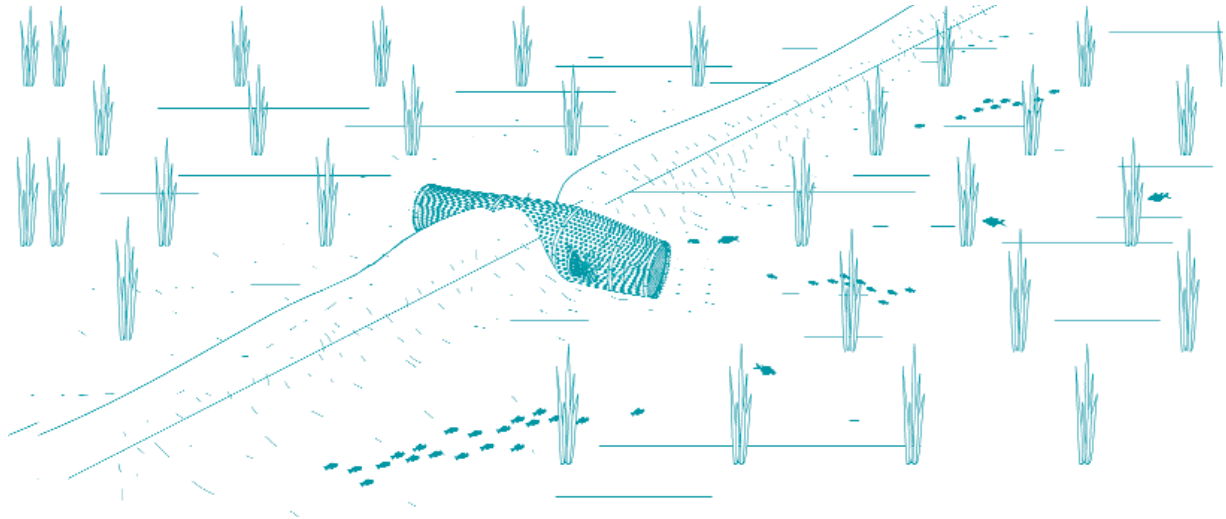
COMMUNITY FISHERIES AND CO-MANAGEMENT ON THE LOWER AMAZON FLOODPLAIN OF BRAZIL

McGrath D.G.[1,2] Cardoso A.[3] Sá E.P.[3]

[1] David G. McGrath, NAEA, Universidade Federal do Pará, Belém, PA 66075-900 E-mail: dmcgrath@whrc.org
[2] Núcleo de Altos Estudos Amazônicos (NAEA), Federal University of Pará, Belém, Pará. Woods Hole Research Centre (WHRC), Woods Hole, MA
[3] Instituto de Pesquisa Ambiental da Amazônia (IPAM), Santarém, Pará



ABSTRACT

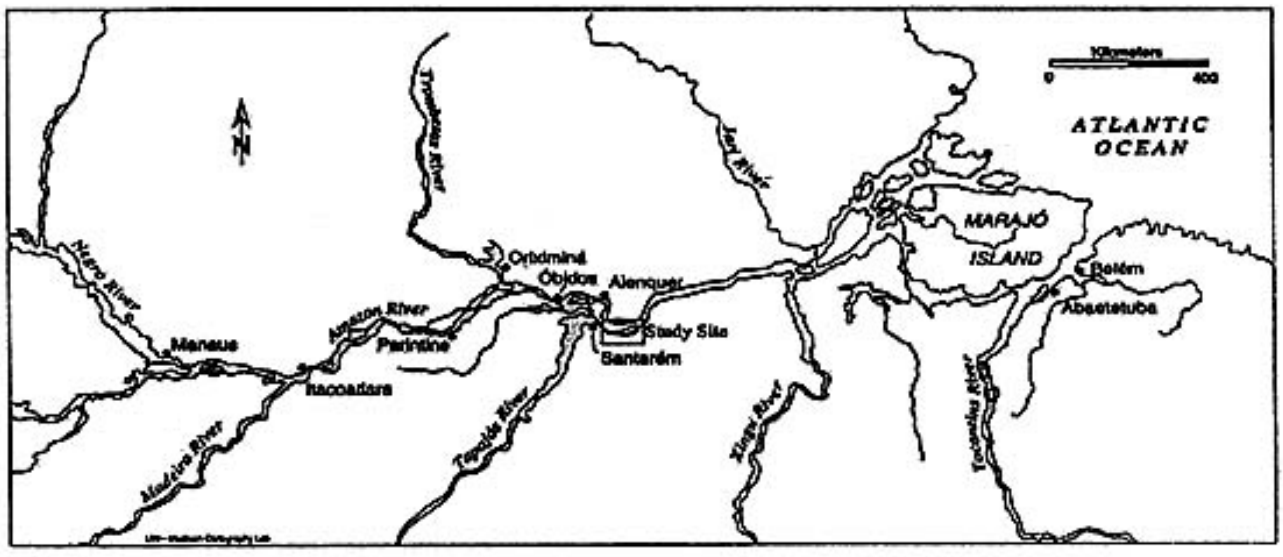
In response to the growth of Amazon commercial fisheries, a loose regional network of community-managed lakes has proliferated throughout the Amazon floodplain system. This approach has been widely perceived as a promising alternative for the sustainable management of floodplain fisheries. Over the last decade, communities, NGOs, grassroots organizations, and IBAMA - the Brazilian environmental agency, have worked together to develop a co-management system for floodplain fisheries based on the legal recognition of community fishing agreements. This paper examines the experience of the Santarém region of the Lower Amazon, the major regional experiment in fisheries co-management. Here, while considerable progress has been made in setting up a functional co-management system, it suffers from serious problems that undermine its effectiveness and threaten its long-term sustainability. Unless communities are permitted to restrict access and charge user fees, it is unlikely that the co-management system will survive once funding for project implementation terminates. There are, however, legal precedents for making the necessary design changes, thereby increasing prospects for the long-term institutional sustainability of the system.

INTRODUCTION

Like many other regional fisheries in the world, fisheries managers in Amazonian Brazil have been experimenting with the implementation of a co-management system since the early 1990s (Castro 2000; Castro and McGrath 2002). The move towards co-management of Amazon fisheries is in part a response to pressure from grassroots movements for community control of floodplain lakes and in part related to changes in environmental management policy at the national level. As elsewhere, adoption of a co-management model is widely regarded as a response to the poor performance of the centralized, top-down management model that has characterized fisheries management in Brazil since its inception (McGrath *et al*. 1999; McGrath 2000). Co-management, by incorporating resource users into the management process, is seen as the most effective way of resolving many of the problems associated with the conventional scientific model of fisheries management, especially those involving resource depletion, conflicts between user groups and development of policies that better address the characteristics of local fisheries (Pinkerton 1989; McGoodwin 1990; Jentoft and McCay 1995).

While the trend towards participatory management is world wide, motives and outcomes can be quite varied. In this context, it is important to distinguish between countries with well-developed institutional structures for resource management and those where resource management institutions are rudimentary or insufficient for maintaining an effective presence in the field. The problem may be quite different in these two contexts. While in the former case increasing user group participation may be an appropriate corrective to the overly centralized approach that often characterizes scientific management (Sen and Nielsen 1996), in the latter case, pressures to increase user group participation may be due to the absence of an effective governmental presence rather than to the poor performance of the scientific management model *per se* (Sunderlin and Gorosope 1997). In these latter cases simply increasing user group participation may be insufficient to improve the effectiveness of local resource management systems.

Over the last ten years a co-management system has evolved in the Lower Amazon floodplain that is a product of both local initiative, government design and efforts of local NGOs and international funding agencies. Though still largely an experimental approach now being tested in a few regions, implementation in these areas has progressed sufficiently so it is possible to trace the main outlines of the emerging system. This paper analyses the experience of the Santarém region of the lower Amazon floodplain, the major Brazilian experiment in fisheries co-management (Figure 1). We describe the process through which community initiatives are being incorporated into an evolving institutional framework for co-management, evaluate progress to date and outline the key



■ **Figure 1.** Lower Amazon region

issues yet to be addressed if this approach is to provide an effective basis for a regional fisheries management policy.

BACKGROUND

While the origins of the current Amazonian experience in co-managing floodplain fisheries can be traced to regional grassroots movements, changes in national policy and even worldwide trends in fisheries management, it is fundamentally the result of local efforts to resolve conflicts and pressures resulting from within the sector itself (Hartmann 1989; McGrath *et al.* 1993; Castro 2000). While nowhere near as well organized, the community lake reserve movement has many parallels with the rubber tapper movement that captured world attention with the assassination of the charismatic rubber tapper leader, Chico Mendes (Allegretti 1995; Schwartzmann 1989). Like the forest people's movement, floodplain communities were motivated by a perceived threat to their resources and way of life resulting from developments in the regional economy; the eclipse of traditional extractive activities by logging and ranching in the case of rubber tappers and the intensification of commercial fisheries in the case of flood plain communities (McGrath *et al*. 1993; Lima 1999; McDaniel 1997). Another common denominator is the strong, though regionally variable, tie to the Catholic Church and Liberation Theology (Lima 1999; Oliveira and Cunha 2002).

Three or four phases can be identified in the emergence of the co-management system: the rise of a modern commercial fishery in the 1960s and 1970s; mobilization of floodplain communities to defend local lakes as part of regional rural labour movements in the 1980s; proliferation of fishing accords as a local strategy within the context of the Amazon wide movement of traditional peoples in the early 1990s; and in the latter half of the decade the effort to integrate these community-based initiatives into a new co-management system for floodplain fisheries.

Rise of Commercial Fisheries

Conflicts between largely agricultural communities and commercial fishers over access to floodplain lakes began early in the development of Amazon commercial fisheries. The introduction of gillnets made of synthetic fibres, diesel engines, ice and fish processing plants led to the transformation of Amazon commercial fisheries from a seasonal activity involving dried salted fish to a year round activity involving fresh and frozen fish (Chapman 1989; McGrath *et al*. 1993; Smith 1985; Veríssimo 1970). With these changes there arose a class of professional, urban-based, commercial fishers know as *geleiros*, who exploited lake fisheries in a steadily expanding radius from major urban centres such as Belém and Manaus (Almeida *et al.* 2001; Goulding 1983). As exploitation of floodplain lakes intensified, conflicts over access to fisheries proliferated. Major conflicts erupted in the Monte Alegre lake system just downstream from Santarém in the mid-sixties and in the Janauacá lake system above Manaus in the early seventies (Hartmann 1989; Junk 1984).

Mobilization of Rural Labour

In the 1980s community opposition to outside commercial fishers was organized and integrated into rural labour movements dedicated to ending two decades of military dictatorship (Leroy 1990; Lima 1999). During this period, experiments with collective fishing agreements emerged in various places along the Amazon River such as Tefé on the Solimões River, Silves below Manaus and Santarém. In the state of Amazonas (Tefé and Silves) the Catholic Church through the efforts of MEB (Movimento Educacional de Base) and the CPT (Comissão Pastoral da Terra) played a major role in organizing communities for managing local fisheries (C.P.T. 1992a, 1992b; Oliveira and Cunha 2002). In the Santarém area FASE (Federação de Órgãos para Assistência Social e Educacional) worked with the municipal Fishermen's Union [*sic*] to organize regional fishers and wrest the Union from the hands of government appointed administrators (Leroy 1990). Here, though, because the Union represents all fishers, support for

community agreements was ambivalent and most such agreements were local initiatives with little outside support (McGrath *et al.* 1993; Castro 2000).

Lake Fisheries Accords

The third phase began in the late 1980s with the growth of the people of the forest movement (Povos da Floresta). What distinguishes this phase is the development of a strategic alliance between the rural labour and environmental movements around the proposal for conserving forests through use by traditional populations ((Shwartzmann 1989). The assassination of the rubber tapper leader, Chico Mendes, in 1989 led to a massive outpouring of national and international support for the rubber tappers and traditional Amazon populations in general (Gryzbowski 1989). This support was rapidly translated into major institutional changes including the creation of the first extractive reserves and the establishment within IBAMA of the National Centre for Traditional Populations (CNPT) (Allegretti 1995). At the same time international funding for conservation initiatives involving traditional populations increased enormously.

While the major emphasis of institutional and financial support has been for forest-based initiatives, this period also witnessed the proliferation of experiments in community lake management throughout the floodplain region and the establishment of several major projects to develop the community lake management model as a floodplain equivalent of the extractive reserve (IBAMA 1995); Projeto Várzea-IPAM (Almeida and McGrath 2000) and the Reserva de Desenvolvimento Sustentável Mamirauá (Lima 1999; Gillingham 2001). In the Santarém area the Colônia has taken a leadership role in working with floodplain communities to develop collective agreements for local lake fisheries. The number of such agreements in the region increased rapidly during this period. Two internationally funded projects in Santarém, Projeto Várzea of IPAM (Instituto de Pesquisa Ambiental da Amazônia) with funding from WWF-DFID and Projeto Iara a bilateral project involving the German government (GTZ) and IBAMA, also began to work with the Colônia and community organizations to develop a participatory management system for floodplain fisheries. During the first part of the decade many of the basic elements of the co-management model that IBAMA was later to implement were developed.

Implementing a co-management system

The fourth phase began in the latter half of the decade with the promulgation of a series of measures that step by step began to lay the legal and institutional basis for co-management of floodplain fisheries. These included decentralization of certain powers from the presidency of IBAMA to the regional superintendents, definition of criteria for legalizing fishing accords, definition of an institutional framework for co-management and creation of a category of volunteer community environmental agents. In addition, the Provarzea program of the G-7 Pilot Program for the Conservation of the Amazon Rainforest was finally approved, with the overall objective of developing the regional institutional and policy framework for co-management of floodplain fisheries (IBAMA 2001).

FISHING ACCORDS

One of the striking features of the community lake management movement of the Lower Amazon is that from quite early on it has been based on formal written documents (Castro and McGrath 2003). This reliance on written documents probably reflects the training community leaders received while participating in the activities of the Catholic Church and the rural labour movement. Known locally as “acordos de pesca” these documents typically consist of two parts, a short preamble, which may state the motives and objectives of the agreement and the area and communities covered and a list of the measures that govern fishing activity, define procedures for monitoring and enforcing accords and possibly sanctions for infractions. A list of signatures of those community members who support the accord may also be annexed.

The general objective of fishing accords is to control fishing pressure in local lake systems. They typically seek to achieve this objective indirectly by restricting the type of gear that can be used, storage

capacity and or the sale of catch. Few if any accords specify catch limits or minimum size requirements, measures that would be more difficult to enforce. While few accords seek to prohibit commercial fishing entirely, many do seek to contain it. A central concern of floodplain fishers is to maintain the productivity of local fisheries at satisfactory levels with the gear they have. Floodplain fishers typically engage in a number of economic activities, including annual cropping, small animal husbandry and cattle raising and do not have either the time or the resources to compete with full-time commercial fishers.

A second important feature of accords is that in contrast to conventional fisheries management policies that seek to protect fish during the spawning season, most fishing accords seek to restrict fishing effort during the low water season when fish are concentrated in smaller water bodies and vulnerable to overexploitation (Isaac, Rocha and Motta 1993). They believe that the rising water levels that coincide with the spawning season provide species with adequate natural protection from fishing pressure. Typical measures during the low water period include the prohibition of gill nets and in some cases restrictions on the sale of fish outside the community. Flood season restrictions of fishing gear, on the other hand, are quite rare and tend to be site specific.

Surprisingly, given the formal presentation of the document itself, most accords are fairly sketchy on how monitoring and enforcement are to be organized. Few contain instructions on who and how these activities are to be carried out and most of these refer vaguely to community members or leaders. Only the most recent accords provide adequate information on how monitoring and enforcement are to be carried out. Those that do address the question of sanctions frequently specify graduated punishments, progressing from verbal warnings for first offenders to apprehension of gear and registration of complaints with IBAMA for those caught a second or third time. Frequently, gear are either held until the end of the closed season or turned over to the Colônia or IBAMA.

FORMALIZATION OF FISHING ACCORDS

While fishing accords are designed to assert community control over local lake fisheries, they should not be regarded as an attempt to substitute government authority. In fact, from the beginning, local leaders have sought to involve IBAMA and the Colônia in support of their accords. Leaders frequently deposit copies of their signed accords with the Colônia and IBAMA and often turn confiscated gear over to these institutions. They also frequently denounce infractors to IBAMA and actively lobby for IBAMA agents to patrol their lakes. One of IBAMA's first concrete actions in this direction took place in response to conflicts in the Lago Grande de Monte Alegre. This is one of the largest lake systems in the region and has a history of fisheries conflicts dating back to the mid 1960s (Hartmann 1989). In an attempt to resolve the problem, or at least separate the warring parties, IBAMA divided the lake into two zones, a northern zone where gillnets and commercial fishing were prohibited and a southern zone where they are permitted. While this was an isolated action at the time, it was an early effort in what later developed into a much more systematic approach to the problem of local participation in fisheries management (Hartmann 1990).

Over the course of the 1990s, the basic structure of the regional co-management system for floodplain fisheries has been developed. There were two interrelated concerns in this process, institutional and legal. The first has involved community level work to improve the performance of existing community management systems and the second development of the legal measures needed to integrate this system into a new formal policy and institutional framework for the co-management of floodplain fisheries.

As has been noted in other regions, the main problems with community fishing accords were identified as their fragile organizational base, the absence of mechanisms to insure representation of all major stakeholder groups and the lack of an explicit organizational structure for monitoring and enforcement.

While most communities have some form of elected leadership, very few have the capacity to actually organize and implement anything but isolated, short-term activities. Furthermore, with the exception of those areas where the Catholic Church and the Fishers' Union provide a regional organizational framework and leadership, there were no multi-community organizations to serve as the institutional base for fishing agreements. Both these organizations, however, had other priorities, organization of church activities in the first case and more political, union-oriented activities in the second.

A related problem is representation in the process of defining and approving fishing accords. Typically, interested individuals, who may or may not be part of their respective community's elected leadership, initiate the process by inviting members of communities sharing the same lakes to a meeting to discuss creation of the fishing accord. Through a series of such meetings a document is eventually produced that satisfies the participants. Those who are opposed to the idea of a fishing accord or to the specific proposals of those promoting the accord, tend not to participate. Since they do not participate, they do not feel any obligation to comply with its regulations once implemented. Since these people are typically the more commercially oriented fishers in the region, the fishing accord that is eventually created is fatally flawed. Unless there is exceptional resolve on the part of the proponents, it is likely to disintegrate if community members suspect that others are not complying.

To address the combined problems of organizational base and representation, efforts in Santarém focused first on creating intercommunity councils for the major lake systems. Called Regional Fisheries Councils, they are composed of representatives of all the communities sharing a common lake system. These councils were created to take responsibility for organizing the process of defining, approving and implementing fishing accords for their respective lake systems. Through an iterative process in which proposals for a fishing accord are developed at the community level, taken to the Regional Council for discussion and development of a common proposal, evaluated and where necessary amended by participating communities, a definitive version is finally developed and approved by the Regional Council and participating communities. While this process does not guarantee adequate representation, it does insure that all communities have roughly equal representation in developing the regional fishing accord and provides abundant opportunities for anyone to participate in the process.

A third problem area was that of monitoring and enforcement. As noted earlier, most fishing accords did not describe in adequate detail procedures for organizing the monitoring of fishing accords nor for judging those accused of infractions. Monitoring tends to be haphazard with irregular patrols of lakes typically conducted by a few community members while the great majority shirked their responsibilities. While such a system may be adequate for dealing with the occasional incursions of outsiders, it is problematic for dealing with situations where infractors are members of the community. In these latter cases, the informality and lack of representation of patrols and leadership leave those apprehending infractors vulnerable to the charge of bias and favouritism, clouding issues and calling into question the credibility of the whole endeavour. This is especially problematic in Amazonia where people are predisposed to assuming that others are dishonest and prone to favour their friends and relatives. While the structuring of Regional Fisheries Councils helped to inject a significant degree of institutional formality into the process of development and implementation, the absence of a legal basis for the developing system was a problem.

Integration of fishing accords into the formal institutional framework for fisheries management involved several steps whereby IBAMA moved from its initial position that community fishing accords were illegal to one in which they have become a fundamental component of the new co-management system for Amazon fisheries. The first step in this process was the decentralization in 1996 of legal authority to issue complementary administrative laws (*portarias complementares*) from the presidency of IBAMA to the

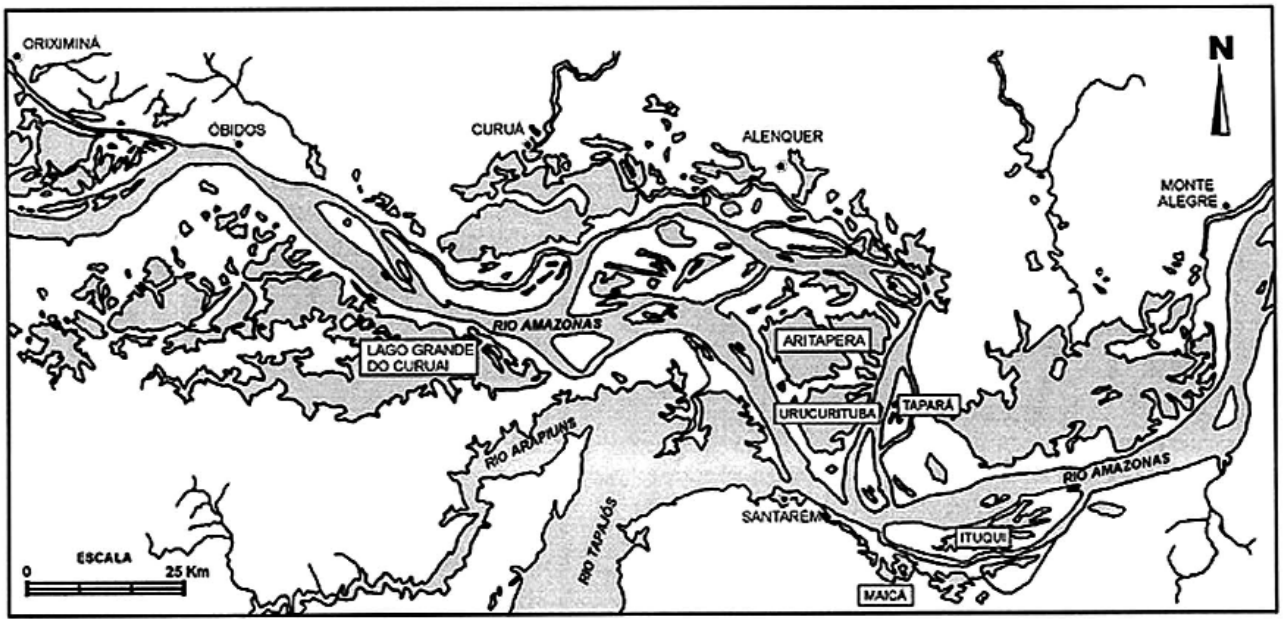
regional superintendents (IBAMA 1996a). This move answered one early objection to legalizing fishing accords, which was that because of the size of the country; IBAMA's national office simply could not operate at such a small scale.

Another problem, though one of less importance to co-management, was that fisheries regulations were defined at the state level. In the case of the Amazon, the five or six Brazilian states of the Amazon basin all had slightly different minimum size requirements for many species, permitted different kinds of gear to be used, protected different species during the spawning season and defined the spawning season slightly differently. This was a constant source of problems, especially for the two states of Pará and Amazonas. Since neither state had much control over the fishery, it was easy for fishers to avoid one state's laws by travelling up or downstream to sell their catch in the other. In 1996 IBAMA issued a law homogenizing fisheries regulations at the basin rather than state level, eliminating many of the contradictions between states (IBAMA 1996b). This measure established the river basin and not the state as the basic unit of management, a move that brought fisheries management in line with the new water resources legislation passed the following year.

That same year an internal memorandum was released specifying criteria and procedures for the legal recognition of community fishing accords, opening the possibility for transforming them into *portarias complementares.* Two criteria are especially relevant, first, the agreement cannot contain provisions for limiting who can fish in the lake and second the agreement must be proposed by an organization that represents all the communities located within the lake system's boundaries and that takes responsibility for implementing the accord once it is approved.

While only an internal memorandum, this document provided the basis for development of regional co-management systems based on community fishing accords. The first fishing accord to be transformed into a *portaria complementar* was that of the Maicá region adjacent to the city of Santarém. This area had a long history of conflict with urban-based canoe fishers that had motivated the communities to seek legal recognition for their fishing accord. Over the next five years Regional Fisheries Councils were set up and fishing accords approved by IBAMA for all seven major lake systems of the municipality (see Figure 2).

Once a fishing accord becomes law, IBAMA is obligated to enforce it. However, merely legalizing the



■ **Figure 2.** Regional Fisheries Councils of the Santaré m Region

accord does not address the problems that have limited IBAMA's ability to enforce fisheries legislation, namely the lack of personnel, equipment and funds for maintaining an effective presence in the field. To resolve this problem IBAMA created the position of Volunteer Environmental Agent (VEA) (IBAMA 2001a, 2001c). These agents are community members who receive training in environmental legislation and enforcement procedures and are responsible for monitoring local compliance with environmental regulations. They do not have the power to make arrests or confiscate equipment, but only to issue citations, which they subsequently turn over to IBAMA field agents. These agents then take over pursuing the appropriate legal procedures for each case. IBAMA has organized several training courses for VEAs of regions that have legal fishing accords. Each community chooses one or two people to participate in the training. Frequently, although not necessarily, they are the community's representatives on the Regional Fisheries Council.

With the creation and training of the VEAs, the main components of the co-management system are now in place. Regional Fisheries Councils representing all the communities of a given lake system define fishing accords and submit them to the regional IBAMA office. If the accord meets IBAMA's criteria for approval it is forwarded to the national office in Brasília for final review, signed by the President of IBAMA and published in the official government registry as a complementary law valid for one to three years. Once the fishing accord has become law, IBAMA trains VEAs who assume responsibility for monitoring compliance with the accord. When infractors are apprehended, VEAs issue citations and report the incident to IBAMA's enforcement office, which pursues the case as deemed appropriate.

In 1999, the ProVarzea Program of the PPG-7 became operational with a projected duration of five years. ProVarzea (Projeto Manejo dos Recursos Naturais da Várzea) was designed to serve as the vehicle for the development and implementation of a region-wide policy and institutional framework for the co-management of Amazon fisheries (IBAMA 2001b; Kolk 1998). The program consists of three components, a Strategic Research component that investigates eight critical areas for fisheries management, a Promising Initiatives Component that supports individual management projects and a Monitoring and Control Component through which the co-management system is to be implemented. Two pilot regions, Santarém and Parintins, were elected for initial implementation of the co-management system described earlier. In terms of approach to fisheries management, institutional relationship with IBAMA and staff origins, the ProVarzea program represents a scaling up of the German-Brazilian Iara Project in Santarém. Coordination of the program is based in IBAMA's office in Manaus with regional offices in Santarém and Parintins. The program is funded through the G-7 Pilot Program as an IBAMA project and is housed in IBAMA's offices. Provarzea staff members, however, are not employees of IBAMA reinforcing the short-term project character of this initiative.

CO-MANAGEMENT EXPERIENCE TO DATE

Over the last six years the basic structure of the regional co-management system has been constructed in the Santarém area that builds on decades of grassroots efforts to control pressure on local lake fisheries. There are now seven Regional Fisheries Councils encompassing all the major floodplain lake systems within the municipality. Eight fishing accords have been legalized, six VEA training courses have been held and 98 agents certified representing four of the seven Regional Fisheries Councils. Finally, in January 2003, IBAMA published legal guidelines for formal recognition of fishing accords as the centrepiece of floodplain fisheries management policy (IBAMA 2003). These accomplishments are the result of a major sustained effort involving floodplain communities, Fishers' Unions, NGOs, IBAMA and international funding agencies and environmental organizations. While the resulting co-management system is far from consolidated, it is sufficiently well developed that it is now possible to evaluate performance and identify those aspects of the system that seem to be working and those that are especially problematic. In the fol-

lowing pages we evaluate the co-management system from the perspective of common pool resource theory focusing on transaction costs, access restrictions, enforcement, research and monitoring and institutional sustainability (see Ostrum 1998).

Co-management systems tend to have fairly high transaction costs from the perspective of users when compared to the conventional resource management model (Pereira 2002). This is because users must participate actively in the management process, attending meetings to decide the rules for fishing activity, patrolling lakes and apprehending infractors. In the Amazon case, these costs tend to be quite high for several reasons. Many of the lake systems are quite large, up to 40 km across and few community members have motorized transport. Participation in local management activities, then, demands a considerable time investment in travel to and from inter-community meetings and in patrolling lakes. It also involves small but significant financial expenditures for participants since there are no mechanisms for covering these costs. Finally, enforcement can be very stressful, especially when infractors are neighbours and relatives. This is exacerbated, as we will discuss below, by the fragile institutional status of VEAs.

A second critical problem with the co-management model is the requirement that communities maintain local lake fisheries open to outsiders. While fishing accords can specify how to fish, including what gear may be used, they cannot specify who can fish. Technically, this position is based on the 1934 Water Resources Code (Brasil 1934) that guarantees access to all water bodies for purposes of navigation. However, this interpretation confuses two fundamentally distinct issues: navigational rights and rights of access to the fish in the water. Use in the former case has no effect on the resource while use in the latter reduces the amount available to others. IBAMA officials have also voiced concern over the very real and complex distributional issues that granting closure of individual lakes to local communities would raise, the most pressing of which relates to the demands of urban canoe fishers.

While there are good reasons for insisting on some degree of accessibility for outsiders, the position taken by IBAMA undermines two basic tenets of the theory of collective action: clear definition of the group of users and the right of that group to the fruits of it's own labour without competition from free-riders (Olsen 1967). As it stands now, anyone can fish in the lake and so have access to the benefits, but they do not have to share in the obligations of maintaining the system. Thus, those who invest in managing the lake must compete with all other users to obtain a share of whatever benefits their efforts generate. From a theoretical perspective, this attribute alone is sufficient to ensure the failure of the enterprise (Olsen 1967; Ostrum 1998).

As noted earlier, it is possible to restrict access by imposing gear restrictions and other measures that make it uninteresting for outsiders to travel long distances to fish in the lake. The problem is that these kinds of restrictions also affect the efficiency of local fishing effort and so impose an additional cost on those participating in the accord. Furthermore, the present system contains no mechanisms through which outsiders could share in the cost of maintaining the system. In fact, Fisheries Councils are specifically prohibited from charging user fees, an attribute of the Federal government (IBAMA 2003). By charging such fees, it would be possible to compensate members for the time they invest in management activities. In the absence of a mechanism such as user fees, Fisheries Councils have had to resort to sponsoring events, such as raffles, bingos and football competitions, to raise funds. While this may solve the immediate financial problem of generating resources to cover management costs, it is an exogenous solution divorced from participation in the lake fishery. Thus it tends to separate economic and regulatory interests, making returns from management even more diffuse and difficult to protect from free riders (see Jentofts and McCay 1995).

These logistical and financial difficulties are exacerbated by problems involving enforcement. Existence of efficient mechanisms for punishing infractors and resolving conflicts is another critical

aspect of the design of community-based management systems (Ostrum 1998). In the Amazon co-management experiment, the main problems relate to the role of VEAs. On the governmental side of the co-management system, collaboration with IBAMA field agents has been problematic. IBAMA field agents have often shown that they do not take citations brought by VEAs seriously and have occasionally declined to pursue normal procedures in cases the VEAs have brought to their attention. Part of this behaviour can be attributed to the lack of resources to undertake patrols, but, more problematically, it also reflects IBAMA agents' resistance to sharing authority with community members.

VEAs have also had difficulty in their relations with communities. VEAs role was originally conceived as responsible for organizing monitoring and enforcement of fishing accords at the community level, legitimising community involvement and extending IBAMA's enforcement capacity. They were not expected to undertake these activities by themselves. Rather than seeing VEAs as organizers of local co-management activities, however, members of many communities assume that the agents have sole responsibility for patrolling lakes and enforcing rules and that therefore they no longer need to participate. The problem is not just one of sharing the work, but of community solidarity with those responsible for monitoring and enforcing the accord. VEAs must often confront infractors, who may be neighbours or relatives, with little explicit, organized support from their communities.

Because of this lack of support, many VEAs find themselves in a difficult position. There is little they can do on their own since their authority depends on the support they receive from IBAMA and their communities. Infractors see that the citations VEAs have issued are not enforced by IBAMA and feel increasingly confident that they can act with impunity. In a few cases, infractors have taken environmental agents to court and these agents have had to defend themselves with little support from IBAMA. Frustrated and humiliated by their lack of power and support, a number of agents have quit and many others have stopped carrying out monitoring and enforcement activities. Of a total of 98 agents that have been trained thus far in seven regions, only 67, are currently active (Table 1). If we consider only the regions where VEAs have been active for at least a year, the proportion drops to 50 percent and in some regions as low as 36 percent. There is the danger that the ambivalence of government officials, will lead to the demobilization of the community commitment to co-management as local leaders see that little has come of their efforts to enforce local fishing accords. As Acala and Vuse (1994) observe, "it is not enough to have laws and organized communities to apprehend offenders. The process must follow through to conviction and penalty when necessary," if communities are not to lose interest in the co-management system.

Table 1: Accredited and Active VEAs

Region	Accredited	Active	% Accredited
Urucurituba	9	5	56
Aritapera	8	4	50
Maica	12	8	67
Ituqui	14	5	36
Tapara	3	1	33
Lago Grande I	27	19	70
Lago Grande II	25	25	100
Total:	98	67	68
One Year Minimum	46	23	50

Some progress in enforcement is being made, however, in response to pressure from Council representatives and supporting NGOs, IBAMA has increased VEAs police powers. They are now permitted to confiscate gear used by infractors, but are still not permitted to make arrests. IBAMA agents are also being pressured to take VEAs more seriously, pursue citations and prosecute infractors where appropriate. In addition, under the formal umbrella of Provárzea the original group of organizations working with IBAMA is developing new institutional arrangements that seek to address the weaknesses of the present system. The main objective here is to develop an alternative mech-

anism for enforcing fishing accords. Towards this end, an informal, multi-institutional system for monitoring and enforcement, CIDA, has been organized that brings together the various governmental agencies with policing powers, including the Public Ministry, the Civil Police, the Coast Guard (Capitânia dos Portos) and IBAMA. In addition to meeting local enforcement demands, this kind of institutional collaboration may also help solve a critical problem for the eventual expansion of the Santarém co-management system, the small number of regional IBAMA offices along the Amazon River.

A fourth point is that the developing co-management system is more focused on regulation than management. Regulation consists of the rules and procedures designed for controlling fishing activity. Management includes regulation but is not limited to it. Management is objective oriented and regulations are the means for achieving those objectives. Management involves monitoring and evaluating the status of the fishery as a basis for developing concrete objectives to determine to what extent those objectives are being met once the management system is implemented. User group participation in collecting the information needed to evaluate the status of the fishery and in developing appropriate regulations is a vital part of creating a local sense of ownership with regard to the management system and an understanding of how regulations will contribute to the plan's objectives. This participation is also essential for obtaining concrete indicators of performance through which users can see what impact their efforts are having on the fishery, thereby reinforcing their motivation for managing the fishery.

The process of developing accords does not involve a regular system for collecting information on the status of local fisheries and is based primarily on local views of the status of local fisheries and the kinds of fishing activities that should or should not be permitted. Accords also do not include specific objectives, so it is unclear what the proposed rules are intended to achieve. Without clear objectives, there is no explicit basis for evaluating whether or not the regulations are having the intended effect on local fisheries. Furthermore, accords do not as yet contain provisions for monitoring performance to determine whether they are succeeding in maintaining fishing pressure within sustainable levels. In this sense, it seems that accords are more concerned with making access to fisheries roughly equal for all users than with conserving fish stocks (Castro and McGrath 2003). While development of a system for monitoring the status of lake fisheries is a complex task (Berkes *et al*. 2000), it is essential to the long term viability of the developing co-management system that it move from a concern with regulation to a more comprehensive concern with management of lake fisheries. This is important not just to ensure the sustainability of the fishery, but also to motivate community participation by providing concrete feedback on the performance of the management system.

The long-term success of co-management in the Brazilian Amazon will depend on revising regulations to permit definition of a user group with exclusive access to the resource and the right to charge user fees. There are precedents for these changes. The Superintendency of IBAMA for the State of Amazonas, for example, has taken advantage of legislation decentralizing some executive powers to bypass Brasília and issue decrees giving some communities exclusive rights to local lakes. In the State of Pará, the number of commercial fishers on the Tucurui reservoir on the Tocantins River is also restricted (Camargo 2002). In both cases, the community or fisher association controls marketing of the catch.

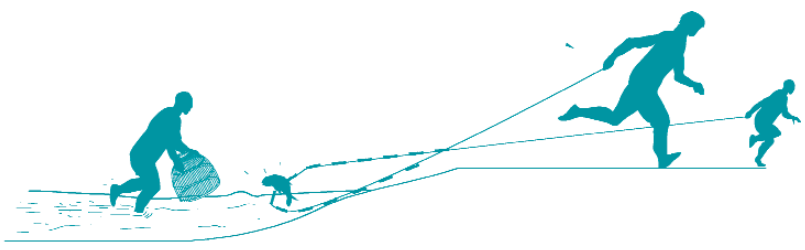
Following these examples, a concession system could be created in which specific community-based, user group associations, which could include non-community members, are granted exclusive fishing rights to specific lake systems. These associations would be responsible for managing the lake fishery and as associations could charge members a user fee, thereby bypassing constitutional constraints on levying fees. They could also centralize marketing of fish and use that control to obtain additional funds in support of management activities. Also, by strengthening local

control over lake systems, such an approach would increase incentives to participate in enforcement and thereby reduce dependence on government support. In addition to contributing to long-term institutional sustainability, this approach could facilitate expansion of the system in regions where IBAMA does not have a permanent presence. Since legal precedents exist for this model, there should be no major legal impediment to implementing such a system on the Amazon floodplain.

CONCLUSION

In conclusion, over the last 10 years considerable progress has been made in the development of a co-management system for Amazon floodplain fisheries that builds on grassroots traditions of community management. The experience is an important example of how diverse groups, communities, fishers' unions, local NGOs, government agencies, international donor agencies and international conservation organizations can work together to develop a new approach to management that supports and legitimises grassroots efforts to defend local resources and livelihoods. The experience also illustrates the capacity of participants to learn from the process and adjust the model to address problems as they arise.

The Santarém experiment also illustrates the difficulties involved in implementing a co-management system where the formal institutional base for fisheries management is minimal. In this regard, one of the main points of this paper is that a critical distinction between First and Third world fisheries management has been neglected in the literature on the development of co-management. Many of the problems identified here can be traced to this confusion. By concentrating on organizing communities and developing policies to support user participation in management, the main problem with the original management system, the absence of an effective governmental presence, has been largely ignored. Design flaws that tend to undermine local participation in the management system have exacerbated this central problem. The result, as the Santarém experience may be illustrating, is a system that is starved for resources and in which the government partner in the co-management system is unable and often unwilling to fulfil its role. This approach is open to the criticism that the whole exercise is little more than a cynical strategy for shifting the cost of fisheries management from the government to the rural poor. In this case, however, relatively straightforward changes in the design of the system could substantially increase the effectiveness and long-term institutional sustainability of the co-management system. It remains to be seen whether IBAMA, the government agency responsible for fisheries management, will be able to make the necessary adjustments.



REFERENCES

Acala A. & Vuse F. 1994. The role of government in coastal resources management. *In* R.S. Pomeroy ed. *Community management and common property of coastal fisheries in Asia and the Pacific: Concepts, methods and experience*. *ICLARM Conf. Proc. 45*. pp. 12-19.

Allegretti M. 1995. Reservas extrativistas: Parâmetros para uma política de desenvolvimento sustentável na Amazônia. *In* R. Arndt ed. *O Destino da Floresta*. Rio de Janeiro, Dumará. pp. 17-47.

Almeida O.T. & McGrath D.G. 2000. Research and intervention for the participatory management of Várzea resources. *Instituto de Pesquisa Ambiental da Amazônia, Santarém*. 24 pp.

Almeida O., McGrath D.G. & Ruffino M.L. 2001. The commercial fisheries of the lower Amazon: An economic analysis. *Fisheries Management and Ecology*, 8: 253-269.

Bayley P. & Petere M. Jr. 1989. Amazon fisheries: Assessment methods, current status and management options. *In* D.P. Dodge ed. *Proceedings of the international large rivers symposium*. *Can. J. Fish. Aquat. Sci. Spec. Publ.*, 106.

Berkes F., Mahon R., McConney P., Pollnac R. & Pomeroy P. 2001. Managing small-scale fisheries: Alternative directions & methods. Ottawa, Canada, IDRC.

Brasil. 1934. Código das Águas. Decreto No 24.643 de 17 de julho de 1934.

De Camargo S.A.F. 2002. Pesca profissional, dilemas e conflitos no reservatório da UHE-Tucurui, PA. São Paulo, Brazil, Tese de Doutorado, CAUNESP.

Castro F. de 2000. *Fishing Accords: The political ecology of fishing intensification in the Amazon*. Dissertation Series No. 4, Bloomington, IN, University of Indiana, Center for Studies of Institutions, Population & Environmental Change.

Castro F. & McGrath D.G. 2003. Moving toward sustainability in the local management of floodplain lake fisheries in the Brazilian Amazon. *Human Organization*, 622:123-133

Chapman M. 1989. The political ecology of fisheries depletion in Amazonia. *Environmental Conservation*, 164: 331-337.

C. P.T. 1992a. *Ribeirinhos: Uma estação de luta*. Dossier 1992. Manaus, Comissão Pastoral da Terra, Regional Amazonas e Roraima.

C.P.T. 1992b. *Os ribeirinhos: Preservação dos Lagos, defesa do meio ambiente e a pesca comercial.* Manaus Comissão Pastoral da Terra, Regional Amazonas e Roraima.

Gillingham S. 2001. Social organization and participatory resource management in Brazilian *Ribeirinho* communities: A case study of the Mamirauá Sustainable Development Reserve, Amazonas. *Society and Natural Resource,s* 14: 803-814.

Goulding M. 1983. Amazonian fisheries. *In* E. Moran ed. *The Dilemma of Amazonian Development*. CO, USA, Westview Press. pp. 189-210.

Gryzbowski C. 1989. *O Testamento do Homem da Floresta, Chico Mendes por Ele Mesmo*. Rio de Janeiro, FASE.

Hartmann W. 1989. Conflitos de pesca em águas interiores da Amazônia e tentativas para sua solução. pp. 103-118 *In Pesca Artesanal: Tradição e Modernidade. III. Encontro de Ciências Sociais e o Mar*. Programa de Pesquisa e Conservação de Áreas Úmidas no Brasil. São Paulo.

Hartmann W. 1990. Por uma co-administração de recursos pesqueiros em aguas interiores da Amazônia. O Caso das comunidades ribeirinhas e pesqueiras do Lago Grande de Monte Alegre. *Populações Humanas, Rios e Mares da Amazônia. IV Encontro de Ciências Sociais e o Mar no Brasil*, 6-9 de junho.

IBAMA Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. 1995. Projeto IARA - Administração dos Recursos Pesqueiros do Médio Amazonas: Estados do Pará e Amazonas. Coleção Meio Ambiente. Série Estudos de Pesca, 15. IBAMA, 100 pp.

IBAMA Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. 1996ª. Portaria Nº 7, de 2 de Fevereiro de 1996.

IBAMA Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. 1996b. Portaria Nº 8, de 2 de Fevereiro de 1996.

IBAMA Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. 2001ª. Instruçã Normativa Nº 19 de 5 de Novembro de 2001.

IBAMA Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. 2001b. Provárzea: Projeto de Manejo dos Recursos Naturais da Várzea, Programa Piloto para a Conservação das Florestas da Amazônia, Brasília, D.F.

IBAMA Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. 2001c. Manual dos agentes ambientais colaboradores. Brasília, D.F.

Isaac V. J., Rocha V. L.C. & Mota S.Q.C. 1993. Considerações Sobre a Legislacão da Piracema e Outras Restriçõoes da Pesca da Região do Médio Amazonas. *In Povos das Águas: Realidade e Perspectiva na Amazônia*. Lourdes F. Gonçalves, Wilma Leitão & Alex F. Mello, eds. pp. 187-212. Belém, Pará, Brazil. Coleção Eduardo Galvão, PR/MCT/CNPq, MPEG.

Junk W. 1984. Ecology, fisheries and fish culture in Amazonia. *In* SIOLI, Harald. *The Amazon: Limnology and landscape ecology of a mighty tropical river and its basin*. Boston, MA, USA, Dr. W. Junk Publishers. Vol. 58(1984): 443-476.

Jentoft S. & McCay B. 1995. User participation in fisheries management. *Marine Policy*, 193: 227-246.

Kolk A. 1998. From conflict to cooperation: International policies to protect the Brazilian Amazon. *World Development*, 268: 1481-1493.

Leroy J.P. 1991. *Uma Chama na Amazônia*. Vozes. Rio de Janeiro, Brazil. 213 pp.

Lima D. 1999. Equity, sustainable development and biodiversity preservation: Some questions on the ecological partnership in the Brazilian Amazon. *In* C. Padoch, M. Ayres, M. Pinedo-Vasquez & A. Henderson eds. Conservation and development of Amazonian Varzea. New York: New York Botanical Garden Press. pp. 247-263.

McDaniel J. 1997. Communal fisheries management in the Peruvian Amazon. *Human Organization*, 562: 147-152.

McGoodwin J.R. 1990. *Crisis in the world's fisheries: People, problems, and policies*. Stanford, Stanford University Press. 235 pp.

McGrath D. 2000. Avoiding a tragedy of the commons: Recent developments in the management of Amazonian Fisheries. *In* A. Hall ed. *Amazonia at the Crossroads*. London: Institute of Latin American Studies. pp. 171-197.

McGrath D., Castro F., Futemma C.RT., Amaral B. D. & Calabria, J. 1993. Fisheries and the evolution of resource management on the Lower Amazon Floodplain. *Human Ecology*, 212: 167-95.

McGrath D., Castro F., Camara E. & Futemma C.R.T. 1999. Community management of floodplain lakes and the sustainable development of Amazonian fisheries. *In* C. Padoch, M. Ayres, M. Pinedo-Vasques & A. Henderson eds. *Varzea: Diversity, development, and conservation of Amazonia's whitewater floodplains. Advances in economic botany*, Vol. 13. New York, The New York Botanical Garden Press. pp. 59-82.

Oliveira A.C. & Cunha L.H. 2002. Manejo comunitário de lagos en la planicie inundable de la cuenca media del río Solimões, Estado de Amazonas, Brasil: um modelo de preservaçión en transformación. *In* R.C. Smith & D. Pinedo eds. *El Cuidado de los Bienes Comunes*. Lima, Peru, Instituto de Estudios Peruanos e Instituo del Bien Común. pp. 244-271.

Ostrum E. 1998. A behavioral approach to the rational choice theory of collective action. *American Political Science Review*, Vol. 921: 1-22.

Pereira H. dos Santos. 2002. Economia institucional da co-gestão de recursos pesqueiros na várzea do Rio Amazonas. Provárzea. Manaus, AM, IBAMA.

Pinkerton E. ed. 1992. Translating legal rights into management practice: Overcoming barriers to the exercise of co-management. *Human Organization*, 514: 330-41.

Schwartzman S. 1989. Extractive reserves: The rubber tappers' strategy for sustainable use of the Amazon rainforest. *In* J. Browder ed. *Fragile lands of Latin America: Strategies for sustainable development*. Boulder, CO, USA, Westview Press. pp. 150-165.

Sen S. & Nielsen J.R. 1996. Fisheries co-management: A comparative analysis. *Marine Policy*, 20: 405-418.

Smith N. 1985. The impact of cultural and ecological change on Amazonian fisheries. *Biological Conservation*, 32: 355-373.

Sunderlin W.D.R. & Gorospe M.L.G. 1997. Fishers' organizations and modes of co-management: The case of San Miguel Bay, Philippines. *Human Organization*, 56(3): 333-343.

Veríssimo J. 1970. *A Pesca na Amazônia*. Rio de Janeiro, Universidade Federal do Pará. 195 pp.