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From common property to co-management: lessons from Brazil's first maritime extractive reserve ☆

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Abstract

Marine extractive reserves (MER) are being established in coastal areas of Brazil to protect 'traditional' coastal populations and the marine resources upon which their livelihoods depend. This paper examines the challenges Brazil's first open-water MER is facing in trying to achieve these goals. Results from a pilot project in Arraial do Cabo, Rio de Janeiro suggest that significant social barriers to collective action exist and that local resource governing institutions are not robust. Consequently, fishers are not becoming decisive players in the decision-making process. The implications of these conclusions for future maritime conservation policy in Brazil are explored.
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Keywords: Brazil; Extractive reserve; Collaborative management; Marine protected area

1. Introduction

Small-scale fishing communities worldwide have long developed local tenure arrangements that govern coastal resources based on traditional ecological knowledge [1–3]. Such institutional arrangements include limitations on resource access, gear and seasonal restrictions. It is widely acknowledged that these regimes can provide locally relevant and environmentally sustainable solutions to resource degradation [4,5]. At the cornerstone of this model of 'productive conservation' is the long-term participation of resource users [6].

In Brazil, a new marine conservation paradigm is emerging which goes beyond crude protectionism. Maritime extractive reserves (MER), a new type of collaboratively managed marine protected areas, are being established in order to protect marine resources while sustaining the livelihoods of traditional resource user communities. This approach to conservation is supported by common property theory that questions the inevitable destruction of collectively managed resources.

This article explores the relationship between Brazil's first open-water MER established in Arraial do Cabo, Rio de Janeiro, and the traditional beach seining community it was created to protect. A brief review of the theoretical underpinnings of common property management through collaborative management is presented followed by a summary of the historic evolution and the creation process of MERs. This paper then investigates the quality of the institutions which have traditionally governed the beach seining[1] community in Arraial do Cabo, Rio de Janeiro, Brazil. Finally, factors that constrain or provide potential for long-term participatory conservation are presented.

2. Collaborative management

Common to most definitions of collaborative or co-management is the sharing of power and responsibility between governments and communities. Co-management is often described as a middle course between pure State management and pure communal property

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[1] Beach seining is a type of fishing that involves a large drag net used in shallow, inshore waters.

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regimes. Central to this process is the recognition and legitimization of traditional or informal local-level management systems. Co-management stresses the importance of decentralized governance and user participation in the management of natural resources. Participatory management, community based management, collaborative management or co-management are all terms used to describe these arrangements.

Within these arrangements, local resource users play a pivotal role in decision-making, implementation and enforcement. Jentoft [7, p. 425] notes that co-management is supported by two main premises. First, the knowledge accumulated over time by resource users is often complementary to more formal scientific knowledge producing more 'enlightened, effective and equitable remedies and solutions to management challenges'. Second, the participation of resource users in the various management stages legitimizes these arrangements, thereby contributing to their compliance and resulting in more effective conservation strategies. Partnerships with local communities may also reduce enforcement costs, a factor which makes these regimes particularly attractive for developing countries.

2.1. Types of co-management

Building on earlier work by McCay and Jentoft [8], Sen and Neilson [9] argue that a broad spectrum of co-management arrangements exists, varying significantly in terms of the balance between community and government involvement (see Fig. 1). Where co-management is *instructive*, the State creates mechanisms for dialogue with users and informs them of government management decisions. Where it is *informative*, user groups inform government of decisions made at the local level.

Arguably the 'truest' form of co-management, *co-operative* co-management is the variation that exemplifies best the goals of co-management. Ideally, under these arrangements, the State and resource users co-operate as equal partners in decision-making. These categories are clearly a simplification of how co-management arrangements function in practice where such regimes are combinations of these five types and the balance of power and involvement to change over time.

The balance of power between the partners should reflect their comparative advantage in offering different elements essential to any collaborative management regime. For example, resource users can offer local ecological knowledge as well as an insider understanding of the social and cultural context while the State can play a central role in enforcement efforts and provide a legal framework that codifies and legitimizes local identity and rights over resources.

3. Conditions for success

The analysis of thriving communally owned resource regimes and co-management case studies suggests that these arrangements may only work effectively under a limited range of conditions. Ostrom [3] identifies key factors for successful decentralized management (see Table 1).

Less tangible qualities presented by Ostrom include the existence of social capital and high levels of trust and shared values as well as a sense of a community or common future. Communities that have a history of

Table 1
Design principals for robust CPR regimes [3]

Design principle	Description
Clear boundaries	Resource users and resource must be clearly defined.
Congruence	Rules restricting harvest should be locally relevant.
Collective choice	Broad participation in rule modification by those affected.
Monitoring	Monitors are accountable to the appropriators or are the appropriators themselves.
Graduated sanctions	Sanctions exist and are applied to appropriators that deviate from the regime.
Conflict-resolution mechanisms	Low cost conflict resolution areas exist to resolve conflicts among appropriators.
Minimal recognition of rights to organize	Rights to organize and manage resources are supported by external official agents.

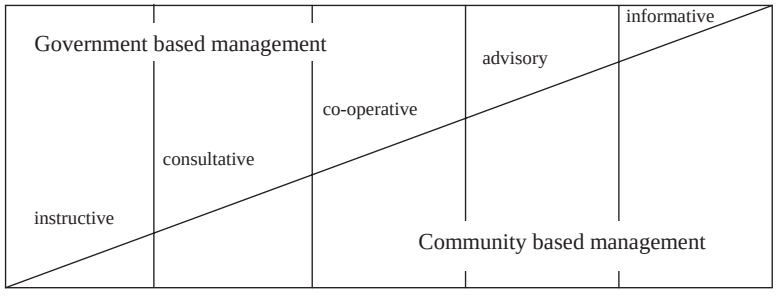

Fig. 1. Spectrum of co-management arrangements [9 p. 405].

collective action seem to be better placed than those that do not. Economic dependence may also provide strong motivation to solve common problems to enhance or protect productivity over time [3].

4. Maritime extractive reserves

Brazilian marine fisheries management has largely mirrored that of North America. Species based management using conventional management tools (quotas, seasonal and size restrictions) were applied to a radically different ecological and social context. Large scale commercial fishing benefited from generous financial incentives along with tax concessions and subsidized credit [10]. Recently though, marine and coastal zone degradation along with social concerns such as employment generation and food security, have led policy makers to seek alternatives to the status quo.

There is growing official recognition in Brazil of traditional resource users and their management systems as a key element in biodiversity and habitat conservation. Central in this trend is the belief that traditional resource users may be the best stewards of the resources their livelihoods depend on.

Increased attention to the potential role of resource users in conservation originated with the struggle the *serengueiros* or rubber tappers of Amazonia to resist the encroachment of their lands by cattle ranchers and loggers from the wealthier southern states [11]. Led by Chico Mendes and Wilson Pinheiro, both rural union leaders who were eventually murdered as a result of their leadership of the movement, the rubber tappers' collaborated to protect the rainforest. The change to democratic governance in the late 1980s coupled with international appeals to protect the rainforest provided timely support for this group. Support for the rubber tappers movement also came from interested academics and international non-governmental organizations who valued this movement as a critical defender of the rainforest.

This process culminated in 1989 with the creation of the Extractive Reserve conservation category.[2] Extractive Reserves are a type of collaborative management regime initiated by local resource users and supported by the federal government. These conservation and development initiatives have emerged as the policy instrument used by the Centre for Traditional Populations (CNPT) within the Brazilian Institute for the Environment (IBAMA) for decentralizing managerial

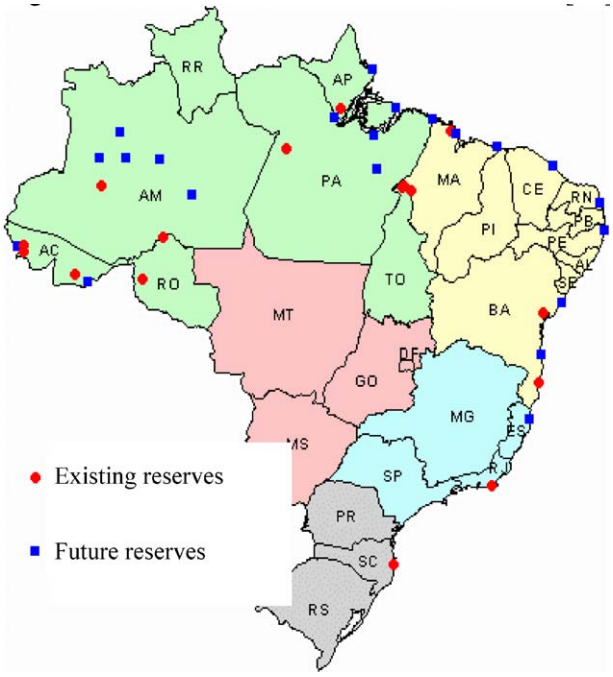

Fig. 2. Present and future extractive reserves [12].

responsibility for natural resources to communities that have a proven history of sustainable use.[3]

Since 1990, 16 federal Extractive Reserves have been created most of which have been land based. However, there is a significant trend towards the establishment of marine based reserves. Of 21 reserves currently in initial stages of development, 18 focus on aquatic resources, the majority (13) of which encompass open water marine environments in coastal areas (Fig. 2). This policy trend is significant in that it represents the first government-sponsored effort to protect the common property resources upon which small-scale fishers depend. Table 2 lists some of the characteristics of the four existing MERs.

4.1. Phases of creation

There are three phases in the establishment of these conservation and development initiatives. Initially, a formal request is developed by the extractivists in a given area that describes the (social, economic, demographic, etc.) setting in which the reserve will function along with arguments in support of their proposal. If approved (by IBAMA/CNPT and then signed by the President), a utilization plan is developed which defines who, when and how resources can be used, in essence representing a social contract among appropriators. This plan must then be approved by IBAMA/CNPT

[2] Since their creation, a broader reassessment of existing conservation categories has been carried out resulting in the new National System of Conservation Units [19].

[3] This effort has also been supported by the G-7 Pilot Program to Save the Brazilian Rainforests, on e of the largest multilateral environmental initiatives to date.

Table 2
Current MERs [12]

Name	Municipality/ State	Degree	Area (ha)	Pop.	Fishery
Pirajubaé Marine Extractive Reserve	Florianópolis, SC	N° 533–20/05/92	1.444	600	Shellfish, crustaceans, multiple fish
Arraial do Cabo Maritime Extractive Reserve	Arraial do Cabo, RJ	S/N°–03/01/97	56.769	3000	Multiple marine fisheries and shellfish
Baia de Iguape Marine Extractive Reserve	Maragojipe/ Cachoeira, BA	S/N°–14/08/00	8.117	1150	Multiple marine fisheries
Ponta do Corumbau Marine Extractive Reserve	Prado, BA	S/N°–21/09/00	38.174	800	Multiple marine fisheries

and published in the federal register in order to codify the rights and responsibilities of government and resource appropriators. Finally, the plan is operationalized and strengthened to increase its long-term resilience. This final phase is clearly the most challenging as it requires robust locally derived institutions sustained by long term community participation and government support.

5. Methodology

A case study approach was used to investigate the relationship between the newly created reserve and the traditional beach seining community in Arraial do Cabo, Rio de Janeiro, Brazil. This approach involves the empirical investigation of a particular contemporary phenomenon (MERs) within its real life context using multiple sources of evidence [13].

Twelve months were spent at the case study site living and working with local stakeholders during 1999–2000. Informal and semi-structured interviews were conducted with representatives of local, state, and federal fishing organizations. A questionnaire was administered with over half of the beach seining population (total 150) in order to obtain standardized information about the group as a whole. Focus groups were held with fishers as a follow up to the questionnaire to triangulate information as well as to explore certain issues in greater depth. Participant observation was particularly useful for gaining an 'insiders' understanding of the case study site. Qualitative data was analyzed using Atlas Ti software and quantitative data were analyzed using SPSS.

6. Arraial do Cabo, Rio de Janeiro

In 1997, Brazil's first open water MER was created in Arraial do Cabo, RJ to protect the resident beach seining community and the resources their livelihoods depend on [14]. The sustainable fishing methods used along with the formal and informal institutions that have governed this group for generations warranted the creation of the reserve. Data reveal, however, that these traditional institutions are no longer robust and that significant social barriers will need to be overcome to revitalize these and fully integrate them into the reserve structure. The following sections review some of the physical, institutional and social factors that affect the potential for long term participatory conservation.

6.1. Physical and technical attributes

Arraial do Cabo, a town of approximately 20,000 residents is located on a cape extending 40 km into the ocean. As a result of its relative isolation, the creation of the reserve had minimal negative impacts on small-scale fishers from neighboring areas. Fishers have been drawn to the cape for centuries because of the rich marine environment, nourished by the up-welling of deep Arctic waters. The town is located in a small, compact area facilitating communications between resource users. Also, all fishers included in this plan fish close to shore facilitating monitoring.[4]

Because all local fishers employ relatively sustainable methods, none were excluded by the creation of the reserve.[5] In fact, local fishing methods did not have to change at all. Although small areas were designated as biological reserves within the MER, fishers largely recognized the need for these areas to recuperate. These characteristics made garnering support for the reserve much easier than it would have been in a situation where there would have been 'winners' and 'losers'.

Attributes of the resource itself, however, complicate the relationship between seiners from the four different beaches where seining takes place. Because they are dependent on a single flow of resources (migratory fish) that pass each beach (starting with Praia Grande), a subtractability problem exists (see Fig. 3). Beach seiners spot incoming shoals visually from the hills adjacent to

[4] it will be interesting to see how reserve boundaries, enforcement and other institutional arrangements are fitted for off shore artisanal fishing fleets like those of the Northeast of Brazil.

[5] SCUBA fishers.

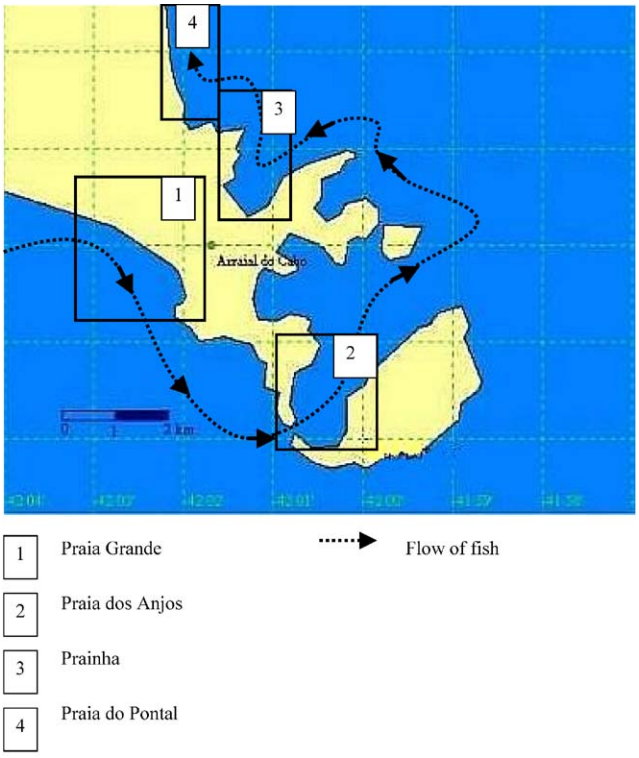

Fig. 3. Resource flow around the cape [16].

fishing grounds. When a shoal is spotted, the type, location and size of the shoal is communicated in silence using hand signals to the fishers waiting below. Given this method of fishing, seiners are aware of the stocks in the area at any given time. Fish caught by seiners on one beach will, consequently, not be caught by those from another. Depleting stocks have heightened sensitivity to this natural hierarchy.

6.2. Resource governing institutions

Fishers in Arraial do Cabo, as elsewhere in Brazil and beyond, live on the margins of organizational life. Although required by law, only 5% of fishers are registered with the coast guard and 18% are registered with the federal fishing agency. Even basic participation in local formal institutions is extremely limited.

Although free-association has been legal since the signing of the new constitution in 1988, the State-sponsored fishing guild (*Colônia de Pescadores*) still enjoys the largest membership. Even so, membership levels are at an all-time low and few fishers feel that this organization adequately represents them. Consequently, fisher participation in this organization is negligible. Only 4% of fishers are members of this organization which prides itself with the broadest based membership of all local formal institutions. Fishers complained that associations created to represent them have often been taken over by the local elite and membership who have utilized these organizations for personal benefit.

Table 3
Fishing days per Beach [16]

Beach	No. of days	No. of canoes
Praia Grande	21 Days	42 canoes
Praia dos Anjos	12 Days	12 canoes
Prainha	7 Days	7 canoes
Praia do Pontal	4 Days	4 canoes

Table 4
Fishery access sequence on Praia Grande [17]

Day	Canoe	Day	Canoe	Day	Canoe
Day 1	1–2	Day 8	15–16	Day 15	29–30
Day 2	3–4	Day 9	17–18	Day 16	31–32
Day 3	5–6	Day 10	19–20	Day 17	33–34
Day 4	7–8	Day 11	21–22	Day 18	35–36
Day 5	9–10	Day 12	23–24	Day 19	37–38
Day 6	11–12	Day 13	25–26	Day 20	39–40
Day 7	13–14	Day 14	27–28	Day 21	41–42

After day 21 the user access system starts again from day one.

In the absence of government support and regulation, the beach seining community has been governed by a set of locally constructed and communally recognized institutions that regulate access to and use of common fishing grounds. Although originally a set of informal institutions, these rules were codified in 1921 by the local fishing guild [15].[6] Complex norms include restrictions on the type of gear, vessel and number of crew that can participate in addition to determining access to local fishing grounds.

Access to the fishing areas is defined by a set of rules called the *Direito do Dia* or Right of the Day system. Each beach has its own *corrida* or user sequence which determines who has the right of access for each day. Rules can be changed by agreements made by the owners from that beach. There is a certain number of 'fishing days' associated with each of the four local beaches that determine when each owner has the right to fish. Given the demand on fishing days on Praia Grande, if an owner only owns one day, s/he[7] will only be able to fish once every 21 days (see Table 3).

Given the local understanding of the resource flow, Praia Grande, the first beach in the flow, has attracted many more fishers hoping to get a first chance at incoming shoals. To maximize efficiency, two canoes fish each day on this beach. While one *companha* fishes the other sorts their fish and resets their gear. By customary law, each day must have a corresponding

[6] Rules were codified in the local fishing colony handbook. At the time, this mode of fishing was the most prominent and important source of employment/food in the area.

[7] There are women who own or are part owners of canoes. Often they are widows of fishermen. These canoes have a reputation of being unkempt and when ones canoe needs work, people might say, it looks like a '*widows canoe*'.

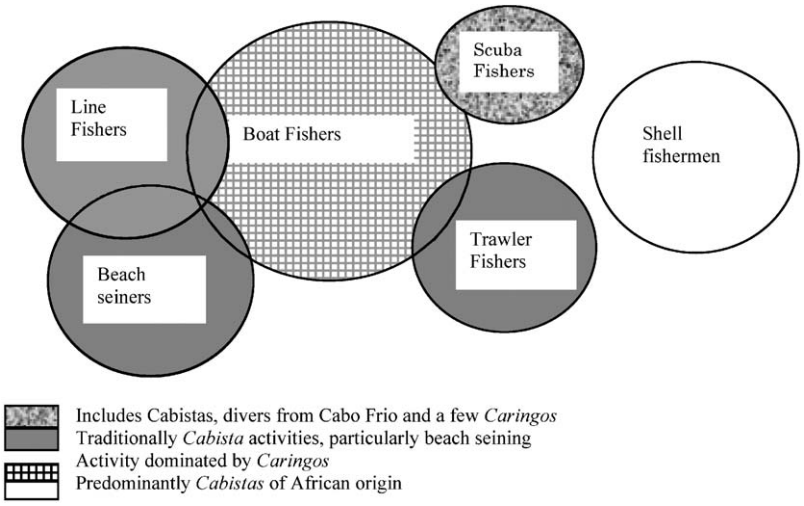

Fig. 4. Group size and ethnic divisions among A.C. fishers [16].

canoe and full gear kit[8] and a work team or *companha* comprised of between 9 and 13 men.

In the past, fewer canoes and gear were owned by multiple owners who were generally seiners themselves. In recent years too many canoes have entered the user sequence and owners have declared a moratorium on new entries. Although owners have enforced this rule vigorously, they have disregarded others. For example, there are now only 15 complete gear sets on Praia Grande when there should be 42. One of the biggest sources of conflict is that owners from Praia Grande have introduced a type of gill net which seiners complain is disrupting the flow of fish to other beaches. Table 4 presents the breakdown access to the Praia Grande fishery.

6.3. Social groups, hierarchies and divisions

Approximately 1340 fishers live in Arraial do Cabo. Of these, 150 are beach seiners. Immigrants attracted to this unregulated and low skilled source of labor have been drawn in numbers to the Cape in the last decade. Local fishers are largely distinguished by the type of gear they use and how long they have been residents of the Cape. Recent migrants generally become hook fishermen, a type of fishing looked down upon locally because of the belief that it does not require a significant understanding of the marine environment. Locals proudly refer to themselves as *Cabistas* (from the Cape) and derogatorily call migrant fishers *Caringo*.[9] Beach seiners are all *Cabistas* and most have come from a long line of seiners. Fig. 4 depicts the different gear groups and the social divisions associated with each group.

Although beach seiners are all *Cabistas*, deep divisions exist within this group. After 500 years,[10] racial differences and divisions between the beaches run deep. Locals often stated that the different neighborhoods were like different tribes. Work teams are often made up of family members and historically, fishers lived in the neighborhood they fished on. Seiners from Praia Grande, for example, are largely of Portuguese decent, those of Praia dos Anjos of French or northern European decent and Prainha's residents are descendants of Africans forced into the transatlantic slave trade. These communities exist side by side, within a minute's walk of one another.

In recent years ownership patterns among beach seiners have changed dramatically. A few individuals (largely from the same family) from Praia Grande have amassed ownership of the majority of canoes and nets, thereby controlling the associated access days to the fishing grounds. Much to the resentment of fishers from other beaches, not only have they accumulated control over the Praia Grande fishery but they are also buying up the access days on other beaches. These owners are vertically integrated and own ice houses and fishmongers and therefore play an important role in setting the value of the catch. Ownership patterns on Praia dos Anjos illustrate this phenomenon (see Table 5).

7. Beach seiners and the reserve

A utilization plan was developed through a series of meetings with local fishers to define the rules that

[8] Required gear includes a seine with specific dimensions, paddles and rope.

[9] *Caringo* is a derogatory name used for recent immigrants to the cape that largely fish off the rocks or hook and line fish off small boats. No one seems to know the origin of the name but it is possibly related to the term *gringo*.

[10] Amerigo Vespucci landed in Arraial do Cabo in 1503 and left a group of 24 men to settle the area.

Table 5
Breakdown of gear/access ownership on Praia dos Anjos [16]

Total no. of owners on P. dos Anjos	10
No. of owners from P. dos Anjos	5
No. of owners from P. Grande	5
% of total owned by owners from P. dos Anjos	37.5
% of total owned by owners from P. Grande	62.5
% of total owned by one family (from P. Grande)	50

represent the social contract among fishers as well as between fishers and government. The seiners' traditional institutions were automatically integrated into the plan. Article 5.1 of the plan states that 'beach seining is permitted according to the norms of the 'right of way system that regulates the canoe sequence' [18]. The reserve, therefore, absorbed the existing beach seiners' CPR and expanded it to include all the different gear groups in the municipality.

The reserve created a new decision-making forum, whereby non-owners have the same vote as owners and hook fishers have the same say as beach seiners. This was a new concept for seiners who had grown accustomed to following decisions made by gear owners. Beach seine owners felt threatened by this new power given to their employees. The establishment of the marine reserve, owners felt, bypassed their legitimacy as the final decision-makers in the seiners' CPR. As a result most boycotted the process and encouraged their employees to do the same.

In practice, their fears may not have been warranted. Since the establishment of the reserve, few beach seiners have participated in any significant way. Only 34% of beach seiners were aware that members of the reserve have the right to vote. Of those, only one fisher who participated in the survey voted in any meeting at the reserve headquarters.

Dependence on the resource could provide an important incentive to participate in the reserve process. Most seiners (80%), however, have alternative sources of income outside of fishing. Many are employed by the local government and many more receive pensions from previous work with a local industrial plant. Forty-two percent of active beach seiners are over 49 years old, and significantly, 32% are over 60. It is not uncommon to see seiners in their 80s pulling in nets.

Many older fishers expressed fear of participating in reserve meetings for fear of loosing their positions on canoes owned by the larger owners. Others stated they were uncomfortable with the open manner in which voting is carried out. In order for a vote to count, fishers must raise their hands at meetings and keep them raised until all votes are counted. Given the tensions between gear groups and between fishers and owners, seiners stated that they often avoided meetings.

The MER in Arraial do Cabo has introduced a more democratic decision-making forum for regulating fishing activities and addressing the concerns of this community. However, the system is beyond the reach of many fishers who find themselves constrained by the middlemen and owners for whom they work. Fishers are afraid of losing an important part of their livelihood by 'sticking their necks out'.

The creation of the MER has not yet managed to replace or strengthen the seiners' institutions. In fact, although the existence of a 'traditional population' warranted the creation of this conservation and development unit, seiner's themselves do not seem to have been seriously involved in its design. Rather, assumptions were made about the quality of their resource management institutions.

8. Co-management and the State

Fishers' experiences with government have generally been negative. Fishers feel largely abandoned by government at all levels. Fishers view the Coast Guard as a threat to their activities rather than a source of support. Fishers also hold a negative view of IBAMA, an organization they feel is riddled with corruption and inefficiency. This view has not improved with the creation of the reserve since many feel that the reserve is an added responsibility placed on fishers without sufficient support from the government. Consequently, trust in government is low.

A crucial weakness of the reserve as it currently operates rests in its ineffective monitoring system. The ability of reserve partners (fishers and the State) to monitor the entire reserve rests on (a) support from IBAMA, (b) availability of resources including monitoring vessels, (c) collaboration of fishers and other community members. At the time research was carried out, there was only one on site IBAMA representative (a biologist) and no monitors. Not only is the government understaffed it is also underfunded. No government vessel was available to carry out monitoring. One fisher describes how he views the involvement of the State thus far, 'They've planted a seed and forgotten to water it…' Table 6 lists Ostroms' design principals and evaluates the ability of the local resource management regime to meet key design principals over time.

9. Potential for successful co-management

Clearly, the beach seining community enjoys a rich history of formal and informal resource management institutions. Access rights to the resource are clearly defined. Resource user numbers are known and controlled. Local identity has developed around these

Table 6
Evaluation of institutional strength over time [3,16]

Design principal	Pre-1960	Pre-reserve	Potential for	As part of the MER
1. Clearly defined Boundaries	Yes	No. Excludability problems existed and drag net shrimp trawlers commonly trawled local waters.	Yes	Yes. With the creation of the MER A.C. a three mile belt was created encompassing all existing artisanal/traditional fishing activities while making predatory fishing activities illegal. Areas utilized by beach seiners have also been clarified.
2. Congruence between appropriation and provision rules and local conditions	Yes	No. Fishers do not feel they earn enough to live on and ownership has become concentrated and too many 'days' have been added to each beach leading to rent dissipation.	Yes	No. There are a number of indicators that these rules and conditions are incongruent. Fishers do not feel that they earn enough to live on. Owners have sold their shares as too many days were added on some beaches leading to rent dissipation. In some cases this situation is getting even worse because the MER is encouraging and enabling new canoes to enter on all beaches.
3. Collective-choice arrangements	Yes	No. Few owners make decisions for everyone. Fishers have little say in changes to or the management of the regime.	Yes	No. Although there is great potential for collective choice arrangements in the MER, currently, there is very little participation in the process. There is also a risk that those gear groups with the most fishers will dominate or for other powerful stakeholders to hijack the process.
4. Monitoring	Yes	Yes. Day to day monitoring still takes place but rules are enforced selectively and rule breaking, particularly by larger owners is not uncommon.	Yes	No. Almost no monitoring is taking place within the reserve. This is due to lack of funds, infrastructure and personnel as well as lack of awareness of the rules.
5. Graduated sanctions	Yes	No. Although traditional rules do include the use of graduated sanctions, these rules are no longer applied.	Yes	No. Although the Utilization Plan does include the use of graduated sanctions these have not been applied due to lack of capacity and resources.
6. Conflict-resolution mechanisms	Yes	No. In the past, local organizations would mediate conflict between seiners. Now, seine owners take matters into their own hands.	Yes	Yes. The MER does create an important forum where different groups within the community can resolve their issues. However, because owners of multiple canoes do not recognize the authority of AREMAC or the decisions made at general assemblies, they are not a part of this important process.
7. Minimal recognition of rights to organize	Yes	Yes. Local government and local organizations recognize the legitimacy of the seiners CPR.	Yes	Yes. Although the beach seiners' CPR was recognized by the local government and organizations related to fishing, the creation of the reserve has emphasized these rights.

activities and rules and the daily rituals involved in this activity constantly reinforce them. Monitoring systems are embedded in this system of rotating access and use whereby each day's user has the incentive to protect their access rights. Collective choice arrangements were secured through ownership rights and responsibilities. In terms of the type of technology used and certain aspects of local culture, this group is fairly homogenous.

Research suggests, however, that although resource governing institutions still exist, they are no longer robust. On the surface, it appears that they are still intact since fishing continues largely unchanged. A closer look reveals that institutions have weakened and have been hijacked by a handful of vertically integrated individuals to serve their own interests. Rules which continue to be adhered to are those that control access to the fishing grounds along with decision-making arrangements. Marketing structures have become increasingly consolidated along with decision-making.

Negative social capital is manifested in the hierarchical structures which have come to control this fishing activity, while a historical legacy of deep divisions within this gear group also complicates and constrains participation. Existing conflicts and hierarchies have hindered the ability of the beach seining community to articulate its needs within the reserve structure. As a result, the reserve has not significantly fortified local management institutions and has overlooked or not been able to deal with these obstacles to participation

and empowerment. Currently, it is not apparent that beach seiners are decisive players in the decision-making process. An indication of this lies in the low level of participation in reserve activities.

At different stages, the MER has demonstrated some characteristics from the entire spectrum of co-management arrangements. At no stage, however, has the contribution of either group (fishers or State) been ideal. The federal environmental organization, IBAMA, has not kept its part of the bargain. With only one representative on-site and no monitors, this group is clearly not able to meet its responsibilities. Furthermore, although fishers have participated to some degree, beach seiners have not played a significant role in this process.

At the moment, this experience may best be characterized as a form of co-management arrangement in which both sides lack the capacity (funds, training, and experience) to support an effective system for collaborative resource governance. Greater fisher participation and more support from the federal government are necessary in order to achieve a more equitable and effective management system.

With the creation of the MER, fishers in Arraial, including the beach seiners have been given an enormous opportunity to control the resources on which they depend. While on the one hand this has the potential to empower local fishers it has also overburdened them with the responsibility associated with creating and managing this reserve.

The establishment of an MER will cause change and disturb the status quo. Because so little government support is available, communities have been left more or less on their own to adapt to this new situation. MERs in Brazil, by definition, are located in places where traditional populations exist. Often, these groups have developed informal institutions to manage their resources. There is no guarantee however, that these institutions are effective and actualized. Given the fact that these areas have been affected by external factors (such as technology change and State fisheries policies) it is likely that many of these institutions have disintegrated over time. Therefore, although local collective resource management regimes may have once offered sustainable, democratic and participatory structures, practitioners must be careful to assume that they are still robust.

10. Policy implications

MERs are being created in significant numbers in coastal areas in Brazil. Phases one and two of their creation may be relatively easy, however the challenge lies in sustaining these initiatives over the long-term. Policy makers and conservation practitioners should bear in mind the following:

- Coastal communities are not organic wholes. Difference and diversity must be taken into account as well as existing power structures that may distort or constrain participation. If not, extractive reserves could potentially reinforce inequitable power structures instead of promoting broad-based participatory conservation.
- Conservation practitioners cannot assume that traditional resource management systems are just, equitable and up-to-date. An assessment of the existence and health of these institutions should be undertaken before creating the utilization plan. Information on the state of these institutions is essential in order to design effective regimes to collaboratively manage natural resources.
- Regional universities and non-governmental organizations could play an important role in building the capacity of fishing communities to co-manage reserves. Financial management, participatory research and management methods are examples of areas where external agents could play a key role.
- Communities may need to go through a process of social preparedness before reserve creation. In Arraial do Cabo this process should have involved bringing fishers together from different gear groups and/or beaches in order discuss and resolve common problems. This process should also include secondary stakeholders such as local government and fishing associations and fisher families. Participatory research methods could guide this process and help ensure transparency.
- In order for government to build trust with fishing communities, relationships of reciprocity need to be developed. This relationship will disintegrate quickly if parties do not hold up their promises. Brazilian small-scale fishers have historically lived outside the law. Negative experiences with the State have left fishers wary and care should be taken to renew relationships between the State and resource user groups.
- Fishing communities are unlikely to be able to take sole responsibility for these initiatives and will not succeed in long-term conservation and development goals without external assistance. With the growing number of planned reserves, CNPT will need more funding and staff to carryout the tasks associated with this network of marine protected areas.
- Clear guidelines for voting and financial management should be in place to ensure the legitimacy and transparency of the organization. Pocket chart voting, for example, could provide the necessary legitimacy while ensuring voter privacy.

Extractive Maritime Reserves are the most significant Federal-level policy initiative to directly address the needs of small-scale coastal fishers in Brazil to date.

Extractive reserves in general represent the first conservation units in which specifically involve local communities in their design and management. These initiatives have enormous potential for conserving coastal areas and securing the livelihoods of coastal populations. This study suggests, however, that in order for these goals to be realized both parties must be willing and able to carry out their role in the process.

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