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Challenges and Prospects of Fisheries Co-Management under a Marine Extractive Reserve Framework in Northeastern Brazil

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In Brazil, Marine Extractive Reserves—MERs (Reservas Extrativistas Marinhais) represent the most significant government-supported effort to protect the common property resources upon which traditional small-scale fishers depend. From an initial small-scale experience in 1992, MERs have expanded countrywide, now encompassing 30 units

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(9,700 km²) and nearly 60,000 fishers. Despite such escalating interest in the model, there is little research on the effectiveness of MERs. In this article, we discuss relevant parts of the history and examine the current situation of the fisheries co-management initiative in the Marine Extractive Reserve of Corumbau, which was created in 2000 as the first MER to encompass coral reefs and reef fisheries. We describe the Extractive Reserve co-management arrangement and its main policy and legislative challenges. Finally, we discuss the prospects for the use of MERs as management frameworks for traditional small-scale fisheries in Brazil.

Keywords co-management, Corumbau, extractive reserve, fisheries, protected areas

Introduction

The decline in Brazil's fisheries has followed the general trends worldwide (McClanahan & Castilla, 2007), with production increasing from 1960 through the mid 1980s, followed by a continual decrease up to the present. Artisanal and small-scale fishing still flourishes in many areas, accounting for about 60% of total fish landings in Brazil and 70% in the poverty-stricken Northeastern coast (Cordell, 2006). Fisheries represent the most important extractive activity in the country, directly involving more than two million people. However, while marine resources are becoming scarce and as urbanization and industrialization steadily increase, legal frameworks and public policies for fisheries remain weak, resulting in an ever-increasing marginalization of traditional and artisanal fishing communities (Diegues, 1999). Due to this pervasive process, culturally based local marine ecological knowledge is disappearing. Currently, the establishment of Marine Extractive Reserves (MERs—*Reservas Extrativistas Marinhas* in Portuguese) is the most significant government-supported effort to protect the common property resources upon which traditional small-scale fishers depend. This is noteworthy, as most incentives and subsidies to fisheries are directed toward export-oriented industrial fleets and aquaculture initiatives (Abdallah & Sumaila, 2007), including shrimp-farming with few sustainability concerns (Primavera, 2005).

Extractive Reserves (ERs) are a particular category of protected areas that explicitly aims to safeguard the livelihoods and cultures of traditional populations, as well as to conserve natural resources and biodiversity. This emerging model originated from the political and organizational struggles of Amazon rubber tapers (*seringueiros*) for socioeconomic and cultural survival (Gonçalves, 2002). Going far beyond protectionism and strongly grounded in common property theory (see Seixas et al., 2009), the ER model was conceived in the 1980s and inaugurated in 1990 with the establishment of the *Juruá* and *Chico Mendes* Extractive Reserves. In less than two years (by 1992), the model was already incorporated into marine conservation, with the establishment of the *Pirajubaé* Marine Extractive Reserve, the first small-scale ER targeting coastal fisherfolk and coastal ecosystems (15 km²; 15 families). The ER model explicitly questions the “inevitable destruction of collective resources” anticipated by Hardin (1968), proposing a change from the current open-access regime into a user-regulated and user-monitored common resource management system (Glaser & Oliveira, 2004; Silva, 2004). The main reason for a general failure of common-use resource systems is that individuals tend to maximize personal harvesting regardless of the resultant reduction in resources for other users and/or the risk of resource extermination (Ostrom et al., 2002). The attenuation of this so-called tragedy of the commons is mainly related to the ability of resource users to build and sustain agreements to avoid over-exploitation. In this context, smaller decentralized self-governed units (e.g., community-based controlled

systems) are believed to perform better than larger-sized units under centralized control (Ostrom, 2002).

Instead of locking people into tradition, ERs have the potential to enhance integrated coastal management, encouraging local communities to preserve sociocultural values embedded in their fishing traditions through the incorporation of native knowledge into formal management structures. Despite considerable growth of and interest in the model, there are few reports that directly address the effectiveness of MERs (e.g., Brasil, 2002; Glaser & Oliveira, 2004; Silva, 2004; Seixas et al., 2009).

In Brazil, protected areas (conservation units) are divided into two broader groups: fully protected areas (further subdivided in several categories) and sustainable-use areas (also subdivided in several categories, including ERs). Conservation units can be managed at the federal, state, or municipal levels, depending on the administrative level at which they were established, as well as through partnerships with the private sector. According to the National System of Conservation Units—Federal Decree 9.985/2000 (SNUC, acronym for *Sistema Nacional de Unidades de Conservação*), ERs are “areas used by traditional populations whose subsistence is based on extractivism and, complementarily, on subsistence agriculture and small scale animal farming,” aiming to “protect the livelihood and culture of these populations and to assure the sustainable use of natural resources.” To date, most ERs have been created at the federal level, with only a few examples at the state level (e.g., *Rio Jaciparaná* ER in the Amazonas State), and no state ERs encompass the marine environment. There is also a similar category of sustainable-use conservation units, the Sustainable Development Reserve (SDR—*Reserva de Desenvolvimento Sustentável*), in which there is a single marine reserve at the state level (*Reserva de Desenvolvimento Sustentável da Ponta do Tubarão*, created by the Rio Grande do Norte State in 2003). According to the SNUC, Sustainable Development Reserves are “natural areas holding traditional populations whose existence is based in sustainable systems for the exploitation of natural resources, developed along generations and adapted to local ecological conditions.” In contrast, ERs are “areas used by traditional populations,” meaning that beneficiaries may live outside the ER area.

Although the establishment of ERs may sometimes be a part of governmental programs related to large-scale landscape planning (a paradoxical top-down approach), the establishment of most ERs started through initiatives created by local communities threatened by development projects and/or with neglected socioeconomic and cultural survival agendas. Such community requests are frequently supported and sometimes opposed by statements and/or legal charges from municipal and state governments, nongovernmental organizations (NGOs) (from grassroots to larger global organizations), universities, private companies, and other relevant stakeholders, at several levels. If preliminary analyses by the Federal Agency responsible for protected areas (*Instituto Chico Mendes de Conservação da Biodiversidade*—ICMBio) indicate possible viability due to the region’s natural attributes and population characteristics, the next steps include the development of biological, land tenure, socioeconomic, and cultural assessments (developed either by ICMBio or by third parties interested in the process), and a public consultative process. This process may take anywhere between a few years and nearly a decade, depending on political pressures at all levels (e.g., resistance from municipal and/or state governments, legal charges, and conflicting governmental policies).

With the exclusive use rights concession for the land or maritime territory, local communities are suddenly (and formally) empowered, and given a number of management responsibilities for which they are generally not prepared (Silva, 2004). The challenge of

implementing an ER is compounded by several social and legal barriers to collective action, as well as limited governmental support to compensate for weak local resource-governing institutions. Here, we discuss relevant parts of the history of the Marine Extractive Reserve of Corumbau (MERC) and describe the development of its co-management initiative within a context of chronic poverty, real estate speculation, tourism growth, and coastal and marine degradation (Di Ciommo, 2007; Moura et al., 2007). We also examine past and current challenges to this ongoing process, and the results of two government-sponsored projects aimed at strengthening MERC's co-management regime, in which the authors were directly engaged.

Study Site

The MERC (900 km²) is located on the southern coast of Bahia State, in northeastern Brazil (Figure 1), a region well known as a biodiversity hotspot and priority area for conservation (Werner et al., 2000; Moura, 2003), encompassing coral reefs, soft bottoms, mangroves, algae, and seagrass beds. Created by Presidential Decree in September 2000, the MERC encompasses sections of two municipalities (Porto Seguro and Prado) and is neighbored by other protected areas and Indigenous Lands (*Terras Indígenas*) (Figure 1).

The MERC's boundaries do not include land, except for beaches and mangroves. Beneficiaries live outside the MERC boundaries in seven localities, as follows: (1) *Caraíva*: The second largest village (94 families), mostly devoted to "sun and sand" tourism since the 1980s, with fisheries becoming increasingly secondary (85% of fisherfolk are involved in the tourism sector) (Stori, 2005). Two main associations represent fishers and other "locals"; (2) *Aldeia Barra Velha*: A major settlement of the Pataxó Indigenous People (370 families), with main activities related to small-scale farming, tourism, craftwork, and fisheries. The locality has one association devoted to communitarian issues, including fisheries; (3) *Aldeia Bugigão*: Located inside the Monte Pascoal National Park, most of its population (20 families) is fully dependent on fisheries. It is a relatively new settlement, established in 2002 after real estate speculation escalated in Ponta do Corumbau, and does not yet have an association; (4) *Ponta do Corumbau*: The starting point of the MERC, where fisherfolk started mobilizing for its establishment. Most villagers (52 families) are Pataxós descendants, devoted to fisheries, 55% of whom are also involved in tourism (Stori, 2005). Real estate and tourism are forcing natives toward less privileged localities, such as Aldeia Bugigão. The locality has three associations, one of which was heavily involved in the MERC's beginnings; (5) *Veleiro*: A small village (28 families), with main activities related to small-scale agriculture or informal labor for larger neighboring farmers and ranchers. Fishing is a subsidiary activity and tourism is virtually nonexistent. The locality has one fishers' association; (6) *Imbassuaba and Barra do Catí*: Encompasses several small and a few large rural properties. Most locals work in small-scale agriculture or for larger neighboring ranches and farms. Fisheries represent a supplementary activity for about 25 families, and tourism is poorly developed. Fishers are represented by one association; (7) *Cumuruxatiba*: The largest village, containing several small hotels and camp sites, developed commerce, a police station, a school, and a small medical emergency facility. Although most fisherfolk have sold their seafront homes since the 1970s, there is still a representative fishing community (164 families; 45% also involved with tourism) and one fishers' association (Stori, 2005). Most villages were only recently provided electricity (since 2006) and none is served by a paved road; access to health care and schools is limited or absent.

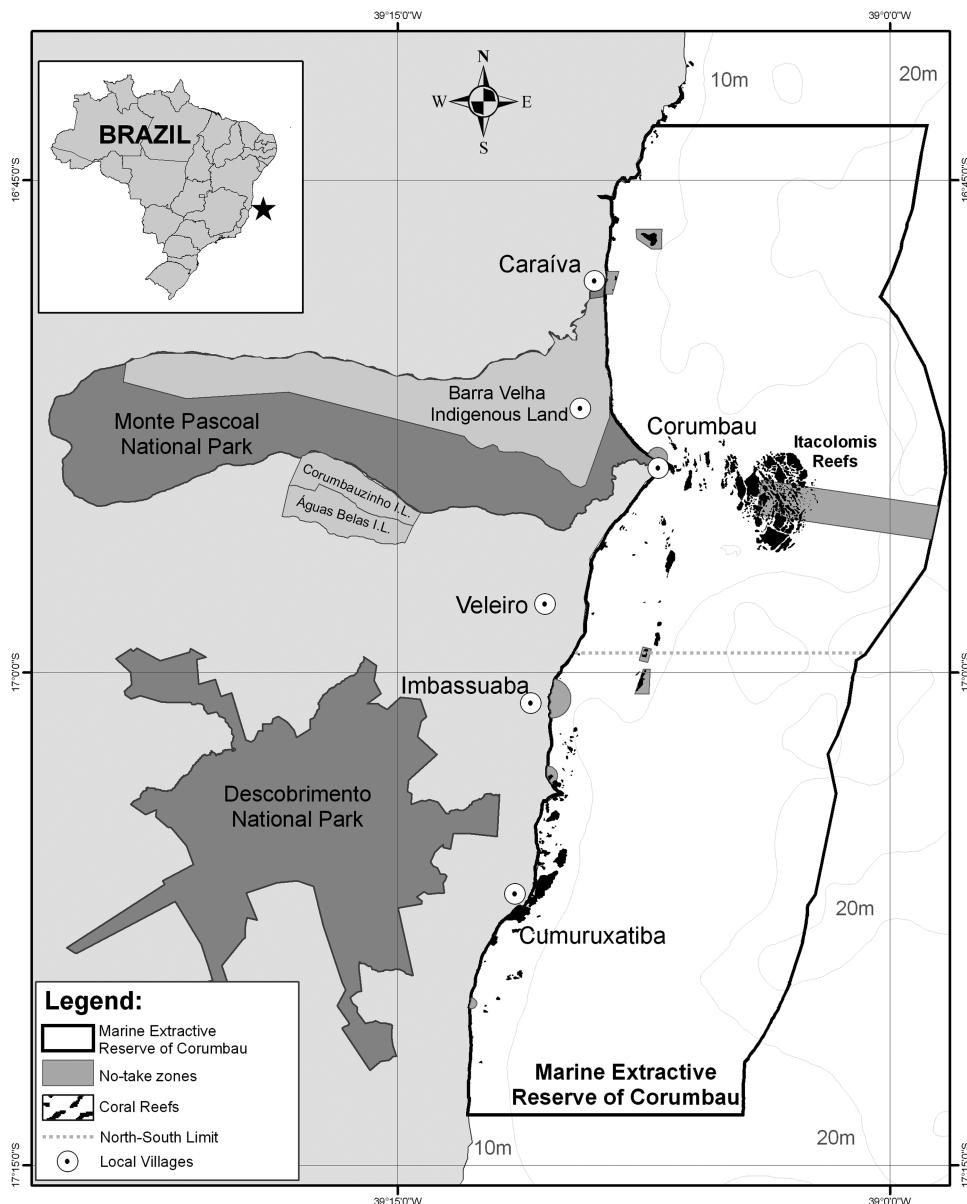


Figure 1. The Marine Extractive Reserve of Corumbau (MERC) and its neighboring National Parks and Indigenous Lands. The six main localities more frequently mentioned in the text are depicted, as well as some of the zones with special restrictions to fisheries.

Drivers and Type of Co-Management

MERC's Creation Process

From the late 1980s on, soon after motorized trawling boats were introduced in the region, fisherfolk from Ponta de Corumbau and neighboring localities started noticing a sharp

decline in marine resources. In the mid 1990s, competition for sea resources, especially shrimp, increased. At that time, an incipient infrastructure for seafood storage (ice and diesel supply) was established in Ponta do Corumbau by an entrepreneur from Vitória (Espírito Santo State), who also financed motorized boats for local use. Cumuruxatiba had a similar commercialization scheme, with expensive ice and diesel supply exchanged for cheap fish and shrimp. Locals were at a clear disadvantage when compared to fishers from neighboring larger cities (e.g., Porto Seguro, Alcobaça, Vitória), who were better equipped and had access to better and cheaper infrastructure.

In 1998, villagers from Ponta do Corumbau (at that time, most of them were fishers) made the first formal appeal for the creation of a sustainable-use protected area, advised by Prado's municipality Judge, who first introduced the idea of establishing an ER to mediate fisheries conflicts. Fishers from Barra Velha and Caraíva, several of them closely related to Corumbau's villagers and with a long history of cooperation (sharing Pataxó origins and kinship), readily joined the movement. With the opening of a formal process for MERC's creation, the National Environmental Agency (IBAMA, currently divided into two agencies: ICMBio—responsible for Conservation Units, and IBAMA—responsible for enforcement and environmental licensing) started developing baseline field assessments and mobilization. Between 1998 and 1999, several meetings to inform and mobilize communities took place at Corumbau, Caraíva, Barra Velha, and Veleiro, with the participation of the extractivists themselves, NGOs (mainly Conservation International—CI-Brasil, *Associação Pradense de Proteção Ambiental*—APPA, and *Instituto Baleia Jubarte*), and some academic scientists. From this point on, NGOs also made formal appeals supporting the MER creation.

At the end of 1999, villagers from Cumuruxatiba, Imbassuaba, and Veleiro, stimulated by the intense mobilization in the other villages, decided to adhere to the process by requesting an extension of MERC's limits to about 30 km south of the originally proposed limit. The extension was not readily accepted by the original proponents because those three communities (mainly Cumuruxatiba) were not seen as being composed of "relatives" (*parentes*). This was one of the first local rule-setting exercises triggered by the ER, and it is noteworthy that the MERC was divided in two sectors in the first version of the Management Plan: one exclusive to Caraíva, Barra Velha, Corumbau, and Veleiro fishers (north) and the other exclusive to Imbassuaba and Cumuruxatiba fishers (south), although both sectors had nearly identical internal rules. Indeed, informal territories were already in place, and the ER establishment tended to maintain these decades-long internal tensions.

Despite the intense debate regarding maritime limits, there were few discussions about MERC's western (land) limits. Initial debates included claims for stretches of land that were never incorporated into the MERC because of a legislative "gray area," the defense of indigenous rights pointed out by *Fundação Nacional do Índio* (FUNAI—the Federal agency responsible for the tutelage of indigenous peoples) and the cost to the government of dispossession. Yet in 1999, CI-Brasil and the National Center for Traditional Populations (CNPT—*Centro Nacional de Populações Tradicionais*), a section of IBAMA, finished the required biological and socioeconomic technical reports (*laudos*), in collaboration with researchers from the *Museu de Zoologia—Universidade de São Paulo* and *Museu Nacional—Universidade Federal do Rio de Janeiro*.

The creation of an ER is a process that includes a succession of events and a long mobilization process, rather than only one significant occasion. However, when fishers from Ponta do Corumbau are asked about those early days, they consistently recall one important event: the closure of the mouth of Corumbau River in 1999, in order to avoid the landing of shrimp by outsiders (on one occasion, as many as 200 boats were trawling in

front of the village). In September 2000, despite some resistance from the government and after many petitions, publicity in the national press and support from the Ministry of the Environment, the Presidential Decree was finally signed.

Fishers' Associations and the Roots of MERC's Formal Fisheries Management

During the mobilization processes for MERC's creation, fishers from Ponta do Corumbau were stimulated by CNPT to create the *Corumbau Reserve Association* (AREMACO), whose main intended role was to mediate the unit's creation and implementation (as suggested by the association's name itself). AREMACO was envisaged by CNPT as the formal co-management organization, representing fishers from the entire reserve. However, as MERC's establishment planted several seeds of empowerment (see Jentoft, 2005), three other associations were rapidly established: *Associação dos Pescadores Artesanais e Amigos da Costa do Descobrimento* from Imbassuaba/Barra do Caí, *Associação dos Pescadores e Agricultores Rurais* from Veleiro, and *Associação dos Nativos* from Caraíva. In Cumuruxatiba, the inactive *Associação dos Pescadores* was reactivated after MERC's establishment. The Pataxó community, with a much longer history of social organization (Grünewald, 2001), was already affiliated with an association (*Associação da Comunidade Indígena da Aldeia Barra Velha*), which readily engaged into fisheries issues. It is noteworthy that only one of these associations (Cumuruxatiba) accepts only fishers as associates, while the others may include "farmers," "friends," and "natives" as well. Currently, representatives from these associations constitute the bulk of fishers' representatives in MERC's Deliberative Council.

The Deliberative Council, MERC's main decision-making body, was formed in 2000, when CI-Brasil and CNPT began discussing with locals the terms of the Management Plan of the forthcoming ER. Such discussions were intended to clarify the potential impacts of the ER, especially regarding fishing and other conflicts in the maritime territory. Initial discussions were restricted to issues such as the most suitable fishing methods and equipment (e.g., limits for mesh and net size), catch limits for some species and the designated use, size and limits of zones. This process also resulted in the unofficial establishment of some fishing regulations even before the Management Plan officially came into being, like a ban on parrotfish fisheries. During this period, which preceded the Decree signature, there was increased surveillance of the waters by local fisherfolk, and outsiders considerably reduced their activity in front of the villages.

Arrival of IBAMA and the Institutionalization of a Co-Management Regime

In 2002, with the Management Plan proposal already drafted, the Deliberative Council crafting progressed, despite the absence of a permanent IBAMA staff member in the area. In this process, preparatory meetings were followed up by open elections of 14 community representatives from the six communities. Fisherfolk constituted 50% (+1 person) of the council chairs, while the remaining chairs were comprised of representatives from municipal, state, and federal governments, the legal system, the tourism sector, and NGOs. In September 2002, during the second anniversary of the MERC, the Deliberative Council took office. Its first act was to approve the Management Plan and statutes (*Regimento Interno*). A few months before the Deliberative Council was established, IBAMA finally allocated a full-time public servant to the MERC.

This interlude between the Decree signature and the "arrival of IBAMA" helped keep fisherfolk highly mobilized and also generated high expectations regarding the

governmental support needed to implement the rules agreed to in the preceding years. Governmental backup, however, has been consistently slow, impeding the empowerment process as a whole (see Pomeroy & Berkes, 1997). For instance, although the Deliberative Council ceremonially took office in 2003, the council was not officially approved by a federal ruling (*portaria*) until July 2006 (which validated all decisions since 2003).

Coupled with several social barriers to collective action (Silva, 2004) and with legal constraints affecting the rights and duties of ER beneficiaries (Glaser & Oliveira, 2004), many of the fisherfolk's early expectations were progressively frustrated throughout the years. Political and ideological alliances increasingly undermined the MERC, especially because the most disputed resource, the seafront, has remained vulnerable to economic interests and its client constituencies. Local leadership has become increasingly discredited by real estate operators and farmers who, in their turn, established a number of local alliances to compensate for the weak support for the communitarian co-managing parties provided by the government. The formal concession of use rights to the maritime territory is nearly virtual, as no individual or collective contract was signed, which strengthens the alliances between private entrepreneurs and community members who increasingly discredit the ER as a central governance tool with the potential to promote equity and improve quality of life.

Despite the weak governmental presence (until now there has been only one full-time IBAMA staff member, who must perform all enforcement, mobilization, and several other duties), the Deliberative Council meets every quarter with rare exceptions. Twenty-five ordinary meetings have been carried out to date, and these always involve a strong presence of community representatives, who are increasingly taking possession of this important management forum. Discussions in the scope of the Deliberative Council are not restricted to fisheries. The lack of electricity and basic infrastructure, land tenure and licensing issues, fishers' documentation, existing governmental programs and projects that may benefit locals, as well as conflicts with tourism and other sectors (e.g., farmers and navigation companies), also permeate the meetings' agenda, demonstrating a clear scaling-up of the discussions. Maintaining a balance between such diversified and contradictory interests requires increased transparency and clarification about the precise rights and duties of the co-managers, communitarians, governmental representatives, and NGO members. This task is even more challenging due to a general feeling that tourism and other business-related sectors help elect councilors in order to defend their own interests, rather than the interests of fishers. A major step toward alleviating some of these contradictions would be the development of a precise definition of the MERC's beneficiaries—the *traditional populations* explicitly mentioned in the SNUC law.

Who are MERC's Beneficiaries?

Although fisheries management measures are currently decided by the Deliberative Council, one of the most important guiding principles is still pending: Who are the legitimate traditional communities that should benefit from the exclusive use-rights of natural resources? This precise identification is a much needed step in the implementation of ERs, especially within the highly diverse sociocultural and socioeconomic settings of the Brazilian northeast coast. Under other ecological, sociocultural, and economic templates, such as in many Amazonian ERs, these challenges seem to be less acute. Besides the inherent pitfalls of dealing with the complex issue of identity and its connections to territoriality, the lack of an explicit legal framework, or at least a set of official guidelines, triggers several conflicts at the local level. In many instances, this uncertainty results in long-lasting mutual

accusations, legal charges, and/or administrative claims, creating an unfavorable atmosphere for strengthening local co-managing parties. For instance, discussions regarding the rights of two tourism operators from Caraíva (both connected with the Porto Seguro municipal government) who were clearly nontraditional outsiders (neither born nor residing in the ER) monopolized a major chunk of Deliberative Council discussions between 2003 and 2004. Indeed, this was the only period in which the Porto Seguro Town-Council (*Câmara Municipal*) had a strong presence in the Deliberative Council meetings.

Because ER beneficiaries are not explicitly and specifically defined by the SNUC law, technicians involved in the MERC "projects" (see later) have taken steps to discuss the issue of beneficiary identity with the communities. In these discussions, technicians have employed Participatory Rural Appraisal tools (PRA; Chambers, 1999), such as group dynamics, visualization and diagrams, and interviews and sampling. These discussions were carried out in all localities, focusing on the relationship between identity and territory. Participants from each locality developed a self-recognition proposal for those who should be considered part of the *traditional population*. This process ("Identifica RESEX") culminated in a larger seminar attended by representatives of each locality (numbers were proportional to the size of each village), in which all proposals were examined and debated. The following absolute majority view was reached: "the MERC's beneficiaries are locals and their families with roots in the region, and people who depend upon fisheries and who have lived near the MERC for at least 10 years." This definition of *traditional populations* will ultimately be discussed in the Deliberative Council, and may help promote some much needed adjustments, increasing the autonomy of beneficiaries in participation and decision-making.

Policy and Legislative Setting

The ER model for co-management assigns several new duties to the state and to local beneficiaries. As emphasized by Glaser and Oliveira (2004) in their analysis of a MER in Northern Brazil, under the ER framework the State shares several responsibilities and entails a number of new duties (e.g., implementing management and monitoring of resources) and rights (e.g. excluding outsiders and developing resource-use rules) to beneficiaries. In addition to the demand for specificity created by the difficulties in distinguishing beneficiaries from other users, there is a great need for explicit definitions about the specific duties and rights of co-managing parties.

On the government side, ICMBio is responsible for the establishment and coordination of ERs but suffers from a chronic lack of infrastructure and personnel. Moreover, ER implementation policies have not been fully incorporated by the fishers, setting back the implementation process and turning co-management into an even greater challenge. On the community side, it is necessary to consider that Brazilian small-scale fishers have historically been socially marginalized (Cordell, 1989), and a number of negative experiences have left fishers wary of any governmental interventions. Thus, if the government indeed intends to break this pattern, a new relationship of reciprocity needs to be developed (Pomeroy & Berkes, 1997; Silva, 2004). For instance, subsidies to diesel, energy, ice, and infrastructure rarely reach the artisanal sector, although they flow abundantly into industrial fisheries and aquaculture plants (Abdallah & Sumaila, 2007). None of the aforementioned benefits from the Presidency's Special Fisheries Secretariat (SEAP) have ever reached most MERs (and the artisanal sector as a whole; see Mendonça & Valêncio, 2008). The new *momentum* provided by the establishment of an MER may disintegrate quickly if both the

state and artisanal fishers do not hold up their roles, a difficult achievement under an unclear policy and legislative framework (Pomeroy & Berkes, 1997).

It is also noteworthy that ERs are not conceived under nor integrated into a national system. So far, IBAMA has convened only a single meeting with countrywide ER beneficiaries (including forest, estuarine, and maritime extractivists), and there is an evident lack of coast-wide coordination and guidelines to deal with the recurrent problems inherent to coastal management (Diegues, 1999). Thus, it seems that the struggle for the creation of several MERs along the entire Brazilian coast may have been a relatively easy task when compared to the policy and legislative challenges for sustaining these initiatives over the long-term. Beyond the need more studies to evaluate the appropriateness of MERs as sustainable development tools (e.g., Di Ciommo, 2007), universities, and nongovernmental organizations must play a major role in the policy debate at the national level, and must engage in local-level capacity-building initiatives related to financial management, participatory research, and management methods, among other emerging issues.

Implementation and Enforcement

Strengthening Co-Management Mechanisms: Roles and Shortcomings of the Two “Projects”

In the MERC, as well as in nearly all other MERs, there are insufficient human, material, and financial governmental resources. For instance, the annual IBAMA budget for the MERC was US\$5,500.00 in 2006 and 2007 (excluding the salary of the only public servant), which is clearly insufficient to fund basic governmental duties. Even maintaining the regular schedule of council meetings and a single monthly visit to each of the villages is not possible under this restricted budget. This situation results in a permanent need for external fundraising, which has generally been carried out through partnerships among NGOs, IBAMA, and local associations.

In 2003, the National Fund for the Environment (FNMA—*Fundo Nacional do Meio Ambiente*) approved a project entitled “Strengthening MERC’s Participatory Management,” involving IBAMA and 11 other institutions (four NGOs, São Carlos Federal University, and six fishers’ associations). Besides providing continuity for long-term monitoring programs (e.g., Francini-Filho & Moura, 2008a,b; Moura et al., 2007), this project aimed to: (i) strengthen the communitarian associations and formal and informal participatory mechanisms of the MERC, (ii) develop low-impact and profitable community-based tourism and fishing practices, (iii) promote environmental education and communication, and (iv) provide the basis for the revision of the Management Plan. More recently, SEAP, in partnership with the Ministry for Agricultural Development (MDA—*Ministério do Desenvolvimento Agrário*) also approved a project proposed by one of the fishers’ associations (based in Imbassuaba). This project aims to encourage local initiatives for sustainable development, through technical assistance and access to credit.

Despite the sizable budget,¹ funding discontinuity coupled with the challenges of managing projects encompassing institutions with diverse agendas, interests, and backgrounds is impeding the much needed empowerment process. Conflicts arise from payment delays, lack of administrative transparency, and inefficient communication between project members and institutions, as well as from the initial confusion about project’s goals. Used to a paternalistic system, several fishers had the misconception that the project was humanitarian aid, and that they would receive the money directly. When this never happened, several stakeholders not directly related to fisheries deemed the project a failure.

Notwithstanding this hostile context, after many project activities, several fishers started to realize how much they were empowered by the project, and the value of participatory research and information. Associations acquired office supplies and computers and organized their legal and financial structures. The project provided necessary funding to promote meetings for discussions of several communitarian issues, and working together allowed the communities to get to know each other. Natural leaders, who were initially quiet and had a bare understanding of the complexities of co-management, were now able to speak out in diverse forums. Today, the view, at least among the leaders and most active members of the community, is that both projects brought empowerment and the courage to speak out, something that is now considered by some to be more permanent than money. This is an ongoing process, although both projects are currently halted due to funding discontinuity.

Enforcement

Enforcement is one of the major challenges, as it is an exclusive duty of the government. As the only ICMBio officer must perform nearly all governmental duties in addition to being the head of the Deliberative Council, interpersonal conflicts and enforcement drawbacks are inevitable.

Surveillance from local fisherfolk, observed in the early days of the MERC, has diminished considerably, as the general understanding is that it requires the presence of neutral and armed authorities. The single officer was occasionally able to request external teams but, due to logistical constraints and, paradoxically, to worries of the extractivists, they were not requested as frequently as necessary. Enforcement officers are stationed about every 200 km, and it is costly to get them to operate regularly in the MERC. Structural and human resources are limited to the extent that even the buoys bought by one of the projects to signal the no-take areas were never installed at sea. Despite the initial overall commitment, illegal fishing by outsiders, as well as by locals (inside the no-take zone; see later), increased from 2003 on, and is a growing practice in the MERC.

Monitoring of Resources and Adaptive Management

MERC's fisheries are located mainly on reefs and secondarily on mud and sand bottoms. The main equipment used by fishers includes hand lines (one or two hooks), longlines, spears, and several kinds of nets, including bottom-trawling nets (*balão*). Both bottom trawling and spearfishing, two fishing techniques with a heavy environmental impact, were introduced fairly recently (1980s and 1990s, respectively). Bottom trawling targets mostly penaeid shrimps, although more than 90 fish species are captured as bycatch (Moura et al., 2007). Reef fisheries target mostly the fish families Lutjanidae (snappers), Carangidae (jacks), Serranidae (groupers), and Scaridae (parrotfishes). The latter is mainly captured with spears. Since 2002, fisheries' landings are being monitored. Started as a small initiative restricted to Ponta do Corumbau (2002–2003), landings monitoring was extended to other MERC localities from 2004 on, with support from the two "projects" (FNMA and SEAP). Although results are not yet consolidated, preliminary analyses show that total captures have remained roughly stable (Moura et al., 2007).

Although most fishers readily acknowledged the need to exclude bottom trawling from river mouths (well-recognized nursery areas), the possibility of establishing no-take zones was an idea introduced by the technicians (academics and NGO staff). Besides the establishment of several zones with restrictions on bottom trawling, a significant no-take zone was established at Itacolomis Reef, encompassing about 1,850 ha (~20% of its total

area). Due to the size and relevance of this reef (Castro & Segal, 2001), as well as its unique value as an experimental site to evaluate the use of no-take zones as fisheries management tools, it was chosen for the underwater monitoring program. Both the no-take and the unprotected zones of Itacolomis Reef were monitored before 2001 and after 2002–2005, the initiation of protection, with positive effects from protection detected inside and near the no-take zone (Francini-Filho & Moura, 2008a). However, even taking into account the increases registered up to the present, the biomass of target fish species at Itacolomis Reef is still considerably lower than that registered in other reef areas within the Abrolhos Bank region (Francini-Filho & Moura, 2008b). The high level of algal cover (~60%) and the low level of live coral cover (~10%) demonstrate that habitat integrity has already been seriously compromised, most likely due to global climate change and long-term overfishing (Francini-Filho & Moura, 2008b).

General Conclusions, Main Challenges, and Opportunities

Brazil has a very poor record in fisheries management. Public policies on fisheries, historically and at present, have not reduced over-exploitation nor the social marginalization of fishers (Mendonça & Valêncio, 2008). Even after considerable and recent attention from the media and society regarding the decline in captures, and even after the collapse of many species, the federal government continues to launch incentives to increase catches without formulating management plans (Abdallah & Sumaila, 2007). Fisheries co-management, as a process of participation, empowerment, power sharing, dialogue, conflict management, and knowledge generation, holds enormous potential, especially because artisanal fisheries predominate throughout the country.

In many areas, MERs may provide an appropriate co-management framework. The central challenge of a MER is to achieve a balance between the maintenance of marine resources, the improvement of livelihoods, and the cultural survival of traditional populations. The great opportunity of an MER lies in the unprecedented *momentum* created by the establishment of a more fair relationship between the state and the long mistreated traditional fishing populations.

The fact that MERs operate with minimal or no external aid, and under extremely low budgets, defies the demands of agencies, NGOs, and community organizations. At present, only some associations and individual leaders are more empowered to take on the task of maintaining marine resources and improving livelihoods. Thus, broadening empowerment must be a priority line item in the agendas of agencies, NGOs, and research institutions, especially through the development of communication tools and strategies that are congruent with the sociocultural background of those whose livelihood the MERC is designed to protect (e.g., strong Indigenous influence; limited access to electricity, television, and printed medias; low literacy rates).

There is also a remarkable incongruence between the relatively brief timelines (and funding consistency) of agencies such as FNMA and the extended period of time required to make changes to an unfavorable context of chronic poverty, real estate speculation, explosive tourism growth, and overall coastal and marine degradation. Inconsistent external support also precludes the periodic revision of fishing rules, which should be backed up by high-quality data with consistent time series. Implementation of a long-term monitoring strategy with no external aid is another major challenge, one that may even be unachievable. However, as expected from any long-term community-based conservation initiative, it is important to recognize that even after nine years, the MERC is still in its initial stages.

Contemporary fisheries management has evolved to incorporate a broad array of socioeconomic and cultural information and approaches regarding fishers and fishing communities (see numerous recent case studies in McClanahan & Castilla, 2007). Research needs to be participatory and/or performed with enough feedback so that members of the community perceive its importance, understand its methods, and are able to share in the joy of working together and discovery. In most instances, Johannes' (1998) data-less management approach, going far beyond precautionary management, is the only alternative, as there are too few researchers and research may not be cost-effective. The scientific enterprise needs to be demystified and used as a tool to improve people's lives. It is important that researchers establish trust with communities, which may be acquired simply by providing regular feedback (e.g., talks and discussions about research methods and results). Researchers need to work with the community as a team, including them in the discussion of experimental procedures, data gathering, and conclusion building (Shanley, 2006).

The unstable land tenure context is pressing traditional fishers to less favorable areas and challenging their main sociocultural reproduction space: the coastline. Ponta do Corumbau, the birthplace of the MERC, represents the most striking example of the pervasive process through which tourism-related real estate drives natives toward less privileged localities. No more than 10 traditional families currently inhabit Ponta do Corumbau, while more than half of the nearly 20 families currently living in Aldeia Bugigão (where there is no road access, school or electricity) originated in Ponta do Corumbau. The migration of these families began in 2002 and intensified after 2004. Direct and indirect financial pressure from tourism entrepreneurs to sell land is steadily increasing, and the possibility of extending the MERC to land is aggravating the tension between fishers and tourism entrepreneurs, who insist on the idea of a "failure of the MERC's promises" and generate false expectations regarding the abundant jobs that will be created when "mass tourism arrives" (see Stori, 2005). Illegal fisheries and a lack of enforcement by ICMBio add to a belief in MERC's failure.

Fishers' representation and the vested interests of user groups represented in the Deliberative Council reflect similar pressures. Several factors may prevent the participation of fishers in the Deliberative Council and other formal and informal discussion forums: (i) the process may seem too time-consuming for some (meetings are sometimes a lengthy process due to the lack of a clear and interesting agenda), (ii) in some communities there are internal conflicts with roots older than the MERC, (iii) some fishers still do not understand the ER concept and fail to participate in any discussion, and (iv) leaders or councilors may fail to provide feedback to the communities about the council's decisions.

Analysis of the MERC with Ostrom's (2002) principles for successful de-centralized management illustrates that even though much has been accomplished in the last nine years, there still exist many challenges and opportunities for improvement:

- *Clear boundaries*—The MERC has well-defined physical boundaries, but users are not clearly defined and there is a need to deepen the discussion about the extension of the MERC's limits to land areas;
- *Congruence*—Although the Management Plan has been extensively discussed, there are still many fishers unaware of the meaning of an MER and MERC's specific rules. There are also discontented or rebel fishers that recurrently break the rules. Although rules should be improved by incorporating local knowledge and practices, this does not mean that they will be readily incorporated by the entire fishing community;
- *Collective choice*—So far, discussion about MERC's rules have been restricted to councilors and the more active fishers and associations. Broader participation in the

process of reviewing the Management Plan should be sought in order to increase participation and compliance, and especially to enhance cohesion among fishers;

- *Monitoring of rule conformance*—Fishers expect agencies to punish trespassers and rule breakers, but fear being harshly punished themselves. There is a clear lack of enforcement capacity on the side of ICMBio, and a lack of institutionalized mechanisms for rule monitoring within the community. This results in few sanctions being applied to appropriators that deviate from the regime;
- *Conflict-resolution mechanisms*—Conflicts between communities are discussed and sometimes resolved in the scope of the Deliberative Council, but there are no other formal mechanisms to resolve conflicts within communities;
- *Minimal recognition of rights to organize*—The MERC is a federal concession, so there should be a full governmental recognition of agreements, rules, council, and associations. Although recognition of rights has clearly improved, the rights to organize and manage resources are not fully supported by official agents. This applies not only to IBAMA and other federal agencies, but mainly to state and municipal-level agencies and to representative bodies such as Town Councils as well. The 1988 Federal Constitution decentralized governance, favoring the state and municipal levels, but conflicts of jurisdiction and local interests permeate MERC and all other coastal management issues in the region.

Finally, we emphasize the enduring difficulty that MERC fishers face in commercializing their products. All production is sold locally, mainly to a few middlemen that take the fish to storage plants. A smaller proportion of the catches is sold directly to restaurants or hotels and *pousadas*. Thus, exclusive rights do not necessarily result in higher income for traditional fishers, and the implementation of the MERC has not yet been translated into better economic indicators.

Decision-making power and the protection of MERC fishing grounds greatly increased over the last nine years. Although there are many useful fisheries co-management and participatory research guidelines (e.g., Berkes et al., 2001), the implementation of a MER or any other co-management framework will always have a strong learning-by-doing component (e.g., Kalikoski & Satterfield, 2004). Institutions and people need to mature individually (capacity building, self-confidence) and as a group (trust, motivation). Changes in the complex social organization of fishing communities will always leave deep scars, as these communities have been shaped by strong kinship relationships, local ecological knowledge, and informal rules (Diegues, 2004). The development of a formal co-management arrangement, with the introduction of several bureaucratic and institutional venues, challenges practitioners, funding agencies and researchers, who must be aware of the long timeframes involved. MERC is in its ninth year, and although several challenges lie ahead, many results are already visible and several new opportunities have been identified.

Note

1. FNMA approved a US\$400,000.00 budget in 2003, but to date less than half of this money has reached the project.

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