

Chapter 11

Fisheries Governance and Food Security in the Eastern Caribbean



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Abstract Fisheries resources are of particular importance to the small island developing states of the Eastern Caribbean. There is an increasing demand for seafood to address food security and nutrition, to support coastal livelihoods and to contribute to sustainable development. The Caribbean Community developed a Regional Food and Nutrition Security Policy and a Common Fisheries Policy. These instruments, however, only make passing mention of fisheries and food security, respectively. There is little evidence of food security being integrated into fisheries governance. Yet, recent research has shown that resilience perspectives on fisheries governance in the Eastern Caribbean can be useful for obtaining ecosystem services, such as those that relate to food security, from social–ecological systems. This resilience takes into account global and regional environmental change, multiple levels of governance and degrees of adaptive capacity, matching the scales of social and ecological processes and managing social networks in the institutional arrangements for resource use and conservation. Building food security and resilience into fisheries governance requires the development of adaptive capacity, especially through social networks, with an emphasis on policies that enable fisherfolk self-organization.

Keywords Caribbean · Environment · Fisheries · Food security · Governance · Resilience

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11.1 Introduction

The Wider Caribbean Region, which encompasses the Caribbean Large Marine Ecosystem, is densely packed with nation-states and territories that are diverse in geography, culture, society, economy, politics and ecology. The region is one of the most complex in the world in terms of marine resource governance (Chakalall et al. 2007; Fanning et al. 2009; Mahon et al. 2010). The Eastern Caribbean is a sub-region of the Caribbean Large Marine Ecosystem that consists entirely of small island developing states (SIDS). Few marine boundaries have been negotiated, but there is considerable interaction of people and issues across jurisdictions due to proximity. Most fisheries resources in the sub-region are shared across marine jurisdictions and resource use regimes during their life histories. This contributes to social–ecological complexity (Fanning et al. 2011). Local, national, sub-regional, regional and international organisations engage in fisheries governance. The interplays among their formal mandates and actual operations add further layers of complexity to governance (Mahon et al. 2010). Current governance arrangements do not always integrate sufficiently, and at multiple levels, for related policies to achieve shared goals and objectives (Fanning et al. 2013).

A case in point is the contribution of small-scale marine capture fisheries to food security. The Caribbean Community (CARICOM) recently developed a Regional Food and Nutrition Security Policy (CARICOM 2010) as well as a draft Common Fisheries Policy (CRFM 2010). These related policies, however, only make brief mention of fisheries and food security, respectively. For example, the preamble of the fisheries policy recognises the ‘importance of fisheries to social and economic development, food and nutrition security and the welfare of the peoples of the Caribbean’ (CRFM 2010: 1). Yet, compared to other aspects of fisheries, food security is not well elaborated or integrated into fisheries governance. Similarly, the food security policy recognises fisheries as a sub-sector of agriculture, but thereafter offers little guidance on fisheries compared to crops and livestock. CARICOM food security and fisheries policies have been deficient in addressing global environmental change (Trotman et al. 2009). Both recent policies, however, acknowledge the need to adapt to global and regional environmental change. They encourage climate change adaptation, disaster risk reduction and people-centred ecosystem-based approaches. Spanning both the food and fisheries policies is the CARICOM strategic plan for 2015–2019 that includes resilience in its vision and as a core theme (CARICOM 2014). An immediate Caribbean challenge, therefore, is to better integrate food security into fisheries governance, both based on a resilience perspective.

The converging interest in resilience, food security and fisheries governance is timely. It provides an opportunity for the innovative integration that is required to nationally implement these regional policies. CARICOM countries must face the challenges of global environmental change (Erickson et al. 2009), the uncertainties surrounding which are amplified when downscaled to regional-level fisheries at the geographic scale of SIDS (Nurse 2011). Devising means of integrating small-scale fisheries into sustainable food systems and food security is of considerable

global interest (Nelson et al. 2013). Research in the Eastern Caribbean has shown that resilience perspectives can be useful for addressing the complex reality of sustaining ecosystem services, such as those related to food security, from dynamic fisheries social–ecological systems (Parsram and McConney 2011; McConney et al. 2011). This resilience takes into account multiple levels of governance, the varying degrees of adaptive capacity, the scales of social and ecological processes and social networks in the institutional arrangements for sustainable resource use (McConney and Parsram 2008). Building food security and resilience into fisheries governance requires the development of adaptive capacity through social networks and an emphasis on enabling fisherfolk self-organization. The next section outlines key concepts, the Eastern Caribbean context and methods of investigation. The results present brief case studies of building food security and resilience into fisheries governance, followed by a discussion of the findings.

11.2 Materials and Methods

Several key concepts guided our investigation of fisheries in the Eastern Caribbean. We set out the concepts, the fisheries context and the methods used in the case studies.

11.2.1 *Concepts*

We argue that for there to be successfully integrated and enabling policy for food fisheries, it is necessary to build both resilience and food security into fisheries governance. There is a reciprocal relationship in that good fisheries governance also enhances food security. Critical to resilience for food security and governance is adaptive capacity. Adaptive capacity is achieved in large part through social networks and the self-organization of resource users who contribute to food security and governance. Figure 11.1 offers a much-simplified illustration of these relationships that, in reality, are quite dynamic with multiple feedback loops, iterations and levels, plus external influences such as global and regional environmental change. The case studies address the relationships among these concepts to inform how to build food security and resilience into fisheries governance.

Resilience and its related subsidiary concepts have competing definitions (Berkes and Ross 2013). Central to the concept of resilience used here is the notion of a social–ecological system (SES). It emphasizes that social and ecological systems are inevitably linked, and that the delineation between the two systems is artificial and arbitrary (Berkes and Folke 1998). Resilience in SES is the capacity of the system to experience shocks while retaining essentially the same function, structure, feedbacks and therefore identity (Walker et al. 2006). Fisheries are complex adaptive SES, and the structure and nature of connections between the elements of a system (its networks) govern the dynamics and functions of complex adaptive systems.

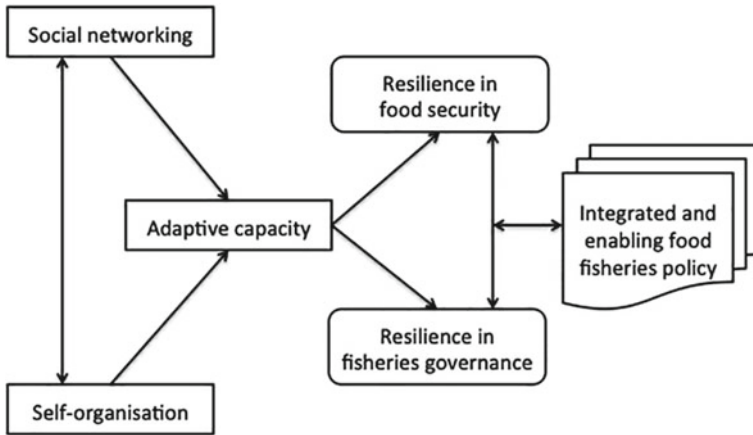


Fig. 11.1 Key concepts in building food security and resilience into fisheries governance for integrated policy

Critical functions include the abilities to self-organize and learn, which contribute to adaptive capacity (Mahon et al. 2008). Adaptive capacity is a multi-faceted contributor to resilience. It includes networks, self-organisation, learning and the ability to experiment with innovative solutions in social–ecological systems (Armitage 2005). In this research, our main interest is in social networks and self-organisation, and how the two enhance adaptive capacity that builds resilience. Other features such as wealth, knowledge, skills and physical assets also contribute to adaptive capacity (Armitage 2005) and resilience at different levels (Berkes and Ross 2013).

Social networks and self-organisation reinforce each other. Networks set out who relates to whom in what way, and how these ties enable the formal and informal institutions that guide and govern people’s behavior (Mahon and McConney 2013). Ties are used to exchange resources such as goods, finance, information, services, social or emotional support, trust or influence (Bodin and Prell 2011). Networks partly determine system function and performance as well as social capital, power, self-organisation, adaptive capacity and other features of resilience (McConney et al. 2011). Self-organisation reflects minimal dependence on external inputs and is facilitated by collective action based upon networks. SES consists of multiple levels of networks that affect the way systems function across various scales and levels to cope with diverse external and internal disturbances (Berkes et al. 2003). This is evident in multi-level governance (Fanning et al. 2009). Governance is “the whole of public as well as private interactions taken to solve societal problems and create societal opportunities. It includes the formulation and application of principles guiding those interactions and care for institutions that enable them” (Kooiman et al. 2005: 17). Good governance that is resilient not only adheres to principles such as participation, inclusiveness, accountability, transparency and equity, but its governance

structures and processes are adaptive. This is in distinct contrast to conventional legal-institutional rigidity and high levels of formality (McConney and Charles 2010).

Food security exists when “all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO 1996). Its three main components are food availability, access and utilisation. Food systems are SES, and within the value chains of small-scale fisheries in Eastern Caribbean SIDS the emphasis is on food production (fish harvest) and processing is minimal for most products purchased for household consumption. Food security, lies within the context of national and local level fisheries governance and needs to take into account environmental change, (McClanahan et al. 2015). Harvest and post-harvest sectors contribute more to food security if there is good fisheries governance (Trotman et al. 2009). Self-organised resource users become involved in national to local level co-management arrangements in which they share fisheries responsibility and authority with government agencies. In compact SIDS where co-management entails little decentralization, delegation or devolution to the community or local level, the emphasis is usually on the national level (Pomeroy et al. 2004). Co-managing fisheries for food security has become increasingly important due to worldwide fisheries depletions that may worsen with global environmental change (McClanahan et al. 2015). At the regional level, the vulnerabilities of SIDS make attention to food security, even more, pressing (Trotman et al. 2009) and quite critical for fisheries (Nurse 2011).

11.2.2 Context

The Eastern Caribbean islands from which the case studies are drawn are Barbados, Grenada, the Grenadines Islands, Saint Lucia, St. Kitts and Nevis, and Trinidad and Tobago. In all of them, the depletion of fisheries resources, coastal habitat degradation, pollution, threats from climate variability and change, fluctuating foreign exchange earnings, increasing unemployment and rising energy costs all contribute to the vulnerabilities typically associated with SIDS (Fanning et al. 2011). Most of their fishery resources are transboundary and shared. Species and species groups harvested include tunas, billfishes, sharks, dolphinfish, flying fish, snappers and other reef fish, sea urchins, lobster and conch. These fisheries vary in the status of resources and exploitation trends, the vessels and gear, and the approaches to governance for development and conservation. Fanning et al. (2011) note that island shelf, reef and inshore resources, including lobster and conch, are generally either fully exploited or over-exploited, as are most of the oceanic large pelagic stocks (e.g. tunas and billfishes). However, the status of the more regional pelagics (e.g. dolphinfish and blackfin tuna) is less certain. FAO (2014) states that in-depth analyses of Caribbean catch trends are generally hampered by the low quality of data and scarce fishery statistics.

The fisheries sector plays important roles in the economies of Eastern Caribbean countries. It contributes to culture, employment and food security, but these are not

captured in its contribution of around 1% to the Gross Domestic Product (GDP) in many countries. Among the case study countries, the estimated employment in fisheries varies from 9,000 in Trinidad and Tobago (contributing 0.07% to GDP) to 600 in St. Kitts and Nevis (but contributing 2.39% to GDP) (CRFM 2012). The employment of women is important in post-harvest. The supply of most species is highly seasonal due either to natural patterns in abundance (e.g. flying fish) or to management measures (e.g. conch). Annual per capita fish consumption varies from a high of around 40 kg in Barbados to around 14 kg in Trinidad and Tobago. However, in most islands tourism demands a high level of seafood importation, and with the expansion of international seafood markets, some small-scale food fisheries have been displaced by fisheries directed towards export markets (CRFM 2012).

Key climate-related drivers in the Caribbean are a decrease in wet season rainfall, increased temperatures, sea-level rise and an increase in tropical cyclone activity, all of which increase the vulnerability of fisheries in these SIDS (FAO 2014). These concern both at-sea and on-land operations. Nurse (2011) states that investigation of the impacts of climate change and variability on Caribbean fisheries has lagged considerably behind other regions, and concludes that exposure and sensitivity to climate change threats are high in the Caribbean, while adaptive capacity in fisheries is low. All countries lack ecosystem-based fisheries policies or management plans, but there are recent initiatives to introduce the ecosystem approach to fisheries, climate change adaptation and disaster risk reduction into the repertoires of fisheries managers and resource users. Food security is still absent.

It is, however, recognised that small-scale fisheries, such as those of the Eastern Caribbean, are dynamic social-ecological systems requiring people-centred approaches (Berkes et al. 2001; Mahon et al. 2008). The Caribbean Community Common Fisheries Policy (CCCFP) provides the framework for this (CRFM 2010). The Regional Food and Nutrition Security Policy acknowledges the CCCFP and encourages the inclusion of food security, but provides no pathway for implementation linked to fisheries governance (CARICOM 2010). Implementation of the CARICOM strategic plan for 2015–2019 has not yet commenced, but it emphasizes resilience as a theme. In the context of transformation, which is systematically moving from an undesirable to a more desirable state (Olsson et al. 2004), this convergence of policies could create a window of opportunity (Fig. 11.2). However, preparatory steps are required to take full advantage of the opportunity. There are initiatives to address the knowledge and information deficiencies identified by Nurse (2011) and FAO (2014) as well as to use policy processes to create a shared vision (CRFM 2010). There is a logical sequence to the steps, but the process is non-linear and iterations are to be expected (e.g. between networking and knowledge mobilization). It is the step of strengthening social networks, self-organisation and adaptive capacity for building resilience (highlighted in Fig. 11.2) that is currently neglected and critically in need of attention. This step is addressed in the case studies.

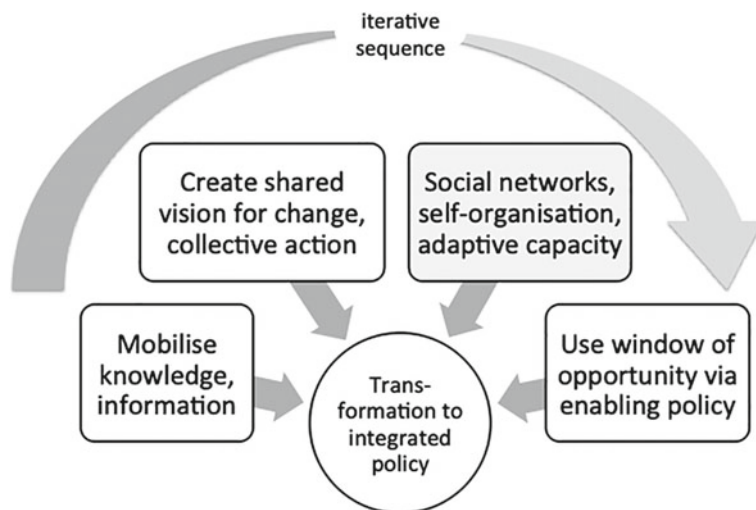


Fig. 11.2 The process of transformation to improved integrated policy

11.2.3 Cases

From 2007 to 2012, the research project on Marine Resource Governance in the Eastern Caribbean (MarGov project) focused on understanding governance related to small-scale fisheries and coastal management in the Eastern Caribbean. It used a conceptual framework derived from a complex adaptive system and social–ecological system perspectives (McConney and Parsram 2008), the relevant aspects of which were shown in Fig. 11.1. Insights into environmental change, resilience and food security were acquired in the investigations that focused on governance. Field research methods were interdisciplinary, with different suites of methods applied to better understand social networks, self-organisation and adaptive capacity (Table 11.1).

Table 11.1 Field research methods used in the case studies

Social networks	Self-organisation	Adaptive capacity
Social network analysis, semi-structured and informal interviews	Informal interviews	Semi-structured and informal interviews
Focus groups	Organisation workshops	Organisation workshops
Participant observation	–	Participant observation
Quantitative network analysis	Qualitative participatory analysis	Qualitative participatory analysis

Field methods comprised a mix of interviews, focus groups, participant observation and workshops. Social network analysis featured prominently. The remaining cases were generated mainly from sub-grants to in-country project collaborators (government agencies, co-management bodies and NGOs) to test some of the tools (e.g. social network analysis) and approaches (e.g. ecosystem approach to fisheries) in partnership with researchers. Workshops with the partner organisations generated most of the insights shared. Although all of the case studies covered the three aspects of interest, there was a clear precedence of focus in each such that the cases can be clustered into three groups based on their primary aspects (Table 11.2).

11.3 Results

Findings from the eight case studies are briefly reported, under the three primary investigative aspects, in terms of environmental change, food security, resilience and governance.

11.3.1 *Social Networks*

11.3.1.1 **Multi-species Fisheries in Grenville, Grenada**

It was found that fisherfolk were less concerned with environmental and ecological change (e.g. catches, seasonality, habitat) than with socio-economic issues (e.g. management livelihoods, marketing). They reported less predictable seasonality of both reef and pelagic fisheries. People structured livelihood strategies around seasonality and used ecological knowledge and marketing networks to cope with vulnerability. Increased variation in both the availability and abundance of fish both posed threats to food security. Rough seas reduced the number of fishing days of small boats with limited range even if fish were available. However, good fishing conditions and large catches quickly caused market gluts resulting in unprofitable price reduction and potential fish spoilage as fish storage was limited. Fishers used networks to manage their fishing operations and ex-vessel sales while fish vendors used their networks to either acquire scarce fish or rapidly move large catches. Vendors also used networks for collusion on low ex-vessel prices while maintaining high-profit margins for retail sales. Thus both the fish suppliers and consumers were at times disadvantaged, and there was high local dependence on the fish supply for household consumption. When the market was glutted, or vendors dropped price regardless of availability, the fishers would occasionally refuse to fish even under good conditions. Self-organization was more evident in the harvest sector through fishing cooperatives, but the adaptive capacity was low. The fishing cooperative and fisheries authority played minor roles in knowledge and marketing networks.

Table 11.2 Case studies clustered by primary aspect of investigation

Case studies noting geographic locations	Main features of each case study	Aspects of resilience focused upon to varying degrees in the case studies		
		Social networks	Self-organisation	Adaptive capacity
Multi-species fisheries in Grenville, Grenada	Network analysis of >100 fisherfolk; fish marketing; ecological knowledge; climate; cooperatives; national planning process	+++	+	++
Sea urchin fisheries in Barbados and Saint Lucia	Network analysis of >100 fisherfolk at 5 sites; climate; ecological knowledge; fisher work groups; livelihoods; planning process	+++	++	+
Caribbean Network of Fisherfolk Organisations	Interviews, workshops co-production with fisherfolk leaders; leadership style; network capacity; multi-level communication	+	+++	++
Fisherfolk organising in the Grenadines	Interviews, fisherfolk workshops; network capacity; communication; leadership	+	+++	++
Fisherfolk and government in Trinidad and Tobago	Institutional arrangements for governance; network adaptive capacity; conflict skills; leadership and advocacy; co-management	++	+	+++
Barbados Fisheries Advisory Committee	Legal mandate; policy influence; leadership; institutional reform; industry engagement	+	++	+++
Sea urchin fishery in Grenada	Collaborative fishery management; policy influence; livelihoods; institutional reform	+	++	+++
Ecosystem approach in St. Kitts and Nevis	Collaborative fishery management; vision; change management; institutional reform	+	++	+++

Key: +++ Primary aspect; ++ Secondary aspect; + Minor aspect

Factors enabling resilience included well-developed coping strategies for dealing with uncertainty from several sources. Tolerance of ecological and environmental uncertainty could confer resilience to climate change and variability in the harvest sector once the future ranges of climate events do not exceed experience to an overwhelming degree. Kinship and friendship informal social networks contribute to resilience in both harvest and post-harvest roles in food security. However, the factors that constrain overwhelm those that enable. The cooperative has little ability to influence fisheries. The negligible role that resource users play in managing the fisheries infrastructure is a constant source of conflict and a threat to food security. There is little evidence of institutional learning and adaptation in the governance arrangements. Fish marketing arrangements that frequently cause conflict and reduce trust between the harvest and post-harvest sectors mar the environment for developing adaptive capacity. The networks operate more for individual or group benefit than for building system resilience and their potential for contributing fully to food security and governance is limited.

11.3.1.2 Sea Urchin Fisheries in Barbados and Saint Lucia

The fisheries for the white sea urchin (*Tripneustes ventricosus*) in Barbados and Saint Lucia are of similar high socio-economic and cultural importance, but are managed under different governance arrangements (Cox and McConney 2015). These aim at adaptive co-management (Plummer and Armitage 2007). Urchin fisheries harvest high-value single species with significant culturally embedded demand and easy marketability. Urchin roe is highly nutritious. Urchins have been overfished in both countries, and the fisheries have remained closed for several years with very brief openings. Urchin populations experience natural large fluctuations due to environmental conditions, but the mechanisms are unclear as are the likely impacts of increasing global and regional environmental change. Despite their ecological similarity and vulnerability to environmental change, being sedentary coastal species, the sea urchin fisheries in Barbados and Saint Lucia are different due to geography, demography, culture and other factors that influence how resilience and food security factor into fisheries governance. The high cultural and financial value of sea urchin roe has caused urchin fisheries to be a high priority for adaptive co-management. However, weak state capacities to manage, and a high prevalence of illegal fishing, undermine the recovery of urchin populations despite multi-year closures in both countries. They also undermine food security.

Social networks among sea urchin divers relate to kinship, ecological knowledge, labour, trust, and fisheries management (Cox and McConney 2012). Despite networks and bio-physical conditions favouring community involvement, sea urchin fishery governance in Saint Lucia is more top-down than in Barbados (Cox 2016). The latter has encouraged fishers participation in all stages from surveys through data analysis to management advice (Mahon et al. 2003), and this has built capacity amongst a small, select group of fishers (Cox and McConney 2012). The illegal fishery has proven to be highly adaptive (e.g. night fishing with SCUBA to avoid surveillance)

and exceptionally resilient supported by ‘rogue’ social networks. These networks are usually static and may include spouses who provide warning of the arrival of law enforcement officials (Cox 2016). The governance arrangements are not resilient, and they have been unable to adapt to resource and harvest patterns sufficient to keep the fisheries open and economically viable.

11.3.2 Self-organisation

11.3.2.1 Caribbean Network of Fisherfolk Organisations

The Caribbean Network of Fisherfolk Organisations (CNFO) was established in 2007 under a CRFM project to form, strengthen and network national level Fisherfolk organisations into a sustainable, self-organising regional entity. Sustainable fisheries livelihoods are the main concern of the CNFO. Fisherfolk leaders have included the ecosystem approach to fisheries in their organisational mission. They informally monitor environmental change and it has been a point of discussion at their workshops. Adaptation of fishing gear, safety at sea during extreme weather events, early warning systems, vessel design and changing species composition in catches are among topics discussed. The CNFO has been involved in regional events on climate change adaptation and disaster risk reduction. However, there is little evidence of food security being a major topic of discussion in any context other than livelihoods.

A highly participatory, bottom-up, collaborative planning process shaped the growth of the CNFO (McConney and Phillips 2011). Partly because of its very articulate and energetic fisherfolk leadership that had begun to influence policy at the regional level, it was considered a fisheries governance success (McIntosh et al. 2010). The CNFO transitioned from an informal network of fisherfolk leaders with no legal identity, formal structure, independent funding, constitution, strategic plan or communication strategy into a not-for-profit company with a board of directors in 2016 (McConney et al. 2016). Still, it continued to operate opportunistically in response to external funding and requests from regional and international fisheries organisations seeking fishing industry engagement in their activities. The façade of widely celebrated success hid deeper persistent organisational problems. Fisherfolk leadership was willing but not able to both maintain full-time fisheries livelihoods and maintain a vibrant regional network, so the latter suffered. The CNFO has become resilient in an undesirable position from a governance perspective and its capacity is too low for self-organisation. It is uniquely positioned for high potential in food security policy (McConney et al. 2017). However, it is not in a position to take significant action without external assistance.

11.3.2.2 Fisherfolk Organising in the Grenadines

In 2006, the Sustainable Grenadines Project brought fisherfolk together from throughout the transboundary Grenadines island chain to discuss key fisheries issues and identify potential solutions. An identified priority was to organise a stakeholder group for fisherfolk collaboration in the Grenadines. Nothing happened until 2009 when MarGov suggested a representative Grenadines fisherfolk network, essentially a downscaled version of the CNFO, to address shared issues surrounding fish marketing, fuel, communication, immigration, marine-protected areas, livelihoods and more. Environmental change was not a major issue, but food security was in terms of freedom of movement of fishers across the marine boundary, access to markets and fisheries infrastructure and several operational issues affecting fish supply. Households in the Grenadines are highly dependent on locally supplied seafood as well as on earnings from fisheries to purchase other food.

However, at present, there are no fully functional fisherfolk associations or cooperatives in the Grenadines, and only slowly emerging local leadership to form any. Most islands had bad experiences with cooperatives and there is a high level of mistrust amongst fisherfolk regarding the mismanagement of funds. Collaboration among Grenadines fishers, and between them and the main islands' Fisheries Divisions has been minimal. Self-organization in fashioning a network fisherfolk organization is taking a long time due to the need to rebuild trust among resource users and over-reliance on the state for leadership. The level of power accorded to state authorities constrains self-organization. An interesting adaptation to low capacity in this system was the decision to leave the fisherfolk network dormant until awakened by a crisis requiring collective action. This is not ideal. It demonstrates acceptance of a low level of adaptive capacity and hence resilience.

11.3.3 Adaptive Capacity

11.3.3.1 Fisherfolk and Government in Trinidad and Tobago

The Trinidad and Tobago government's Cabinet-appointed Monitoring and Advisory Committee (MAC) was a body that included government and fishing industry stakeholders. Trinidad and Tobago Unified Fisherfolk (TTUF) is the umbrella NGO that represents primary fisherfolk organisations in the country. Fisheries legislation did not prescribe formal stakeholder involvement in fisheries governance and not all governance structures enable self-organization and enhance adaptive capacity. However, these two bodies with overlapping memberships provided an informal institutional arrangement for collaboration (Sandy et al. 2011). The MAC was formed out of the need to resolve conflicts between trawlers and artisanal fishers along the north coast of Trinidad. A wide range of vessels of different size and range commonly practice shrimp trawling. The MAC advised the government on matters such as fishing regulations, gear specification and marine zoning for large- and small-scale fleets. All

require attention to environmental change and are relevant to food security. Food security issues concern the amount and composition of catch available for local consumption versus export based on fleet size and operations, as well as target species versus by-catch and by-product (by-catch that is not discarded at sea).

Fishing industry MAC members established the TTUF partly because of dissatisfaction with decision-making in the MAC, and the need to form a national fisherfolk organisation for greater voice and influence on fisheries policy. The two organisations had an uneasy relationship. The actors who were dissatisfied had the capacity in their networks to form a new organisation but high levels of conflict pervaded both organisations. The MAC had such severe internal conflicts that it ceased functioning for a period. Low capacity for conflict management in the MAC and TTUF constrained fisheries governance and hence decision-making related to food security and other matters. Neither organisation was resilient. Training in conflict management, as part of building adaptive capacity, could have facilitated more resilient and effective in fisheries governance.

11.3.3.2 Barbados Fisheries Advisory Committee

Fisheries legislation in most CARICOM countries calls for a multi-stakeholder Fisheries Advisory Committee (FAC) to advise the minister on policy matters. This is, in effect, statutory national consultative co-management. Few countries have implemented this provision, but Barbados has since 1995. However, the FAC has struggled to influence policy (McConney et al. 2003). The FAC has been deeply involved in formulating successive fisheries management plans with attention to global and regional environmental change. This includes not only oceanographic conditions but also issues such as beach erosion that reduces fishing vessel haul-out space for repairs. The latter and similar operational matters affect food security by altering the amount and timing of fishing effort and the distribution of fish landings. The FAC often deliberates on seafood marketing and trade due to conflicts between seafood imports and local landings that are highly seasonal but unpredictable. Other food security issues have included seafood quality assurance and public health as the sale of low-quality local and imported seafood is a concern especially since customers attracted by low prices are often the poorest in society.

In 2008, the FAC attempted to strengthen its role in fisheries governance by engaging the fishing industry on current issues and good governance (inclusiveness, transparency, accountability, equity, consensus, efficiency, effectiveness, responsiveness, and rule of law). It became apparent, however, that the FAC lacked the capacity and leadership to self-organise and undertake its work in a more interactive approach. Gaps in capacity and leadership constrained the development of resilient governance arrangements. Dependence on the fisheries authority for support conflicted with the autonomy required for the FAC to render the best available policy advice from increased engagement with the fishing industry. Maintaining the FAC as a weak structure in national fisheries governance undermines the resilience of the industry contrary to the intention of the law.

11.3.3.3 Sea Urchin Fishery in Grenada

Depletion of the white sea urchin (*Tripneustes ventricosus*) around Grenada, caused mainly by commercial fishing for an export market, prompted the government to close the fishery in 1995 (Phillip and Isaac 2010). Since then there has been continuous illegal harvest resulting in only modest, occasional, temporary recoveries of urchin populations in years of exceptional recruitment. The population remains in a depleted state similar to the fisheries in Barbados and St. Lucia. However, a major difference is that in Grenada there is no system geared to open and close the fishery, depending on urchin abundance, based on a plan for collaborative management. As elsewhere, urchin populations fluctuate naturally in Grenada in response to environmental conditions in ways that are not well understood. Heavy recruitment can overgraze seagrass beds, so persistent fishery closure harms habitat as well as denying Grenadians a highly valued and nutritious food in years of plenty unless they engage in illegal harvest and purchase. As elsewhere, the illegal fishery is quite resilient.

Pressure from resource users for the fisheries authority to actively manage the fishery reached political levels in 2008. Partly in response to this pressure, the Fisheries Division initiated the participatory development of a sea urchin fisheries management plan. Grenada needs the adaptive capacity to transform the depleted and closed fishery into viability. Despite a stated desire to establish collaborative management, the fisheries authority was unable to operationalize this governance (Phillip and Isaac 2010). The enabling policy to provide the resources (financial, physical, human) for the fisheries authority to carry out its mandate as a co-management partner was absent. The required capacity could not be acquired through networking with the fishing industry since their capacity was also low (Nayar et al. 2009). Even with a new fisheries management plan, and substantial buy-in from most of the urchin fishers, the situation reverted to the status quo as there was no window of opportunity to sustain transformation.

11.3.3.4 Ecosystem Approach in St. Kitts and Nevis

Introducing an ecosystem approach to fisheries (EAF) involves changing marine resource governance; such as the way people make fisheries decisions for the benefit of society. EAF is a response to the failure of less comprehensive, conventional approaches to fisheries management to meet ecological, economic and social objectives. The Department of Marine Resources (DMR) of the Federation of St. Kitts and Nevis indicated interest in introducing EAF for its fisheries management planning (DMR 2011). EAF is incorporated into the Caribbean Community Common Fisheries Policy (CCCFP), as is food security, but no CARICOM country has introduced EAF or explicitly addressed food security in fisheries governance. Recent marine zoning provided information on environmental and ecological conditions and trends. The remaining priorities for transformation were visioning, developing adaptive capacity, and identifying EAF entry points (windows of opportunity). Consultations with

stakeholders revealed that they had mainly ecological and economic perspectives on EAF. Fishers were concerned mainly about the fish stocks available for harvest and the markets to sustain and improve their livelihoods. NGOs were concerned mainly about the marine environment, while recreational users straddled the ecological and economic aspects.

Stakeholders said that to build resilience the critical requirements for adaptive capacity included awareness of EAF, stakeholder engagement, strengthening stakeholder organisations and promoting consumer involvement. The latter favours attention to food security. The conventional legal-institutional arrangements for fisheries governance were seen as too restrictive and not adaptive. Many suggested that implementation of EAF should be incremental rather than a large change. The immediate activation of a multi-stakeholder fisheries advisory committee, as provided for in legislation, was seen as a way to proceed, integrated across economic sectors. Participants also stressed the importance of proceeding with a change management plan. Stakeholders wanted to avoid partial or intermittent implementation that would frustrate stakeholders due to poor process.

11.3.4 Summary

Table 11.3 summarises the main findings from the above case studies and outlines recommended actions that are discussed collectively in the next section.

11.4 Discussion

Fisheries governance in the Caribbean Community is at a critical crossroads. Separate regional policies address food security (CARICOM 2010), fisheries governance (CRFM 2010) and resilience (CARICOM 2014), but lack guidance on how these policies are to be integrated and implemented at the national level in the context of global and regional environmental change. Nurse (2011) notes the absence of attention to climate change and variability in regional fisheries governance, but this situation is improving (Fanning et al. 2013). The same cannot be said for food security (Trotman et al. 2009). Directly or indirectly increasing the contribution of small-scale fisheries to food security is part of the global process of making fisheries governance more resilient (Béné et al. 2007). National fisheries governance typically addresses food security only indirectly as shown in the case studies, but there are opportunities to transform fisheries governance to better incorporate food security. In these cases, the weakest part of the process concerns social networks, self-organisation and adaptive capacity.

Resilience can be examined at several levels (Berkes and Ross 2013). Fisherfolk use social networks for coping with environmental and social change at the individual or enterprise level as evident in Grenada, Saint Lucia and Barbados. This individual

Table 11.3 Main findings from case studies and action recommended for the way forward

Case studies noting geographic locations	Main findings on resilience, food security and fisheries governance	Action to address resilience, food security and fisheries governance
Multi-species fisheries in Grenville, Grenada	<ul style="list-style-type: none"> • Networks are key in fishing, marketing • Vendors influence food price, supply • Governance arrangements are weak 	Engage organised harvest and post-harvest fisherfolk in co-managing the fish market in order to stabilise seafood supply and prices, reducing wastage as part of comprehensive management
Sea urchin fisheries in Barbados and Saint Lucia	<ul style="list-style-type: none"> • Networks are strong for illegal harvest • Illegal harvest threatens food security • Adaptive co-management has potential 	Using existing labour and knowledge networks, intensify the introduction of adaptive co-management, incentives for compliance and swift enforcement of equitable harvest rules agreed upon
Caribbean Network of Fisherfolk Organisations	<ul style="list-style-type: none"> • Low capacity limits self-organisation • High potential for food security role • Essential for regional level governance 	Promote regional and national fisherfolk leadership training, strategic recruitment of support staff with financial skills and network CNFO to food security actors
Fisherfolk organising in the Grenadines	<ul style="list-style-type: none"> • Leadership constrains self-organisation • Critical role in local level food security • Too isolated for effective governance 	Encourage Grenadines fisher leaders to network, collectively engage mainland authorities to improve infrastructure and systems for seafood, and join the CNFO
Fisherfolk and government in Trinidad and Tobago	<ul style="list-style-type: none"> • Conflicts cripple resilience building • High potential for food security role • Conflict management critically needed 	Develop capacity in managing conflicts, policy influence and awareness of food security policy among both government authorities and fishing industry actors
Barbados Fisheries Advisory Committee	<ul style="list-style-type: none"> • Unable to adapt to increase influence • Key to improving food security policy • Statutory duty to improve functioning 	Provide FAC with resources to engage the fishing industry and advise directly on policy including food security, with reduced dependence on the fisheries authority for most operational support
Sea urchin fishery in Grenada	<ul style="list-style-type: none"> • Transformation could not be completed • Important for national food security • Enabling policy sustainable change 	Strengthen the policy and legal basis for collaborative management, enabling the fisheries authority to perform; increase fisherfolk and consumers awareness of food security in fisheries management
Ecosystem approach in St. Kitts and Nevis	<ul style="list-style-type: none"> • High potential to improve resilience • Food security needs to be addressed • Amenable to EAF governance reform 	Formulate a participatory process for incrementally introducing EAF within the context of new legal-institutional arrangements for multi-stakeholder engagement, including on food security

or enterprise level resilience is often not scaled up to the local or national level for positive contributions to food security and fisheries governance. On the contrary, these networks can be harmful and only benefit a few. In Grenville, post-harvest networks at times constrain fish landings and inflate consumer prices, while in Saint Lucia and Barbados networks feature in illegal sea urchin harvest and marketing to the detriment of long-term stock recovery and a more sustainable supply of seafood for everyone. We advocate using network analysis to identify leaders and change agents in these networks (also see Bodin and Prell 2011) to redirect their efforts to strengthen collective action through cooperatives or other industry groups that could collaborate in managing fisheries infrastructure and resources. This, as integrated and enabling policy, would strengthen fisheries governance and stabilise affordable, legal seafood supplies. At sites like Grenville, such changes and the removal of constraints could also herald the introduction of small-scale fishery local food movements (Nelson et al. 2013), making further positive use of fisherfolk social networks in food security.

Self-organisation applies in these cases particularly to the struggling fisherfolk organisations such as the regional CNFO and the transboundary network organisation in the Grenadines. Given that most fisheries resources in the Eastern Caribbean are shared, these organisations offer unique opportunities, if strengthened, to assist in matching the geographic scale of the harvest to ecological management units, with consequent benefits for food security. One can envisage policy enabling coordinated efforts across maritime jurisdictions at the resource user level for both conservation and exploitation to ensure more sustainable and stable seafood supplies. The CNFO is already a part of the CRFM governance structure. With the strengthening of leadership and sustainable financing it could become a resilient and influential actor, as could the Grenadines network at a lower level. A policy initiative along these lines would enhance the ‘livelihood landscapes’ of the fisherfolk, improving their adaptive capacity (McClanahan et al. 2015). These connections have not yet been considered under policy.

Adaptive capacity encompasses more than networks and self-organisation. In these cases, the capacity to adapt for more resilient fisheries governance structures and arrangements that could contribute to food security required skills in conflict management, resources to provide policy advice, enabling policy for operational resources and revised legal-institutional arrangements among others. The actors in the four cases were involved or intending to be involved in national level collaborative management with relevance to food security but the latter was not a priority. The governance reforms recommended here (Table 11.3) provide the opportunity to increase awareness of their roles in food security, which in turn will strengthen their arguments for further developing adaptive capacity and resilience. The Caribbean is dependent on fisheries resources for food security, livelihoods and other ecosystem services that are highly vulnerable to climate impacts. Nurse (2011) indicates that global climate models, even if downscaled to the regional level, will still leave more questions than answers for fisheries in Caribbean SIDS. It is essential therefore that attention focus less on prediction and more on adaptation and resilience. Food security offers new opportunities to focus on the integration of enabling policy coupled

with reformed fisheries governance to improve fisheries social–ecological resilience in the CARICOM region.

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References

- Armitage, D. (2005). Adaptive capacity and community-based natural resource management. *Environmental Management*, 35, 703–715.
- Béné, C., Macfadyen, G., & Allison, E. H. (2007). *Increasing the contribution of small-scale fisheries to poverty alleviation and food security*. FAO Fisheries Technical Paper No. 481. FAO, Rome.
- Berkes, F., & Folke, C. (Eds.). (1998). *Linking social and ecological systems: Management practices and social mechanisms for building resilience*. Cambridge: Cambridge University Press.
- Berkes, F., & Ross, H. (2013). Community resilience: Toward an integrated approach. *Society and Natural Resources*, 26(1), 5–20.
- Berkes, F., Mahon, R., McConney, P., Pollnac, R., & Pomeroy, R. (2001). *Managing small-scale fisheries: Alternative directions and methods*. International Development Research Centre (IDRC), Ottawa.
- Berkes, F., Colding, J., & Folke, C. (Eds.). (2003). *Navigating social-ecological systems: Building resilience for complexity and change*. Cambridge: Cambridge University Press.
- Bodin, Ö., & Prell, C. (Eds.). (2011). *Social networks and natural resource management: Uncovers the social fabric of resource governance*. Cambridge: Cambridge University Press.
- CARICOM. (2010). *Regional Food and Nutrition Security Policy*. CARICOM Secretariat, Georgetown, Guyana.
- CARICOM. (2014). *Strategic plan for the Caribbean Community 2015–2019*. CARICOM Secretariat, Georgetown, Guyana.
- Chakalall, B., Mahon, R., McConney, P., Nurse, L., & Oderson, D. (2007). Governance of fisheries and other living marine resources in the Wider Caribbean. *Fisheries Research*, 87, 92–99.
- CRFM. (2010). *Agreement establishing the Caribbean Community Common Fisheries Policy*. Caribbean Regional Fisheries Mechanism, Belize City, Belize.
- CRFM. (2012). *Diagnostic study to determine poverty levels in CARICOM fisheries communities*, CRFM Technical and Advisory Document No. 2012/3. Volume I, Caribbean Regional Fisheries Mechanism, Belize City, Belize.
- Cox, S. (2016). *Conditions for establishing and sustaining the adaptive co-management of the sea urchin fisheries of Barbados and Saint Lucia*. Ph.D. thesis, University of the West Indies, Cave Hill, Barbados.
- Cox, S., & McConney, P. (2012). The role livelihood outcomes and strategies play in the adaptive co-management of the sea urchin fisheries in Barbados and St. Lucia. *Proceedings of the Gulf and Caribbean Fisheries Institute*, 64, 335–341.
- Cox, S., & McConney, P. (2015). Exploring adaptive co-management as a pathway to enhance the governability of sea urchin fisheries in Barbados and Saint Lucia. In S. Jentoft & R. Chuenpagdee (Eds.), *Interactive governance for small-scale fisheries* (pp. 583–604). Cham: Springer International Publishing.

- Department of Marine Resources. (2011). *Preparing to introduce an ecosystem approach to fisheries in St Kitts and Nevis: The final meeting*. Report of the DMR produced under a CERMES MarGov Small Grant. Department of Marine Resources, St Kitts and Nevis.
- Erickson, P. J., Ingram, J. S., & Liverman, D. M. (2009). Food security and global environmental change: Emerging challenges. *Environmental Science and Policy*, 12(4), 373–377.
- Fanning, L., Mahon, R., & McConney, P. (2009). Focusing on living marine resource governance: The Caribbean Large Marine Ecosystem and Adjacent Areas Project. *Coastal Management*, 37, 219–234.
- Fanning, L., Mahon, R., & McConney, P. (Eds.). (2011). *Towards marine ecosystem-based management in the Wider Caribbean*. Amsterdam: Amsterdam University Press.
- Fanning, L., Mahon, R., & McConney, P. (2013). Applying the large marine ecosystem (LME) governance framework in the Wider Caribbean Region. *Marine Policy*, 42, 99–110.
- FAO. (2014). *The state of world fisheries and aquaculture*. FAO, Rome.
- FAO. (1996). *Rome Declaration on Food Security and World Food Summit Plan of Action*. FAO, Rome.
- Kooiman, J., Bavinck, M., Jentoft, S., & Pullin, R. (Eds.). (2005). *Fish for life: Interactive governance for fisheries*. MARE Publication Series No. 3. Amsterdam: University of Amsterdam Press.
- Mahon, R., & McConney, P. (2013). A network perspective on governing interactions. In M. Bavinck, R. Chuenpagdee, S. Jentoft, & J. Kooiman (Eds.), *Governability of fisheries and aquaculture: Theory and applications* (pp. 301–314). Dordrecht: Springer.
- Mahon, R., McConney, P., & Roy, R. (2008). Governing fisheries as complex adaptive systems. *Marine Policy*, 32, 104–112.
- Mahon, R., Fanning, L., McConney, P., & Pollnac, R. (2010). Governance characteristics of large marine ecosystems. *Marine Policy*, 34, 919–927.
- Mahon, R., Almerigi, S., McConney, P., Parker, C., & Brewster, L. (2003). Participatory methodology used for sea urchin co-management in Barbados. *Ocean and Coastal Management*, 46, 1–25.
- McClanahan, T., Allison, E. H., & Cinner, J. E. (2015). Managing fisheries for human and food security. *Fish and Fisheries*, 16, 78–103.
- McConney, P., & Charles, A. T. (2010). Managing small-scale fisheries: Moving toward people-centered perspectives. In R. Q. Grafton, R. Hilborn, D. Squires, M. Tait, & M. Williams (Eds.), *Handbook of marine fisheries conservation and management* (pp. 532–545). New York: Oxford University Press.
- McConney, P., & Parsram, K. (2008). A research framework for examining the characteristics of networks that determine resilience and adaptability in marine resource governance in the English speaking eastern Caribbean. *Proceedings of the Gulf and Caribbean Fisheries Institute*, 60, 65–72.
- McConney, P., & Phillips, T. (2011). Collaborative planning to create a network of fisherfolk organisations in the Caribbean. In B. Goldstein (Ed.), *Collaborative resilience: Moving through crisis to opportunity* (pp. 207–230). Cambridge: MIT Press.
- McConney, P., Mahon, R., & Oxenford, H. (2003). *Barbados case study: The Fisheries Advisory Committee*. Caribbean Coastal Co-management Guidelines Project. Caribbean Conservation Association, Barbados.
- McConney, P., Mahon, R., Parsram, K., & Cox, S. (2011). Fisheries networks in the Caribbean. In R. Chuenpagdee (Ed.), *World small-scale fisheries contemporary visions* (pp. 273–284). Delft: Eburon Academic Publishers.
- McConney, P., Phillips, T., Lay, M., & Nembhard, N. (2016). Organizing for good fisheries governance. *Social and Economic Studies*, 65, 57–86.
- McConney, P., Phillips, T., Lay, M., & Nembhard, N. (2017). Caribbean fisherfolk engage the small-scale fisheries guidelines. In S. Jentoft, R. Chuenpagdee, M. Barragán-Paladines, & N. Franz. (Eds.), *The small-scale fisheries guidelines: Global implementation* (pp. 451–472), MARE Publication Series 14. Cham: Springer.

- McIntosh, S., Lay, M., McConney, P., & Phillips, T. (2010). The development of a Caribbean regional network of fisherfolk organisations and its role in influencing fisheries policy. *Proceedings of the Gulf and Caribbean Fisheries Institute*, 62, 298–305.
- Nayar, R., Davidson-Hunt, I., McConney, P., & Davy, B. (2009). *The sea urchin fishery in Grenada: A case study of social-ecological networks*. CERMES Technical Report No. 24. Centre for Resource Management and Environmental Studies, University of the West Indies, Barbados.
- Nelson, C. H., Lowitt, K., Nagy, M., & Bavington, D. (2013). Future research approaches to encourage small-scale fisheries in the local food movement. *Journal of Agriculture, Food Systems, and Community Development*, 3(4), 177–181.
- Nurse, L. A. (2011). The implications of global climate change for fisheries management in the Caribbean. *Climate and Development*, 3, 228–241.
- Olsson, P., Folke, C., & Hahn, T. (2004). Social-ecological transformation for ecosystem management: The development of adaptive co-management of a wetland landscape in southern Sweden. *Ecology and Society*, 9(4), 2.
- Parsram, K., & McConney, P. (2011). A network approach to understanding coastal management and governance of small scale fisheries in the eastern Caribbean. In R. Ommer, R. I. Perry, P. Cury, & K. Cochrane (Eds.), *World fisheries: A social-ecological analysis* (pp. 334–350). Oxford: Wiley-Blackwell.
- Phillip, P. E., & Isaac, C. J. (2010). *Fisheries management planning for the Grenada sea urchin fishery*. Marine Resource Governance in the Eastern Caribbean (MarGov) Project. CERMES Technical Report No. 41. Centre for Resource Management and Environmental Studies, University of the West Indies, Barbados.
- Plummer, R., & Armitage, D. (2007). A resilience-based framework for evaluating adaptive co-management: Linking ecology, economy and society in a complex world. *Ecological Economics*, 61, 62–74.
- Pomeroy, R., McConney, P., & Mahon, R. (2004). Comparative analysis of coastal resource co-management in the Caribbean. *Ocean and Coastal Management*, 47, 429–447.
- Sandy, K., Leotaud, N., Leid, S., & Blackman, K. (2011). *Network analysis of two stakeholder organisations involved in the governance of the fishing industry of Trinidad and Tobago*. CERMES Technical Report No. 49. Centre for Resource Management and Environmental Studies, University of the West Indies, Barbados.
- Trotman, A., Gordon, R. M., Hutchinson, S. D., Singh, R., & McRae-Smith, D. (2009). Policy responses to GEC impacts on food availability and affordability in the Caribbean community. *Environmental Science and Policy*, 12, 529–541.
- Walker, B. H., Gunderson, L. H., Kinzig, A. P., Folke, C., et al. (2006). A handful of heuristics and some propositions for understanding resilience in social-ecological systems. *Ecology and Society*, 11(1), 13.