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Chapter 22

Implementing the Small-Scale Fisheries Guidelines: Lessons from Brazilian Clam Fisheries

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Abstract From 2008 to 2011 the Brazilian Ministry of Fisheries and Aquaculture and the Canadian charity World Fisheries Trust implemented a project known as *Gente da Maré* (GDM), or ‘People of the Tides’. GDM worked strategically to build institutional and community capacity and linkages between government, university researchers, and local fishing associations involved in projects to improve the livelihoods and well-being of ‘marisqueiras,’ women and families that depend on clam and oyster extraction, mainly the Venerid clam *Anomalocardia brasiliiana*, in the Northeast Region of Brazil where the country’s highest number of coastal and estuarine small-scale fishers are concentrated. Consistent with many of the principles and guidelines in FAO’s Voluntary Guidelines for Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines), GDM promoted an integrated approach to equitable development of sustainable fisheries that included: co-management including participatory research and stronger research-policy interface; empowerment of women in fisheries occupations and improved opportunities for women; and value chain upgrading and democratization focusing on the decent work agenda. In this chapter, we analyze the clam fisheries component of GDM as an example of steps towards the implementation of the SSF Guidelines in Brazil. We examine the context in which the project was carried out, the results that were achieved, lessons learned, and indications on how a regional government could act to implement the new SSF Guidelines to the benefit of the clam fisheries.

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Introduction

Small-scale fisheries are complex, plural, and individual activities that variably perform cultural, economic, food security, poverty alleviation, and livelihood functions within the constraints of socio-environmental sustainability (da Silva et al. 2014a). One of the key features of a small-scale fishery is the multiplicity of fishers' decision-making relationships along the whole value chain that affect production, income, and participation (Maldonado 1986), along with the involvement of an array of other stakeholders and practitioners. It is important to understand which factors influence decision-making by fishers and managers, not only in relation to a *technical-scientific* concern for conservation and sustainability of the resource, but also to attend *empirical-traditional* pressures to achieve social, cultural, and economic expectations (Mattos 2011).

Supporting the visibility, recognition and enhancement of small-scale fisheries, fishers, fishworkers and fisheries-related activities, through a human rights-based approach, is a central element of the Food and Agriculture Organization's (FAO) *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication* (FAO 2015), hereafter referred to as the SSF Guidelines. Recognition of unequal power relationships between value chain stakeholders, specifically the marginalization of vulnerable groups involved at the production and pre- and post-harvest levels of fisheries is critical. In this context, vulnerable and marginalized groups may benefit from special support to enhance their participation in decision-making processes.

In this chapter, we examine the steps needed to implement the SSF Guidelines in Brazil. We analyze the specific case of the clam fishery in the Northeast region of Brazil, where significant international cooperation was invested between 2008 and 2011, through a project known as *Gente da Maré* (GDM), or 'People of the Tides', to build institutional and community capacity for improving the livelihoods of fisherwomen and families in coastal communities.¹ In our analysis, we try to answer the question, "In what ways does the work of the GDM project, and the features of the clam fishery itself, support the implementation of the SSF Guidelines?"

Implementing supportive policies and monitoring systems may provide a way forward for the future development of small-scale fisheries and the implementation of the objectives and recommendations in the SSF Guidelines. We focus on a subset of specific principles of the SSF Guidelines that are most relevant to the case of the

¹The Gente da Maré (GDM) project was co-coordinated by the Brazilian Ministry of Fisheries and Aquaculture and the Canadian charity organization World Fisheries Trust (WFT) and funded by the Canadian International Developmental Agency (CIDA) through a cooperation agreement with the Brazilian Cooperation Agency (ABC) of the Ministry of Foreign Affairs for the "Development of Coastal Communities in the Northeast of Brazil".

clam fishery and GDM, namely: (1) governance of tenure in small-scale fisheries and resource management; (2) social development, employment and decent work; (3) value chains, post-harvest and trade; (4) gender equality; (5) policy coherence, coordination and collaboration; (6) information, research and communication; and (7) capacity development.

We first examine the pre-existing context of small-scale fisheries and specifically the clam fishery in northeast Brazil. Following this, for each of the identified principles, we discuss the results achieved by GDM. Based on lessons learned from the project and our analysis, we provide recommendations with regard to what is still needed to advance public policies for regional implementation of the SSF Guidelines to the benefit of the clam fisheries.

The Brazilian Small-Scale Fishing Sector – A Brief

The last available official statistics (MPA/Brasil 2010) placed Brazil as the 18th largest fish producer in the world, with around 65% of production coming from marine fisheries, and approximately half of this from the country's Northeastern Region, the leading regional producer. The available numbers suggest that over 60% of the total estimated catch comes from small-scale fisheries. Fishing is one of the most traditional and important activities for coastal communities in Brazil, in many cases providing the main source of food and income (Isaac et al. 2006), generating direct jobs and income for an estimated one million fishers and fishworkers, as well as indirect employment for another three million. Small-scale fisheries are marked by local and regional diversity, resulting from differences in habitats, ecosystems, and target species of fish, as well as in the availability of fishing resources, and the technology and practices of fishers.

Brazilian national policy has historically promoted natural resource extraction, including fisheries development, as an important contributor to economic growth and development, at both national and local levels. However, Dias-Neto and Dornelles (1996) estimated that over 80% of Brazil's main fisheries were already fully exploited, overfished, depleted, or recovering; a situation that does not appear to have improved since, though data for many of these fisheries is limited or unavailable. Given the existing mismatch between policy and reality, poverty in coastal fishing communities is a wicked problem (Jentoft and Chuenpagdee 2009), a continuing and complex issue that cannot be resolved by policies promoting a simple increase in fishery production. Fifty-nine percent (9.6 million) of the 16.3 million Brazilians who live below the poverty level are located in the country's Northeast Region (IBGE 2010), many in small coastal communities where fishing is a main livelihood (Fig. 22.1).

Following Brazil's independence in 1822, decades of civil war, the declaration of the Brazilian Republic, and the official end of slavery in 1888, poor landless peasants and former slaves migrated within the country in search of land and work, many settling in riverine and coastal areas to fish. Subsequently, in the early 1900s,



Fig. 22.1 Although proud, clam fishing communities in Igarassu, Pernambuco State, Northeast Region of Brazil, live in very poor conditions, lacking basic health conditions and citizenship, surrounded by disorderly growths of urban centers (Photo credit: Sergio Mattos 2008)

male fishers were individually registered and organized into ‘capatazias’ (a regional unit within the context of a naval reserve), largely to facilitate the supervision of the activity and people involved, and to promote surveillance of the coast and waterways which were strategically important to national security and for moving goods and people (Silva 1988). During the twentieth century, with continuing economic and political upheaval, the movement of people into urban centers and then out to smaller communities continued and more poor people entered the fisheries, often as an occupation of last resort.

Since the 1960s, institutional crises have marked discussions on fisheries management in Brazil, and the institutions responsible for governance of fisheries have gone through cycles of interventions, from emptying and re-starting institutional structures, to expansion through specific planning authorities and public policies (Mattos 2011). Such policies for the fisheries sector, from the 1960s to the mid-1980s, led to great increases in fish harvests, but without appropriate consideration for the long-term sustainability of the marine resource, leading to the decline in fish catch in the following years (Abdallah et al. 2007). Public policies at the start of the twenty-first century have not helped, and possibly will not help, in reducing overexploitation, because these policies were too optimistic about the abundance of fish in

Brazil's EEZ, and were not accompanied by a fisheries management plan that is likely to work.

The perception that fish stocks were inexhaustible led to the development of the small-scale fishing sector by Superintendência do Desenvolvimento da Pesca – SUDEPE (Superintendency for the Development of Fishery), linked to the Ministry of Agriculture. SUDEPE's aim was to industrialize small-scale fisheries to enhance productivity. It promoted this strategy through tax incentives. The result was environmental degradation, decline of numerous fish stocks, breakdown of many fishing communities, and impoverishment of traditional fishing families.

Following the Rio Summit in 1992, Brazilian environmental policy shifted to a more conservationist stance under the governance of the newly created Instituto Nacional do Meio Ambiente e dos Recursos Naturais Renováveis – IBAMA (National Institute for the Environment and Renewable Natural Resources). This was accompanied by a growing public awareness of the importance of ecosystem conservation, and more recently, the importance of managing this ecosystem for the sustainable use of fisheries resources by local communities. Despite this, the Ministry of Agriculture and Supply in the 1990s continued to focus on developing fishing as a production-oriented industry, formulating and implementing policies to increase production and international competitiveness in various segments of the value chain.

In 2003, with the creation of the Secretaria Especial de Aquicultura e Pesca da Presidência da República – SEAP/PR (Special Secretariat of Aquaculture and Fisheries of Brazilian Presidency), the government directed its efforts to structure an integrated national policy for fishing and aquaculture activities. The main goal was to increase production and revenue, including through the promotion of fish consumption nationally for enhanced food security. SEAP was upgraded to the status of Ministry of Fisheries and Aquaculture in 2009, at the same time as new Fisheries and Aquaculture Law that established a National Plan on the Sustainable Development of Fisheries and Aquaculture (Law #11,959/2009) came into being. The overarching aim of this law was to promote sustainable development in harmony with environmental and biodiversity protection, representing the most significant step forward in Brazilian fisheries policy in the last 50 years. The guiding principles of the Brazilian Fisheries and Aquaculture Policy (Brasil 2009), reinforced by the Strategic Plan of Action, include: (1) social, economic and environmental sustainability; (2) transparency; (3) innovation; (4) guaranteed rights; (5) equity and social participation; (6) recognition of local cultures; (7) respect for regional diversity; (8) efficiency, efficacy and effectiveness; (9) commitment; and (10) development and growth with a focus on value chains.

The new institutional and legal framework of the Ministry established guidelines for the planning, promotion, and supervision of fisheries and aquatic resources as well as their preservation, conservation, and recovery. Moreover, it sought to promote socio-economic, cultural, and institutional capacity building. The promotion of sustainable development, shared and participatory management of resources with fishing communities, and research and development of new technologies and value chain development were central components. Development was recognized as not

purely an economic goal, but as something that should also consider well-being, citizenship, and democracy outcomes (SEAP/Brasil 2008).

While these reforms in the structure and mandate of public sector agencies responsible for fisheries represent a significant advance, policy implementation and local engagement remain a challenge. Despite its broad mandate, the Ministry of Fisheries and Aquaculture lacked an adequate budget and the number of personnel necessary for outreach to the small-scale fisheries sector and implementation of these reforms, relying heavily on regional superintendents with limited staff and budgets to attend to the large numbers of fishers, who in many cases are socio-economically marginalized with very low effective access to other public agencies and programs for public health, education, and other basic services. In this context, and in an effort to support and strengthen civil society, it was important to work closely with local organizations representing fishers. What were once *capatazias*, now known as *colônias* (fishing guilds) and in some cases registered as Producer Associations, continue to be the main institutional mechanism through which the public sector reaches fishers. Producer Associations help with the registration of professional fishers and facilitate fisher access to social benefits. They are also the platform from which fishers organize and lobby for fisheries and social rights. However, a legacy of cronyism, nepotism, clientelism, and corruption continue to plague many of such groups, in some cases challenging their ability to effectively and fairly meet the needs of their membership. In parallel, a number of civil society groups, supported by associated social movements, for example the pastoral non-governmental organization ‘Conselho Pastoral dos Pescadores,’ (CPP) have developed alternative local organizations. Generally the goal of these organizations is to strengthen fishers’ rights through advocacy for public recognition of the sector’s economic and social contribution, and associated policy to support its development. As stated by Mattos (2014), these groups are also plagued by issues of legitimacy, representativeness, and lack of balance between political rhetoric and the achievement of real social justice.

Overall, despite significant advances in public policy, increased visibility and political voice of the sector, especially in the past decade or so, the small-scale fishing sector continues to lack adequate institutional and political support at all levels for sustainability and social balance. Fishers still face poor working conditions, lack of infrastructure, and low levels of education (MPA/Brasil 2013), all aggravated by the demise of the Ministry of Fisheries and Aquaculture in 2015. Even though government policies after SUDEPE brought major changes in the fisheries sector, required modernization became a fallacy and a ‘myth,’ generating very heterogeneous production structures (Mattos 2007). Modernization, according to Diegues (1983), did nothing more than hasten the irrational exploitation of fishing resources, and the gradual impoverishment of thousands of small-scale fishers. In fact, SUDEPE warned that the low level of technology at the time and the non-adoption of a research incentive policy to propitiate their improvement, creation and/or adaptation, became limiting factors of the process of development.

The construction and implementation of public policies for the sector requires dialogue and a close relationship with representative fishers associations, not only

to induce intervention processes, but also to meet the challenges of a bottom-up implementation of public policies that take notice of empirical and traditional knowledge (Mattos 2011). There is still a lack of access to basic rights, such as adequate health care (including primary care), recognition, prevention, and treatment of occupational diseases that affect fishworkers, documentation (many fishers do not have basic documents such as birth certificates or social insurance numbers that are necessary to register for most social support programs), and basic information about individual rights and how to access social security programs.

Clam Fisheries and Women

Fishing continues to be considered primarily a male activity in Brazil, with a lack of visibility and recognition of fisherwomen and their contribution to household food security, income, and regional economies. Almost half of registered professional fishers (46.3%), both men and women, live in the Northeast Region, working mainly in coastal and estuarine areas (MPA/Brasil 2012). Across Brazil's more than 8000 km of coastline, women carry out the bulk of harvesting in estuarine fisheries, through the collection of clams (mainly the Venerid clam *Anomalocardia brasiliiana*, hereafter referred to as the 'tiny venus clam') (Fig. 22.2), oysters, crabs, other types of shellfish, and other aquatic organisms.



Fig. 22.2 Tiny venus clam (*Anomalocardia brasiliiana*) collected during low tide, mainly by fisherwomen, in Grossos, Rio Grande do Norte State, Northeast Region of Brazil. Clams are placed in bucket for further processing (Photo credit: Gustavo Henrique G. da Silva 2012)

Bivalve mollusks are a particularly common target species (Dias et al. 2007; Rios 2009) which are extensively distributed and harvested year-round. Tiny venus and other similar beach clams are easily extracted and do not require boats or specialized fishing gear to harvest (Rodrigues et al. 2013), providing an accessible source of income for many small-scale fishing families (Oliveira et al. 2014), as well as constituting an important source of protein, contributing to food security (Nishida et al. 2004). Exploitation levels of the tiny venus clams are considered high throughout their range, with some evidence of reduced abundance attributed to fishing pressure and coastal degradation (Nishida et al. 2004; Rocha 2013; Rodrigues et al. 2013). However, historical studies on the impacts of fishing on the resource are scarce, and existing records largely inaccurate (Chiba et al. 2012), making resource management and the decision-making process of collecting and processing shellfish difficult (Rocha and Lopes 2014).

People of the Tides – The GDM Project – Capacity Building for Institutions and People Together

The GDM project was an agreement of cooperation between the Brazilian Cooperation Agency (ABC) of the Ministry of Foreign Affairs and the Canadian International Developmental Agency (CIDA). The Agreement was also coordinated by the Brazilian Ministry of Fisheries and Aquaculture and the Canadian charity organization World Fisheries Trust (WFT), and implemented from 2008 to 2011. The aim was to build institutional and community capacity for improving the livelihoods of women and families that depend on clam and oyster extraction in coastal communities in the Northeast of Brazil, through a partnership initiative involving national and local governments, researchers (universities) and local fishing associations (guilds). The project proposed to mainstream social equity, reduce poverty, improve access to citizenship rights and duties, and develop technology for fisheries management, culture, processing and commercialization of bivalve mollusks. It worked in collaboration with local institutions already engaged in research and extension partnerships with traditional coastal clam harvesting communities in four Brazilian northeastern states: Pernambuco, Paraíba, Rio Grande do Norte and Bahia. The GDM project actively pursued the participation of fishing community representatives at all levels from the inception stage and promoted an affirmative approach to enhancing the participation of women in particular. It was possible to create strong, locally supported, and doable activities which fostered some exciting opportunities for collaboration and exchange among Brazilian and Canadian partners, from fishing community representatives to private sector and federal government representatives. By emphasizing participatory processes, GDM initiatives built multilateral partnerships and strengthened local resource users' capacity, in particular fisherwomen and vulnerable and marginalized groups, to monitor their own progress in support of adaptive management of local development and sustainable shellfish fisheries management (Macnaughton et al. 2010).

Prior to this work, many clam fisherwomen self-identified themselves as housewives rather than professional fishers, because of the negative social stigma associated with the activity. The project created a national public profile for these fishers, through a variety of activities including a national exposition of a clam-fishers photo-voice project, and support for their active participation at state and national-level meetings, congresses, and consultations on the 2009 Fisheries and Aquaculture Law. Further, it helped promote networking with and support of the work of researchers and civil society organizations already working in partnership with strong female leaders in fishing associations and *Colônias* (Macnaughton et al. 2010). A variety of university research groups involved with GDM developed new projects on clams and oysters and associated fisheries (da Silva et al. 2014a), some of which continue to be pursued. This has greatly improved knowledge on *Anomalocardia brasiliiana* biology and this fishery.

Advances in the Implementation of Key SSF Guidelines – The Case of the Clam Fishery and GDM Experience in Brazil

Guideline 5 – Governance of Tenure in Small-Scale Fisheries and Resource Management

The right to fish for subsistence by traditional fishing communities is guaranteed in the Brazilian Constitution. However, specific tenured access to fishing areas and resources continues to be a contentious issue due to unclear and overlapping jurisdictions in shared commons, resulting in many conflicts between different users of both the space and the resource. Access to traditional fishing grounds and coastal lands by small-scale fishing communities is often very limited in practice. On the other hand, there are often significant systems of informally regulated tenured use of resources or fishing spaces within fishing community environments, including some rules and practices that contravene federal fishing regulations related to minimum catch size and fishing non-take zones.

Government-led fisheries management in Brazil generally focuses on controlling effort and fleet capacity through seasonal and spatial closures and gear restrictions. Legislation does not generally allow for exclusive access rights for either large or small-scale fisheries. However, extractive reserves (RESEXs²), marine protected areas (MPAs) defined in Brazilian legislation as conservation units as per the National Protected Areas System³ (Brasil 2000), provide an interesting anomaly. Under this system, the request to establish a RESEX must come from traditional resource users, based on a concern for conserving biodiversity and resources for

²RESEX – Reserva Extrativista (Extractive Reserve); Sistema Nacional de Unidades de Conservação – SNUC: Law # 9,985/2000.

³Sistema Nacional de Unidades de Conservação – SNUC. Law # 9.985/2000.

sustainable use. Following the designation of RESEX areas, resources within them should be allocated to creating local resource management plans and monitoring systems in the protected areas. Simply put, traditional fishing communities are allowed to extract resources because their 'tenure rights to the resources that form the basis for their social and cultural well-being, their livelihoods and their sustainable development' are recognized (FAO 2015, 5.15). Some extensions of this principle are being trialed by clam fisherwomen, primarily within the envelope of community co-management that may implement gear or temporal restrictions that make fishing by 'outside' users difficult (Kalikoski et al. 2006; Almeida et al. 2009).

The high degree of manual labour and low economic returns associated with clam fisheries, as well as the wide distribution of tiny venus clam, means there is relatively little competition or conflict among harvesters over acceptable fishing grounds (e.g., beaches). However, there are considerable conflicts associated with restricted access to beaches through irregular occupation of public lands by private interests, especially in the vicinity of tourist resorts. This goes against what SSF Guidelines (FAO 2015, 5.3) propose to ensure, namely, that small-scale fishers, fish workers, and their communities have secure, equitable, and socially and culturally appropriate tenure rights to fishery resources and small-scale fishing areas and adjacent land. Special attention, moreover, is given to women in the Guidelines. Through the GDM project, a group of female leaders of local fishing associations raised concerns regarding user-conflicts and tenure and access rights. Making use of the network of GDM partners they were able to articulate their demand for support to the appropriate public actors involved. Accountability was improved with some inroads made with regard to consolidating legal access to fishing beaches and promoting a better understanding of the need for a comprehensive restriction on the number of users in the fishery and the prioritization of zoning to avoid contaminated areas.

Sustainable resource management in an open-access situation such as that of coastal beaches is a daunting task, particularly in the general absence of fisheries and stock data and the lack of effective policing. The value of traditional knowledge among small-scale fishers has long been promoted by both researchers and social advocates (Begossi et al. 2006; Silvano 1997 cited by Clauzet et al. 2005), resulting in a significant institutional focus on community co-management and the importance of community participation in decision-making for local resource management. However, Kalikoski et al. (2006) and Rocha and Pinkerton (2015) stress that while many state-proposed co-management arrangements express a willingness to assign rights and responsibilities to communities, few actually delegate decision making powers. Mattos (2014) emphasizes the need to minimize, even halt, continuing predominance of centralized control, the demand for education at all levels, and the need for greater recognition that community-based organization can build *de facto* effective policy for participatory and equitable resource management.

During the course of the GDM Project, there were examples in smaller communities such as Grossos, Rio Grande do Norte State, of fisherwomen collectively controlling resource access effectively, and demonstrating great interest for sustainable use and a willingness to adjust fishing pressures as needed. In areas of the project closer to large urban centres in Pernambuco State, interests were more

focused on gaining adequate access to the beaches so as to increase economic returns. In both cases, platforms suitable for discussions on sustainable use of fishing resources were provided.

This information recorded by GDM indicates that an important starting point for sustainable fisheries lies in improving the knowledge base necessary for management, while appreciating the broader integrated community context, including the need for community development and poverty reduction. Following the recommendations of the SSF Guidelines (FAO 2015, 5.15), it is necessary to involve small-scale fishing communities in the design and planning of, and, as appropriate, in the implementation of management measures.

Guideline 6 – Social Development, Employment and Decent Work

Although Brazilian fishing policies commonly engage *social development* and social justice approaches, the concepts of equality and effective *employment* or *decent work* are not necessarily guaranteed through this discourse. Due attention to ensuring that small-scale fishing communities are empowered and can enjoy their human rights are a must (FAO 2015, 6.1). Also, fisheries activities in both the formal and informal sectors must be taken into account in order to ensure the sustainability of small-scale fisheries (FAO 2015, 6.6).

Prior to the creation of the Ministry of Fisheries and Aquaculture, responsibility for the implementation of fishing policies resided in the Ministry of Agriculture. This resulted in the adoption primarily of an agribusiness model, generating little, if any, opportunity for small-scale fishing, and consequently little social inclusion. Unsustainable development models were the order of the day. In the push to create a distinct ministry and institutional framework, specifically to govern fisheries and promote sustainable policies that brought actors and actions together, the lobbying by civil society was instrumental.

One of the main accomplishments of GDM was to improve the public visibility of female clam diggers and their concerns, and increase their recognition as professional fishers, improving their access to associated rights. However, actual implementation of such rights has remained problematic. A key priority identified by several female leaders was a concern for occupational health and safety – the heavy manual labour and extreme exposure and difficult working conditions associated with digging and processing of the clams contribute to a series of health issues that are being largely ignored by the medical profession. Recognition of these distinct health concerns of the small-scale fishing sector (e.g. users or groups of users) may support “fishers, particularly women, to be able to earn a fair return from their labour, capital and management, and encourage conservation and sustainable management of natural resources” (FAO 2015, 6.7).

Guideline 7: Value Chains, Post-Harvest, and Trade

Value chain optimization for equality has been a key target of fisheries-based community development goals for quite a long time. Potential latent income through value-added processing, losses due to inadequate handling practices, and considerable inequities and potential short-cuts in fish trading and marketing have been recently documented. Timely and accurate market information has been shown to be a key element in affording fishers equitable return for their products, in order to enhance their income and livelihood security (FAO 2015, 7.4). Unequal power relationships sometimes observed in the Brazilian context mean that vulnerable and marginalized groups may require special support (FAO 2015, 7.1). For example, women are often involved in the post-harvest processing, with a need for appropriate working conditions and processes for good quality and safe fish products (FAO 2015, 7.2 & 7.3) and reduced waste (FAO 2015, 7.5). The Brazilian government has recognized these needs, and has built them into their institutional strategies, providing the enabling legislation that allows for effective fisheries management systems to prevent overexploitation driven by market demand threatening the sustainability of fisheries resources, food security, and nutrition (FAO 2015, 7.8).

A participatory value chain analysis was carried out through GDM for clam fisheries (Wojciechowski et al. 2014), and identified limitations in fishing and processing practices, as well as unpreparedness of local actors for marketing and low organizational collaboration in the critical early stages of the value chain. Supportive public policies to aid development have not been implemented, undermining isolated efforts to improve production and shellfish quality, especially with regard to distribution and marketing. Advances were made in processing and value-added production in Rio Grande do Norte State, with the help of the Universidade Federal do Semi-Árido – UFERSA (Semi-Arid Federal University) team. Interventions were also made in Pernambuco State with the introduction of more efficient stoves that produced less smoke when cooking clams (as part of processing). These new stoves had less of an adverse impact on fisherwomen's lungs and visions and reduced the use of mangrove trees for combustion up to 80%. However, many needs still remain to be addressed with respect to marketing, fishing, and processing in manners that are equitable and adequately address cultural and social concerns. Creation and adoption of significant innovations of this kind is particularly challenging, where poverty is high and resilience to impacts from change low. Efficiency enhancement along the value chain, improving post-harvest technology, and helping create better environmental conditions, all aimed at adding value and trading safe and healthy fishing products, may contribute in engaging fishing communities in issues regarding their own development, in line with many assumptions raised by the SSF Guidelines.

Guideline 8 – Gender Equality

Brazil has made substantial investment in improved rights and opportunities for women. Policies that have aimed to do so recognize the need for gender mainstreaming, with strategies and approaches adapted to different cultural contexts (FAO 2015, 8.1). Nevertheless, gender inequality, including violence against women, continues to be significant in most rural communities. According to Nishida et al. (2004), the clam fishery provides the main source of income or is a complementary source of income for a significant number of women. They indicate that the clam fishery is important from an economic, social, and cultural point of view, as well as being a critical source of protein and food security for families.

The clam fishery component of GDM was specifically designed to work with women, and promote opportunities for them. The project worked to catalyze the formation of a gender and fisheries working group within the Ministry of Fisheries and Aquaculture and supported a variety of successful associated lobbies that aimed to improve the language in the new fisheries legislation in 2009, recognizing clam fishers and others in the post-harvest sector (in large part women) as professional fishers and promoting more equitable rights. These women also became some of the most effective political lobbyists at the federal level for clam fisherwomen diggers, being instrumental in gaining recognition for the group as professional fishers.

Guideline 9: Disaster Risks and Climate Change

Fishing resources are quite sensitive to changes in weather patterns or other environmental changes. Such changes acutely affect small-scale fishers who are limited in how far they can move to find new resources. Mechanisms to mitigate such impacts are evolving, generally as a patchwork of locally adapted solutions, with different levels of effectiveness. These mechanisms recognize the need, following the SSF Guidelines (FAO 2015, 9.3), for integrated and holistic approaches, including cross-sectoral collaboration, in order to address disaster risks and climate change in small-scale fisheries.

Clam resources could be seriously affected by changing weather patterns – particularly in areas with seasonal freshwater inputs or changing coastal erosion. Changes of this kind were documented in the project area (da Silva et al. 2014b), with fishers shifting to more remote clam beds where possible, which required a participatory management strategy. The project also developed protocols for clam aquaculture, in preparation for eventual supplementation of natural beds and/or specific beach culture. However, adequate time for field implementation was not available, and wild resources appeared to be adequate to maintain fisheries at the time.

Guideline 10: Policy Coherence, Coordination, Collaboration

While both the small- and large-scale fisheries sectors have shaped policy and development strategies, as Chuenpagdee (2011) warns, their needs and priorities are not necessarily similar. In Brazil, both sectors lobbied for relief from the ‘conservationist’ regulatory system imposed by the state, albeit with substantially different agendas (Acsehrad 2004). The large-scale fishery sought deregulation and weakening of the institutional framework to overcome restrictions to fishing. The small-scale fishery sector, on the other hand, felt persecuted and repressed by the state, and lobbied for similar relief from regulation. But in the name of ‘environmental justice’, its aim was to overcome inequalities, promote rights to the benefits of environmental goods, and gain entry to the decision-making process regarding use and access of local natural resources.

GDM raised concerns that clam fisherwomen should be part of discussion forums and councils under the existing institutional framework, where stakeholders, practitioners and government representatives participate in the implementation of initiatives for participatory fisheries management; socio-educational issues focusing on gender mainstreaming and promoting empowerment of women in fisheries occupations; and value chain upgrading and democratization focusing on the decent work agenda. This would provide an opportunity to the Government, through the Ministry of Fisheries and Aquaculture, to ascertain the strengths of the various interventions made in terms of the direction of public policies. It was also stated that this should be done “through consultation, participation and publicizing, gender-sensitive policies and laws on regulated spatial planning” (FAO 2015, 10.2). Substantial gains were achieved with the capacity development and value chain upgrading components of the proposal. The fact that the process was semi-autonomous from the Ministry of Fisheries and Aquaculture allowed for some supplementary synergies, i.e. co-management, that may not otherwise have been possible.

Fisheries co-management implementation for many species faces great challenges, though clam fisheries are *de facto* largely unmanaged and of such low profile that their management is not a high institutional priority. This highlights the difficulties of adopting specific measures that ensure the harmonization of policies affecting the health of coastal ecosystems to fishing communities’ livelihoods and well-being. Overcoming these challenges is necessary for achieving policy coherence, cross-sectoral collaboration, and the implementation of holistic and inclusive ecosystem approaches in the fisheries sector (FAO 2015, 10.5). It will also facilitate fishing community involvement in policy- and decision-making processes relevant to small-scale fisheries (FAO 2015, 10.6).

Guideline 11: Information, Research, Communication

Most Brazilian fisheries have limited information about their stock and catches. Data from small-scale fisheries is particularly difficult to obtain and keep up-to-date. The existing institutional and legal framework does not support detailed reporting

from fishers. To date, production statistics have long delays and are primarily for total production. They do not have information with regard to fishing activity and catch composition, and hence small-scale fishing communities are not effectively recognized as “holders, providers and receivers of knowledge” (FAO 2015, 11.4).

Despite this paucity of fishing data and information, the main difficulties faced by small-scale fishers are known. For example, low educational levels in fishing communities is related to the difficulty of reconciling ‘working time’ with ‘study time’, thus resulting in a high illiteracy rate. This also interferes with efforts to organize fishers and to work in a cooperative and/ or associated manner, making the search for solutions to community problems more complicated, as well as reducing access to benefits of public policies and communication with governmental agencies and civil society organizations at national, state and local levels.

Outcomes from the project recognized that an improvement in continuous and systematic monitoring of coastal and estuarine small-scale fisheries is needed, as well as more information about environmental conservation for the recovery of shellfish stocks. It is also necessary for development that ensures ecosystem sustainability, “for an improved understanding and visibility of the importance of small-scale fisheries and its different components, including socioeconomic aspects” (FAO 2015, 11.1). And, perhaps even more applicable, in line with the SSF Guidelines (FAO 2015, 11.6) is the need “to investigate and document traditional fisheries knowledge and technologies in order to assess their application to sustainable fisheries conservation, management and development”. Equally important is that “research priorities should be agreed upon through a consultative process focusing on the role of small-scale fisheries in sustainable resource utilization, food security and nutrition, poverty eradication, and equitable development” (FAO 2015, 11.9).

Guideline 12: Capacity Development

The Brazilian government launched several educational initiatives for fishers to increase literacy. Lessons were given in the fishing communities’ space and time and to improve access to technical training by recognizing practical experience, through a civil society institutional framework. Despite these substantial efforts and good will to enhance the capacity of small-scale fishing communities in order to enable them to participate in decision-making processes (FAO 2015, 12.1), substantial challenges remain in reaching remote communities and the most vulnerable populations, many of whom may depend on local small-scale fisheries for part of their food security and livelihoods.

Capacity development in the GDM included technical training for processing and value-added product development, but also training in participatory value chain evaluation, leadership, gender equality, and peer-peer networks. The most striking results were empowerment and increased visibility of fisherwomen, a “possible way to develop knowledge and skills to support sustainable small-scale fisheries development and successful co-management arrangements” (FAO 2015, 12.4).

A Way Moving Forward: Small-Scale Fisheries Proposed Model and Roadmap for Brazilian Small-Scale Fishing Sector

Based on our experiences with the GDM project, and analysis of the evolution and main challenges facing small-scale fishing policies for Brazilian coastal communities, we have highlighted some critical areas that need improvement. Although the challenges facing small-scale fisheries development in Brazil may seem straightforward in general, they are not yet broadly acknowledged among fisheries scientists, government representatives, and other stakeholders. This is particularly the case for clam fisheries where information about the sector is still scattered.

In Brazil, variable political support and associated difficulty in providing continuity to national initiatives has been a paradox. Empowerment, supportive networking, appropriate visibility, and civil society support are thus essential in creating the necessary lobbies for program and policy continuity (e.g. Oliveira 2013). Of course, programs at all levels may be favourable or unfavourable for the small-scale fisheries sector, depending on lobbies of different fishing groups, creating barriers for implementation and continuity of some initiatives. Long-term monitoring depends on both governmental support (through political will and institutional steadiness), and more localized research projects, and both have historically been patchy. Ongoing support programs and monitoring for sustainable small-scale clam fisheries with equitable socio-economic benefits seem unlikely without ongoing financial and technical support from the outside. Nevertheless, the patchwork of projects that have reached communities over the years do provide benefits that are of great local significance to the people that carry out this activity within a complex reality of diverse livelihoods and social environments “that allow a better understanding and documentation of the true contribution of small-scale fisheries to sustainable resource management for food security and poverty eradication” (FAO 2015, 13.4).

Finally, we present the following road map, constructed with stakeholders during the final workshops of the GDM Project in 2010, of priority action fronts for the sector:

1. Co-management of Small-Scale Fisheries

Goal: Effective and timely monitoring and regulation of small-scale fishing resources in estuarine and coastal areas.

Deliverable 1.1: Instruments and mechanisms for monitoring and regulation elaborated for clam fisheries.

Activity 1.1.1: Conceptual and methodological studies on instruments and mechanisms for monitoring.

Activity 1.1.2: Conceptual and methodological studies on processes, instruments, and mechanisms for regulation.

Activity 1.1.3: Implementation of mechanisms for monitoring and regulation.

Deliverable 1.2: Processes, tools, and mechanisms for small-scale fisheries monitoring and regulation through ecosystem approaches and ecosystem-based management, considering human dimensions and creating appropriate space to support empowered participation of clam fishers.

Activity 1.2.1: Carry out pilot case studies of clam fisheries co-management.

Activity 1.2.2: Publications of case studies allowing for their replication and evolution.

Activity 1.2.3: Evaluation of the effectiveness of processes, tools, and mechanisms.

2. *Gender Mainstreaming and the Empowerment of Women in Fisheries Occupations.*

Goal: On-going education and technical training, including monitoring and effectiveness, of small-scale fishers and fishworkers, in particular clam fisherwomen.

Deliverable 2.1: Integration of existing databases of the clam fishery

Activity 2.1.1: Studies on the integration of existing databases.

Activity 2.1.2: Gender mainstreaming and promoting empowerment of women in fisheries occupations.

Deliverable 2.2: Programs of education and capacity building developed and implemented.

Activity 2.2.1: Carry out pilot studies of education and professional training for clam fisheries value chains.

Activity 2.2.2: Assist stakeholder involvement to implement, refine, and monitor pilot studies.

Activity 2.2.3: Develop training documents in accessible language based on pilot experiences.

3. *Value Chain Upgrading and Democratization Focusing on the Decent Work Agenda.*

Goal: Development and monitoring of small-scale fisheries value chains with a focus on decent work for clam fishers in estuarine and coastal areas.

Deliverable 3.1: Instruments and mechanisms for the monitoring and socio-economic optimization of the clam fisheries value chains.

Activity 3.1.1: Conceptual, methodological, and technical studies for monitoring and developing technical assistance.

Activity 3.1.2: Develop and test processes, instruments, and monitoring for regulatory mechanisms.

Activity 3.1.3: Create parameters and criteria to evaluate the effectiveness of instruments and mechanisms for monitoring and control.

Activity 3.1.4: Carry out surveys and systematic mapping of needs for technical assistance.

Deliverable 3.2: Technologies and innovations for the clam fisheries value chain developed and tested.

Activity 3.2.1: Pilot studies to improve technologies and innovations.

Activity 3.2.2: Intersectoral dialogues for the analysis and proposal of sustainable development.

Activity 3.2.3: Develop training documents in accessible languages for the different audiences based on the pilot experiences.

Deliverable 3.3: Methods and instruments develop for the evaluation and monitoring of working conditions in the clam fisheries value chain.

Activity 3.3.1: Conceptual, methodological, and technical multi-stakeholder studies on decent work to develop monitoring instruments and mechanisms.

Activity 3.3.2: Conduct a diagnostic study of working conditions.

Activity 3.3.3: Develop and test a monitoring plan for promoting decent work conditions.

Activity 3.3.4: Perform conceptual and technical studies to support knowledge of causal diseases related to clam fisheries working conditions.

Each strategy should include communications and dialogues of the ascertained goals, considering a combination of: (a) deliverables and activities with *economic* issues that require a diversification and consolidation of production flows for improved economic and social returns; (b) *social* issues to promote societal equality in access rights and reduction of social gaps – particularly for women – including social security, conditions for decent work, and access to appropriate health services; and (c) *environmental* issues for proper resource management, reduction of waste, and general minimization of the environmental impact during the production, processing, distribution, and marketing processes.

Final Remarks

National richness is the human development of its citizens. For this to be possible, it is necessary to create a situation in which all people enjoy a long, good quality with sound health and avenues for creativity. In this sense, economic income should not be seen as an end in itself but as a means for welfare. That is why the role of small-scale fisheries in local economies and the links of the subsector to the wider economy need to be recognized and benefit from sustainable resource utilization and livelihood diversification (FAO 2015, 6.8).

Initially our belief was that the key challenge for improved small-scale fisheries in Brazil rested in the implementation processes rather than in the policy itself. Mattos (2011, 2014) notes that implementation should benefit the most vulnerable and marginalized groups of fishers, such as clam harvesters, through special support on a long-term basis, e.g. through gender mainstreaming and decent work agendas.

Even if a consensus can be achieved in participatory decision making processes, with legitimate, democratic and representative structures, challenges remain in providing access to market opportunities and increased transparency and information-sharing in the small-scale fisheries value chains. While the current Brazilian

government incorporates many of these principles in its development strategies, at least on paper, implementation is an ongoing challenge, particularly if combating social inequality is to become ineffective due to a decline in economic growth that hampers wealth creation and equitable distribution.

Most important among the findings and recommendations of the GDM project is improving the knowledge base necessary to support both sustainable fishery management and more broadly community development and poverty reduction programs and policy. Clam fisheries are vitally important to food security and as a source of income and should be protected and supported as such.

It is important to state that there has been significant progress in implementing the SSF Guidelines for Brazilian fishers, through civil society organizations' activities, and supported by national and international non-governmental organizations. In particular, a national workshop on capacity building for the implementation of the SSF Guidelines was held in Brazil, in June 2016, which paved the road ahead for implementation taking a co-design approach to identifying critical areas and priorities.

The aim of the workshop was to promote awareness about the SSF Guidelines and mobilize support for their implementation across several countries of the Global South through a methodological, analytical, and descriptive approach. An additional objective was to build capacity, in particular, among fishers' organizations to position them as the key actors in the implementation process. The workshop was also an opportunity to document existing governance practices of tenure and resource management to enhance small-scale fishers' rights to resources and territories, and guarantee respect of human rights. Values, norms, and principles embedded in governance and resource management practices, which are essential for facilitating the implementation of the SSF Guidelines in Brazil, were adopted keeping in mind the need for autonomy. This, in turn, stimulated discussion on suitable training and exchanges of experiences to disseminate local knowledge, using a broad participatory and communicative process.⁴

Considering the characteristics of Brazilian small-scale fisheries, in particular the expressed features of clam fishery, and the recognition of similarities with states' existing obligations under national and international law and voluntary commitments, including the Code of Conduct for Responsible Fisheries (FAO 1995), that give due recognition to the requirements and opportunities of small-scale fisheries (FAO 2015, 5.13), we believe the discussion and analysis provided about the outcomes and lessons learned from the GDM project can help implement the SSF Guidelines, assisting the Brazilian state in the process to promote and implement appropriate management systems.

⁴Ouvidoria do Mar. <https://sites.google.com/site/ssfguidelines/brazil/resources>

References

- Abdallah, R., Sumaila, U. R., & Abdallah, P. (2007). An historical account of Brazilian public policy on fisheries subsidies. *Marine Policy*, 31(4), 444–450.
- Acsehrad, H. (2004). As práticas espaciais e o campo dos conflitos ambientais. In H. Acsehrad (Ed.), *Conflitos ambientais no Brasil* (pp. 13–35). Rio de Janeiro: Relume Dumará.
- Almeida, O. T., Lorenzen, K., & McGrath, D. G. (2009). Fishing agreements in the lower Amazon: For gain and restraint. *Fisheries Management and Ecology*, 16(1), 61–67.
- Begossi, A., Hanazaki, N., Peroni, N., & Silvano, R. A. M. (2006). Estudos de ecologia humana e etnobiologia: uma revisão sobre usos e conservação. In C. F. D. Rocha, H. G. Bergallo, M. A. S. Alves, & M. Van Sluys (Eds.), *Biologia da Conservação: Essências* (pp. 320–331). Rio de Janeiro: Editora da UERJ.
- Brasil. (2000). *Lei nº 9.985, de 18 de Julho de 2000*. Regulamenta o art. 225, § 1º, incisos I, II, III e VII da Constituição Federal, institui o Sistema Nacional de Unidades de Conservação da Natureza e dá outras providências. Brasília: Diário Oficial da República Federativa do Brasil.
- Brasil. (2009). *Lei nº 11.959, de 29 de Junho de 2009*. Dispõe sobre a Política Nacional de Desenvolvimento Sustentável da Aquicultura e da Pesca, regula as atividades pesqueiras, revoga a Lei nº 7.679, de 23 de novembro de 1988, e dispositivos do Decreto-Lei nº 221, de 28 de fevereiro de 1967, e dá outras providências. Brasília: Diário Oficial da República Federativa do Brasil.
- Chiba, W. A. C., Assunção, A. W. A., Takao, L. K., Rocha, G. S., Janke, H., Valsko, J., Ebert, L. A., Figueroa, M. E., & Cunha, S. (2012). Caracterização da produção pesqueira ao longo do tempo, no município de Cananéia, litoral Sul de São Paulo. *Boletim do Instituto de Pesca*, 38(3), 265–273.
- Chuenpagdee, R. (2011). A matter of scale: Prospects in small-scale fisheries. In R. Chuenpagdee (Ed.), *World small-scale fisheries contemporary visions* (pp. 21–36). Delft: Eburon Academic Publishers.
- Clauzet, M., Ramires, M., & Barella, W. (2005). Pesca artesanal e conhecimento local de duas populações caiçaras (Enseada do Mar Virado e Barra do Una) no litoral de São Paulo, Brasil. *MultiCiência*, p. 4.
- da Silva, G. G., Costa, R. S., Belem, T. P., Rodrigues, A. M. L., Moura, R. S. T., Martins, L. P. C., et al. (2014a). Ecologia populacional e manejo pesqueiro de *Anomalocardia brasiliiana*. In G. G. da Silva, J. Carolsfeld, & A. Olivera Gálvez (Eds.), *GENTE DA MARÉ: Aspectos Ecológicos e Socioeconômicos da Mariscação no Nordeste Brasileiro* (pp. 117–156). Mossoró: EdUFERSA.
- da Silva, G. G., Macnaughton, A., & Carolsfeld, J. (2014b). Projeto Gente da Maré: aspectos sociais, ambientais e econômicos. In G. G. da Silva, J. Carolsfeld, & A. Olivera Gálvez (Eds.), *GENTE DA MARÉ: Aspectos Ecológicos e Socioeconômicos da Mariscação no Nordeste Brasileiro* (pp. 25–34). Mossoró: EdUFERSA.
- Dias, T. L. P., Rosa, R. S., & Damasceno, L. C. P. (2007). Aspectos socioeconômicos, percepção ambiental e perspectivas das mulheres marisqueiras da reserva de desenvolvimento sustentável Ponta do Tubarão (Rio Grande do Norte, Brasil). *Gaia Scientia*, 1(1), 25–35.
- Dias-Neto, J., & Dornelles, L. C. C. (1996). *Diagnóstico da pesca marítima no Brasil*. Brasília: Ibama.
- Diegues, A. C. S. (1983). *Pescadores, Camponeses e Trabalhadores do Mar*. São Paulo: Ática.
- FAO. (1995). *Code of conduct for responsible fisheries*. Rome: Food and Agriculture Organization of the United Nations.
- FAO. (2015). *Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication*. Rome: Food and Agriculture Organization of the United Nations.
- IBGE. (2010). *Censo 2010*. Brasília: Instituto Brasileiro de Geografia e Estatística.
- Isaac, V. J., Martins, A. S., Haimovici, M., Castello, P., & Andriguetto, J. M. (2006). Síntese do estado de conhecimento sobre a pesca marinha e estuarina do Brasil. In V. J. Isaac, A. S.

- Martins, M. Haimovici, & J. M. Andriquetto (Eds.), *A pesca marinha e estuarina do Brasil no início do século XXI: recursos, tecnologias, aspectos socioeconômicos e institucionais* (pp. 181–186). Belém: Editora Universitaria UFPA.
- Jentoft, S., & Chuenpagdee, R. (2009). Fisheries and coastal governance as a wicked problem. *Marine Policy*, 33, 553–560.
- Kalikoski, C. D., Almudi, T., & Seixas, C. S. (2006). O Estado da Arte da Gestão Compartilhada e Gestão Comunitária da Pesca no Brasil. In Informativo do Projeto Manejo dos Recursos Naturais da Várzea. *Revista Jirau*, p. 15.
- Macnaughton, A., Rocha, L. M., Wojciechowski, J. M., & Carolsfeld, J. (2010). Tools for understanding the complexities of small-scale coastal fisheries economies in Northeastern Brazil: Participatory value-chain mapping and economic feasibility studies. In A. L. Shriver (Ed.), *Proceedings of the IIFET- International Institute of Fisheries Economic and Trade*. Corvallis: International Institute of Fisheries Economics & Trade.
- Maldonado, S. C. (1986). *Pescadores do Mar*. São Paulo: Editora Ática.
- Mattos, S. M. G. (2007). Contribuição dos modelos bio-econômicos para a gestão participativa e o ordenamento da pesca artesanal e de pequena escala. *Revista Brasileira de Engenharia de Pesca*, 2(2), 52–68.
- Mattos, S. M. G. (2011). Desafios à implementação de políticas públicas e à gestão participativa da pesca artesanal. In S. M. G. Mattos, R. T. Moura, & W. M. Maia Jr. (Eds.), *Gestão de Pescarias Costeiras e da Maricultura. Anais da II Oficina de Trabalho de Aquicultura e Pesca do Nordeste* (pp. 79–96). Brasília: Ministério da Pesca e Aquicultura; Superintendência do Desenvolvimento do Nordeste.
- Mattos, S. M. G. (2014). Políticas Públicas e Gestão Participativa da Pesca Artesanal: O Extrativismo Pesqueiro em Ecossistemas Estuarinos. In G. H. G. da Silva, J. Carolsfeld, & A. Olivera Gálvez (Eds.), *GENTE DA MARÉ: Aspectos Ecológicos e Socioeconômicos da Mariscagem no Nordeste Brasileiro* (pp. 315–352). Mossoró: EdUFERSA.
- MPA/Brasil. (2010). *Boletim Estatístico da Pesca e Aquicultura 2008 e 2009*. Brasília: Ministério da Pesca e Aquicultura.
- MPA/Brasil. (2012). *Registro Geral da Atividade Pesqueira e Aquícola (RGP)*. Brasília: Ministério da Pesca e Aquicultura.
- MPA/Brasil. (2013). *Produção pesqueira e aquícola*. Brasília: Ministério Da Pesca e Aquicultura.
- Nishida, A. K., Nordi, N., & Alves, R. R. N. (2004). Abordagem etnoecológica da coleta de moluscos no litoral paraibano. *Tropical Oceanography*, 32(1), 53–68.
- Oliveira, V. R. (2013). O Processo de Participação Social nos Planos Plurianuais do Governo Federal. In E. M. Silva & L. B. Soares (Eds.), *Experiências de Participação Institucionalizada*. Belo Horizonte: UFMG.
- Oliveira, I. B., Silva Neto, S. R., Lima Filho, J. V. M., Peixoto, S. R. M., & Galvez, A. O. (2014). Efeito do período chuvoso na extração do molusco bivalve *Anomalocardia brasiliana* (Gmelin, 1791). *Revista Brasileira de Ciências Agrárias*, 9(1), 139–145.
- Rios, E. C. (2009). *Seashells of Brazil*. Rio Grande: Editora da Fundação Universidade do Rio Grande.
- Rocha, L. M. (2013). *Ecologia humana e manejo participativo da pesca do búzio *Anomalocardia brasiliana* (Gmelin, 1791) bivalvia: veneridae na Reserva de Desenvolvimento Sustentável Estadual Ponta do Tubarão (RN)* (Doctoral dissertation). Universidade Federal do Rio Grande do Norte, Natal.
- Rocha, L. M., & Lopes, P. F. M. (2014). Ecologia humana e mariscagem de *Anomalocardia brasiliana* no Nordeste brasileiro. In G. H. G. da Silva, J. Carolsfeld, & A. Olivera Gálvez (Eds.), *GENTE DA MARÉ: Aspectos Ecológicos e Socioeconômicos da Mariscagem no Nordeste Brasileiro* (pp. 157–184). Mossoró: EdUFERSA.
- Rocha, L. M., & Pinkerton, E. (2015). Co-management of clams in Brazil: A framework to advance comparison. *Ecology and Society*, 20(1), 7–16.

- Rodrigues, A. M. L., Azevedo, C. M. S. B., Costa, R. S., & Henry-Silva, G. G. (2013). Population structure of bivalve *Anomalocardia brasiliana* (Gmelin, 1791) in semi-arid estuarine region of Northeast Brazil. *Brazilian Journal of Biology*, 73, 4.
- SEAP/Brasil. (2008). *Mais Pesca e Aquicultura. Plano de Desenvolvimento Sustentável – Uma rede de ações para o fortalecimento do setor*. Secretaria Especial de Aquicultura e Pesca da Presidência da República.
- Silva, L. G. (1988). *Os pescadores na história do Brasil*. Petrópolis: Vozes, Conselho Pastoral dos Pescadores.
- Silvano, R. A. M. (1997). *Ecologia de Três Comunidades de Pescadores do Rio Piracicaba (SP)*. (Dissertação de Mestrado). Universidade Estadual de Campinas Instituto de Biologia, Campinas, SP.
- Wojciechowski, M. J., Melo, K. S. G., & Nascimento, A. F. (2014). Caracterização da cadeia produtiva de moluscos bivalves nos Estados de Pernambuco e Rio Grande do Norte. In G. H. G. Da Silva, J. Carolsfeld, & A. Olivera Gálvez (Eds.), *GENTE DA MARÉ: Aspectos Ecológicos e Socioeconômicos da Mariscagem no Nordeste Brasileiro* (pp. 271–314). Mossoró: EdUFERSA.