FIELD EVALUATION

Socio-economic situation of fishing communities at the San Francisco River – Brazil

An independent and rapid assessment

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1. INTRODUCTION

The current report is the outcome of fieldwork carried out in the states of Minas Gerais and Alagoas, Brazil, from June 25 to July 14, 2003. Throughout this period we received the support of many people and institutions, including heads of fisher organizations (Colônias de pescadores) and fisher associations, several government agencies and non-governmental organisations (NGOs), as well as a number of fisher families in all localities we visited. Several other researchers accompanied us in several parts of the trip, giving valuable contributions. We thank them all!

In general, many artisanal fisheries in traditional riverine and coastal communities from different Brazilian regions are now experiencing a crisis. The reasons behind this situation are diverse and vary from place to place. Among these are population growth, social exclusion of traditional fishers, conflicts between traditional fishers and other more powerful resource users, and overfishing.

Hence, there is an urgent need to develop management strategies to ensure a socially just and environmentally sustainable resource use among all fishing and water resource users. Otherwise, traditional fishing communities are at risk to become even more socially excluded and their livelihoods become threatened. For fisher families fishing means not only the everyday searching for food, but it constitutes a main cultural factor that builds the livelihoods of fishing communities.

Co-management is a way to better regulate fishing methods, catch, closing seasons and areas (Nogara 2000, p.136). This report presents some of the environmental and socio-economic baseline information needed for the *rapid assessment* on chances of success in implementing a co-management arrangement for the San Francisco (SF) river basin.

1.1 Main objectives

- 1.) Survey the main environmental and socio-economic problems regarding fisheries in the studied communities
- 2.) Get IARA agent familiar with conditions at the project's focal area for a possible adaptation of the *Acordos de Pesca* (fishing agreements) methodology (developed by IARA) for the San Francisco River
- 3.) Discuss with local leaders and government representatives the current fishery situation and possible solutions, and at the end, identify possible actions the project may take to improve such situation
- 4.) Assess existing capacities at local communities and municipalities and their potential for comanagement
- 5.) Propose appropriate indicators for monitoring the project

1.2 Research methods

Much research has been carried out on San Francisco fisheries (Thé, Madi & Nordi s.d., Godinho & Godinho s.d., Valêncio et ali. s.d., among others). Hence, in this report on the assessment of the socio-economic situation of fishing communities at the higher, middle and lower San

Francisco¹, our main focus is on the analysis of data obtained during fieldwork. In particular, we focus our analysis on the focal areas identified by the project (see map at Figure 1).

Because the project aims to expand and build new capacities for sustainable development of fishing communities, we adapted a participatory research approach. However, because of the short time we spent in the field, it was not possible to establish strong interactions with local people as required by such approach. To compensate this problem, we seek to be in accordance with the main objectives of such approach to during interviews and meetings. According to Thiollent (2002), these are to identify priorities among the problems to be tackled while searching for solutions that create a better understanding of the current situation and to search for solutions, increasing the knowledge of the people and the groups involved. One of our main research task was to identify the priority order of problems to be addressed and the possible viable solutions to be implemented.

Our field research focused on identifying and valuing community resources and existing capabilities. It is quite important to know the capabilities and limitations of communities. In order to get such information we adapted the *asset based community development* approach (Foster & Mathie 2003) and the *capacity assessment* approach (Markey et ali. 2001). Such approaches are based on *appreciative inquire*, that means, on valuing communities' existing capabilities and on identifying their needs. These perspectives involve the identification and mobilisation of social capital for community development².

Fieldwork took place from June 25 to July 14, 2003. Many municipalities were visited along the SF River, in addition to the municipality of Buritis, which is located along one of SF tributary rivers - Rio Urucaia. In Minas Gerais, we visited Três Marias, Pirapora, Buritizeiros, São Francisco, Januária, Pedras de Maria da Cruz and Buritis. In Alagoas, we visited Piranhas, Entremontes, Penedo and Marituba do Peixe.

During the first two days (a boat trip from Três Marias to Pirapora, Minas Gerais State), Jutta Gutberlet was joined by Mr. Norberto (Colônia Z5), Ana Thé (Federal University at São Carlos) and Regina Cerdeira (IARA). The head of the Minas Gerais Fisher Federation, Mr. Raimundo, joined the rest of trip in that state. Cristiana Seixas participated on the trip from Pirapora to São Francisco. In the Alagoas State, Jutta Gutberlet was joined by Sineide Silva Montenegro and Fátima de Sá from Alagoas Federal University (UFAL).

¹ The San Francisco river basin is sub-divided into four sections: higher, middle, sub-middle, and lower. The higher part correspond from the source to Pirapora (630 km in length), the middle part runs from Pirapora to Remanso (1,090 km), the sub-middle part runs from Remanso to the old Paulo Afonso falls (686 km), and the lower runs from that point to the river mouth (274 km).

² See also Kretzmann & McKnight 1993.

Figure 1: The study region



In all municipalities and communities we visited, meetings and interviews were held with leaders of civil society and representatives of some government agencies. We interviewed the head of fisher organisations (Colônia de Pescadores) or fisher associations and government agents responsible for the enforcement of regulations from the Brazilian Agency for the Environment and Natural Resources (IBAMA³), the State Institute of Forests (IEF⁴) of Minas Gerais, and the Environmental Police⁵. Representatives from City Hall and municipal secretaries such as the Municipal Secretary for Environment and Tourism) and local leaders such as university professors, environmentalists, and NGO members were also interviewed. We further carried out semi-structured interviews with randomly chosen fishers and their families, including fisherwomen. We intended to diversity the opinions about fisheries and water resource issues.

The interview structure was aimed to explore the socio-economic and environmental universe of local communities (see questionnaire in Appendix 1 - in Portuguese), and questions were mainly open-ended ones. Interviews were carried out individually or in-group. Time spent in each interview varied from 20 min to 2 hours, according to interviewee availability. Despite the short time we spent in each locality, we also interacted with other locals and made several observations to complement our understanding of the local cultural and ecological diversity.

In some localities meetings were held with large groups of fishers and government and NGO representatives. In these cases, data collection was based on focal discussion about the fisheries, the river and resource management issues at each locality. In each municipality, we tried to assess the available infrastructure for carrying out workshops and meetings.

To a certain point, our fieldwork has already made a contribution in preparing local communities for co-management – as specified at the project proposal. During the first part of the trip (from Belo Horizonte to Pirapora, MG), Regina Cerdeira from IARA helped us to get familiar with the IARA methodology on *acordos de pesca* (fishing agreements) (Castro 2000). She introduced the topic during meetings with fishers, government agencies and ONGs. The idea of fishing agreements was carried on farther to other communities and municipalities visited.

As mentioned before, the short time available to research each locality became a constraint to this research. Nevertheless, the initial idea was to carry out a *rapid assessment*. Hence, the current report is not a deep study with detailed information, but the result of an effort to get a general understanding of the local scenarios and to identify key actions that may be taken to solve the conflicts identified.

³ Instituto do Meio Ambiente e dos Recursos Naturais Renováveis

⁴ Instituto Estadual de Florestas

⁵ Polícia Militar Ambiental

2. RESULTS AND DISCUSSION

In this section, we discuss our main research findings concerning (1) major stakeholder groups involved in fisheries and water management; (2) the local socio-economy; (3) social mobilisation and leadership; (4) environmental impacts; and (5) stakeholder conflicts.

2.1 Major stakeholder groups

Fishers (professionals, sport)

In all municipalities visited there is already a certain degree of organisation among fishers, through the Colônia de Pescadores or Fisher Associations. The way each of these organisations works varies according to their history and engagement with the fishers' concerns. The total number of fishers affiliated to each organisation varies from region to region. There is however a high number of full-time fishers who are unaffiliated – often this number is even higher than that of affiliated fishers. The unaffiliated fishers are known as "gancheiros" by the affiliated ones. They carry out their fishing activity and market their products as professionals, but do not pay tax nor do they have a fishing license. Unaffiliated fishers do not receive insurance benefits, such as "unemployment insurance" during the closed fishing seasons which means that they continue fishing during the closed seasons, risking being caught (and getting a fine or losing gear).

Farmers

Farming (both agriculture and cattle ranching) occurs in several parts of the SF Basin, sometime right on the river margins. Most farms are quite large. In the higher and middle SF River, cattle ranches predominate but there are also some fruit farms and other plantations (annual and perennial). Close to the river mouth in the lower SF River, however, sugar cane monocultures are continually expanding. These are usually large farms and their owner sometimes also own alcohol and sugar industries. These large farmers are usually very powerful and influential and may hold close ties with politicians from different administrative levels. The initial contact with those farmers may be done through their union representatives or government agents who assist them.

<u>CHESF</u>

The SF Hydroelectric Company (CHESF⁶) was created by a Law Decree in 1945. It is one of the biggest companies of the electric power sector in Brazil. The company owns 14 hydroelectric plants, nine of which located at the SF river. 97% of the energy generated by CHESF benefits 42 millions of people in eight states of the Northeast region of the country. This company holds a lot of decision-making power concerning development issues in the Northeast region.

<u>CEMIG</u>

The Energetic Company of Minas Gerais (CEMIG⁷) controls the generation of hydroelectric energy in the higher and middle SF basin, including the Três Marias plant. This company holds a lot of decision-making power, and decision-making concerning the SF river management has not been quite democratic.

⁶ Companhia Hidroelétrica do São Francisco

⁷ Companhia Energética de Minas Gerais

CODEVASF

The Company for the Development of SF Valley (CODEVASF⁸) promotes several activities in the region, including capacity building and implementation of fish farming projects, particularly with tilapia – an exotic species. In Xingó, CODEVASF operates a capacity building centre, a fish farming training station, and a fish processing plant. It has good resources and infrastructure. Nevertheless, the company's interests are not always in accordance with the use of sustainable technology for small-scale fisheries, neither are they adequate to local conditions. Local fishers have not yet received the deserved attention from this company.

ANA⁹

The National Water Agency develops projects on water management (see: http://www.ana.gov.br/).

Environmentalists

During fieldwork we identified several environmental NGOs (see contact list). In general, their performances are punctual and quite restricted by the small amount of financial resources they have. The few NGOs we contacted seemed to be aware of the important role fishers play in conserving the river, and hence these NGOs support the fisher category.

Public authorities at local, state, federal levels

In Minas Gerais many municipal public authorities are experiencing financial and political crisis. In Januária and São Francisco, for example, the municipal executive is paralysed due to an inquiry of corruption and nepotism. These cities' Majors have recently been impeached.

Not all municipalities are well structured to deal with environmental and natural resources management issues. However, in almost all municipalities we could identify people who work for the municipal government and who are interested to deal with such issues. This means that there is a potential to strengthen the local existing structures and hence to amplify local actions towards the environment.

In Minas Gerais, the State Institute of Forests (IEF) is responsible for enforcing fishery regulations jointly with the Environmental Police. Both agencies have bureaus in all municipalities we visited. Fishers consider IEF and Environmental Police actions as repressive. In many municipalities there is no dialogue between IEF/Police agents and fishers.

Despite the fact that IBAMA (a federal agency) has bureaus in several of the municipalities we visited, this agency often acts together with state agencies such as IEF and Environmental Police. IBAMA has not much direct action in enforcing fisheries and water resources uses in this area. However, there are human resources available in IBAMA, which could be better utilised to preserve the river.

⁸ Companhia de Desenvolvimento do Vale do São Francisco

⁹ Agência Nacional de Águas

In 2003, a new federal agency responsible for fisheries and aquaculture (SAP¹⁰) was created. However, it is still too early to assess their role in managing water and fishing resources at the SF river. This agency is expected to play an important role in solving social and environmental problems at the SF river basin.

Watershed management committee

The Watershed management committees are part of the federal government policy for water management. At the SF river basin, discussions about the Watershed Committee varies from place to place. In the state of Alagoas, e.g. some actions have been taken to mobilise people to form sub-basin committees. The current project could work jointly with the Watershed Committee in order to cooperate in planning and implementation of the Committee's activities, such as:

- Implementation of workshops to discuss environmental impacts of waste mismanagement, selective waste collection, recycling and handcrafting,
- Survey of marginal lagoons distribution and their environmental status,
- Workshops to inform about environmental and fisheries legislations.

2.2 Socio-economic scenario

The following information was obtained through individual interviews in each municipality. It is important to note that due to time constraints, only a limited number of interviews were performed. Hence the data presented below should be seen as qualitative information with no statistical value.

The income of professional fishers varies from place to place. In Três Marias, there are two fisher groups: lake fishers and river fishers. The net income of lake fishers is about R\$ 200 to R\$ 300 per week, while net income of river fishers is about R\$ 100 to R\$ 200 per week. Fishing expenses are about R\$ 80/week. In lake fisheries, those who own boats and gears make much more money than fishers who work for middlemen.

In São Francisco city, river fishers make between R\$ 80 to R\$ 300 per month according to the season. During the "clear water" season (no rain) fish is more rare and expensive. During the "dirty water" season, fish is abundant and a fisher can make up to R\$ 120 on a good fishing day. Nevertheless, fish is becoming scarcer in recent years.

In Januária, a fisher can make up to R\$ 300/month during a good fishing month.

In Buritis, fishing net income for "encircling fishing" (*pesca em rodada*) varies between R\$ 150 to R\$ 400. Fishing expenses are high due to transportation (average of R\$ 20/5 km) and the cost of ice.

In the lower SF basin, fishers' economic situation is even worse. In Entremontes, during the low fishing season, a fisher makes only R\$ 20/week. For that reason those working at the Xingó fish processing plant are satisfied with a salary of R\$ 200/month (working 8h/day).

¹⁰ Secretaria Especial de Aqüicultura e Pesca

The *pitu* (fresh-water shrimp) fishery has declined drastically during the last decade. In 1998, Entremontes' and Piranhas' fishers had an average net income of R\$ 100/month (Montenegro 2001, p. 3). According to fishers, nowadays the situation is even worse. Some affirmed that sometimes they capture no *pitu* at all – which is an indicator that fisheries are drastically declining.

In Marituba do Peixe, the fishers' income before the construction of the hydroelectric dam (about six years ago) was about R\$ 150 to R \$200 per day. Nowadays, the monthly fishing income is about R\$ 80. Income from temporary jobs on farms is much better; for example, working in sugar-cane cutting yields R\$24/day (or a little over R\$500/month). Day labour on farm jobs usually make R\$ 10/day.

It is quite common to see fishers involved in subsistence agriculture along all the SF river basin. Several fishers have their gardens along the river floodplain and terraces. In general, these are also the places where fishers camp. Food production (corn, bean, rice, pumpkin, etc) is very important in helping secure the fishers' livelihoods.

Many fishers (including retired ones) produce and repair their gear. We didn't notice women's involvement in such activities. Neither did we notice fishers who produced gear for selling in the communities visited.

2.2.1 Social exclusion

Field data reveals some differences in terms of infrastructure access among fisher families. In general, families living in cities have access to water and electricity. However, not all neighbourhoods benefit from waste collection. In all municipalities, sewage is drained into septic tanks or directly into the river with no previous treatment. This situation may start changing as some municipalities (e.g., Buritis) have already plans for building a sewage treatment station.

For riverine people, access to basic infrastructure often resumes in energy provision only. Drinking water often comes from wells or direct from the river with no treatment. Household waste is not collected, but burned, buried or deposited on vacant lots.

Children from riverine households often have to commute daily to school, by boat through the river or through roads. As rural schools were closed, these children have to travel longer distances. The Federal Government's *bolsa escola* program has encouraged the participation of rural children in formal schooling.

In general, we observed a low self-esteem among fisher families. Fishers and their families are marginalized and treated as inferior by the government and the civil society as a whole. Fishers often have little or no participation in policy decision-making at the municipal level or in committees and council boards. Representation of fisher interests is quite low. In addition, the low educational level that still prevails among fisher families contributes to the maintenance of prejudice against them and their social exclusion.

Nevertheless, we observed some cases where such stagnation and exclusion seems to be changing due to a recent mobilisation of fishers. For example, in the municipalities of Maria da Cruz, Buritis and Penedo, fishers are more actively engaging in social mobilisation, and participating in meetings, workshops, lectures, etc, to discuss their situation and search for solutions to their problems.

2.2.2 Women participation in fisheries

Despite the fact that fishing is typically a male activity, there are also some fisherwomen. Only in a few places, however, fisherwomen are organised. An exception are the fisherwomen from Penedo. They created a Fisherwomen Association,¹¹ which is mobilising women who develop fishing-related work to demand better working and livelihood conditions. This association has a very active agenda to work with women from the lower SF river region. It is also co-ordinating its actions with both the Colônia de Pescadores and the Watershed Committee working in that region.

According to Marques' (1992) report, in the early 1990's there were some active fisherwomen in Marituba do Peixe. During that time, local men considered one of these women really *a fisher*, because she used gear exclusively used by men such as *covo*, gillnet (*rede de travessa*) and cast-net. The rest of the women used hook-and-line (*anzol-de-vara*), *bóia, jereré-de-cabo, jereré-redondo* and *linha de mão*. Some of the gear, such as *jereré*, are not used by fishermen. Marques' (1992, p. 50) results indicate that, in this area, women do not usually fish as men do. Women normally fish when men are sick or when needed. Often, child education is different between girls and boys; the former learn straw crafting and the latter learn to fish (Marques, 1992, p. 51).

In one of our interviews in the lower SF River, a riverine man mentioned that his former wife fishes as a professional. Similar cases, in which women became professional fishers because they want to, or because they need to, are no exceptions. Once women get affiliated to the Colonia, they enjoy the same benefits given to all fishers, which makes a big difference to their family income.

2.2.3 Middlemen and patronage systems

Middlemen in fish commercialisation were detected in almost all places visited. It was not possible, however, to carry a detailed investigation on the relationship between middlemen and fishers. We observed, however, that even when fishers get self-organised to acquire a place to market their product – as it occurred in Três Marias – those fishers who acquired such a place often become middlemen themselves; i.e., they buy fish from other fishers at a lower price and re-sell it in that place. It would be worth investigating to what extent middlemen explore, in a negative sense, such situation or if they play an important role between fishers and the market.

Most likely, there are still patronage systems in the SF river basin. During this rapid survey, we heard about a patronage system in Barra de Guaicui, in a SF river tributary. According to a fisher, the buyer (middlemen) supplies the boat, fuel and ice to the fisher, who in return sells all his

¹¹ Associação das Mulheres Pescadeiras

catch to this middleman. The problem is that in many cases, fishers will only increase their debts, as they cannot make enough money to pay the middlemen back.

It was mentioned during an interview that a cold storage plan (Frigorífico) in Pirapora supplies ice, fuel, and even transportation for fishers to get to their fishing spots (sometimes a 100 km away). We also observed that the Colônia Z-3 in São Francisco city operates a fish warehouse. This Colônia provides ice and money in advance to pay bills (water, electricity, medicines) to those fishers who sell their catches to it. Nevertheless, we were not able to verify if the Colônia pays lower prices than the overall market. In both cases, the Frigorífico and the Colônia, there may be a patronage system guiding the relations between them and the fishers; on the other hand, the current system may simply reflect the local market rules.

2.3 Social mobilisation and leadership

Colônia/Federation

Through this survey, we noticed that some colônias were well structured and apparently well organised, such as the case of Z-3 in São Francisco and Z-12 in Penedo. In Buritis, we participated in a meeting called by the Colônia Z-11 and we were able to assess *in situ* this organisation's mobilising potential. During our visit to Januária, the local Colônia head also called a meeting; nevertheless, a few fishers attended it. In Penedo, another meeting occurred during our stay there, involving the board of directors of the Colônia and some fishers. At that same day, however, the National Secretary of Fisheries and Acquaculture (from Brasilia) was visiting the city and the head of Colônia was also celebrating his birthday. Hence not many fishers attended the meeting.

Colônia Z-11 in Buritis demonstrated to hold a good mobilising capacity. Both the heads of the Colônia Z-11 (Buritis) and the Colônia Z-3 (São Francisco) seem to have strong local leaderships; on the other hand, the heads of Z-1 (Pirapora) and Z-2 (Januária) seemed to not be responding to the fishers' needs.

Although there are many affiliated fishers in almost all Colônias, the large part of them do not pay the annual fee nor do they participate in meetings and discussions. There is a huge discredit of unaffiliated fishers concerning the Colônia administration. This is in part reflects the culture of corruption established in many of these Colônias, during current or past administrations, such as the cases of the Colônias in Januária, Minas Gerais, and in Pão de Açúcar, Alagoas. Moreover, most of the unaffiliated fishers lack information about the benefits of affiliation.

Some Colônias hold monthly meetings, but in many cases fishers are not willing to participate. It might be the result of fishers' lack of confidence in the mobilising capabilities of their class to change issues of concern. They might be tired of simply receiving information, and not seeing their opinions and knowledge being used by their representatives in order to improve their situation. Hence, it is important that this project aims to value the fisher's knowledge and time when calling meetings during the co-management process.

Community radios are available in almost all places visited, but it is not always used as a mobilisation tool by the Colônias. Radio seems to be a very important media for fishers; all fishers interviewed regularly listened to community radio.

Apparently, the fisher organisation at the state level (Fisher Federation¹²) in Minas Gerais has done a good job in diffusing information regarding fisher rights (such as unemployment insurance, maternity leave, retirement payment, etc) in all Colônias of that state. The Fisher Federation has also shown its mobilising potential when organising together with several Colônias the largest public hearing of the Legislative Assembly of Minas Gerais, to discuss fishing management in this state (more than 2,000 fishers attended it). The head of Fisher Federation is also involved in several committees and councils related to environmental issues at municipal (Três Marias) and state levels. This demonstrates the capability to articulate and mobilise people and agencies for the co-management process.

Some of the Colônias in Alagoas need to be reorganised, because, as in the case of Minas Gerais, there is a culture of corruption, clientelism and long-stand power maintenance; issues that need to be overcome.

Community associations

Community associations were found in several cities. Some represented different neighbourhoods (e.g., 150 associations in São Francisco city) and others represented groups of people working in the same subject, such as washerwomen and embroiders. Here we focus only on community associations related to fisheries.

In Pedras de Maria da Cruz, Minas Gerais, the local Fisher Association has shown to be able to mobilise local fishers as well as fishers from distant areas. It deals with fisheries issues and also takes other actions such as organising the community for collecting garbage from the river. This association is independent from Colônia Z-2 in Januária.

In Entremontes, Alagoas, the local Fisher Association¹³ jointed the Colônia de Pescadores Z-25 in Piranhas. The head of the Colônia, also a member of the Fisher Association, seems to be a local leader. However, the Colônia was reactivated only recently and hence it is difficult to assess its mobilising capacity. It is clear however that there is a group of fishers willing to change their current situation.

The Penedo Fisherwomen Group¹⁴ is an association related to and part of the Colônia de Pescadores Z-12 in Penedo. This group gathers 24 women who fish *pitu* (fresh-water shrimp) using *puça* as a gear and fish with gillnets (*rede de travessia*). Many other women however are still unaffiliated. The group mobilises women from 13 municipalities under Z-12 jurisdiction and meet twice a month, besides participating in other regional and state meetings and workshops. It is a well-articulated group carrying co-operative projects with the Fisher Pastoral, SEBRAE, and a group from Netherlands to develop a fish processing plant. Further, this group has previous experience in organising workshops.

¹² Federação de Pescadores

¹³ Associação de Pescadores

¹⁴ Grupo de Mulheres Pescadeiras de Penedo

Environmental NGOs

Overall we did not identify many environmental NGOs in the municipalities we visited. We may cite only few.

The Angels of São Francisco¹⁵ are volunteer environmental agents that monitor the river and are found in some of the places we visited. They were trained by the Minas Gerais Military Police and by the Ministry of the Environment in collaboration with environmental agencies, which are developing a revitalisation project in the SF river basin¹⁶. The Angels of São Francisco are a potential partner for the project.

In Pirapora, the São Francisco de Assis Ecological Movement¹⁷ seems to be demobilised, according to an informant. Another NGO found in Pirapora is the Minas Gerais Nature Conservancy Centre¹⁸, which develops the " $Oia \ o \ Chico$ " Program ("Look after the SF river") through a recent environmental proposal that involves the state and federal governments.

In Buritis, the Integrated Environmental Association of Buritis¹⁹ (ABIMA) aims to deal with issues related to waste management, agrotoxic boxes, environmental education, reforestation and river revitalisation. Many other actors in this municipality are concerned with and involved in environment issues, including local environmentalists, the Municipal Secretary for the Environment, the Municipal Secretary for Agriculture, and the Municipal Common Council.

2.4 Environment impacts

Interviews with fishers and their representatives show their local knowledge about the river. Fishers depend on the river and explore it almost every day. Hence, they can really identify on going changes in the river, although they may not know the reasons behind these changes. Fishers, both men and women, are potential collaborators for the project, as they may act as environmental monitoring agents. They have already identified several environment impacts at the SF River (see Table 1a and 1b in Appendix 2 - in Portuguese). In the following sub-sections we will address the main environmental impacts identified during our fieldtrip and interviews made, and some confirmed by the existing literature.

2.4.1 Water pollution

Sewage drainage into the river implicates in lowering river water quality and in threatening people's health, particular for those depending exclusively on the river as drinking water. All municipalities, villages and communities we visited drain sewage directly into the river. Moreover, the SF River receives industrial discharge and household sewage through its

¹⁵ Anjos do São Francisco

¹⁶ Projeto de Revitalização da Bacia do Rio São Francisco

¹⁷ Movimento Ecológico São Francisco de Assis

¹⁸ Centro de Conservação da Natureza (CCN) de Minas Gerais

¹⁹ Associação Buritinense Integrada de Meio Ambiente (ABIMA)

tributaries rivers, such as the Rio das Velhas which brings into the SF river all the discharges and sewage from the major metropolis Belo Horizonte.

Nowadays, water supply is contaminated by sewage and discharges in even small localities. In Marituba do Peixe, for example, a fish-farming project is located close to a sewage draining spot and a fisher port, a place also shared by washerwomen. It is not surprising that water quality analysis show high concentration of Faecal Coliforms (Prof. Fátima, UFAL, pers. comm.).

Lack of urban waste management is a severe problem in all localities visited, despite the locality size. Many municipalities collect urban waste, at least in the most accessible areas. However, the final destination of the waste is inappropriate in all places. Often, it is dumped into open areas in the cities' surroundings; this may cause water table contamination. It may also be dispersed by winds and it may pollute the river. In less urbanised neighbourhoods and in riverine communities urban waste is not collected at all; part of it is burnt (causing air pollution), buried (causing water table pollution) or dumped into open areas (*lixões*) (which may be dispersed by wind).

In addition to health and environmental problems, the lack of urban waste management may be detrimental for the tourism sector. Garbage on the roadside and everywhere else is not the best post card for promoting tourism in a city.

None of the municipalities visited has a waste management plan in action (e.g., recycling, separate collection of recyclables). Some Secretaries, however, already understand the importance of waste management. There is a potential to receive their support to work towards this front. As a matter of fact, many ideas were discussed with government agents and fisher representatives about educating people on waste management. There is also an urgent need to elaborate a solid waste management plan to minimise domestic waste generation and to promote recycling and selective waste collection using agents who already work in this field.

In several parts of the river, industrial pollution is already a problem. According to interviewees, one of the most serious examples is the Metal Mining Company²⁰ (CMM) in Três Marias. This company has been polluting river water for decades and is often responsible for fish slaughter downstream after industrial discharge. Lately this situation is improving after the construction of a decanting tank and the hiring of an environmental engineering to deal with environmental problems.

Not much has been done to reduce agro-business pollution, mainly by agrotoxic substances. Fishers often mention problems resulted from water contamination by agriculture. The development of large-scale agriculture also contributes to the deforestation of Cerrado (savannah) and of the gallery forests (*mata ciliar*), provoking erosion. Small and large irrigation projects are found along the SF River. They remove water for both agriculture and cattle raising.

The large cattle-raising impact on river quality is related to deforestation of the gallery forests of the main river and its tributaries. With deforestation, many food chains involving species, including fish, that feed on fruits and leaves of the gallery forest trees are interrupted. Hillside

²⁰ Companhia Mineira de Metais

erosion becomes also a problem due to the lack of tree roots to hold land. This on turn leads to river siltation. In addition, farmers do often build dams on marginal lagoons to provide cattle with water.

Hydroelectric plants are also seen as water polluters due to the change in water temperature and the discharge of contaminants. In Três Marias, fishers observed deposition of layer (probably algae) on vegetation leaves found on sand banks along the river, downstream the dam. Fishers believe there is a close relation between this algae growth and the substances used to clean the turbines. They also believe that these substances are the chemicals causing skin problems in cast-net fishers (Santos & Marques 2003).

2.4.2 River physical changes

Among the major causes of change in water flow at the SF River is the construction of largescale dams for the generation of hydroelectric power and the small-scale dams built on marginal lakes and small tributaries for farming purposes. The influences of a dam on the water level may extend to hundreds of kilometres both upstream and downstream. Upstream, habitats change from lotic to lentic. Downstream, a dam disturbs the natural seasonal floods that normally allow fish into and out of the marginal lakes – a breeding ground for many species. In addition, a dam becomes an obstacle for migratory fish – the main commercial fish species at the SF river basin. Hence, dam construction affects fish species composition, both upstream (habitat change) and downstream (lack of floods). Socio-economic impacts of a dam vary from the replacement of riverine population upstream to the several environmental changes downstream causing many problems to fishing communities. We expand on some of these issues.

In tropical floodplains systems– such as the area of the middle SF river– some fish species reproduction depend on moon-phase variation, and floods seem to be the most important regulatory factor for spawning for some species. Marginal lakes on the floodplain area, in which water level changes according to river floods, are known as natural breeding spots for many migratory fish species (locally know as *piracema* fish). Hence fish stocks are directly related to floodplain extension. Changing water regimes affect floodplain areas and in turn fish populations (Melo, Souza Rosa, Silva & Pinto 2003). Local fishers are quite familiar with such factors due to their experiences; as well, scientists have known the ecology of many fish species in this area for decades (Thé, Madi & Nordi s.d., p. 392). Both local and scientific knowledge was systematically disregarded in decision-making concerning water resource uses at the SF River Basin.

Before the Três Marias dam was built, the SF river floodplains were full of marginal lakes (see research cited by Jiménez, Godinho e Petrere Jr. s.d., p. 379). Nowadays, fishers, from both the high-middle and the lower SF river, complain about the dams built on marginal lakes by farmers, who use the water for agriculture and cattle raising.

In addition to changing water flow, dams by hydroelectric plants also change the physicalchemical composition of the water. For example, they change the cycles of "clear water" and "dirty water" (floods) disturbing the fish spawning. In Três Marias, fishers observed a slower water flow inside the dam area and the formation of sand banks where plants grow downstream. River siltation is a serious problem; it modifies water flow and its course and negatively affects fishing and transportation. Sand mining activities in some parts of the river may help reverse siltation, but, on the other hand, it also modifies water flow and its course.

Fishers from Piranhas, Entremontes and even Penedo, talk about the disastrous consequences of hydroelectric plant constructions, including the Xingó plant, operated by CHESF since 1996. Change in water flow impacts on the reproduction of many fish species. In addition, introduction of exotic and aloctone species after dam construction (e.g., tucunaré –see below) has negatively affected the natural fishing stocks in general (Montenegro, Nordi & Marques 2001, p. 5). In Piranhas and Entremontes region, the *pitu* fishery – a very important commercial fishery – became not feasible as *pitu* needs to migrate downstream to the estuary for spawning.

Based on their previous experiences, fishers from Piranhas, Entremontes and surrounding areas are now quite worried about the rumour of the construction of a new dam at the SF river near Piranhas. During the fieldwork we were unable to get more information on this matter; but we would like to call attention for the importance of developing a transparent planning for such a plant, so that fishers, the most affected group concerning changes in the river, are aware of all the plans.

2.4.3 Change in vegetation

Deforestation in the SF river basin is a big problem. Mining development increased demands for charcoal. Large extensions of the natural Cerrado vegetation in Minas Gerais area have been cut down. This is an ongoing process, and many trucks filled with charcoal travel towards mining industries every day on the roads in Minas Gerais. Meanwhile, eucalyptus and pine monocultures are expanding in this state.

Deforestation of the river gallery forest is also a serious problem. Hillside erosion due to the missing tree root system is a visible process, which can produce big impacts. Lack of vegetation along the river margins rapidly increases the siltation process, which may even lead to difficulties in transportation along the river.

We observed gallery forest deforestation in areas in Minas Gerais and Alagoas/Sergipe. In Alagoas, the expansion of sugar-cane monoculture is the main factor of deforestation. There is quite a strong economic power behind such activities, what may explain the inertia of enforcement agencies responsible for environmental monitoring.

2.4.4 Change in fishing resources

Introduction of exotic²¹ and aloctone²² species

The problems caused by the introduction of exotic and aloctone species in aquatic environments are well known in the literature. In many cases, introduced species compete with native species

²¹ Species from and naturally occurring in other countries' water, despite of previous introduction in Brazilian water.

²² Species from and naturally occurring in other Brazilian water basin different the one studied.

for food and habitat, or the former are a predator of the latter, leading to local extinction of many native species. In other cases, introduced species carry diseases not previously faced by native species, hence generating a large slaughter of the former. In the SF River, one of the most known aloctone species is the Tucunaré (Cichla ocellaris) from the Amazon river basin, a very efficient piscivorous species able to colonise diverse habitats. Since 1984, when it started to appear in fishers' catches, the percentage of Tucunaré on the overall catch has been increasing considerably (Sato e Goldinho 1988). Tambaqui (Colossoma macropomum) is another species introduced from the Amazon River basin. Another aloctone species is pescada-do-piau (Plagioscion squamosissimus) from the Paranaíba River, the most captured non-migratory species in Sobradinho dam. Tilápia (Oreochromis nornorum) is the most captured exotic species at the Itaparica dam. There are some fish farming projects using Tilápia in some parts of the SF river (Sato e Goldinho s.d.). According to Portaria 145/98 from IBAMA, aloctone species found at the SF river basin are Tucunaré (Cichla ocellaris), Apaiari (Astronotus ocellatus), Tambaqui (Colossoma macropomum), Pacu caranha (Piaractus mesopotâmicus), Pescada do Piauí (Plagioscion squamosissimus), Pirapitinga (Colossoma brachipomum), and Tambacu (Hybrid: TambaquiXpacu). The exotic species found there are Carpa comum (Cyprinus carpio), Carpa prateada (Hypophthamictys molitrix), Tilápia nilótica (Oreochromis niloticus), Tilápia (Oreochromis nornorum), Carpa cabeça grande (Aristichthys nobilis), Camarão gigante da Malásia (Macrobrachium rosenbergii), and Tilápia vermelha (Hybrid).

Decreasing in autoctone²³ native species

Several factors have contributed to a quantitative and qualitative decrease in the native icthiofauna biodiversity. Among these, we point out changes in natural habitats and riverbed (addressed in item 4.4.2), introduction of exotic and aloctone species (addressed above), predatory fisheries (addressed below), and river water pollution (addressed in item 4.4.1). Changes in the habitat of native species and riverbeds result mainly from (1) damming up the river in several spots (for building hydroelectric plants), which in turn transforms lotic environments into lentic ones and impedes species spawning migration (*piracema*); and (2) damming up the river marginal lakes (for farm uses) which are used as a breeding grounds for many fish species. As a fisher puts it, "Fisher life is quite difficult; one day you catch, the other you don't. Every day things become worse. Before the dam, I was able to catch 30 kg of fish; nowadays, if I catch 5 or 8 kg that is a lot". According to some fishers, the species that are decreasing the most are the large migratory fishes such as *Surubim (Pseudoplatystoma coruscans*) and *Dourado (Salminus brasiliensis*).

Predatory fisheries

Predatory fishery may be defined as one that captures individuals before they reach their sexual maturation stage and had an opportunity to reproduce at least once. Predatory fishery may also be one that prevents part of a target population from escaping for reproduction. That is, setting gillnets from one river margin to the other prevents part of a fish population in spawning migration, from completing its migratory route and its reproductive cycle. Another predatory

²³ Species from and naturally occurring in the Brazilian water basin studied

fishery is one that causes fish injuries (wounds) without catching the fish, such as the case of some harpoon fisheries.

Predatory fisheries in the SF River is mentioned by some researchers (Sato e Goldinho s.d., Thé 2003) and also by some interviewees. Examples include the use of net mesh sizes smaller than the ones allowed by legislation and the harpoon fishery.

2.5. Main stakeholders conflicts

In the following paragraphs, we present stakeholder conflicts that we observed during fieldwork. Nevertheless, we were not able to map all the stakeholder conflicts in the SF river basin due to time constraints (see Table 2a and 2b in Appendix 2 - in Portuguese).

2.5.1 Fisher groups conflicts

Between fishing communities

Conflicts among various fishing communities were only found in Alagoas. These conflicts result from the installation of Xingó hydroelectric plant, which caused damages to fisheries in the municipality of Pão de Açúcar. Fishers from this municipality started to move to other fishing areas in the Piranhas and Entremontes municipalities.

Professional fishers vs. sport (amateur) fishers

Conflict between professional fishers and sport fishers exists in almost all localities visited. This conflict regards access to resources and to fishing spots. In Minas Gerais, professional fishers using gillnets complain about sport fishers using harpoon and hook-and-line. In Piranhas, Alagoas, the conflict regards the Surubim harpoon fishery carried out by tourists and by some local fishers, and the professional fishers who practice other fisheries.

Colônia affiliated fishers vs. unaffiliated fishers

Conflict between affiliated and unaffiliated fishers is not explicit; but the first group does not hold appreciation for the second one. Unaffiliated fishers argue that the Colônia does not bring them benefits and that money collected by the Colônia is not invested in fishers and their needs, but is used in the interest of few. This problem was observed in all municipalities visited.

Between fisher-groups using different gear

We have not found any conflict between different groups of professional fishers concerning the use of different gear; only those already mentioned above between professional fishers and sport fishers.

2.5.2 Conflicts between fishers and other stakeholders

Fishers vs. Farmers

This conflict exists in all places visited. It results from (1) the construction of small dams in marginal lakes of the SF River and its tributaries (areas used as nursery for many fish species) and (2) the construction of dams on small tributaries that prevent fish migration and spawning of some species. Farmers impede fishers to access the riverine area and fish in the lakes and dammed areas. Moreover, farmers collect river water for irrigating private plantations, hence, decreasing river water flow. Illegal water collection may be contained by introducing a fee for water usage. Another problem is water contamination by agrotoxic substances and cattle manure. As well, deforestation of the gallery forest for cattle raising and agriculture also leads to erosion of river margins and consequent siltation, which in turn affects fisheries.

Fishers vs. Environmental Police

Conflicts between fishers and the Environmental Police exist in many of the municipalities visited. Many reported on the violence with which fishers are/were treated by policemen. Further, many reported on cases where gear and fish were illegally caught and apprehended and, since 1998, on cases where fines (minimum value of R\$700) were applied to fishers.

Fishers vs. IBAMA/IEF

In almost all municipalities, conflicts exist between fishers and IBAMA and/or IEF agents. Most of these conflicts result from the fact that some fishing regulations seem to be inadequate for the local context, according to fishers' view. This is particularly true for the cases of closing fishery periods, gear restrictions and restrictions in species caught. Lately these conflicts have been minimised by educational programs developed by IEF.

Fishers vs. Hydroelectric companies

In both states visited, fishers mentioned serious conflicts between them and the hydroelectric companies (CEMIG, CHESF). Fishers identify these companies as the main responsible for changing water regime and flow in the SF River, causing several problems for fisheries. In Três Marias and Piranhas, fishers complained about health problems, which according to them results from contaminated water discharged into the river after the plant turbines are cleaned.

Fishers vs. Mining company

In Três Marias a conflict exists between the mining company CMM and fishers. According to some fishers, residues from zinc production (from silicate mineral) are still contaminating downstream water. So much so that a fisher said that all his metal fishing gear, particularly hooks, were oxidising when used near Pirapora. Although we have seen sand extraction from the river; no conflict between this activity and fishers seem to occur.

3. RECOMMENDATIONS FOR THE BRAZIL CONTINENTAL FISHERIES PROJECT

The idea of the *Towards Co-Management (Rumos à Co-Gestão)* project proposal is to adapt the methodology elaborated by Instituto IARA for a possible fisheries management in the SF river

basin. One of our objectives was to assess the potential and hindrances for using such a methodology. In this section we present our assessment.

3.1 Strategies to increase resource and fishing community sustainability

We identified a series of factors that may contribute to a strategy aiming to increase the sustainability in natural resource use and to improve the quality of life of fishers and their families. The findings are presented as follows:

- Promote an assembly to involve all the main stakeholders (users, government, NGOs) in the discussion about co-management and strategies to increase resource and fishing community sustainability
 - o touch people
 - mobilise people
 - inform about the project and discuss it
 - develop the project strategic planning
- Implement the project:
 - o carry out a gender analysis
 - o capacitate co-management facilitators (fieldworkers, project managers, trainees)
 - capacitate fishers
 - teach adults to write and read
 - workshops to redeem fisher self-esteem
 - workshops to discuss equity and gender issues
 - workshops to address fisher wives' needs
 - environmental education for local society (including fisher families)
 - capacitate Colônias in:
 - administration
 - environmental and fisheries legislation
 - co-operativism
 - microcredit
 - methods to aggregate value to fishing products
 - marketing and commercialisation
 - equity and gender issues
 - carry out social-environmental participatory appraisal and scientific research²⁴
 - valuing local ecological knowledge
 - valuing locally-devised (informal) fishing rules (customary rights)
 - o develop a database for both socio-economic and environmental information
 - o develop a database for capacity-building materials
 - o communicate results from participatory appraisal and scientific research through:
 - radio programs
 - seminars and workshops
 - posters and booklets
 - elementary school and high school

²⁴ Participatory methods such as *Rapid Rural Appraisal*, *Community Statistical Census, Community studies of the local Environment*. Use data from previous research, studies and surveys about the SF river fisheries.

- Carry out a participatory planning for co-management
 - Establish a permanent discussion forum involving several stakeholders
 - Develop fishing agreements ("acordos de pesca")
- Implement actions identified to increase resource and fishing community sustainability
 - Implement fishing agreements
 - Implement other actions needed for environmental conservation and income generation
- Monitor implemented actions
- Evaluate these actions' results
- Discuss the result evaluation within the forum and promote the necessary adaptation of the actions to increase resource and fishing community sustainability
- Monitor and assess the project performance throughout the co-management process

As acting strategy, we also suggest that:

- The project should hold a regional co-ordination in Minas Gerais and another one in Alagoas; each one formed by a main co-ordinator and a secretary. For a better project performance, it is fundamental to hold local co-ordinators (fieldworkers or trainees) in each municipality. As well, it is quite important that the local co-ordinator works together with a fisher (male/female) elected by his/her class, so that this fisher becomes a link between the project local co-ordination and fishers.
- Capacity building should not focus only on the Colônia boards, but fishers in general, including unaffiliated fishers and those affiliated ones but not active in Colônia. Hence, Colônias should discuss strategic actions to include those fishers into the co-management process.
- The project timeline be adequate to capacity-building and learning speed of stakeholders;

that is, the project should allow enough time for each of the co-management issues and

steps to be dealt with properly.

3.1.1 Partners for co-management in Minas Gerais

Regional technical co-ordination (Minas Gerais)

- Ana Thé

Contacts for extension (Minas Gerais)

- Bárbara Johnson (Três Marias' Secretary for the Environment)
- Raimundo Marques (Head of the Fisher Federation, Três Marias)

Partners at communities/municipalities

- Três Marias: Mr. Norberto dos Santos (contact with riverine fishers)
- Pirapora: Prof. Sandra and Prof. Andréa (UNIMONTES- Pirapora)

- São Francisco: João (Head of Colônia Z3 in São Francisco), Luiz Ferreira de Souza (São Francisco's Secretary for Community Actions)
- Pedras de Maria da Cruz: Lorivaldo Evangelista de Souza (Head of Associação dos Pescadores de Pedras de Maria da Cruz)
- Januária: Sônia (SESC manager)
- Buritis: Renato (Head of Colônia Z11 in Buritis), Clorimundo de Jesus Mariano (environmentalist), Jesus Lopes Siqueira (ABIMA Associação Buritinense Integrado de Meio Ambiente de Buritis)
- 3.1.2 Partners for co-management in Alagoas

Regional Technical Co-ordination (Alagoas)

- Prof. Sineide Silva Montenegro (UFAL)
- Prof. Fátima de Sá (UFAL)

Contacts for extension (Alagoas)

- Antonio Gomes dos Santos (Vice Head of Fishers Federation in Alagoas and Member of the Hydrographic Basin National Committee for the São Francisco River Basin)
- Sandra Maria Lopes de Moura (agent of Alagoas' Secretary for the Environment)

Parceiros nas comunidades/municípios:

- Entremontes: Mr. Gabriel Araujo Gonçalves (Head of Colônia Z 25)
- Piranhas: Mr. Flávio (Colônia Z-25 treasurer)
- Penedo: Mr. Alfredo Fernando (Piau) (Head of Colônia Z12); Mrs. Angelincia (Head of the Fisherwomen Group in Penedo); Sineide's student willing to work with *pitu* fisherwomen
- Marituba do Peixe: Mr. Genival Bezerra Ramos (Val); Fisher; Sr. Manuel dos Santos (Colônia's monitor man), and Mrs. Belinaura Fernades Thomáz (Restaurant owner)

See also other contacts in Appendix 3 (in Portuguese).

3.1.3 Proposals for stakeholder capacity building

- Teach fishers to write and read using Paulo Freire's education methods (Freire, 1998/1970 e 1996)
- Workshops to address the following issues:
 - consciousness raising for citizenship (rights and duties)
 - social inclusion and self-esteem redeem
 - co-operativism, people's bank
 - fisheries in the SF river: ecology, regulations, alternatives
 - preparation (mechanisms) for conflict resolution
 - water and the environment: sewage, solid residues, recycling
- Capacity building for leadership and communities
 - Meeting moderation
 - Organising and structuring associations/colônias

- Capacity building for *community statistical census* (according to IARA methods) and *community studies of the local environment (community mapping)*
- Promoting meetings/assemblies
- Technical courses to aggregate value to fishing products (smoking, cooking, processing, packaging)
- Courses for fish farming with native autoctone species

3.2 Choosing sites for pilot projects: potentials and risks

We analysed Minas Gerais and Alagoas separately for the implementation of pilot projects (see Tables 3a and 3b in Appendix 2 - in Portuguese). In Minas Gerais, municipalities showing a certain potential for co-management are, in a decreasing order, Três Marias, Buritis, São Francisco and Pedra de Maria da Cruz.

Três Marias stands out due to several reasons. It is the home office of the Fisher Federation in Minas Gerais. This organisation in addition to the Colônia Z-5 (which own a Fisher Training Centre) and the Municipal Government, in particular the Secretary for the Environment, support the project. Two other organisations UNIMONTES and CODEVASF are potential contributors to the project. There are previous experiences in local leadership participation and citizen mobilisation through the Consórcio COMLAGO and Comitê de Bacia do Rio São Francisco. We consider the project risks of failure as medium, due to: (1) a possible loss of support by municipal government after 2004 elections; (2) the large area under jurisdiction of Colônia Z-5 results in a number of complex and diverse socio-ecological problems, which may diffuse mobilisation efforts; and, (3) we are not certain about IEF and IBAMA's local office support to the project.

Buritis' potential for co-management relies on: the relatively small size of the municipality and large number of families depending on fisheries; the apparent group cohesion among fishers; the project support received by Colônia Z-11, Municipal Secretary for the Environment, Municipal Secretary for Agriculture; Municipal Common Council, ABIMA, and local environmentalists. In addition, there is a high demand for the project because local people are quite aware of local conflicts and social-environmental problems that need to be tackled. Although a risk of losing support from the municipal government after 2004 elections exists, the existing complementary civil society network (Colônia, ABIMA environmentalists) is likely to provide project continuity.

São Francisco stands out due to: the mobilising potential of the Secretary for Community Action; the good infrastructure and administration of Colônia Z-3; the support from the Secretary of Health and the Environment, the Environmental Police, and most likely from IEF and environmental NGOs. In addition, the good communication between the Colônia and the Municipal Government seemed quite relevant. Based on the contacts made during the fieldwork, we considered local demand for the project²⁵ as high. The project's risks of failure are medium due to the large jurisdiction of Colônia Z-3; the Colônia's level of political awareness; and the political instabilities at the Municipal Government – the Major was impeached.

²⁵ Local awareness of social and environmental problems and willingness to tackle them.

Pedras de Maria da Cruz' potential relies on the Fisher Association, which has mobilising experience, high level of awareness concerning social-environmental problems, and willingness to work towards conflict resolution. That is, there is a high demand for project implementation there. Nevertheless, we were not able to assess local government and other NGOs support to the project. The SESC Januária (neighbour city) may provide infrastructure for capacity building. We do not recommend Pirapora, Butizeiros and Januária as pilot project sites due to the following reasons. In Pirapora, Colônia Z-1 does not seem able to mobilise fishers, and it seems that there is no communication between the Colônia and the Municipal Government. During our short visit, we were not able to investigate the potential support of other organisations (Municipal Government, IEF, IBAMA, Capitania dos Portos, NGOs) to the project. Nevertheless, there are previous successful experiences on community development carried out by the Comissão de Solidariedade aos Trabalhadores; and UNIMONTES seems to hold a large potential for research and capacity building.

We do not have enough information to assess Buritizeiro potential as a pilot project site. In Januária, corruption and lack of structure in Colônia Z-2 impede project development at this moment. Despite political instabilities in the Municipal Government – the Major was impeached - the Secretary of Tourism supports the project. It is worth noting infrastructure facilities provided by SESC Januária.

Despite the fact that the project does not anticipate pilot projects in Alagoas, we assess the potentials and risks of failures of the sites visited in that state. Overall, there is a high demand for developing the project in all municipalities in Alagoas. Piranhas and Penedo stand out as sites to start focal work.

Colônia Z-25 has its home office in Piranhas and was recently reactivated. It holds a certain degree of mobilisation including fishers from neighbouring municipalities such as Entremontes. Municipal Governments in Piranhas and in Entremontes support the Project, including Piranhas' Secretary for the Environment. Some NGOs such as Embroiders Association also do so, but we were not able to seek support from environmental NGOs in theses municipalities.

Xingó Institute and the Federal University of Alagoas (UFAL - with research and extension experience in the area) can provide infrastructure and capacity building. Xingó Institute works in the area of fish farming, extension education, management, and water resource monitoring, among others; and it has quite a good infrastructure for capacity-building activities. The Colônia Z-25 pointed out the high demand for project implementation in the area. There are some initial local actions related to the project goals that could be implemented by UFAL researchers and students with a minimum financial support from the project.

Project risks of failure are medium because of the "youth" of Colônia Z-25, the possible loss of support from the municipal government after the 2004 elections, and the apparent lack of strong non-governmental leaderships to provide continuity to the project.

In Penedo, there is a traditional strong mobilisation of fishers. Colônia Z-12 board of directors is very active and demonstrates high interests in implementing some of the project's activities. The

Fisherwomen Group is also able to mobilise several people. At the municipal level, the Secretary for Tourism and the Environment supports the project. This secretary seems to be well articulated with other government agencies and NGOs. The Fisher Pastoral in Alagoas has developed important works with fishers and can be considered a serious project partner. Other organisations also support the project, such as the Fisher Federation in Alagoas, the São Francisco River Basin Committee and UFAL. Some awareness regarding social-environmental problems that need to be tackled already exists in Penedo. There is a significant demand to initiate project's activities in this municipality.

Project risks of failure in Pendeo may be considered low due to the Colônia's mobilisation capacity. There seems to be a certain degree of self-recognition and self-appreciation among fishers (both men and women). The Colônia together with the support of the Fisher Federation is already carrying out some activities to improve fisheries. Some government agencies are also keen about working with fishers to improve social and environmental actions. Nevertheless, political discontinuity due to the 2004 election and political awareness of the Colônia may threaten the project's development.

3.3 Socio-economic indicators for the project medium-term monitoring

- *Project effectiveness*: remaining or increasing number of families or communities depending primarily on fishing; cost-benefit analysis
- *Improvement in fishers' wellbeing*: fisher's average income (engaged in the project); number of fisher families engaged in other fishing-related economic activities
- *Co-management implementation*: number of fishing agreements established; number of stakeholders participating in each agreement; stakeholder representation
- *Co-management process transparency*: level of information of all stakeholders engaged in the process
- *Fishing agreements efficiency*: number of conflicts solved; number of infractions detected by environmental police before and after the implementation of the agreement
- *Involvement of government agencies*: local government actions to mitigate or solve environmental problems (urban waste, sewage, water pollution, deforestation).
- *Involvement of NGOs:* local actions to mitigate or solve environmental problems (urban waste, sewage, water pollution, deforestation).
- *Continuity of project actions*: perseverance of people in participating in action promoted by the project (forum, assemblies, courses, workshops, seminars); number of young people involved in project activity, etc.
- *Improvement of fisher self-esteem*: fisher participation in producing radio programs specific for fishers and number of the program listeners; fisher's participation in local politics
- *Fishers' environmental awareness*: Participation of fishers and their families in other activities to mitigate social-environmental problems
- *Inter-institutional co-operation*: number of government agencies participating in project activities and in building fishing agreements
- *Decision-making power*: decision-making rules (e.g., consensus, voting), degree of stakeholder and government participation

- *Institutional strengthening*: number of people participating in capacity-building courses; effectiveness of task accomplishment
- *Equity*: number of women participating in project activities
- Credibility: continuity of proposed activities.

In order to monitor such indicators, it is necessary that, *after defining the pilot project sites, a detailed research is carried out in these places to identify the baselines (i.e., current data)* against which to compare data obtained through monitoring in the following years. Depending on the sites chosen, some data may be already available through reports or publications of previous research in the area such as data presented by Thé (2003), Thé, Madi & Nordi s.d., Godinho & Godinho s.d., Valêncio et ali. s.d., among others.

The co-management assessment should further consider indicators of institutional, economic and environmental aspects of sustainability, as those proposed by Hanna (1996):

- *Resilience*: innovation, rule flexibility, adaptation to new situation, and adaptation to changes in markets
- *Efficiency* (cost-benefit analysis): costs of information gathering and processing, coordination of decision makers and user groups, and enforcement cost
- *Equity*: parties representation, process clarity, (compatible) expectations, and distributive effects of actions,
- *Stewardship*: lengthened time horizon, monitoring of behaviour, and enforcement of rules

It is important to note that a trade-off exists among these indicators and that, in fact, they do not represent single variables but a set o variables that reinforce one another. It is also worth noting that evaluation and monitoring shall be an on-going process during co-management, and that new problems may emerge during evaluations, which should be addressed.

Fisheries sustainability indicators per se shall also be monitored. Research on fisheries biology may be carried out to point out the best quantitative indicators and their target goals for sustainable use of the SF river fisheries. This however demands a lot of timely and economic investments in research. On the other hand, one may assess fisheries sustainability based on the direction towards which some indicators are moving; for example, increase in catch-per-unit-effort (CPUE), increase in number of individuals larger (total length) than specie sexual maturation size; reduction on the proportion of immature individuals in the total catch; presence (re-appearance) of native autoctone species previously disappeared from fishing landing, etc. Definition of key indicators of ecosystem health shall consider yet fisher's local knowledge on the ecosystem²⁶. They may provide more trustful indicators based on their experience in exploring the system.

3.4 Hindrances for co-management

The main hindrances observed during fieldwork are the following (see also Table 4a and 4b in Appendix 2 - in Portuguese).

²⁶ Effectiveness of resource users participation in defining key indicator of ecosystem health was documented for an South Africa community (Rhodes University, Unitra and Fort Cox 2001).

Colônia's lack of mobilisation and low representation

Not many fishers attend Colônia meetings despite meetings are called by community radios. Many fishers do not trust the Colônia administration and complain about the lack of content during the meetings. Capacitating Colônias' board of directors to better plan meetings may help to overcome this problem. Another problem is the large distance some fishers need to travel to participate in meeting. One way to deal with this is to choose two informants from each distant region to attend meetings, so that they become the link between local fishers and the Colônia.

Communication problems between political levels and Colônia affiliated fishers

Two levels of communication problems: (1) between Colônia and politicians, and (2) between fishers and several sectors of society. Political divergence between Colônia board of directors and government agencies may impede communication and co-operation between them. This barrier may be overcome by increasing social and political awareness through courses on co-responsibility and conflict management workshops. Prejudice against fishers may also impede the dialog between them and the governmental and non-governmental sectors. To deal with it, a medium-term program shall be developed for valuing fishers and their work and for bringing to a legal status fishers working illegally.

Colônia's lack of infrastructure

The type of administration and material acquisition varies among the Colônias visited. A Colônia board of directors encompasses a president , vice-president, secretary, vice-secretary, treasurer and vice-treasurer. In some Colônias, the president plays several of these roles because the secretary and/or treasurer, for example, are not qualified (formally educated) for the position they hold. At Colônia Z-3, for example, the board hired an outside, educated secretary to overcome this problem. On the other hand, some fishers refuse to run for a board position because they are not well qualified for it (e.g. they might not be versatile in writing and mathematics). We suggest that each Colônia should hire an accountant to avoid accounting mistakes and minimise risks of corruption.

At least one Colônia (Z-3) is well equipped, owning freezers, boat, and computer, among other items. At the opposite side, Colônia Z-1 sold its equipment donated by the government, and Colônia Z-2 let its equipment deteriorate. To avoid such problems, Colônia affiliated fishers need to be aware that they are co-owners of such equipment's and hence should take care of them.

Colônias' culture of corruption

Corruption culture is a problem of society in general and not only of Colônias; nevertheless this issue should be tackled. Some fishers mentioned incidents of corruption at Colônia Z-2; e.g. they had to pay one third of their unemployment benefit to the president. A strategy to help change this culture is to provide information on Colônia accounting to all fishers in a transparent way, and to provide capacity building on accounting for the board of directors.

Politization in Colônias

In some Colônias, the board of directors uses the Colônia infrastructure towards their private political interests, such as to run for a political position. We see it as a hindrance because the person (people), instead of looking after the fisher's needs and interests, focuses efforts towards his/their own interests (candidacy). We also understand, however, that a former president of a Colônia may bring benefits to fishers while in a government position. To avoid conflict of interests, we suggest incorporating a new regulation into the Colônia statute that impede members of the board of directors to run as candidates in government election during two years after finishing their administration period in a Colônia. We also suggest that members of the board should be re-elected only once in order to allow for renewal and to avoid the same people in the administration of the Colônia for a long period.

Municipal government's lack of engagement with environmental problems

Not all municipalities hold a Secretary for the Environment. Often, environment issues are dealt within the Secretary of Tourism and Sports or the Secretary of Health. Nevertheless, we were able to identify at least one person responsible for environment issues in most municipalities visited. We recommend involving these people in the co-management process.

Communication problems among government, NGOs and local population

Lack of communication among government, NGOs and civil society is quite common in Brazil's history. Notwithstanding, this situation is changing lately due to an increased number of active NGOs and recent changes in the Brazilian legislation, which encourages civil society's participation in decision making. We suggest the establishment of a discussion forum involving all these groups (such as the case of SF Watershed Committee) to minimise communication problems.

Corruption in municipal governments

As stated before, corruption culture is quite disseminated in Brazil. In two of the municipalities we visited, the Majors were impeached.

4. FINAL CONSIDERATIONS

This report has shown a series of socio-economic and environmental data about fishing communities along the SF River. Such information may be used in elaborating strategies to overcome current problems and conflicts, which are better adapted to the local scenario. This report is a result of a *rapid assessment* focusing on observations regarding the main socio-economic and environmental problems and on interviews with resource users and other stakeholders, including government agencies in the region. More information on the socio-economic situation and environmental degradation of the SF river are presented by other researchers including Cavalcanti e Cruz (1992), Cappio, Martins e Kirchner (1995), MANDACARÚ (2000), and Valêncio et ali. (s.d.).

Along the SF River, there are many professional fishers living exclusively on fishing; some are affiliated to a Colônia, some are not. Over the past two centuries, fishing communities have accumulated a rich body of local knowledge about the river and its resources. This knowledge has often been disregarded (neglected) in governmental decision making about fisheries and water resource use. Integrating local and scientific knowledge is an important pre-requisite in the search of viable and sustainable solutions for socio-economic and environment problems at the SF river basin.

This research shows the critical situation of social and economic exclusion that fishers and their families are facing. Most of the families interviewed make on average less than a month minimum wage in Brazil; many practice subsistence agriculture and/or have their members working in day-labour activities to complement the household income.

To minimise poverty levels in these communities <u>more income opportunities need to be sought</u>, <u>for example, by aggregating value on fish products or by creating alternative income sources</u>. Some options are: fish farming with autoctone species (while trying to avoid side-effects of this activities); industrial or hand-crafting processing of fish secondary products, such as fish leather; establishing fish processing plants; etc. In order to provide a better and fairer income distribution, all of these activities should be managed through a joint effort such as co-operatives. To diversity income sources in these communities, the project should offer specific training in fish utilisation and processing, marketing and commercialisation, and other activities adequate for the local social-cultural context (e.g., hand-crafting, small-scale agriculture, boat building, tourism). The project may as well introduce new low-cost technologies adequate for the region.

Social exclusion of fishers can be seen through the low, or complete lack of, mobilisation and participation of fishers in decision making and/or in efforts to guarantee their rights and improve their well-being. Many factors account for this situation, including: (1) government agencies' (federal, state and municipal) lack of concern with artesanal fisheries issues; (2) the establishment of top-down fisheries policies, with no consultation or participation of fishers; (3) more powerful river resource users, such as farmers and hydroelectric companies, that historically have imposed their interests on public policies to the detriment of the fishers' ones; and (4) the severe enforcement of fisheries regulations (considered inappropriate by many fishers) causing fishers to pay exorbitant fines or to lose their gear, which puts them into an even worse marginalized position.

In this sense, any effort towards the social inclusion of fishers and a sustainable resource management at the SF river needs primarily to work with regulatory government agencies (e.g., IBAMA, IEF, municipal secretaries), so that they can start changing their attitudes and accept sharing the decision making power with resource users, including fishers. Further, it is necessary to help enforcement agencies (e.g., Environmental Police, IBAMA, IEF) to change their attitude towards fishers, so that actions become more educational than punishing.

Generally, fishers are poorly educated through the formal educational system; hence, many are illiterate. This becomes a problem in accessing information; as well, there is a lack of appropriate information routes and ways designed specifically for fisher needs. Fishers are found to be extremely vulnerable and "disempowered". In order to revert such a situation continuous work

should be carried out <u>to strengthen citizenship and self-esteem</u>, informing fishers about their rights and duties, teaching them to write and read, and capacitating them to get involved in comanagement processes. Activities such as improving verbal expression, communication and negotiation skills, data analysis, and information dissemination should be pursued. Implementing a radio program turned to fisher needs may help to transmit knowledge, spread information, and strengthen fisher citizenship and self-esteem.

Environmental degradation was found along all sites visited along the SF river. The factors behind such impacts are complex and actors generating them are many. These include farmers (cattle raising and monoculture); hydroelectric companies; industries (e.g., mining) and agribusiness. Government omission about domestic sewage treatment is another important factor contributing to water pollution and to threatening fisheries and human health.

It is important to survey the sources of pollution and degradation and to identify the responsible <u>actors</u>. In each of the pilot project sites, the community shall carry out a *community study of the local environment*, that is, a participatory survey of the local environment. An expert in participatory surveys (from NGO, university, or government agencies) should advise the community on research methodologies. The survey should map, for example, the damming of marginal lakes, the spots where river water is extracted for agriculture irrigation, the spots where discharged water and sewage is drained into the river, and all those actors responsible for these impacts. This participatory mapping will serve to identify conflicts, mobilise main actors, and start a process of conflict resolution. Indeed, the project's success will depend on its ability in bringing together different actors (fishers, farmers, industries, ONGs, government agencies, scientists, etc) to a negotiation table and in involving them within a transparent and constructive dialogue.

So far, actors responsible for environmental impacts have not done much to revert the situation; in addition, government actions are often quite punctual, and do not always lead towards greater sustainability (e.g., stimulation of tilápia fish farming). This project, on the other hand, aims to contribute to conflict resolution and fisheries sustainability. For this purpose, the project intends to adapt the acordos de pesca (fishing agreements) methodology developed by IARA Institute. This methodology has been able to solve serious conflicts among several users in the Lower Amazon Region. The authors of the current report have not participated in any of the experiences in the Amazon River, and all the information we have about these fishing agreements result from readings and conversation with Regina Cerdeira from IARA. To adapt this methodology to the historical, cultural, social, economic and ecological scenario of the SF river, it is necessary to get quite familiar with such proposals to better asses its potential. Our previous experiences from other projects and research on participatory management makes us believe that adapting the IARA methodology for the SF river has an enormous potential for conflict resolution. Here, we suggest working with interactive learning in order to achieve more sustainable results. It is not worth establishing new agreements if users do not practice them in their everyday activities. Previous experiences with innovative and creative strategies using interactive learning already exists (Borrini-Feyerabend et ali. 2000).

The present moment is quite appropriate to intervene in social and environmental conflicts. For most fishers, their situation is at the limit of precariousness. Fisher's willingness to change that

situation varies from place to place, depending on the mobilising abilities of the Colonia board of directors. In Buritis, Pedras de Maria da Cruz, Três Marias and Penedo, the Colônia mobilising potential is much higher than in Januária and Pirapora. In all localities visited, however, artisanal fisheries are experiencing a crisis, which reflects resource degradation and fishers' social and economic exclusion. Immediate actions are required towards the co-management of the SF river resources.

5. **BIBLIOGRAPHY**

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APPENDIX 1: THEMATIC SUMMARY OF SEMI-STRUCTURED INTERVIEWS

1. Estado da arte das comunidades de pesca (generalidades e particularidades)

1.3 Situação econômica dos pescadores

- Atividades econômicas no município
- Renda média da pesca
- Formas de comercialização
- Conservação e processamento do pescado
- Tempo gasto com atividade da pesca
- Existem outras alternativas de geração de renda entre os pescadores
- Nível de pobreza dos pescadores (indicadores)
- Sistema de crédito para pescador (microfinanciamento)

1.2 Situação social e qualidade de vida

- Principal origem da população
- História da migração
- Nível de êxodo
- Número de filhos
- Controle de natalidade
- Escolaridade
- Situação de saúde
- Condições de infraestrutura
- Principais problemas em termos de infraestrutura
- Problemas sociais

1.3 Mobilização e coesão social

- Tipo de organização social (colônia, associação)
- Número de associados
- Principais atividades da colonia/associação
- Principais problemas com a colonia/associação
- Quem são os outros lideres locais (qualidade)
- Existe alguma mobilização em torno da questão ambiental?
- Apoio ao projeto
- Comunicação pescadores/colonia com os órgãos do Governo
- Comunicação pescadores/colonia com o resto da comunidade
- Quais são os prncipais conflitos com pescadores
- Grau de cooperação entre as organizações e os atores sociais
- Qual é a estratégia atual de mobilização e organização social?
- Funcionamento dos órgãos de controle, monitoramento e fiscalização
- Conflitos com a fiscalização

1.4 Avaliação do capital humano

- Auto estima do pescador
- Percepção do pescador pela sociedade
- Capacidade de organização

- Nível de informação
- Contextos culturais
 - formas de engajamento, organização, participação
 - agendas locais
 - papel das mulheres
- Conhecimento local (regras, controle)

2. Situação ambiental (específica para cada município visitado)

- Água
 - Esgoto e resíduos sólidos
 - Assoreamento
 - Indústria
 - Agropecuária
- Rio
 - Pesca esportiva
- Mata ciliar
- Contaminação e desmatamento
- Lixo
- 3. Situação da pesca
- Abundância de recursos naturais
- Acesso aos recursos
- Problemas referente aos recursos (sobrepesca, contaminação, técnicas de pesca, conflitos)
- Manejo atual dos recursos:
 - Qual é o papel dos órgãos oficiais no manejo?
 - Qual é o envolvimento dos pescadores organisados com o manejo?
 - Qual é o papel do conhecimento local no manejo?
- Legislação e fiscalização
- 4. Considerações técnicas da pesca
- Frota e artes de pesca
- Quantidades pescadas
- Época de pesca
- Locais de pesca
- Material necessário para a pesca
- Número de pessoas envolvidas

5. Sugestão para estratégias apropriadas para o manejo da pesca e o trabalho de desenvolvimento comunitário

- Nível de preparo da comunidade para o co-manejo
- Nível de treinamento, educação ambiental dos parceiros e das comunidades
- Conhecimento e consciência sobre meio ambiente e recursos naturais
- Potencial de policiamento (law enforcement)
- Resolução de conflitos pelo recurso água e pesca
- Perspectivas

APPENDIX 2: ENVIRONMENTAL IMPACTS, STAKEHOLDER CONFLICTS AND POTENTIAL AND HINDRANCES FOR CO-MANAGEMENT

	Localidades	Três Marias	Pirapora	Buritizeiro	São Francisco	Januária	M ^a da Cruz	Buritis
	Ambiente	Lêntico e lótico	Lótico	Lótico	Lótico	Lótico	Lótico	Lótico
Poluição da água	Esgoto urbano	sim	sim	sim	sim	sim	sim	sim
	Lixo urbano	sim, más já existe uma iniciativa de coleta seletiva	sim	sim	sim	sim	sim	sim
	Industrial	СММ	indústria têxtil e de liga de ferro					
	Agrícola	sim	sim		sim	sim	sim	sim
	Pecuária					sim		sim
	Hidroelétrica	CEMIG						
Alterações físicas do rio	Barramento de lagoas marginais	sim	sim	sim	sim		sim	sim
	Represamento do SF e tributários	sim					sim	sim
	Assoreamento	sim	sim			sim	sim	
	Desvio do leito	sim						
	Irrigação	sim	sim		sim			sim
	Mineração - areia				sim			
Alterações na cobertura vegetal	Desmatamento na área da bacia	sim	sim			sim	sim	sim
	Desmatamento da mata ciliar					sim	sim	sim
Alterações nos recursos pesqueiros	Espécies exóticas	Tucunaré, Tilápia	Tilápia em tanque- rede					
	Diminuição de pop. de espécies nativas	sim	sim	sim	sim	sim	sim	sim
	Pesca predatória	mergulho, fisga	litro, pesca na piracema		uso de molinete por pescador amador			mergulho com arpão

Tabela 1a: Impactos Ambientais - MG¹

¹ Os espaços vagos significam que não foi possível obter informações sobre este assunto no município em questão.

	Localidades	Entremontes	Piranhas	Penedo	Marituba do Peixe
	Ambiente	Lótico	Lótico	Lótico	Lótico
Poluição da água	Esgoto urbano	sim	sim	sim	sim
	Lixo urbano	sim	sim	sim	sim
	Industrial				
	Agrícola				sim
	Pecuária				
Alterações físicas do rio	Hidroelétrica	sim	sim	sim	sim
	Barramento de lagoas marginais	sim	sim	sim	sim
	Represamento do SF e tributários			sim	sim
	Assoreamento	sim	sim	sim	sim
	Desvio do leito	sim	sim		
	Irrigação	sim	sim	sim	sim
	Mineração - areia	sim	sim		
Alterações na cobertura vegetal	Desmatamento na área da bacia			sim	sim
	Desmatamento da mata ciliar			sim	sim
Alterações nos recursos pesqueiros	Espécies exóticas	Tilápia	Tilápia	Tilápia	Tilápia, Tambaqui
	Diminuição de populações de espécies nativas	sim	sim	sim	sim
	Pesca predatória	uso de bombas, arpão	arpão	rede batida	

Tabela 1b: Impactos Ambientais - AL

	Localidades	Três Marias	Pirapora	Buritizeiro	São Fco	Januária	M ^a da Cruz	Buritis
Conflito entre grupos de pescadores	entre comunidades							
	profissional X amador	Sim			Sim	sim		sim
	(entre diferentes petrechos)	(arpão x rede)			(molinete x caceia)			(arpão x rede)
	colonizado X não-colonizado				sim			
Conflitos entre pescador e outros atores	Pesc. X fazendeiros	sim	sim	sim	sim	sim	sim	sim
	Pesc. X polícia ambiental		sim	sim	sim			sim
	Pesc. X IBAMA/IEF	sim	sim	sim	sim	sim		sim
	Pesc. X hidroelétrica	sim	sim	sim	sim	sim	sim	sim
	Pesc. X mineradora	sim						

Tabela 2a: Conflitos entre os diferentes stakeholders - MG

	Localidades	Entremontes	Piranhas	Penedo	Marituba
Conflito entre grupos de pescadores	entre comunidades	sim (Pão de Açúcar)			
	profissional X amador	sim	sim	sim	
	(entre diferentes petrechos)		(arpão x rede)	(rede espera x rede batida)	
	colonizado X não-coloniz.				
Conflitos entre pescador e outros atores	Pesc. X fazendeiros			sim	sim
	Pesc. X polícia ambiental				
	Pesc. X IBAMA/IEF	sim	sim		
	Pesc. X hidroelétrica	sim	sim	sim	sim
	Pesc. X mineradora				

Tabela 2b: Conflitos entre os diferentes stakeholders - AL

Localidades	Três Marias	Pirapora	Buritizeiro	São Francisco	Januária	M ^a da Cruz	Buritis
Pop. município	20.000	20.300	25.900	51.400	63.500		20.400
Colônia	Z 5	Z 1	Z 1	Z 3	Z 2	Associação	Z 11
Abrangência da Colônia	23 municípios			7 municípios	9 municípios		
População de pescadores cadastrados	1.200	300	300	710	390	120 (total)	130
População de pescadores não- cadastrados	poucos	300	300		910		
É a Colônia uma liderança comunitária?	sim	não	não	sim	não	sim	sim
Outras lideranças comunitárias	Prefeitura, SMA, federação	Comissão de Solidariedade dos Trabalhadores		Secretaria da Ação Comunitária	SESC	Escolas	ambientalistas, vereador, ABIMA
Experiência com mobilização social	sim	sim	sim	bastante	sim	sim	
Apoio colônia	sim	sim		sim	não	sim	sim
Apoio prefeitura	sim					sim	
Apoio Secret. MA	sim			sim	sim		sim
Apoio IEF				provavelmente	sim		sim
Apoio IBAMA							
Apoio Polícia Ambiental	provavelmente			sim	sim		provavelmente
Apoio ONGs		provavelmente		sim	provavelmente		sim
Apoio Universidade e órgãos de pesquisa	Unimontes, CODESVASF	Unimontes	não tem	não tem	não tem	não tem	não tem
Apoio Comitê da Bacia Hidrog. e consórcios	COMLAGO, Comitê da Bacia Hidrográfica				sim	não tem	não tem
Facilidades e infra-estrutura	Centro de treinamento para pescadores	Unimontes		Caíque (escola)	SESC	SESC, rádio comunitário	rádio comunitário
Demanda local*	alta	média		alta	baixa	alta	alta
Risco de fracasso	médio	alto	alto	médio	alto	baixo	baixo

Tabela 3a: Avaliação rápida do potencial de mobilização para o desenvolvimento do projeto em Minas Gerais

* relativa à conscientização sobre os problemas sócio-ambientais locais e à disposição para solucioná-los.

Localidades	Entremontes	Piranhas	Penedo	Marituba
Pop. município			56.800	63.500
Colônia	Z25	Z25	Z12	
Abrangência da Colônia			1150	
População de pescadores cadastrados	110	110		85 famílias dependem da pesca
População de pescadores não-cadastrados				
É a Colônia uma liderança comunitária?	recentemente reativada	recentemente reativada	sim	em fase de reestruturação
Outras lideranças comunitárias	Associação das Bordadeiras (2)		IPMA, Amigos do Velho Chico (ONGs), Pastoral dos Pescadores, Grupo de Mulheres Pescadeiras	
Experiência com mobilização social	sim		sim	não
Apoio colônia	sim	sim	sim	
Apoio prefeitura	sim	sim	sim	sim
Apoio Secret. MA		sim	sim	sim
Apoio IEF				
Apoio IBAMA				
Apoio Polícia Ambiental				
Apoio ONGs	sim		sim	
Apoio Universidade e órgãos de pesquisas/outros órgãos do Governo	UFAL	CHESF, Instituto Xingó, UFAL	Escola Estadual Teotônio Ribeiro, SEBRAE, UFAL, CODEVASF	UFAL
Apoio Comitê da Bacia Hidrográfico e consórcios			sim	sim
Facilidades e infra-estrutura		CHESF		
Demanda local*	media	alta	alta	alta
Risco de fracasso	médio	médio	baixo	médio

Tabela 3b: Avaliação rápida	la do potencial de mobilizaçã	o para o desenvolvimento do	projeto em Alagoas
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* relativa à conscientização sobre os problemas sócio-ambientais locais e à disposição para solucioná-los.

	Localidades	Três Marias	Pirapora	Buritizeiro	São Francisco	Januária	M ^a da Cruz	Buritis
Colônia	Mobilização	alta	baixa	baixa	alta	baixa	alta	alta
	Comunicação entre níveis políticos e colonizados	alta	baixa	baixa	alta	baixa	alta	média
	Infra-estrutura	boa	ruim	ruim	ótima	média	ausente	em construção
	Corrupção					alta		
	Representatividade	média-alta	médio	médio	alta	baixa	alta	alta
	Politização	médio	baixo	baixo	alto	alto	baixo	médio
Governo Municipal	Engajamento na área ambiental	boa	boa		boa	ruim	aparentemente boa	muito boa
	Comunicação entre Governo, ONGs, e população	boa	boa		boa		aparentemente boa	boa
	Corrupção				sim	sim		

Tabela 4a: Empecilhos para o desenvolvimento do projeto - MG

Tabela 4b: Empecilhos para o desenvolvimento do projeto - AL

	Localidades	Entremontes	Piranhas	Penedo	Marituba
Colônia	Mobilização	alta	alta	alta	media
	Comunicação entre níveis políticos e colonizados	alta	alta	alta	
	Infra-estrutura		Prefeitura	Prefeitura	
	Corrupção				
	Representatividade	alta	alta	alta	media
	Politização				
Governo Municipal	Engajamento na área ambiental			boa	media
	Comunicação entre Governo, ONGs, e população	boa	boa	boa	boa
	Corrupção				

Appendix 3: Contacts

Cidade	Name	Institution	Telephone
Belo Horizonte	Marcelo Coutinho	IEF	(31) 3295 3614
(MG)	Amarante		dgp@ief.mg.gov.br
	Alexandre Godinho	UFMG Conservação e Manejo de Peixes	(31) 3499 2909
			agodinho@icb.ufmg.br
	Beatrix Booschi	IBAMA	
	Comandante Arley	PM Minas Gerais	arley@pmmg.mg.gov.br
Brasília (DF)	Sávia Dumont	Arte Educadora (oficinas ambientais)	(61) 3682598
			saviadumont@uol.com.br
	Tadeu Assade	Secretaria Nacional de Aquicultura e Pesca.	(61) 2182112
		Subsecretaria de Planejamento	assadmar@agricultura.gov.br
Buritis (MG)	Jesus Lopes Siqueira	ABIMA Associação Buritinense Integrada	(38) 3662 1212
		do Meio Ambiente	dimal@netibr.com.br
	Mário Rodrigues de Farias	Presidente da Câmera dos Vereadores	(38) 3662 1527
	Gladystone Alves de Magalhães	IEF-Buritis	(38) 3662 1112
	Manoel Pereira de Sousa	SEMA Chefe de Setor	
	Dr. João Alberto Campos Valladares	Ambientalista (Químico)	
	Clorimundo de Jesus Mariano	Ambientalista	(38) 3662 1634
	Jarbas Noronha	Radio Alternativa 97.7 FM	
Entremontes (AL)	Dona Fátima	Associação das Bordadeiras Entremontes	(82) 686 6000
	Dona Ione	Cia de Bordados de Entremontes	(82) 686 6023

Cidade	Name	Institution	Telephone
Januária (MG)	Mércia Moreira	Prefeitura de Januária, CBHSF	(38) 9965 0005
	Wellington Viana (?)	Prefeitura Januária Secretaria de Turismo	(38) 3621 1770 Ramal 236
			(38) 9979 6675
	Sônia	Gerente do SESC Minas Gerais	(38) 3621 1076
			sescmgjr@uai.com.br
Maceió (AL)	Anivaldo de Miranda Pinto	Secretário Executivo do Meio Ambiente, Recursos Hídricos e Naturais de Alagoas	
	Paulo Nunes	Secretário Estadual da Pesca	
	Sandra Maria Lopes de Moura	Secretaria do Meio Ambiente (Comitê de Bacia)	smlmoura@yahoo.com.br
Montes Claros	Maria Neuma Nunes	Secret. do Estado de Desenvolvimento	(38) 3222-2938
	(mobilização social e planejamento participativo)	Social e Esportes (SEDESE)	neumanumes@hotmail.com
Pedras de Maria da Cruz	Lorivaldo Evangelista de Souza	Presidente da Associação de Pescadores de Pedras de Maria da Cruz	(38) 3622 4229 (recados com Maria ou Antonio)
(MG)			Praça Don Pacheco, 7 CEP 39481-000
	Manoel Carlos Fernandes (Prefeito)	Prefeitura	
	João	EMATER	
	Prof. Charles	Escola Dona Cila	
Penedo (AL)	Antonio Gomes dos Santos	Vice Presidente da Federação dos	(82) 5514463 (res.)
	(Toinho Pescador)	Pescadores de Alagoas e Titular do Comitê	(82) 3216200 (Federação em Maceió)
		Inacional de Bacias para a Bacia do Rio SF	93096143 (cel.)
			Praça da Alegria, 69 Bairro Sto. Antonio, CEP 57200-000 Penedo, AL

Cidade	Name	Institution	Telephone
Penedo (AL)	Antonio Avila	Rádio AM Penedo	
	Dona Angelincia	Presidente do Grupo de Mulheres Pescadeiras de Penedo	(82) 5516488
	José Marinho Júnior	Coordenador Unidade Executora de Projetos, Prefeitura de Penedo	(82) 551 3333 (82) 9302 9009 (cel.) uep.penedoal@ig.com.br
	Rosangela de Queiroz Ana Tavares	Unidade Executora de Projetos, Secretaria do Meio Ambiente, Prefeitura de Penedo	(82) 9991 9009 (cel.) uep.penedoal@ig.com.br
	Fernando Pedro	IPMA (ONG) trabalha sobre: turismo, preservação da mata e reflorestamento da mata ciliar e conscientização ambiental	
	Socorro Barbosa	CODEVASF Psicultura	(82) 99811237
Piranhas (AL)	Gabriel Araujo Gonçalves	Presidente da Colonia de Piranhas Z25	(82) 686 6023 (recados)
	Flávio (filho do Sr. Yonas)	Tesoureiro da Colonia Z25	
	Ignacio Loyola	Prefeito de Piranhas	
Poço Redondo (SE)	Frei Noque	Prefeito de Poço Redondo (Sergipe) Colabora com Piranhas	
	João Alves	Governador de Sergipe	
Pirapora (MG)	Geraldo Diniz	Prefeitura SEMA (reciclagem)	
	Prof. Redelvim Dumont	UNIMONTES	(38) 3741 2412
	Prof. Ivo Chagas (Mestrado na França em Geografia)	UNIMONTES Geografia	
	Prof. Sandra Torres	UNIMONTES Geografia	(38) 3741 2412, (38) 3741 4377