

# Co-managing a complex commons: the case of a marine protected area established along a coastal urban setting in Brazil

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## Abstract

Coastal urban areas are often good examples of complex commons. This paper examines the co-management of a marine protected area established in 1997 along the coast of an urban area in Brazil: the Arraial do Cabo Marine Extractive Reserve. The Reserve area is used for fisheries, tourism, port and chemical industry. We use stakeholder analyses to investigate the history of and potential interventions in managing the Reserve. Field research (2005-2007) included informal interviews, structured open-ended interviews, participant observation and archival research. Initially, the co-management involved only the Federal Environmental Agency and the traditional population, especially fishers, and focused mainly on a single-commons: fisheries. Since 2002, a major change in legislation at the national level required the development of a co-management board involving all major stakeholders in order to manage a complex commons: the coastal zone of Arraial do Cabo. Although expected to be more inclusive/participative, this board has not been crafted yet due to numerous stakeholder conflicts and lack of resources/preparedness of many groups, including government. We conclude that co-managing a complex commons requires involvement of all interested parties, particularly when a marine protected area is established along a coastal urban setting. Although there are legal instruments available to develop platforms of resource user negotiation in Brazil, much still has to be improved concerning capacity of stakeholders (including government agents) to engage in collective action and decision-making.

**Keywords:** *Costal management, Marine Extractive Reserve, Complex Commons, Coastal urban setting, Co-management*

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## INTRODUCTION

Coastal fisheries are a classical example of commons. Much advances in coastal fisheries management approaches which take into account both social and ecological aspects of management (in contrast to conventional fisheries management based primarily on ecological features, such as maximum sustainable yield) are due to the development of the Common Property Theory. Of particular interest are co-management arrangements. In the past two decades or so, co-management mostly between government and resources users has been developed for coastal areas worldwide focusing mainly on a single common-pool resource: fisheries. Notwithstanding, fishing activities often overlap with other uses of the sea, particularly on coastal urban areas. As a result, recent studies point out the need to look at coastal management as complex commons (Berkes 2006, Cheong 2008) involving multiple resource users (Burger et al. 2001, Steins and Edwards 1999) and governance processes operating at multiple levels of organization (Armitage 2008, Berkes 2007). Steins and Edwards (1999, p. 242) defines complex commons as “resources that are used for *different types* of extractive and non-extractive purposes *by different stakeholder groups* and are managed under a *mixture of property rights regimes*.” In order to deal with such complexity in coastal fisheries there is a need to cross disciplinary boundaries and develop more integrated analytical perspectives for management (Degnbol et al. 2006).

This paper examines the co-management of a marine protected area established in 1997 along the coast of an urban area in Brazil: the Arraial do Cabo Marine Extractive Reserve. The Reserve was primarily established to benefit the traditional fisher population (i.e., its main focus was on a single common-pool resource: fisheries) and the initial co-management arrangement involved basically the federal government and traditional fishers, with several implications for other stakeholders. Since 2002, a major change in legislation at the national level required the development of a co-management board involving all major stakeholders.

This paper uses stakeholder analysis (Grimble e Chan 1995) to elucidate resource use conflicts and governance issues at this coastal urban setting. We also borrow on the work of Steins and Edwards (1999) to discuss the implications of a multi-stakeholder co-management board (a platform for resource use negotiation in their terms) to manage this complex commons.

## METHODS

Fieldwork took place between 2005 and 2007, summing up six fieldtrips ranging from two to twelve days. Research methods included (i) literature review on previous research regarding the Arraial do Cabo Marine Extractive Reserve and

its region; (ii) 39 informal, non-structured interviews with fishers and government agents; (iii) participant observation on meetings and, particularly, on a workshop organized by the Federal Environmental Agency (CNPT/IBAMA) in June 2005, when it was possible to identify most stakeholders and to map most social-environmental disputes within the Reserve area; (iv) archival research; and (v) 26 open-ended structured interviews (ranging from 35 min to 1h30min) with 20 representatives of several stakeholder groups and six randomly chosen fishers to perform Stakeholder Analysis (Grimble e Chan 1995).

Stakeholders' identification at the initial phase of research (i.e., literature review, participation in meetings, and informal interviews) was validated during the latter phase of our research (i.e., the stakeholder analysis). Out of the 26 interviewees for the stakeholder analysis, 13 works on fisheries and/or aquaculture, seven the tourism sector, three on industries, one in research, one in the government and one in rural development.

## **STUDY SITE: THE ARRAIAL DO CABO MARINE EXTRACTIVE RESERVE**

The Marine Extractive Reserve in Arraial do Cabo, created in 1997 by a federal decree, is located within a 3-miles belt along the coast of Arraial do Cabo (Rio de Janeiro State, Brazil), encompassing an area of 56.769 ha of water surface. According to the federal decree, the main objective of this Extractive Reserve was to guarantee the sustainable exploitation and conservation of renewable natural resources traditionally used by local artisanal fishers and mollusk harvesters (*popululação extrativista*) of Arraial do Cabo.

The city of Arraial do Cabo is located on a peninsula in front of the Cabo Frio Island<sup>2</sup>. As of 2006, the local economy relied on fisheries, tourism, a chemical industry, a port and other small businesses. Arraial do Cabo has a total of eight beaches (including one beach at the island), but we concentrated our research effort on the three beaches used by most fishers: Prainha, Praia do Anjos and Praia Grande. The Arraial do Cabo sea is characterized by an upwelling phenomenon, occurring normally during spring and summer. The upwelling water increases primary productivity and consequently fisheries resources. This phenomenon also contributes to clear the sea water and favors scuba diving and specific fishing methods.

Pelagic fishes are the most target species in Arraial do Cabo and the species most caught between 1992 and 2002 (Silva 2004) were *Sardinella brasiliensis* (brazilian sardinella), *Pomatomus saltatrix* (bluefish), *Trichiurus lepturus* (largehead hairtail), *Euthynnus alleteratus* (little tunny), *Scomber japonicus* (chub

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<sup>2</sup> *Cabo Frio* means "Cold Cape" and it received its name due to the upwelling waters from South Atlantic Central Water currents. "Arraial do Cabo region is the point of the Brazilian coast where the main upwelling event occurs" (Carvalho and Gonzalez-Rodriguez 2004)

mackerel), *Caranx latus* (horse-eye jack) and *Coryphaena hippurus* (common dolphinfish).

## **MAJOR STAKEHOLDERS AT THE ARRAIAL DO CABO MARINE EXTRACTIVE RESERVE**

The resources and area of the Extractive Reserve is used by several user-groups representing five major sectors: fisheries/aquaculture, tourism, industry (including a port), research, and national defense (Table 1<sup>3</sup>). Fisheries involve different fisher groups, some organized according to fishing methods, as explained below. There is no consensus about the number of fishers, but all estimates indicate that there is more than 1,500 full-time fishers in Arraial do Cabo and at least 3,000 families depending fully or partially on fisheries. Aquaculture is practiced by a relatively small number of shellfish farmers.

Tourism-related activities involve bathers, surfers, and people working on/owning scuba-diving business and sightseeing boats, as well as people working on/owning hotel and restaurant businesses. The industry sector is mainly represented by Álcalis, a chemical industry that produces sodium carbonate (*barilha*) and sodium hydroxide, and Porto do Forno, a port used to import salt and export sodium carbonate and as a support site for petroleum-extraction activities on Campos Basin. Research in Arraial do Cabo is carried out by researchers from the Navy Research Institute (IEAPM) and academics from several Brazilian and international universities. The Fisheries Municipal Department (FIPAC) controls/researches fishing landing and boats docked at the municipal pier. The Brazilian Navy also uses the Reserve area for measuring the acoustic signature of its ships. All the above users (some of them organized in associations and business companies) in addition to government agencies form the major stakeholders of the Reserve (Table 2).

In order to check if our stakeholder list obtained from the first research phase was completed, we asked the 26 interviewees in the second research phase to identify other stakeholder groups using the Marine Extractive Reserve area. We observed that fishers (including shellfish farmers) are first in the list, followed by those working with tourism. The activities of Brazilian Navy (research and ship acoustic measuring) and the industries (a port and a chemical industry), were however the least cited. This indicates that interviewees associate the Reserve to an extractive activity (fisheries and aquaculture) and to a protected area that favors tourism activities.

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<sup>3</sup> The data here presented was the Reserve situation in the year 2005 and 2006. Since then, the chemical industry (Álcalis) stopped its activity and the IBAMA's unit responsible for managing Extractive Reserves (CNPT) has been moved under the newly created Instituto Chico Mendes' Unit for Traditional Population and Protected Areas of Sustainable Use.

### ***Fishing methods and fisher organization***

The main fishing methods practiced in Arraial do Cabo are: (i) beach seining using dugout, paddle canoes, (ii) hook and line fishing using canoes near the shoreline, (iii) hook and line fishing using motor boats and several hook types (including long-lines), (iv) purse seining using motor boats able to store up to 8 ton, (v) diving fishing using motor boats to access diving spots; and (iv) gillnet fishing – mainly carried out by fishers from Monte Alto and Figueiras, two communities away from the city centre where we concentrated our research efforts. Other fishing methods used less often are: squid fishing with trap nets, cast net fishing, and hook and line fishing using no vessel. Two other activities related to marine resource use in Arraial do Cabo but practiced by fewer people are shellfish extraction and shellfish farming.

Most full-time fishers practice more than one fishing method and/or diversify fishing spots; exceptions include a few beach seine fishers. Purse seining and beach seining require a collective effort and are often practiced by full-time fishers. Part-time fishers, on the other hand, often practice more individualized fishing methods such as hook and line fishing and diving fishing.

Fishers are formally organized into several associations in Arraial do Cabo (Table 2). The oldest organization, named Colônia de Pescadores Z 5, was first established in 1921 (Hartmann and Leitão 1986). Other seven organizations were created in the past two decades to represent fishers. Of particular interest is the Association of the Arraial do Cabo Marine Extractive Reserve (AREMAC) created in 1997 to co-manage the reserve with the Federal Environmental Agency (IBAMA).

It is important to note, however, that some fishers are member of more than one organization. For instance, many fishers are member of the organization representing his major activity (e.g., purse seiners, diving fishers), but are also member of other organizations representing fishers as a unique category (e.g., Colônia, and APAC). There are also organizations representing more than one economic sector, such as sightseeing tour guides and fishers (Table 2). In our analysis, though, we considered these latter organizations as tourism organizations, because sightseeing tour seems to provide major income for their members.

### **MARINE EXTRACTIVE RESERVE: CONCEPT AND LEGISLATION**

Extractive Reserve is a type of Brazilian Protected Area (known as Conservation Unit in Brazil) which allows sustainable use of natural resources. The area is utilized by traditional people, which livelihood depends on extractive activities. The basic objectives of an Extractive Reserve are to protect the culture and

livelihoods of the traditional people and to assert the sustainable use of resources within its area (Brazilian Law 9.985/2000, Ch. III, art.18).

The idea of extractive reserves was initially proposed during the 1970s and 1980s by the 'rubber tappers' or 'extractivists' social movements in the Brazilian Amazon as a way to promote social justice and environmental protection (Brown and Rosendo 2000, Diegues 2001). In 1990, the first federal extractive reserve was established in the Amazon. In 1992, the concept of Extractive Reserve was transferred "from the land to the sea"<sup>4</sup> with the establishment of the first Marine Extractive Reserve (MER) in Pirajubaé, Florianópolis, Brazil. The Arraial do Cabo Marine Extractive Reserve was the second one to be established on the coast of Brazil, in 1997.

What distinguishes Marine Extractive Reserves from other types of marine protected areas, such as Parks and no-take Reserves, is that the former are based on the use and conservation of resources, while the latter focus on the preservation of ecosystems. An extractive reserve is an area in which access to the resource can be controlled; the local population has 'use rights' [*usufruto*] in the area, while entry by outsiders can be regulated.

From 1990 to 2000, according to the Brazilian legislation, the management of any Extractive Reserve had to be a collaborative effort between a local organization representing the traditional people and the local office of the National Center for the Sustainable Development of Traditional People (CNPT), a unit of IBAMA. During that period, the establishment of any Extractive Reserve required the development of a 'Utilization Plan' [*Plano de Utilização*], which had to be crafted jointly by the local population and CNPT/IBAMA, sometimes with the help of scientists. This utilization plan should specify 'how', 'when', 'where' and by 'whom' each resource could be exploited. It set out the rights and duties of each party in the extractive reserve. Enforcement of this plan should be a joint effort among local population, IBAMA officers, and other municipal or state government agencies (CNPT-IBAMA 2002).

In sum, extractive reserves should contemplate the active involvement of resource users in the planning, implementation, monitoring, enforcement and evaluation of utilization plans, and should help ensure the permanence of local people in their traditional areas (Cunha 2002).

In 2000, a new federal law was issued (Brazilian Law 9.985/2000) creating the National System of Nature Conservation Units (SNUC), encompassing Extractive Reserves in the category of Sustainable-Use Conservation Units. Two years later, a federal decree was issued (Decree 4.340/2002) instituting, among other

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<sup>4</sup> Pimenta and Hargreaves (1999) questioned the appropriateness of transferring an institutional model from a continental protected area to a marine protected area. They argue that the sea boundaries are often unclear, in contrast to land marks. Moreover, the main resources in continental extractive reserves are plant products (e.g., rubber and nuts), while marine resources are often fish that form migratory school, and only few species are benthonic.

things, how extractive reserves shall be created and managed. Accordingly, from the year 2002 on, all extractive reserves shall be managed by a Deliberative Council, involving representatives of several stakeholder groups, and not just by the organization representing the traditional people and IBAMA. Guidelines on how to form this Deliberative Council was only issued though in 2007 (Instituto Chico Mendes, Normative Instruction N. 2/2007). According to this instruction, a Deliberative Council shall be constituted by representatives of government, civil society organizations and organizations of traditional people, but the head of the Council shall be head of the IBAMA's local office.

It is important to mention, that in August 2007 the Federal Government created a new agency named Chico Mendes Institute for Biodiversity Conservation in charge of all protected areas in Brazil. The new Chico Mendes Institute was formed with part of IBAMA's staff and encompassed the National Center for the Sustainable Development of Traditional People (CNPT), among other IBAMA units. As observed in our research, few months after these institutional changes, the role of each one of these two distinct agencies, IBAMA and Chico Mendes Institute, was not clear for most resource users and even for some the agencies staff.

## **ESTABLISHMENT AND MANAGEMENT OF A MARINE EXTRACTIVE RESERVE ALONG AN URBAN SETTING**

The idea to create the Arraial do Cabo Marine Extractive Reserve emerged in response to the industrial fishing fleet from large cities that was invading the Arraial do Cabo sea since the 1980s (Pimenta and Hargreaves 1999), fishing on areas used by local artisanal fishers. Some of these areas were considered important recruitment and nursing sites. This fleet encompassed large beach seine boats, large gillnet boats and large shrimp trawlers. Establishing a marine extractive reserve in Arraial do Cabo was expected to regulate access by outsiders, while asserting use-rights for local fishers. The process of creating the Arraial do Cabo Marine Extractive Reserve was led by an agent of the Federal Environmental Agency (IBAMA)'s local office named Fabiano, with support of academics from the Fluminense Federal University (UFF), based in Niteroi, Rio de Janeiro State (Lobão 2000).

Despite the existing organizations representing fishers in Arraial do Cabo (Colônia dos Pescadors and APAC), another organization, AREMAC, was created to co-manage the Reserve with CNPT/IBAMA. The Utilization Plan was crafted during three years following the creation of the reserve in 1997, in a series of AREMAC assemblies. As well, a Scientific Technical Council was also formed to assist AREMAC (Lobão 2000).

According to Prado (2002), the processes of creating the Reserve and of crafting its Utilization Plan triggered a movement of reaffirmation of fishers' esteem and

of redemption of traditional artisanal fisheries as a viable livelihood option adequate to the region economy. On the other hand, these processes excluded other important users of the area (Pimenta and Hargreaves 1999), such as people involved in tourism-related activities, the port and the chemical industry. As pointed by Lobão (2000, p.18), “the Decree creating the Reserve in Arraial do Cabo did not ‘solve’ a dispute, but increased some disputes and created new ones”.

### ***Stakeholders and the creation of the Arraial do Cabo Marine Extractive Reserve***

The process leading to the creation of the Reserve and its management since then is observed differently by stakeholder groups.

Overall, the Reserve creation process was led by a few people, mainly Fabiano (an IBAMA agent), and did not involve many stakeholders (only 31% of interviewees attended at least one meeting). According to interviews, IBAMA had prioritized fisheries (including aquaculture) in detriment of other activities taking place in Arraial do Cabo sea, such as tourism, industry, research and Navy activities. The Reserve Utilization Plan restricted all the above activities. In general, interviewees working in one of the above activities complained that they were not invited to participate in meeting or in a few cases when they were invited they had no right to vote. Even fishers interviewed mentioned that overall, Arraial do Cabo fishers had little involvement in discussions to create the Reserve, and only two interviewees signed the petition sent to CNPT-IBAMA.

Some issues raised by interviewees concerning the Reserve creation process are: (i) the Reserve creation was based on an anthropological study promoting traditional fisher livelihood preservation, and old pictures of Arraial do Cabo were attached in the petition misrepresenting the reality of Arraial do Cabo in 1997; (ii) the Extractive Reserve model elaborated for land areas in Amazon should not be simply transfer for a marine area (see footnote 4); and (iii) fishers signing the petition to create the Reserve were mainly from neighbor towns. Despite their concerns about the creation process, at that time, 69% of the interviewees were in agreement with the establishment of a marine extractive reserve because would either protect traditional fisher livelihoods or conserve the marine area of Arraial do Cabo.

When questioned about whether the Reserve brought them any benefit, 50% of the interviewees said no, and 35% said yes. Benefits mentioned by them include: (i) restricting access to outside fishers; (ii) banning of industrial fishing (large trawls and large purse-seine boats), which benefit both local artisanal fisheries and scuba diving activities; (iii) prohibition of outside entrepreneurs to practice aquaculture – only locals are allowed; and (iv) the Reserve put Arraial do Cabo in the spotlight favoring tourism.



When questioned about whether the Reserve cause any harm to their livelihood, 62% of interviewees said no, and 27% said yes. It is interesting to note that most fishers who felt harmed by the Reserve were involved in tourism activities. In the case of tourism, the Reserve restricted where sightseeing boats can moor; and when and where scuba diving can take place. In the case of research, new restrictions were imposed on sample collection by researchers. Also, the Reserve banned oil platforms to moor at the port – where repairing, cleaning and supply are done - limiting employment opportunities for people working on such activities. Concerning fisheries, the Reserve limited diving fishing activities to a few hours a day (from 7 am to 2 pm), banning it at night and on Sundays and Holidays.

Benefits and harms caused by the Reserve creation to stakeholder groups are also perceived by other groups. Our findings indicate that there is a general perception that Arraial do Cabo fishers were those who benefited the most from the Reserve creation and tourism-related people were those who suffered the most. In fact, the implementation of the Reserve Utilization Plan imposed restrictions to several stakeholder groups and command activities by other groups. Overall, interviewees acknowledge at least on rule concerning his/her activity (65% of interviewees) but know nothing or little about rules commanding other activities in the area. This indicate that although they know about their duties (i.e., to comply with the Utilization Plan), they know little about their rights. Moreover, some of them are not clear about the area of the Reserve or do understand the distinction of the Reserve as a conservation unit and its management by IBAMA and AREMAC.

### ***Socio-environmental disputes at the Arraial do Cabo Marine Extractive Reserve***

As mentioned above, the establishment of the Reserve solved some conflict between 'locals' and 'outsiders', but created a number of socio-environmental disputes among stakeholders, mainly locals. Table 3 presents disputes over use of space and use of resources, and power disputes among others. Each dispute or stakeholder conflict has taken place at a different moment of the Reserve management history; some are quite vivid nowadays while others are obsolete. We do not aim here to address each of these disputes, but we call attention that disputes occurred (i) between fishers using different gears (e.g., beach seiners and small trawlers); (ii) between fishers from different beach communities; (iii) between different fisher organizations; (iv) between fishers and tourism related people (e.g., surfers, scuba diving agencies, sightseeing boat owners); (v) between fishers and private sector (e.g., chemical industry and port); (vi) between fishers and government agencies; and (vii) between government agencies from different political levels or sectors, among others.

One has to bear in mind, though, that in many cases, especially regarding government agencies, conflicts are generated due to personal beliefs and acts (i.e. profile) of key representatives, and not necessary due to the organization agenda. This is particularly verified in the case of the local representative of Federal Environmental Agency (IBAMA) and the head of traditional people organization (AREMAC) who co-manage the Arraial do Cabo Marine Extractive Reserve. Over the past 10 years, since the Reserve was created, the management system has undergone different managers with distinct profiles: IBAMA's local manager has changed four times (a fifth one since the end of fieldwork) and AREMAC's president has changed three times. In IBAMA, the first and fourth managers were the one who lasted longer in the position; the others held the position for only a few months. The profile of each representative both in AREMAC and IBAMA from our perspective is discussed elsewhere (Seixas, in prep). Below we present the stakeholder's view of Reserve management.

### ***Stakeholders' view of the Arraial do Cabo Marine Extractive Reserve Management***

All the 26 interviewees were requested to comment on the Reserve management since its creation. According to their answers we noted that there is a misunderstanding on the management role of IBAMA and AREMAC – the initial co-managers – and there are critiques to both organizations. Overall, critiques to AREMAC concerns bad administration of the organization, inefficient in keeping its members and illicit linkage with the municipal government. In relation to IBAMA, it is clear that interviewees divide the Reserve management in two periods: “the First Manager period” and “nowadays”.

During the First Manager period (1997-2002), 27% of the interviewees, most of them fishers, affirmed that the Reserve management was good or excellent. They argue that he enforced regulations strongly. On the other hand, 19% of the interviewees, none of them a fisher, mentioned the reserve management at the First Manager period was bad. They argue that he committed abuse of authority.

Concerning the administration of the Reserve at the time of the field research (2005/2006), we observed that 23% of the interviewees considered it good while 54% considered it bad. Among those that agree with the current<sup>5</sup> administration, most have criticized the First Manager period. They pointed out that the current [fourth] IBAMA manager is more flexible, pursue the dialogue with all stakeholder groups, has patience to negotiate, and does not inhibit fishers from entering IBAMA office – as the First Manager did. Among the 54% of interviewees who do

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<sup>5</sup> Note that the interviews were carried out at the time the fourth IBAMA manager held his position, hence we use the term “current” to describe that period from 2003 to 2007. In mid 2007, a fifth IBAMA officer was appointed to manage the Reserve.

not agree with the current administration, most are fishers. They complained about lack of or bad rule enforcement and damages it causes to their livelihood.

On the one hand, interviewees criticize IBAMA role, on the other they seem not to get involved on issues concerning the Reserve management. When questioned about the role they and/or their organizations play on managing the Reserve, representatives of four organizations (Colônia, AMA, ATAC, Port workers' union) said they have no role or are not involved at all. Representatives of other four organizations (APETURNAC, ABTBPA, ATURNAC, ASAC) said they merely attend meetings when invited. Representatives of only three organizations (AREMAC, APAC, ABTBPA) said they denounce illicit practices observed within the Reserve area to IBAMA and only one representative (APPMAC) said he help sea cleaning. The Chemical industry representative mentioned that the industry gives financial support (paying electricity, telephone and gas bills) to IBAMA and some fisher organizations. Finally, representatives of three organizations (ACRIMAC, IEAPM, Port administration) said they have not played any role in the Reserve management so far, but that their organization will be part of (have a sit on) the Deliberative Management Council that is being formed.

Concerning participation of individual fishers, only one mentioned he never attends meetings because “a fisher only has a break at windy day” – i.e., he is often fishing out in the sea and has no time to attend meetings. The same fisher suggested that a meeting involving fishers must be schedule for the next day after a windy day – i.e., it is not possible to plan a meeting several days ahead because if it turns out to be in a good day for fishing, fishers will go fishing.

Despite low involvement on the Reserve management, most interviewees have an opinion on how they would like the Reserve management to be. The two main issues were raised: (i) more and better enforcement (42% of interviewees, most fishers), including enforcement of the Utilization Plan; (ii) a more participative decision-making process, including other organizations of civil society and government (34% of interviewees, most of them non-fishers, who explicit mentioned the Deliberative Council). There is no consensus though on how this Council shall be formed concerning number of sits and distribution of them among stakeholder groups (see the next section). Other issues raised by only one or two interviewees concerning the Reserve management that is worth mentioning may be synthesized as: (i) a better management, integrating it to a broader coastal management plan; (ii) a focus on Environmental Education informing all groups about what is a reserve, how it should be cared, and what can and cannot be done within its area; (iii) developing actions to increase fisheries productivity and reduce beach pollution; (iv) changing the Utilization Plan to accommodate diverse interests; and (v) using conflict resolution mechanism.

Only three interviewees mentioned they would like the Reserve to be managed as it has been so far (i.e., decisions being made at AREMAC assemblies by local people only). It is important to note that one of them was the AREMAC head, what means that he was not willing to lose/share his power with other stakeholder groups at the Deliberative Council.

Despite all the critiques to the Reserve management, 83% of the interviewees support the existence of the Reserve today, while the other 17% has shown indifference to it. The main reason behind their support is the conservation of the Reserve area, including water and fisheries resources – what favors both fisheries and tourism. Although supporting the Reserve existence, interviewees explicitly expect: more action from the Deliberative Council and the Reserve managers concerning mainly enforcement of the management plan (nine fishers); better management (three tourism-related people); and an opportunity for all parties to be listened at the Deliberative Council and by the Reserve managers (two non-fisher interviewees).

### ***Attempt to form a Deliberative Council***

In June 2005, IBAMA organized five-day workshop inviting the different stakeholder groups to debate the issue of preservation of the Reserve area and the constitution of the Deliberative Council. Several seminars and talks were given by academics, government agents, and representatives of user-groups such as fishers, tourism, the port and the chemical industry. At the end of five days of discussion, 163 attended the workshop, with an average of 60 people per day. During the workshop a proposal to constitute the Deliberative Council was made: 50% of the sits for fishers/shellfish farmers, 25% for other civil society organizations (including tourism organizations, the port, the chemical industry, non-governmental organizations, research institutions, etc), and 25% of the sits for government agencies (municipal, state and federal) (Gomes 2005). Outcomes of this seminar are still uncertain as two years after it took place (in August 2007); the Deliberative Council was not formed and approved by IBAMA yet. In spite of that, it is worth mentioning interviewees' participation and feelings about this workshop.

Out of 26 interviewees, 54% attended the workshop. Out of those 11 interviewees who did not attend<sup>6</sup> the workshop, six were not aware of it, three knew about it, but were busy (although two of them mentioned that other representative of their organization attended), and two others were aware of the workshop but opt not to attend because they feel deluded with/ distrust the Reserve management. Out of those who attended the workshop some made positive comments about it while others raised negative points. Positive features raised by two or more interviewees include: the workshop (i) was informative about the Reserve, the Deliberative Council and IBAMA's intents; (ii) promoted a

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<sup>6</sup> Four interviewees did not answer this question.

dialogue and made explicit the interests of various groups; and, (iii) was good to put fisher issues on the media spotlight. Although four interviewees asserted they enjoyed the workshop, they call attention they have not seen the outcomes of it (i.e., the Deliberative Council is not created yet).

Concerning the negative issues raised by two or more interviewees, they are linked to poor organization of the workshop: (i) there was low participation of fishers and traditional people – the call for the event was poorly disseminated; (ii) seminars, particularly by academics and government agents, were little elucidative and used jargons not which fishers were not familiar with; and (iii) there was little discussion and nothing or very few things were defined. It is worth noting that the head of one of the oldest and most influential fisher organizations commented that he only attended the workshop for one day because he could not afford capturing no fish for five days.

## **DISCUSSION**

The history of the Reserve establishment and management shows the problems that can arise when a complex commons is managed as a single commons. In the first half to the XX century, what today is the Reserve area was used mainly by fishers (although the Port started operating at that time). Old fishers comment that up to the 1960's, bathers and surfers (which were quite rare) would only enter the sea if no one was fishing – i.e., they respect fishing rules. That helps to explain for instance the well-consolidated local institution developed in the early 1900's to manage beach seining in Arraial do Cabo, which has survive up to date (Silva, P.P. 2004). At that time the user community had a higher social cohesion (Britto 1999) and they managed a single commons.

As new users emerged in the area, the establishment of a co-management arrangement which favors one user-group (fishers) in detriment of others (particularly tourism) has raised several disputes. Moreover, the outcomes of the Reserve implementation regarding sustainability of fisheries are uncertain. On the one hand, the implementation of the Reserve Utilization Plan and its enforcement during the first years seems to have helped to conserve local habitat and increase the fish available to catch. On the other, this relative increase in catch seems to be much more a resource re-allocation from industrial fisheries to small-scale artisanal fisheries (as the former were excluded from the system) than an increase in species stocks, especially considering that most species caught in Arraial do Cabo are pelagic migratory fishes.

A detailed analysis of the evolution of the Reserve management in the past 10 years is presented elsewhere (Seixas et al. in prep). In short, the Reserve was co-managed by the Federal Environmental Agency (IBAMA) and the Local People organization (AREMAC), from its creation in 1997 to 2002. Since 2002, a major change in legislation at the national level required the development of a co-

management board (the Deliberative Council) involving all major stakeholders. There has been a change from a co-management arrangement involving a vertical institutional linkage between two organizational levels (federal government and local fishers) to a more complex arrangement (the Deliberative Council) filled with several horizontal and vertical institutional linkages among several stakeholders from different organizational levels in a co-management network (Carlsson e Berkes 2005).

This change in co-management arrangements has led to a disarticulation of local people (initially represented by AREMAC); on the other hand, the same people and other ones started to self-organize into small organizations – sometimes representing no more than 15 individuals – in order to have the right of a sit on Deliberative Council. The number of fisher organizations, for instance, has increased four-fold since the Reserve was created - not mentioning the number of tourism organizations. In fact, the complexity of institutional interactions within this co-management network seems to be the biggest barrier for the formation of the Deliberative Council. Although expected to be more inclusive/participative, this board has not been crafted yet due to numerous stakeholder conflicts and lack of resources/ preparedness of many groups, including government.

Seixas et al (in prep) analyzing the evolution of the Reserve management point out that both horizontal and vertical cross-scale interactions change over time according to (i) changes in organizations' representatives; (ii) changes in management rules and legislation; and (iii) new stakeholders emerging in the scenario. Concerning resilience, initially the Reserve contributed to build resilience in the fisheries system as it (i) minimized negative environmental impacts of industrial fisheries; (ii) favored fishing community self-organization; and (iii) favored local and scientific knowledge mobilization for planning as well as created a space for revising the management plan (learning and adaptation). On the other hand, the exclusion of stakeholders other than fishers in the initial co-management arrangement triggered/enhanced several stakeholder conflicts. In fact, since 2002 the Reserve system has lost much of its resilience and is far from attaining its purpose of conserving biodiversity while promoting traditional fishing livelihoods. Most responses to deal with the current crisis in this complex commons are individual ones. Most interviewees do not feel responsible for the crisis and blame government or other stakeholders for it (Seixas et al. in prep).

To conclude, in the next paragraphs we will present five Discussion Statements raised by Steins and Edwards (1999) regarding the role of nested platform for resource use negotiation; and, we will discuss the Reserve platforms in the light of these statements. At the Arraial do Cabo Marine Extractive Reserve these platforms were the AREMAC assemblies in the past, and the Deliberative Council to be in the near future.

Discussion statements (Steins and Edwards 1999, p. 253)

- (1) *“Platforms for resource use negotiation in [complex commons] must consist of representatives of different user groups (i.e., individual user groups need to appoint a representative who negotiates on their behalf in the platform)”*

This user group representation is expected to happen at the Deliberative Council. However, one of the problems hampering the creation of this council regards the number of sits it should have. User groups have not come into agreement yet, and every organization (despite the number of people it represents) wants a sit in the council, which may threaten its functionality.

- (2) *“Platforms must be physically (i.e., place and time) and culturally (i.e., constitution and operation of meetings) accessible to representatives of all user groups”*

As pointed out by a fisher, most meetings take place during fishing time which hinders participation of many fishers. The Deliberative Council will have to address this issue from its beginning or effective participation of all representatives will be threatened.

- (3) *“Platform performance depends on the level of organization of individual user groups within the platform, the relations between the various user groups, and the strengths and skills of the representatives of the individual user groups”*

In this research we observed that user groups were not well organized and group representatives were not well prepared/willing to engage in collective action and shared decision making. Much capacity-building and empowerment towards this end is still needed.

- (4) *“New platform for resource use negotiation in complex [commons] must not be built on existing forums for single-use resource management.”*

The Deliberative Council is expected to be a forum for decision-making quite independent from the AREMAC assemblies. In spite of that, the Council will be created to manage a Reserve which, in turn, was established to manage a single commons: fisheries. Hence, some balance will need to be reached concerning the initial goal of the Reserve and the interests of different parties.

- (5) *“Platforms must be facilitated by a third party to co-ordinate multiple user groups, to ensure continuity and to reduce or absorb the transaction costs of forming and operating the platform”*

In the meetings leading to the creation of the Reserve and in attempts to create the Deliberative Council, the third party was played by the head of

IBAMA local office. The problem here is that IBAMA is quite an interested party, as its main agenda is to work towards conservation. Last year (2007), a new stakeholder emerged in the scene which may help to fill this gap: a university group is working in the area aiming to improve the Reserve management.

In conclusion, co-managing a complex commons requires more than “two to tangle” (Pomeroy and Berkes 1997), particularly when a marine protected area is established along a coastal urban setting. In Brazil, there are legal instruments available to form platforms of resource user negotiation, however, much has to be improved concerning capacity of stakeholders (including government agents) to engage in collective action and decision-making (Seixas 2006).

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**Table 1.** Major users of resources and spaces of the Marine Extractive Reserve in 2006

<b>Major users</b>	<b>Area</b>
<b><i>Fisheries and Aquaculture</i></b>	
Beach seine fishers	Beaches
Hook and line fishers (motor boat)	Sea area and pier “Marina dos Pescadores”
Hook and line fishers (canoe)	Sea area and beaches (mainly Prainha and Praia Grande)
Purse seine fishers	Sea area and pier “Marina dos Pescadores”
Diving fishers	Sea bottom and pier “Marina dos Pescadores”
Gillnet fishers	Sea along the long sandy shore locally known as ‘Restinga da Massanbaba’
Shellfish collectors	Rocky shore
Shellfish farmers	Rocky shore (‘seed’ extraction) and farms at “Praia do Forno”
<b><i>Tourism</i></b>	
Scuba diving companies	Sea bottom and pier “Marina dos Pescadores”
Sightseeing guides – boat owners	Along the coast and pier “Marina dos Pescadores”
Surfers	Beaches (mainly, Praia Grande)
Bathers	Beaches
<b><i>Industries</i></b>	
Álcalis (CNA) (Chemical industry)	Water collection at Praia Grande and discharge of production residues at between Praia do Pontal and Prainha
Port (Porto do Forno)	Port area adjacent to Praia dos Anjos
Oil company (Petrobrás) and dockyard companies ( <i>estaleiros</i> )	Port area and Praia dos Anjos bay used for cleaning oil platforms
<b><i>Research</i></b>	
Navy’s research institute (IEAPM)	Sea area, beaches and rocky shore
Several universities and research institutes	Sea area, beaches, rocky shore, sand dunes
Municipal Fisheries Department (FIPAC)	Pier “Marina dos Pescadores” – fish landing control
<b><i>National Defense</i></b>	
Brazilian Navy Operational System Unit (CASOP)	Sea area in front “Boqueirão” used for ships’ acoustic measures

**Table 2.** Major stakeholder organizations at the Marine Extractive Reserve in 2006.

<b><i>Fisheries and aquaculture</i></b>		
Colônia APAC	Colônia de Pescadores Z-5 Associação dos Pescadores de Arraial do Cabo	Oldest Fisher Organization Arraial do Cabo Fisher Organization <sup>7</sup>
AREMAC	Associação da Reserva Extrativista Marinha de Arraial do Cabo	Reserve users (mainly fishers)
ACRIMAC	Associação de Coletores e Criadores de Mariscos de Arraial do Cabo	Shellfish farmers' Organization
APPMAC	Associação da Pesca Profissional de Mergulho de Arraial do Cabo	Diving Fishers' Organization
APATAC	Associação de Pescadores Artesanais de Traineiras de Arraial do Cabo	Purse Seiners' Organization
<b><i>Tourism</i></b>		
ABTBPA	Associação dos Barqueiros Tradicionais da Beira da Praia dos Anjos	Organization of fishing and sightseeing tours from Praia dos Anjos
AMA	Associação de Mergulho de Arraial do Cabo – Operadoras de Mergulho	Scuba diving organizations
APETUNAC	Associação de Pesca e Turismo Náutico de Arraial do Cabo	Organization of fishing and sightseeing tours from Arraial do Cabo
ATAC	Associação de Turismo de Arraial do Cabo	Organization of hotels and restaurants
ATURNAC	Associação de Turismo Náutico de Arraial do Cabo	Organization of sightseeing tours (non-fishers)
ASAC	Associação de Surfistas de Arraial do Cabo	Surf Organization
<b><i>Industry</i></b>		
Álcalis Porto do Forno	Companhia Nacional de Álcalis (CNA) COMAP – Companhia Municipal de Administração Portuária; Sindicato dos Portuários; Sindicato de Estivadores	Chemical industry Port
<b><i>Government</i></b>		
IBAMA/ CNPT	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis/ Centro Nacional das Populações Tradicionais e Desenvolvimento Sustentável	Federal Environmental Agency / National Center for Traditional Population and Sustainable Development
IEAPM	Instituto de Estudos do Mar Almirante Paulo Moreira - Marinha do Brasil	Navy – Research Institute
CASOP	Centro de Apoio a Sistemas Operativos – Marinha do Brasil	Navy – Operational Systems Unit
FIPAC	Fundação Instituto de Pesca de Arraial do Cabo da Prefeitura Municipal de Arraial do Cabo	Municipal Fisheries Department
SEAP	Secretaria Especial de Aqüicultura e Pesca da Presidência da República (Rio de Janeiro)	Federal Fisheries and Aquaculture Agency

<sup>7</sup> According to its name, APAC should represent all fishers from Arraial do Cabo, but according to some fishers from Prainha and Praia dos Anjos, APAC represents mainly Praia Grande fishers

**Table 3.** Socio-environmental disputes at Arraial do Cabo Marine Extractive Reserve.

<b>Disputes over space and/or resource use</b>	<b>Focal area or resource</b>	<b>Motives</b>
Beach seiners <i>Vs.</i> Surfers	Grande beach	Surfers scare away fishing schools
Beach seiners <i>Vs.</i> Small trawlers	Grande and Prainha beaches	Small trawlers fish close to beaches.
Fishers from central beaches <i>Vs.</i> Fishers from Monte Alto/Figueira	Migratory fish	Monte Alto and Figueira fishers use long gillnets impeding fish school to approach central beaches Monte Alto and Figueira fishers feel marginalized on Reserve decision-making processes.
Praia dos Anjos beach seiners <i>Vs.</i> Sightseeing tour guides	Ilha do Farol beach	Sightseeing boats interfere with beach seining.
Fishers <i>Vs.</i> Scuba diving agencies	Scuba diving spots	Fishers complain tourists practices diving fishing and agencies uses diving spots not permitted in the Utilization Plan. Agencies argue tourists only take pictures out of the sea.
Scuba diving agencies and sightseeing boat owners <i>Vs.</i> Small trawlers	Pier “Marina dos Pescadores”	Agencies and boat owners complain fishers put trawling nets along the pier obstructing tourist passage
Prainha fishers <i>Vs.</i> sport vessel owners	Prainha beach	Jet-skis and Banana boats scare away fish
Scuba diving agencies <i>Vs.</i> The Reserve (IBAMA + fishers)	Diving spots	Night diving is prohibited inside the Reserve. Fishers say flashlights scare away fish. Agencies argue that there is no study to justify banning night diving.
Small trawlers <i>Vs.</i> Fisheries Ministry (SEAP)	Sea area in front Grande beach	SEAP put artificial reef modules near Grande beach to hinder trawling in the area
Fishers using motor boats <i>Vs.</i> Navy (CASOP)	Area used to measure ships’ acoustic signature	Navy sometimes prohibit boats to fish in part of the Reserve where ships’ acoustic signature is been measured
Fishers <i>Vs.</i> Port	Anjos bay	Ship lights scare away fish schools interfering with night fishing
IBAMA and some fishers <i>Vs.</i> Dockyard companies	Forno bay	Dockyard companies aim to bring oil platforms to be cleaned and fixed inside the Reserve. IBAMA and some fishers are concerned with the environmental impact it may cause.
Fishers <i>Vs.</i> Chemical Industry (Álcalis)	Sea shore near Prainha beach	Water pollution due to industrial resides
Fishers using motor boats <i>Vs.</i> Sightseeing tour guides	Tourists	Fishers complain that they are not allowed to take tourists in their boats, but sightseeing boats take sport fishers.
Sightseeing tours: Local boat owners (part-time fishers) <i>Vs.</i> Outside boat owners	Tourists	Local boat owners often have smaller boats than outside boat owners (richer entrepreneurs). Market competition is a problem the locals face.

<b>Power disputes</b>	<b>Focal area or resource</b>	<b>Motives</b>
IBAMA X Navy	Cabo Frio Island	Dispute over entitlement for managing the Island – the Navy was entitled prior the Reserve creation. Also, the Navy does not recognize fishers as traditional people, hence they should not have the privilege to co-manage the Reserve with IBAMA (Gomes 2005a).
IBAMA x City hall	Pier “Marina dos Pescadores” and beaches	Dispute over entitlement for managing the pier “Marina dos Pescadores”. Also IBAMA has fined city hall many times for sewage discharge at Anjos beach
Colônia Z5 Vs. AREMAC	Reserve	Colônia, the oldest Fisher organization, did not recognize AREMAC, a newly created organization, as co-manager of the Reserve.
Fishers Vs. Middlemen	Fish production	Fishers feel prices practiced by middlemen are unfair
IBAMA X Fisheries Ministry (SEAP)	Artificial reef modules	SEAP put artificial reef modules within the Reserve area with no Environmental License issued by IBAMA, as required by legislation
IBAMA X Colonia Z5		Disagreement on the Reserve management and the right to issue fishers’ unemployment benefits during fishing season closures
<b><u>Other disputes</u></b>		
Grande beach fishers Vs. Anjos beach fishers	---	Historical rivalry <sup>8</sup>
Fishers X IBAMA		Fishers complain IBAMA should provide better enforcement against illegal activities. On the other hand, IBAMA expects fishers feel more responsible for taking care of the Reserve.

<sup>8</sup> The conflict between Grande beach fishers and Anjos beach fishers dates back as early as 1950’s, and it is related to ethnic/cultural differences and technological progresses/retards in fisheries. Nowadays, this conflict is more subtle.