ecosystem change.

The problem facing small-scale fishermen, as identified by Smith [1], was that of low standard of living, or more specifically, low income. He identified contributing empirical problems as limited fisheries resources, open-access, surplus fishers, conflicts with the commercial fishery, inadequate vessels and gear, lack of alternative income sources, lack of market power, and inflation. These problems are still with us, and have been compounded by a range of other problems or drivers of change including lack of stakeholder participation, poor enforcement, weak institutional capacity, overcapacity of fishing fleets, inadequate information, IUU fishing, maritime security, globalization of trade and market access, technological advances, population growth, health, human rights, habitat loss, degradation, pollution, and climate change [197].

Smith [1] concluded his monograph by stating that priority for development and research should be given to those programs that reduce fishing intensity. He suggested 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 [1] 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 former is a vertical concept and the latter a horizontal concept, which taken together imply the necessity for a holistic perspective of fishing and fishing communities.

In addition to the ongoing research, development and policy analysis mentioned above, several other research priorities are suggested for the next decade. It should be noted that these research priorities are, by coincidence, in-line with those suggested by Ian Smith more than forty-five years ago.

Fishing overcapacity continues to be one of the leading causes of overfishing. Overfishing has increased poverty among coastal fishers and also reduced the contribution of coastal fisheries to employment, export revenue, food security, and rural social stability in these nations. Ineffective sector governance and open access have enabled overcapacity and overfishing to continue and has negatively affected fisheries in ever-larger areas. Any gains obtained through marine conservation and management are often lost due to increasing overcapacity. Unless remedial action is taken, resource declines, increasing poverty, and impaired contribution to national development are expected to worsen as coastal populations increase. Although the problem of overcapacity is well-recognized and relatively easy to analyze, it remains one of the most intractable issues in fisheries to do something about. Integral elements of this situation that add to the complexity of finding solutions are varied and include growing populations, high dependence of fishers on the resource for food and livelihood, lack of ready alternative and supplemental livelihood opportunities, and lack of political will. Fisheries managers have become increasingly aware of the need to develop appropriate policies to facilitate the exit of capital and labor from overexploited fisheries. However, there is a lack of a policy focus on the specific approaches that could be pursued in small-scale fisheries. Countries with small-scale fisheries with severe overcapacity are unlikely to implement effective plans to address fishing overcapacity without strategies and approaches to analyze the problem and generate new policy options. Research is needed on methods to simply measure fishing capacity in data-deficient, small scale fisheries and approaches are needed to effectively reduce fishing capacity without causing large-scale social, economic and political disruptions.

Moving toward improved fisheries management, such as moving toward an ecosystem approach to fisheries management (EAFM), 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. Despite calls for a more holistic and integrated approach, fisheries agencies have been largely unable – with some notable exceptions – to incorporate the development of livelihood alternatives into fishery policy and management practices. Often the structures needed to coordinate among different sectoral agencies who are better suited to livelihood development is lacking. Nevertheless, the broadened perspective inherent in improved fisheries management requires a holistic approach to addressing the needs of individuals, households and communities and should support their development of sustainable portfolios of livelihood sources. Over the last thirty years, a range of different livelihoods have been provided and implemented in fishing and coastal communities around the world with mixed success and sustainability by the fisher and household. In the Philippines, for example, it is estimated that no higher than 15–20% of livelihood interventions are successful and sustainable; that is, that they are maintained by the recipients one year after the project ends

(Pomeroy et al., 2015). Research is needed to improve the success and sustainability rates of livelihood projects and programs in order to support both fisher households and communities and improved fisheries management.

The market both provides for, and restricts, opportunities for small-scale fishers. Increasingly, the catch from small-scale fisheries is marketed not only locally, but through intermediaries to distant national or global markets. In most cases, it puts the decision-making beyond the fisher and those involved in other fishing activities. Small-scale fishers also face constraints to market access including weak bargaining power and poor marketing strategies, monopolies among intermediaries, poor product holding infrastructure, lack of finance capital, difficulties meeting quality standards, and lack of market information. With specialized intermediaries, fishers often have little, if any, control over marketing outlets and the prices that they receive. Women producers and traders face additional gender-related barriers including lack of access to credit and technology, increased dependence, as well as a lack of representation in local decision-making related to fisheries and other livelihood opportunities. Low incomes create a situation of potential dependence that influences decisions about production, marketing and livelihood decisions by the fisher. This dependency becomes a motive for excessive exploitation of open access resources, a concern for food security and nutrition, and it may undermine compliance with formal resource governance institutions. This dependency can also lead to poverty traps where poor fishers are unable to mobilize the necessary resources to overcome shocks or chronic low-income situations and consequently remain in poverty. Relations and potential inequalities between fishers and intermediaries point to the need to find ways to increase the benefits from improved and equitable access to markets. This requires a better understanding of fisher-intermediaries relations and how these relations affect decision about resource use and ecological outcomes. Traditionally, markets have been looked at from a strictly social or economic perspective. Limited analysis has been conducted to understand the combined effects of the marketing system and the nature of fisher-market intermediaries' relationships on social and ecological components and outcomes, and on linked social-ecological systems. Market analysis studies utilizing the industrial organization approach of structure, conduct and performance can be undertaken to identify non-competitive conditions in the market. Value chain studies can be undertaken to analyze the interactions between different market actors and to identify areas for increasing value to fishers, value chain upgrading, market information, increasing efficiency and improving governance. Research and development efforts need to be increased on market-based approaches and incentives to improving the environmental sustainability of small-scale fisheries, such as certification schemes, traceability of products, ecolabelling, small investment funds and consumer marketing efforts, and their impacts. Research is also needed on the tools, appropriate role and potential of the financial sector to drive change. This might involve the development of impact investing strategies that utilize private, rent-seeking capital to support sustainable seafood, the provision of financial services or financial incentives to mitigate the cost of purchasing new gear technology.

4. Conclusion

Fishing communities face a broad range of security issues including, but not limited to, food security and nutrition, resource decline, conflict and competition over resources, health, livelihoods and income, peace and order and crime, inequitable economic development, and political marginalization. It is difficult for a fisher and family to think about, for example, long term resource

management and conservation when they feel economically, socially, physically and politically insecure. In addition, fisheries resources scarcity and conflict, among others, is eroding the social-ecological resilience of fishing households and communities who have a high dependence on coastal ecosystems to meet daily food and household income needs. A variety of responses to address these issues have been undertaken through the years by national governments, non-governmental organizations, and international agencies. All have had differing success rates depending on the country and the site/location within the country. A concern with use of the strategies is that while each has its own set of interventions that address a particular problem or set of problems, they are often not utilized together in an integrated manner to address the complex web of issues and solutions that are necessary to deal with insecurity and build resilience in coastal communities. Continued research is needed to address the underlying factors of insecurity and instability, not just the more observable outcomes such as terrorism and piracy and to build and strengthen the social-ecological resilience of fishing households and communities.

Acknowledgements

A version of this paper was presented as "Linking Science and People: Applying Socioeconomic and Governance Science to Solve Problems and Create Opportunities in Caribbean Fisheries" as a Keynote Address at the 67th Gulf and Caribbean Fisheries Institute Annual Meeting in Christ Church, Barbados on 3–7 November 2014. The author wishes to thank the Connecticut Agricultural Experiment Station and Connecticut Sea Grant for supporting this work. The author thanks two anonymous reviewers.

References

- [1] I. Smith, A research framework for traditional fisheries. ICLARM Studies and Reviews No. 2, International Center For Living Aquatic Resources Management, Manila, 1979.
- [2] M. Williams, The Transition in the Contribution of Living Aquatic Resources to Food Security, International Center For Living Aquatic Resources Management, Manila, 1996.
- [3] D. Pauly, Theory and Management of Tropical Multispecies Stocks: A Review, With Emphasis on the Southeast Asian demersal fisheries. ICLARM Studies and Reviews 1, International Center For Living Aquatic Resources Management, Manila, 1979.
- [4] D. Pauly, Assessment methodologies and fisheries management: how to keep making sense. in: Voigtlander C W. (Eds.) Proceedings of the World Fisheries Congress, Plenary Sessions, New Delhi: The State of the World's Fisheries Resources, Oxford and IBH Publishing, 1994.
- [5] A. Charles, T. Braner, A. Bermudez, H. Montalvo, R. Pomeroy, Fisheries Socioeconomics in the Developing World: Regional Assessments and an Annotated Bibliography, International Development Research Centre, Ottawa, 1994.
- [6] B. Malinowski, Argonauts of the Western Pacific: An Account of Native Enterprise and Adventures in the Archipelagos of Melanesia New Guinea, George Routledge, London, 1922.
- [7] R. Firth, Malay Fishermen: Their Peasant Economy, Archon, Hamden, CT, 1966.
- [8] W. Alkire, Lamotrek Atoll and Inter-Island Socioeconomic Ties, University Of Illinois Press, Urbana, 1965.
- [9] T.M. Fraser, Rusembilan: A Malay Fishing Village in Southern Thailand, Cornell University Press, Ithaca, 1960.
- [10] R. Price, Caribbean "shing and "shermen: a historical sketch', Am. Anthropol. 68 (1966) 1363–1381.
- [11] J.E. Bardach, Small-scale fisheries development: social science contribution, planning meeting, in: B. Lockwood, K. Ruddle (Eds.), Small-scale fisheries development: social science contribution, East-West Center, Honolulu, Hawaii, 1976.
- [12] R.M. Lawson, New directions in developing small-scale fisheries, Mar. Policy 1 (1) (1977) 45–51.
- [13] R.M. Lawson, Economics of Fisheries Development, Praeger Publishers, New York, 1984.
- [14] R.M. Lawson, E. Kwei, African entrepreneurship and economic growth: a case study of the fishing industry in Ghana. Ghana University Press (available from the University Bookstore, University of Hull, United Kingdom), 1974.

- [15] G.A. Baum, J.A. Maynard, Tobuan/Sual: a socioeconomic study. SCS/76/WP/22. Manila: South China Sea Fisheries Development and Coordinating Program, 1976.
- [16] G.A. Baum, J.A. Maynard, Coron/Tagumpay: a socioeconomic study. SCS/76/WP/22. Manila: South China Sea Fisheries Development and Coordinating Program, 1976.
- [17] D.K. Emmerson, Rethinking artisanal fisheries development: western concepts, Asian experiences, World Bank Staff Working Paper No. 423, World Bank, Washington DC, 1980.
- [18] J.C. Marr, Management and development of fisheries in the Indian Ocean, *J. Fish. Res. Board Can.* 30 (1973) 2312–2320.
- [19] J.C. Marr, D.K. Ghosh, G. Pontecorvo, B.J. Rothschild, A.R. Tussing, A plan for fishery development in the Indian Ocean, IOFC/DEV/71/1, UN Food and Agriculture Organization, Rome, 1971.
- [20] R.B. Pollnac, Continuity and change in marine fishing communities. Anthropology Working Paper No. 10. Kingston, International Center for Marine Resource Development, Rhode Island, 1976.
- [21] R.B. Pollnac, Panamanian Small-scale Fishermen: Society, Culture and Change, International Center for Marine Resource Development, University of Rhode Island, Kingston, Rhode Island, 1977.
- [22] R.B. Pollnac, Sociocultural aspects of technological and institutional change among small-scale fishermen, Anthropology Working Paper No. 22, Kingston, International Center for Marine Resource Development, Rhode Island, 1978.
- [23] F. Christy, Alternative Arrangements of Marine Fisheries: An Overview, *Reources For The Future*, Washington DC, 1973.
- [24] D.L. Szanton, Estancia in transition: economic growth in a rural Philippine community, Institute of Philippine Culture Paper No. 9, Ateneo de Manila University Press, Quezon City, 1971.
- [25] B. Lockwood, K. Ruddle K. (Eds.) Small scale fisheries development: social science contribution; proceedings of a planning meeting held at the East-West Food Inst. Honolulu, Hawaii, Sep 6–11, 1976. Honolulu, Hawaii: East-West Center, 1977.
- [26] P. Alexander, Innovation in a cultural vacuum: the mechanization of Sri Lanka fisheries, *Human. Organ.* 34 (4) (1975) 333–344.
- [27] B.A. Blake, Technological change among the coastal marine fishermen of Madras State, (PhD dissertation), Anthropology, University of Wisconsin, Madison, Wisconsin, 1969.
- [28] FAO, Manual on Fishermen's Cooperative, FAO Fisheries Studies No. 13, UN Food and Agriculture Organization, Rome, 1971.
- [29] M. Digby, *The Organization of Fishermen's Cooperatives*, Plunkett Foundation, Oxfordshire, UK, 1973.
- [30] FAO, Report of the International conference on investment in fisheries, Fisheries Report No. 83, UN Food and Agriculture Organization, Rome, 1970.
- [31] W.H.L. Allsop, *Fishery Development Experiences*, Fishing News Books Ltd., Farnham, Surrey, England, 1985.
- [32] ICMRD, Socioeconomic research issues in fisheries development, International Center for Marine Resource Development, Kingston, Rhode Island, 1977.
- [33] Indo-Pacific Fisheries Council, Symposium on the development and management of small-scale fisheries, Bangkok, Thailand, 1980.
- [34] T. Panayotou, Management concepts for small-scale fisheries: economic and social aspects, FAO Fisheries Technical Papers No. 228, UN Food And Agriculture Organization, Rome, 1982.
- [35] F. Christy, Special characteristics and problems of small-scale fisheries management in developing countries, in: E. Miles, R. Pealy, R. Stokes (Eds.), *Natural Resource Economics and Policy Applications*, University of Washington Press, Seattle, 1986, pp. 118–151.
- [36] R.B. Pollnac, Sociocultural aspects of developing small-scale fisheries: delivering services to the poor, World Bank Staff Working Paper No. 490, The World Bank, Washington, DC, 1981.
- [37] R.B. Pollnac, M.T. Morrissey, *Aspects of Small-Scale Fishery Development*, International Centre For Marine Resource Development, Kingston, Rhode Island, 1989.
- [38] J.P.L. Troadec, *Homme et les Ressources Halieutiques: Essai sur l'Usage d'une Ressource Commune Renouvelable*, IFREMER, Plouzane, France, 1989.
- [39] J. Cordell, A Sea of Small Boats, Cultural Survival Report 26, Cambridge, Massachusetts, 1989.
- [40] C. Bailey, Natural resource management: a basis for viable organizations of small-scale fisheries, ICLARM Working Paper 12, International Center for Living Aquatic Resources Management, Manila, 1981.
- [41] J. Kurien, Studies on the Role of Fishermen's Organizations in Fisheries Management, FAO Fisheries Technical Paper 300, UN Food and Agriculture Organization, Rome, 1988.
- [42] F. Christy, Territorial use rights in marine fisheries: definitions and conditions, FAO Fisheries Technical Paper 227, UN Food and Agriculture Organization, Rome, 1982.
- [43] C. Dahl, *Traditional marine tenure: a basis for artisanal fisheries management*, *Mar. Policy* 12 (1988) 40–48.
- [44] R. Johannes, *Words of the Lagoon: Fishing and Marine Lore in the Palau District of Micronesia*, University Of California Press, Berkeley, California, 1981.
- [45] K. Ruddle, R. Johannes (Eds.), *The Traditional Knowledge and Management of Coastal Systems in Asia and the Pacific*, UNESCO, Jakarta, Indonesia, 1985.
- [46] R.B. Pollnac (Ed.), *Monitoring and Evaluating the Impacts of Small-Scale Fishery Projects*, International Center for Marine Resource Development, Kingston, Rhode Island, 1989.
- [47] F. Berkes, A. Shaw, *Ecologically sustainable development: a Caribbean case study*, *Can. J. Dev. Stud.* 7 (2) (1986) 175–196.
- [48] L. Scura, T.E. Chua, M. Pido, J. Paw, Lessons for integrated coastal zone management: the ASEAN experience, in: T.E. Chua, L. Scura (Eds.) *Integrated Framework and Methods for Coastal Area Management*, ICLARM Conference Proceedings 37, International Center for Living Aquatic Resources Management, Manila, 1992.
- [49] T.E. Chua, *Essential elements of integrated coastal zone management*, *Ocean Coast. Manag.* 21 (1–3) (1993) 81–108.
- [50] P. Burbridge, Planning processes for integrated coastal zone management, ICES Council Meeting, Mariculture Committee, Paper No. 28, International Council for the Exploration of the Sea, Copenhagen: 1994.
- [51] M. Ben Yami, Post-harvest in fisheries, FAO Fisheries Technical Paper 196, UN Food and Agriculture Organization, Rome, 1980.
- [52] FAO, Report of the Expert Consultation on the Acquisition of Socio-Economic Information in Fisheries, FAO Fisheries Report No. 344, UN Food and Agriculture Organization, Rome, 1985.
- [53] J.-L. Gaudet, D. Greboval, G.M. Bernacsek, A. Bonzon, Challenge of small-scale fisheries development in Africa, *Proc. GERMA IIFET* 3 (3) (1986) 191–204.
- [54] R. Lawson, M. Robinson, *Artisanal fisheries in West Africa: problems of management implementation*, *Mar. Policy* 7 (4) (1983) 279–290.
- [55] J. Sutinen, R. Pollnac, *Small-Scale Fisheries in Central America: Acquiring Information for Decision-making*, International Center For Marine Resource Development, Kingston, Rhode Island, 1981.
- [56] M. Aguero, Small-scale fisheries research in Pacific South America, in: J. Durand, J. Lemoalle, J. Weber (Eds.), *La Recherche Face a la Peche Artisanale*, I, ORSTOM-IFREMER, Montpellier, France, 1989.
- [57] B.P. Satia, Ten years of Integrated Development of Artisanal Fisheries in West Africa, 1993 (Origin, Evolution and Lessons Learned), IDAF/WP/50. Cotonou: Program for the Integrated Development of Artisanal Fisheries in West Africa: 1993.
- [58] FAO, *Study of the Socio-economic and Cultural Aspects of the Fishing Industry in Saint Lucia*, UN Food and Agriculture Organization, Rome, 1984.
- [59] S. Sentongo-Kabuka, *International food marketing strategies for island economies: a case of the Eastern Caribbean*, *Proc. Caribb. Food Crop. Soc.* 20 (1984) 271–278.
- [60] J.R. McGoodwin, *Crisis in the World's Fisheries: People, Problems and Politics*, Stanford University Press, Stanford, California, 1990.
- [61] J. Kurien, R. Willmann, Economics of Artisanal and Mechanized Fisheries in Kerala, Bay of Bengal Program, Food FAO/UNDP Working Paper No. 34, UN Food and Agriculture Organization, Rome, 1982.
- [62] R. Willmann, Economic information for small-scale fisheries management, FAO Fisheries Report No. 284, UN Food and Agriculture Organization, Rome, 1983.
- [63] T. Panayotou, Economic conditions and prospects of small-scale fishermen in Thailand, *Mar. Policy* 4 (2) (1980) 142–146.
- [64] T. Panayotou, Management concepts for small-scale fisheries: economic and social aspects, FAO Fisheries Technical Papers No. 228, UN Food and Agriculture Organization, Rome, 1982.
- [65] T. Panayotou, *Small-Scale Fisheries in Asia: Socioeconomic Analysis and Policy*, International Development Research Centre, Ottawa, 1985.
- [66] H. Campbell, K. Menz, G. Waugh (Eds.), *Economics of Fishery Management in the Pacific Islands Region*, Australian Center for International Agricultural Research, Canberra, 1989, p. 1989.
- [67] A. White, Marine reserves: how effective as a management strategies for Philippine, Indonesian and Malaysian coral reef environments? *Ocean Manag.* 10 (1986) 137–159.
- [68] A. White, Two community-based marine reserves: lessons for coastal management. in: T.E. Chua, D. Pauly (Eds.) *Coastal Area Management in Southeast Asia*, International Center for Living Aquatic Resources Management Conference Proceedings 19, International Center for Living Aquatic Resources Management, Manila, 1989.
- [69] K. Ruddle, T. Akimichi (Eds.), *Maritime Institutions in the Western Pacific*, *Senri Ethnological Studies* 17, National Museum of Ethnology, Osaka, Japan, 1984.
- [70] J.Y. Weigel, Traditional management of some lagoons of the Gulf of Guinea, FAO Fisheries Circular No. 790, UN Food and Agriculture Organization, Rome, 1985.
- [71] E. Ferrer, *Learning and Working Together Towards Community-Based Coastal Resources Management. Research and Extension for Development Office*, College of Social Work and Community Development, University Of The Philippines, Diliman, Quezon City, 1992.
- [72] B. McCay, J. Acheson, *The Question of the Commons: The Culture and Ecology of Communal Resources*, University Of Arizona Press, Tucson 1987, p. 1987.
- [73] F. Martin, *Common pool resources and collective action: a bibliography*. Bloomington: Workshop in Political Theory and Policy Analysis, Indiana University, Bloomington, 1989.
- [74] I. Smith, D. Pauly, Resolving multi-gear competition in nearshore fisheries. ICLARM Newsletter, International Center for Living Aquatic Resources Management, Manila, vol. 6(4), 1983, pp. 11–18.
- [75] Small-scale fisheries in San Miguel Bay, Philippines: social aspects of production and technology, in: C. Bailey (Ed.), *ICLARM Technical Report 9*, International Center for Living Aquatic Resources Management, Manila, 1982.
- [76] C. Bailey, Small-scale fisheries of San Miguel Bay, Philippines: occupational

- and geographic mobility, ICLARM Technical Report 10, International Center for Living Aquatic Resources Management, Manila, 1982.
- [77] I. Smith, A. Mines, Small-scale fisheries of San Miguel Bay, Philippines: economics of production and marketing, ICLARM Technical Report 8, International Center for Living Aquatic Resources Management, Manila, 1982.
- [78] D. Stevenson, R. Pollnac, P. Logan, A guide for the small-scale fishery administrator: information from the harvest sector, International Center for Marine Resource Development, University of Rhode Island, Kingston, Rhode Island, 1982.
- [79] W.F. Royce, Fishery Development, Academic Press, Orlando, Florida, 1987.
- [80] World Bank, A study of international fisheries research. Policy and Research Series 19, The World Bank, Washington, D.C., 1992.
- [81] World Bank, Small-scale fisheries: research needs, World Bank Technical Paper Number 152 – Fisheries Series, The World Bank, Washington, D.C., 1991.
- [82] J.J. Poggie, R.B. Pollnac (Eds.), Small-scale Fishery Development: Sociocultural Perspectives, International Center for Marine Resource Development, Kingston, Rhode Island, 1991.
- [83] P. Espeut, CFRAMP Socioeconomic Baseline Survey of Fishing Communities in CARICOM Countries, CFRAMP, Belize, 1991.
- [84] P. Merrikin, Women in Fisheries – A Selective Annotated Bibliography. FAO Fisheries Circular No. 811 Revision 1, UN Food And Agriculture Organization, Rome, 1990.
- [85] E. Matthews (Ed.), Fishing for Answers: Women and Fisheries in the Pacific Islands. Women and Fisheries Network, Oceania Printers Ltd, Suva, Fiji, 1995.
- [86] Asian Fisheries Society, International Symposium on Women in Asian Fisheries. Asian Fisheries Society and International Center for Living Aquatic Resources Management, International Center for Living Aquatic Resources Management, Manila, 1998.
- [87] F. Berkes, C. Folke (Eds.), Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience, Cambridge University Press, New York, 1998 1998.
- [88] S.J. Fiske, Sociocultural aspects of establishing marine protected areas, *Ocean Coast. Manag.* 18 (1992) 25–46.
- [89] C. Kelleher, C. Recchia, Lessons from marine protected areas around the world, *Parks* 8 (2) (1998) 1–4.
- [90] K. Kuperan, N. Abdullah, L. Susilowati, I. Siason, C. Ticao, Enforcement and compliance with fisheries regulations in Malaysia, Indonesia and the Philippines. ICLARM Co-management Project Research Report No. 5, International Center for Living Aquatic Resources Management, Manila, 1997.
- [91] M. Ahmed, C. Delgado, S. Sverdrup-Jensen, R. Santos, Fisheries policy research in developing countries: issues, priorities and needs, ICLARM Conference Proceeding 60, International Center for Living Aquatic Resources Management, Manila, 1999.
- [92] R.P. Steenbank, G. Munro, International work on fishing subsidies – an update, Update of the original paper, in: A. Hatcher, K. Robinson (Eds.), *Overcapacity, Overcapitalization and Subsidies in European Fisheries*, CEMARE, University of Portsmouth, United Kingdom, 1999.
- [93] S. Salas, R. Chuenpagdee, J. Seijo, A. Charles, Challenges in the assessment and management of small-scale fisheries in Latin America and the Caribbean, *Fish. Res.* 87 (2007) 5–16.
- [94] F. Christy, The Development and Management of Marine Fisheries in Latin America and the Caribbean, Policy Research Paper, Inter-American Development Bank, Washington D.C., 1997.
- [95] Community Management and Common Property of Coastal Fisheries in Asia and the Pacific: Concepts, Methods and Experiences, in: R. Pomeroy (Ed.), International Center for Living Aquatic Resources Management, Manila, 1994 1994.
- [96] C. Hess, Common Pool Resources and Collective Action: A Bibliography, Workshop in Political Theory and Policy Analysis, Indiana University, Bloomington, 1996.
- [97] K. Ruddle, Local knowledge in the future management of inshore tropical marine resources and environments, *Nat. Resour.* 29 (4) (1993) 28–37.
- [98] E. Hviding, G. Baines, Custom and complexity: marine tenure, fisheries management and conservation in Marovo Lagoon, Solomon Islands, in: R. Howitt (Ed.), *Resources, Nations and Indigenous Peoples: Case Studies from Australasia, Melanesia and Southeast Asia*, Oxford University Press, Australia, 1996.
- [99] R. Mahon, Does fisheries science serve the needs of managers of small stocks in developing countries? *Can. J. Fish. Aquat. Sci.* 54 (1997) 2207–2213.
- [100] S. Grant, F. Berkes, One Hand Can't Clap: Combining Scientific and Local Knowledge for Improved Caribbean Fisheries Management, University of Manitoba, Winnipeg, 2004 2004.
- [101] K. Ruddle, A guide to the literature on traditional community-based fishery management in the Asia-Pacific tropics, FAO Fisheries Circular No. 869, UN Food and Agriculture Organization, Rome, 1994.
- [102] C. Dyer, J. McGoodwin, Folk Management in the World's Fisheries: Lessons for Modern Fisheries Management, University Of Colorado Press, Niwot, 1994.
- [103] CANARI (Caribbean Natural Resource Institute), Evaluation of Caribbean Experiences in Participatory Planning and Management of Marine and Coastal Resources, Caribbean Natural Resource Institute, St Lucia, 1999.
- [104] P.J. DeCosse, S.S. Jayawickrama, Issues and opportunities in co-management: Lessons from Sri Lanka, in: A. Kothari, et al., (Eds.), *Communities and Conservation: Natural Resource Management in South and Central Asia*, Sage Publications, New Delhi, 1998.
- [105] ICLARM (International Center for Living Aquatic Resources Management)/ IFM (Institute for Fisheries Management and Coastal Community Development), Analysis of Fisheries Co-management Arrangements: A research framework, International Center for Living Aquatic Resources Management, Manila, 1996.
- [106] A.K. Normann, J. Nielsen, S. Sverdrup-Nielsen(Eds.), Fisheries co-management in Africa: Proceedings from a regional workshop on fisheries co-management research. Fisheries Co-management Research Project, research report no. 12, Institute for Fisheries Management and Coastal Community Development, Hirtshals, Denmark, 1998.
- [107] S. Sverdrup-Jensen, J. Nielsen, Co-management in Small-scale Fisheries: A Synthesis of Southern and West African Experiences, Institute For Fisheries Management and Coastal Community Development, Hirtshals, Denmark: North Sea Center, 1998.
- [108] A. White, L. Hale, Y. Renard, L. Cortesi, Collaborative and Community-based Management of Coral Reefs, Kumarian Press, West Hartford, CT, 1994.
- [109] R. Pomeroy, Community-based and co-management institutions for sustainable coastal fisheries management in Southeast Asia, *Ocean Coast. Manag.* 27 (3) (1995) 143–162.
- [110] IIRR, Participatory Methods in Community-based Coastal Resource Management, International Institute Of Rural Reconstruction, Silang, Cavite, Philippines, 1998.
- [111] M. Pido, R. Pomeroy, M. Carlos, L. Garces, A Handbook for Rapid Appraisal of Fisheries Management Systems (Version 1). ICLARM Educational Series No.16., International Center For Living Aquatic Resources Management, Manila, 1996.
- [112] P. Townsley, Rapid Rural Appraisal, Participatory Rural Appraisal and Aquaculture, FAO Fisheries Technical Paper no. 358, UN Food and Agriculture Organization, Rome, 1996.
- [113] E. Ostrom, *Governing The Commons: The Evolution of Institutions For Collective Action*, Cambridge University Press, Cambridge, 1990.
- [114] M. Bavinck, R. Chuenpagdee, M. Diallo, P. van der Heijden, J. Kooiman, R. Mahon, S. Williams, *Interactive Fisheries Governance*, Eburon Publishers, Delft, 2005.
- [115] R. Mahon, P. McConney, R.N. Roy, Governing fisheries as complex adaptive systems, *Mar. Policy* 32 (2008) 104–112.
- [116] C. Bene, A. Neiland, From participation to governance. *WorldFish Center Studies and Reviews* No. 29, WorldFish Center, Penang, Malaysia, 2006.
- [117] P. Thompson, S. Sultana, N. Islam, Lessons from community based management of floodplain fisheries in Bangladesh, *J. Environ. Manag.* 69 (3) (2003) 307–321.
- [118] C. Bene, When fishery rhymes with poverty, a first step beyond the old paradigm on poverty in small-scale fisheries, *World Dev.* 31 (6) (2003) 949–975.
- [119] C. Bene G. Macfadyen E. Allison, Increasing the contribution of small-scale fisheries to poverty alleviation and food security, FAO Technical Paper No. 481, UN Food and Agriculture Organization, Rome, 2007.
- [120] D. Staples, B. Satia, P. Gardiner, A Research Agenda for Small-Scale Fisheries. RAP Publication No. 2004/21 and FIPC/C 10009, FAO Regional Office For Asia And The Pacific, Bangkok, 2004.
- [121] M. Williams, M. Porter, P. Choo, K. Kusakabe, V. Vuki, N. Gopal , M. Bondad-Reantaso, Guest editorial: gender in aquaculture and fisheries – moving the agenda forward, *Asian Fisheries Science*, 2012, Special Issue 25, pp.1–13.
- [122] R. Willmann, K. Kelleher, R. Arnason, The sunken billion – the economic justification for fisheries reform, The World Bank, Washington D.C., 2009.
- [123] S. Cunningham, A. Neiland, Investigating the linkages between fisheries, poverty and growth: policy brief, A report prepared by IDRR Ltd. for the Department of International Development, Department of International Development, London, 2005.
- [124] D. Mills, L. Westlund L. G. de Graaf, Y. Kura, R. Willman, K. Kelleher, Under-reported and undervalued: small-scale fisheries in the developing world. Chapter 1 in: R. Pomeroy, N. Andrews (Eds.), *Small-Scale Fisheries Management: Frameworks and Approaches for the Developing World*, CABI, Oxfordshire, UK, 2011.
- [125] C. Bene, B. Hersoug, E. Allison, Not by rent alone: analyzing the poor-poor functions of small-scale fisheries in developing countries, *Dev. Policy Rev.* 28 (3) (2010) 325–358.
- [126] FAO, Report of the global conference on small-scale fisheries: securing sustainable small-scale fisheries. Bangkok, Thailand 13 – 17 October 2008, UN Food and Agriculture Organization, Rome, 2009.
- [127] E. Allison, F. Ellis, The livelihoods approach and management of small-scale fisheries, *Mar. Policy* 2001 (25) (2001) 377–388.
- [128] A. Thorpe, N. Andrew, et al. Fisheries and poverty reduction. *CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources*, 2(85), 2007, pp.1–12.
- [129] E. Allison, B. Horemans, Putting the principles of the Sustainable Livelihoods Approach into fisheries development policy and practice, *Mar. Policy* 30 (6) (2006) 757–766.
- [130] FAO, Fisheries management. 2. The ecosystem approach to fisheries, FAO Technical Guidelines for Responsible Fisheries 4, Suppl. 2. UN Food and Agriculture Organization, Rome, 2003.
- [131] S. Garcia, A. Zerbi, C. Aliaume, T. Do Chi, G. Lasserre, The ecosystem approach to fisheries. Issues, terminology, principles, institutional foundations, implementation and outlook, FAO Fisheries Technical Paper. No. 443, UN Food and Agriculture Organization, Rome, 2003.
- [132] S. Carpenter, B. Walker, J. Anderies, N. Abel, From metaphor to measurement: resilience of what to what? *Ecosystems* 4 (2001) 765–781.

- [133] S. Carpenter, R. Westley, M. Turner, Surrogates for resilience of social-ecological systems, *Ecosystems* 8 (2005) 941–944.
- [134] B. Walker, C. Holling, S. Carpenter, A. Kinzig, Resilience, adaptability and transformability in social-ecological systems, *Ecol. Soc.* 9 (2) (2004), art. 5.
- [135] F. Berkes, J. Colding, F. Folke (Eds.), *Navigating Social-ecological Systems: Building Resilience for Complexity and Change*, Cambridge University Press, Cambridge, 2003.
- [136] I. Gough, J. McGregor, *Well-being in Developing Countries: From Theory To Research*, Cambridge University Press, Cambridge, 2010.
- [137] N. Weeratunge, C. Bene, R. Siriwardane, A. Charles, D. Johnson, E.H. Allison, P. K. Nayak, M.-C. Badjeck, Small-scale fisheries through a well-being lens, *Fish Fish.* 15 (2014) 255–279.
- [138] C. Sharma, Securing economic, social, and cultural rights of small-scale and artisanal fishworkers and fishing communities, *MAST* 10 (2) (2011) 41–61.
- [139] E. Allison, Should states and international organizations adopt a human rights approach to fisheries policy? *MAST* 10 (2) (2011) 95–116.
- [140] R. Pomeroy, M. Mascia, R. Pollnac, Marine Protected Areas: The Social Dimension. In *Workshop on Marine Protected Areas and Fisheries Management: Review of Issues and Considerations*, FAO Fisheries Report No. 825, UN Food and Agriculture Organization, Rome, 2007.
- [141] H. Govan, et al., Status and potential of locally-managed marine areas in the South Pacific: meeting nature conservation and sustainable livelihood targets through wide-spread implementation of LMMAs. Apia, Samoa: SPREP/WWF/WorldFish-Reefbase/CRISP, 2009.
- [142] J. Kurien, Fish Trade for the People: Toward Understanding the Relationship between International Fish Trade and Food Security, Report of the Study on the impact of international trade in fishery products on food security, Food and Agriculture Organization of the United Nations and the Royal Norwegian Ministry of Foreign Affairs, Rome, 2004.
- [143] C. Béné, R. Lawton, E. Allison, Trade matters in the fight against poverty: narratives, perceptions, and (lack of) evidence in the case of fish trade in Africa, *World Dev.* 38 (7) (2010) 933–954.
- [144] R. Gillett, *Fisheries in the Economies of the Pacific Island Countries and Territories*, Asian Development Bank, Manila, 2009.
- [145] M. Smith, C. Roheim, L. Crowder, et al., Sustainability and global seafood, *Science* 327 (2010) 784–786.
- [146] E. Jacinto, R. Pomeroy, Chapter 9: Developing markets for small-scale fisheries: utilizing the value chain approach, in: R. Pomeroy, N. Andrew (Eds.), *Small-Scale Fisheries Management: Frameworks and Approaches for the Developing World*, CABI Publishing, Oxfordshire, UK, 2011.
- [147] S. Hall, Chapter 8: Climate change and other external drivers in small-scale fisheries: practical steps for responding, in: R. Pomeroy, N. Andrew (Eds.), *Small-Scale Fisheries Management: Frameworks and Approaches for the Developing World*, CABI Publishing, Oxfordshire, UK, 2011.
- [148] T. McClanahan, C. Cinner, T. Maina, N. Graham, T. Daw, S. Stead, A. Wamukota, K. Brown, M. Ateweberhan, V. Venus, N. Polunin, Conservation action in a changing climate, *Conserv. Lett.* 1 (2) (2008) 53–59.
- [149] E.H. Allison, J. Seeley, HIV and AIDS among fisherfolks: a threat to 're-sponsible fisheries'? *Fish Fish.* 5 (2004) 215–234.
- [150] P.Z. Choo, B.S. Nowak, K. Kusakabe, M. Williams, Editorial: Gender and Fisheries, *Development* 51 (2008) 176–179.
- [151] N. Weeratunge, K. Snyder, Gleaner, Fisher, Trader, Processor: Understanding Gendered Employment in the Fisheries and Aquaculture Sector, WorldFish Center, Penang, Malaysia, 2009.
- [152] MRAG, Review of Impacts of Illegal, Unreported and Unregulated Fishing on Developing Countries – Final Report, Marine Resources Assessment Group Ltd, London, 2005.
- [153] Sustainable Fisheries Management, Assessment of impacts of illegal, unreported and unregulated (IUU) fishing in the Asia-Pacific, Report prepared for Asia-Pacific Economic Cooperation – fisheries working group, Asia-Pacific Economic Cooperation Secretariat, Singapore, 2008.
- [154] M. Hauck, Chapter 11: Small-scale fisheries compliance: integrating social justice, legitimacy and deterrence, in: R. Pomeroy, N. Andrew (Eds.), *Small-Scale Fisheries Management: Frameworks and Approaches for the Developing World*, CABI Publishing, Oxfordshire, UK, 2011.
- [155] E. Bennett, A. Neiland, E. Anam, P. Bannerman, A. Rahman, S. Huq, S. Bhuiya, M. Day, M. Fulford-Gardiner, W. Clerveaux, Towards a better understanding of conflict management in tropical fisheries: evidence from Ghana, Bangladesh and the Caribbean, *Mar. Policy* 25 (2001) 365–376.
- [156] B. Christian, Learning from piracy: future challenges of maritime security governance, *Glob. Aff.* 1 (1) (2015) 33–42.
- [157] B. Germond, The geopolitical dimensions of maritime security, *Mar. Policy* 54 (4) (2015) 137–142.
- [158] MA (Millennium Assessment), *Ecosystems and Human Well-being: Synthesis*, Island Press, Washington, DC, 2005.
- [159] MA (Millennium Assessment), *Ecosystems and Human Well-being, Ecosystems and Human Well-being: A Framework for Assessment*, Island Press, Washington, DC, 2003.
- [160] C. Perrings, Ecological economics after the Millennium Assessment, *Int. J. Ecol. Econ. Stat.* 6 (2006) 8–22.
- [161] P. Ronnback, B. Crona, L. Ingwall, The return of ecosystem goods and services in replanted mangrove forests: perspectives from local communities in Kenya, *Environ. Conserv.* 34 (2007) 313–324.
- [162] E. Nelson, G. Mendoza, J. Regetz, S. Polasky, H. Tallis, D. Cameron, K. Chan, G. Daily, J. Goldstein, P. Kareiva, E. Lonsdorf, R. Naidoo, T. Ricketts, M. Shaw, Modeling multiple ecosystem services, biodiversity conservation, commodity production, and tradeoffs at landscape scales, *Front. Ecol. Environ.* 7 (2009) 4–11.
- [163] I. Bateman, G. Mace, C. Fezzi, G. Atkinson, K. Turner, Economic analysis for ecosystem service assessments, *Environ. Resour. Econ.* 48 (2011) 177–218.
- [164] J. Boyd, S. Banzhaf, What are ecosystem services? The need for standardized environmental accounting units, *Ecol. Econ.* 63 (2007) 616–626.
- [165] S. Wunder, Payments for environmental services and the poor: concepts and preliminary evidence, *Environ. Dev. Econ.* 13 (2008) 279–297.
- [166] S. Wunder, S. Engel, S. Pagiola, Taking stock: a comparative analysis of payments for environmental services programs in developed and developing countries, *Ecol. Econ.* 65 (2008) 834–852.
- [167] S. McIntosh, M. Lay, P. McConney, T. Phillips, The Development of a Caribbean Regional Network of Fisherfolk Organisations and its Role in Influencing Fisheries Policy, in: *Proceedings of the 62nd Gulf and Caribbean Fisheries Institute*, Cumana, Venezuela, 2010, pp. 298–305.
- [168] K.N. Mikalsen, H.-K. Hernes, S. Jenftoft, Leaning on user-groups: the role of civil society in fisheries governance, *Mar. Policy* 31 (2) (2007) 201–209.
- [169] E. Dunn, The role of environmental NGOs in fisheries governance. Chapter 12 in: T.S. Gray, (ed.), *Participation in Fisheries Governance*, Springer, 2005, pp.209–218.
- [170] K.M. Crosman, The roles of non-governmental organizations in marine conservation, MS thesis (Natural Resources and Environment), University of Michigan, Ann Arbor, 2013.
- [171] P. McConney, R. Pomeroy, Z. Khan, ENGOs and SIDS: Environmental interventions in Small Island Developing States. Chapter 25 in: S.M. Garcia, J. Rice, A.T. Charles (eds) *Governance for fisheries and marine conservation: Interactions and co-evolution*, Elsevier Publishing, 2013.
- [172] R. Pomeroy, The Asian Fisheries Social Science Research Network Case Study, in: O. Maessen, *Influence of Research on Public Policy*, International Development Research Centre, Ottawa, Canada, 2003.
- [173] Too Big to Ignore toobigtoignore.net.
- [174] FAO, *The Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in The Context of Food Security and Poverty Eradication*, UN Food and Agriculture Organization, Rome, 2015.
- [175] E. Allison, Aquaculture, Fisheries, Poverty and Food Security. Working Paper 2011–65, WorldFish Center, Penang, Malaysia, 2011.
- [176] HLPE, Sustainable Fisheries and Aquaculture for Food Security and Nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, High Level Panel of Experts, Rome, 2014.
- [177] World Bank, *Fish to 2030: prospects for fisheries and aquaculture*, World Bank Report Number 83177-GLB, Agriculture and Environmental Services Discussion Paper 03, Washington DC, 2013.
- [178] S. Jenftoft, A. Eide, *Poverty Mosaics: Realities and Prospects in Small-scale Fisheries*, Springer, Berlin, 2011.
- [179] A. Allison, B. Ratner, B. Asgard, R. Willmann, R. Pomeroy, J. Kurien, Rights based fisheries governance: from fishing rights to human rights, *Fish Fish.* 13 (2012) 14–29.
- [180] S. Jenftoft, R. Chuenpagee (Eds.), *Interactive governance for small-scale fisheries: global reflections*, 13, MARE Publication Series, Springer, Berlin, 2015.
- [181] CEA, *Charting a Course to Sustainable Fisheries*, California Environmental Associates, San Francisco, 2012.
- [182] CCIF, *Assessment of Enabling Conditions for Rights-based Management of Fisheries and Coastal Marine Resources in the Western Pacific*, Conservation and Community Investment Forum, San Francisco, 2013.
- [183] B. Katon, R. Pomeroy, L. Garces, A. Salamanca, *Fisheries Management of San Salvador Island, Philippines: a shared responsibility*, *Soc. Nat. Resour.* 12 (8) (1998) 777–795.
- [184] WFFP and W.F.F, *A Call for Governments to Stop Supporting the Global Partnership for Oceans (GPO) and Rights-Based Fishing (RBF) Reforms*. World Forum of Fisher Peoples and the World Forum of Fish Harvesters and Fish Workers, Cape Town, South Africa, 2013.
- [185] N.J. Bennett, H. Govan, T. Satterfield, Ocean grabbing, *Mar. Policy* 57 (2015) 61–68.
- [186] B. Mansfield, Neoliberalism in the oceans: 'rationalization', property rights, and the commons question, *Geoforum* 35 (2004) 313–326.
- [187] A. Davis, K. Ruddle, Massaging the misery: recent approaches to fisheries governance and the betrayal of small-scale fisheries, *Human Organ.* 71 (3) (2012) 244–255.
- [188] K. Ruddle, A. Davis, Human rights and neoliberalism in small-scale fisheries: conjoined priorities and processes, *Mar. Policy* 39 (2013) 87–93.
- [189] E. Pinkerton, R. Davis, Neoliberalism and the politics of enclosure in North American small-scale fisheries, *Mar. Policy* 61 (2015) 303–312.
- [190] G. Sampson, J. Sanchirico, C. Roheim, S. Bush, J. Taylor, E. Allison, J. Anderson, N. Ban, R. Fujita, S. Jupiter, J. Wilson, Secure sustainable seafood from developing countries, *Science* 348 (6234) (2015) 504–506.
- [191] EDF/ISU/50in10, *Towards investment in sustainable fisheries: a framework for financing the transition*. New York: Environmental Defense Fund, London: The Prince's Charities International Sustainability Unit, Washington D.C., 50 in10, 2014.
- [192] EKO, *Sustainable fisheries financing strategies: save the oceans feed the world project*, EKO Asset Management Partners, New York, 2014.
- [193] C. Ehler, F. Douvere, *Marine spatial planning: a step-by-step approach toward ecosystem-based management*. Intergovernmental Oceanographic Commission and Man and the Biosphere Program. IOC Manual and Guides No. 53, ICAM Dossier No. 6, UNESCO, Paris, 2009.

- [194] C. Ehler, An introduction to marine spatial planning. Jakarta: Coral Triangle Support Partnership, 2013.
- [195] T. Agardy, J. Davis, K. Sherwood, O. Vestergaard, *Taking Steps toward Marine and Coastal Ecosystem-Based Management: An Introductory Guide*, United Nations Environment Program, Nairobi, 2011.
- [196] K. Flower, S. Atkinson, R. Brainard, K. Courtney, B. Parker, J. Parks, R. Pomeroy, A. White, *Toward ecosystem-based coastal area and fisheries management in the Coral Triangle: integrated strategies and guidance*, Coral Triangle Support Partnership, Jakarta, 2013.
- [197] R. Pomeroy, *Marine Fisheries in Crisis: Improving Fisheries Management in Southeast Asia*, in: R. Hathaway, M. Mills (Eds.), *New Security Challenges in Asia*, Woodrow Wilson Center Press, Washington, D.C., 2013.