CONFERENCE REPORT

World Aquaculture 2003 – Freshwater Aquaculture and Environment in Brazil: What's Next?

Salvador, Brazil, May 20th, 2003

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SESSION AGENDA

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Freshwater Aquaculture and Environment in Brazil: What's Next?

A Roundtable on Developing Environmental Protocols for Brazilian Freshwater Aquaculture

World Aquaculture 2003

Tuesday May 20, 2003 13:20-17:50 Room Oxalá 2

Chair: **Joachim Carolsfeld**, World Fisheries Trust

13:20 **Raimundo Ferreira Marquez**, Federação dos Pescadores Profissionais MG. "Fishing families' concerns for the environment"

13:40 **Joachim Carolsfeld**, World Fisheries Trust, Victoria, B.C., Canada "Environmental impacts of freshwater aquaculture in Brazil: Are there practical solutions?"

14:00 **Dr. Allan Castledine**, Director - Aquaculture Development, Ministry of Agriculture and Fisheries, Government of British Columbia, Canada: "Evolution of the Canadian aquaculture industry and regulatory environment"

14:20 **TBA** - IBAMA and Secretaria de Pesca, Brasilia - Perspective on environmental standards for aquaculture in Brazil

14:40 **Márcia Noela Eler and Evaldo Espíndola** - CRHEA (Centro de Recursos Hídricos e Ecologia Aplicada) - Universidade de São Paulo (USP) - "Case study: Environmental impacts of fee-fishing ponds in the State of São Paulo"

15:00 **Carlos Bernardo Mascarenhas Alves**, Fish Passage Center, Universidade Federal de Minas Gerais (UFMG): "Introduced fish species in Minas Gerais (Brazil): what will be the environmental impacts?"

15:20 **Gerald Kurten**, A.E. Wood State Fish Hatchery, Texas Parks & Wildlife, San Marcos, Texas: "Practical considerations for Inland aquaculture in environmentally sensitive areas"

Break 15:40-16:10

16:10 **Open discussion**: (Joachim Carolsfeld, moderator): Recommendations for protocols

Canadian International Development Agency | Agence canadienne de développement international

This activity undertaken with the financial support of the Government of Canada provided through the Canadian International Development Agency (CIDA)

WORLD FISHERIES TRUST

Federação dos Pescadores Profissionais MG

AWARENESS PAMPHLET

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Federação dos Pescadores Profissionais MG

ROUNDTABLE SESSION NOTES

Prepared by: Carmen Ross, World Fisheries Trust

PRESENTATIONS

Raimundo Ferreira Marquez, Federação dos Pescadores Profissionais MG

"Fishing families' concerns for the environment"

Mr. Marquez spoke about his communities' concerns for the environmental impacts of aquaculture on the São Francisco River (SF), from the headwaters to the mouth. He described the SF as unrecognizable compared to what it was 50 years ago and attributed these changes to urban development, deforestation and the release of industrial effluents into the river. Mr. Marques stressed that methods of dealing with these problems need to change, and provided some examples (see below).

The first example is the almost complete deforestation of the great plains of Minas Gerais. Many of Brazil's rivers, including the SF, originate from this area. The plains have been destroyed despite laws that were written to protect them, because they are not adhered to in practice. One of these laws states that a minimum of 50 meters of forest must be preserved along riverbanks; however this is believed to be insufficient. Mr. Marquez feels that this band should be at least 100 meters wide, given that the Eucalyptus tree has a root system, which can extend more than 50 meters.

Other examples of negative environmental impacts on the SF River are related to mining, agriculture, and urban development. Mining affects both the SF River and its tributaries. The expansion of agricultural plantations for soy, rice, and cane, for example, has resulted in the deforestation of huge amounts of land in this basin. Industries and urban development also contribute to declining water quality through the release of effluents into the river system.

Mr. Marquez cites an example of the kind of damage that is related to some of these activities. A friend at the mouth of the SF River reported that he could no longer see fish in the river due to high levels of silt. He feels that this is an unacceptable situation and needs to be rectified. To save the SF River we need to protect not only the mainstream but also all the tributaries and the headwaters that feed the river. Finally, Mr. Marquez stresses that everyone, including individuals, community groups and governmental organizations, needs to be concerned about the welfare of our rivers. No one is paying enough attention to this issue, even though the bottom line is that: when the water is not healthy, neither are the people who depend on it for their livelihoods and well-being. For example, poor water quality has caused high levels of kidney disease, not only amongst the people of Minas Gerais, but throughout Brazil. For these reasons, the need for clean water has to be given very high priority.

Unfortunately, there are many factors that complicate this issue. For instance, while agriculture and industry are needed to support growing populations, the fishing community is being negatively impacted by these activities. Yet many Brazilians see fishermen as the only reason for the decline in fish stocks. However, Mr. Marquez points out that the present-day fishing methods employed on the SF River have been used for centuries without causing the severe population declines of recent times. Thus he feels strongly that declining populations are clearly related in large part to the effects of industrial effluents and other effects of urbanization, rather than over-fishing.

Fishermen have a deep connection to the river in their everyday lives. They gauge water quality on a daily basis, as they observe the river and see, smell and "feel" the quality of the water. Although this is not done in a scientific way, *per se*, Mr. Marquez feels that this knowledge and understanding can contribute a great deal to helping improve the quality of the SF River and its people. His community understands that technology can help provide better methods for improving environmental conditions; however he stresses that, ultimately, their livelihoods are at the mercy of natural processes such as rainfall, which cannot be controlled.

Overpopulation and the ability to feed future generations is another major concern. One solution that has been offered is aquaculture; however Mr. Marquez is reluctant to see this as a simple answer. Brazil has a history of introducing non-native species without giving careful thought to the species that are introduced and the possible consequences. For example, the African Catfish has escaped from fee-fishing ponds and is expanding into more and more Brazilian rivers and competing with native fish. The Tucunaré, a fish that is native to the Amazon River, has also wiped out many of the native species of the SF River.

Mr. Marquez suggested that aqualculture of non-native fish species such as Carp and Tilapia is, in some ways equivalent to the broiler chicken industry. At first, Brazilian people did not accept the mass production of poultry, but preferred to only eat free-range chicken. However, chicken has become a very large part of the Brazilian diet, so with growing populations it would be impossible to fill the market needs without farmed chicken. Likewise, we need aquacultural ponds to fill the market needs for fish and to develop jobs. Furthermore, he believes that small scale (50 – 100 lbs) is not sufficient, but that only large-scale operations will be able to fill these market needs.

Allan Castledyne, Ministry of Agriculture and Fisheries, BC

"Evolution of the Canadian aquaculture industry and regulatory environment"

Dr. Castledyne stated that the fishing industry is a very valuable resource in Canada, with commercial, recreational and aquacultural components totaling about 9 billion dollars in revenue per year. Aquaculture is an important part of this and in his talk he explained how the Canadian industry has evolved, as well as providing some examples of policies that have been developed

to deal with the environmental concerns related to this industry. He stressed that everyone needs to realize is that this has not been a simple process, and it has taken Canada over 100 years to get to this point. The main complicating issues have been geo-political boundaries and jurisdictional issues between federal and provincial governmental agencies. One example of a successful strategy is to include the groups using this resource (fishers, communities groups, industry, etc.) in discussions related to environmental concerns, early on in the process.

Aquaculture in Canada is not done at the subsistence level, but on larger scale and for export. Our national aquaculture objectives are to sustain a diverse economy, to improve food production, and to maintain biodiversity. Some of the environmental issues related to this industry include: the release of solid wastes into the environment; the introduction and magnification of disease; and the introduction of exotic species. In addition, there are the human issues relating to aquaculture, such as social implications, planning and communication, which are also important to consider. Historically, we have had a tendency to concentrate on technical issues and forget to deal with the human issues.

Canada has a history of allowing the introduction of non-native species, both on purpose and by accident. Brown Trout, Common Carp, Yellow Perch and Goldfish were all intentionally introduced from Europe and other parts of Canada, and have always managed to escape into the wild! It has proven to be almost impossible to keep fish contained. These escapes of non-native fish have genetic, ecosystem and disease implications on native fish populations. For example, in British Columbia we are experiencing a problem with the possible magnification of sea lice populations. This problem has been linked to fish farming and could pose a serious problem for wild salmon.

Control and management in the Canadian aquaculture industry meets international, national and local standards. International standards include FAO, ISO 14001 and fish health/disease certification. These standards don't solve environmental problems; they just provide guidelines to achieve effective management. Canada has both a Federal Fisheries Act and provincial regulations that relate to aquaculture operations. It is not only necessary to have environmental regulations in place, but these regulations must be enforced in such a way as to demand compliance.

Some examples of regulatory mechanisms include:

- Waste management regulations: These are performance based and measure the effect of aquaculture operations on the river or ocean bottom. They provide models for solid separation, appropriate feeding systems and waste output.

- Specific mechanisms: All fee fishing ponds must have a permit, which is approved, with or without conditions, after the operation has gone through a thorough risk assessment process (AORA).

- Regional control mechanisms: These provide control for the movement of fish.

- Disease control mechanisms
- Industry-based codes of practices

In summary, the first thing that needs to be done is to define the objectives of both aquaculture and management of wild fish stocks. It is difficult for governments to manage this industry when they are dealing with many separate individuals or operations, so it is important for users to be organized and to have strong associations to represent their concerns. In order to meet these needs, a comprehensive approach to management, possibly including the hazard analysis approach, must be taken.

It is important to realize that there will always be people opposed to the idea of aquaculture, and that this is often based on lack of information, but as a group this opposition is very influential. Thus, Canada is moving toward an area-based approach where all user needs and concerns are taken into account. We hope that this will provide a good model for other countries embarking on aquaculture management.

Márcia Noela Eler and Evaldo Espíndola, CRHEA, USP

"Case Study: Environmental impacts of fee-fishing ponds in the state of São Paulo"

Marcia Noela Eler

Ms. Noela Eler's work began a long time ago in IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis) while she was doing her Master's research. She noticed that the one concern that wasn't being addressed was the negative environmental effects associated with fee-fishing operations. The effluent from these operations was having a huge impact on the environment; however, the link between pond production and environmental impacts had not yet been recognized.

The research team used the hydrographic basin as the basis of their area of study. They were asked to look at water samples to determine why fish in fee-fishing farms were dying. The study looked at many aspects of farm operation, including water treatment, feed, and proximity to agricultural operations. The analysis was based on data collected from a questionnaire that was sent to operators of fee fishing farms within the basin, including questions on environmental factors.

In the upper part of the basin there are many plantations and many fee-fishing farms. The study showed that the major effect these fish farms had on the environment was the escape of non-native fish species into the basin. For example, African Catfish escaped from one farm, built within 30 m of the river, and found their way into the river. Many other "exotic" species, including the Tucunaré (a native of the Amazon River), had also been released into the river.

Another major difficulty is that many installations are unlicenced, and have been built without following any regulations. Even those that have been built to code and receive their license often stop following regulations, but run little risk of losing their license. The regulations that are in place are also not very inclusive. For example, water quality studies only require an operator to measure pH, but don't include nitrogen levels. Often, farmers are not honest about their use of chemicals, which is unfortunate since many of these were developed for use on land, not in water. The study found levels of chemicals in fee-fishing farms that were well over the maximum allowable legal levels.

Finally, 80% of fee-fishing installations had high levels of cyanobacteria, with blooms occurring in levels that were lethal to mice. Organophosphate insecticides (neurotoxins) were also present in many farms.

Evaldo Espíndola

Dr. Espíndola's study focussed on the operators of fee fish farms. Only 45% of the installations were profitable and 45% of owners also did not comply with regulations that were in place for fee fish farms. Most operators were farmers or tradesmen with no previous experience in fish culture and there was no technical assistance available to them.

This study also examined the public perception of fee-fishing activities. An attempt was made to raise the level of public awareness of the negative impacts of small-scale, non-regulated aquaculture on the environment. This was done in an attempt to promote an ethic of ecological responsibility.

Some possible solutions were discussed. These were based both on the results of this study and input from owners and proprietors and are listed below:

- Improved training in the areas of technical, administrative, and environmental control;
- Incentives for complying with regulatory practices related to reforestation, composting, etc.;
- Formation of co-operatives;
- Quality control, including classification of installations; and
- Use of effluents for hydroponics or brick making

Future work should include the evaluation of the situation in the context of the entire basin, taking into account other activities in the basin as well as socio-economic factors and other community issues. The group proposed that a protocol for evaluating aquacultural activities, which considers both environmental and socio-economic aspects, needs to be established. However, such a protocol would need to be rigorously applied and continually re-evaluated.

Carlos Bernardo Mascarenhas Alves, UFMG

"Introduced fish species in Minas Gerias (Brazil): what will be the environmental impacts?"

This presentation is part of a scientific publication on the introduction of exotic species to Brazil. Mr. Alves is currently working on two federal projects concerning introduced species, one of which highlights legal aspects and the other concerning the original purposes of these introductions.

The introduction of exotic fish species is only one of the many factors, such as deforestation, urbanization, development of dams, and release of industrial effluents, which have a negative impact on native fish populations. The introduction of non-native fishes is very common in Brazil. It began in the late 19th century with the introduction of the Common Carp. The introduction of the African Catfish is a more recent example that has happened without any controls during the last 30 years.

Legal aspects:

Mr. Alves' research shows that the existing laws regarding the introduction of exotic species tend to be ignored. One of the main problems with these laws is that they are so filled with jargon that they are difficult to interpret. For example, the words "introduction", "translocation" and "re-introduction" are all used extensively, but lack a common definition, which has been agreed upon. Since these important concepts are never clearly defined, the laws are difficult to interpret and are subject to different interpretation by different people, making them very difficult to enforce.

Purposes of Introductions of Exotic Species:

Mr. Alves found that exotic fish species have been introduced to Brazil for many different reasons. These include: expanding the aquaculture and sport fishing industries; stocking reservoirs; controlling undesirable species; developing the ornamental fish industry; and accidental escapes, such as the release of the African or Walking Catfish into the SF River during a large flood in the summer of 96/97.

Whatever the original reason for these introductions, they have many well-known and adverse effects on native populations. This can be so far-reaching as to cause the extinction of native species. Some of the adverse effects that can lead to extinction of native species include: limnological perturbations; the introduction of diseases and parasites; changes in competition and predation rates; hybridization with native species; and changes in the composition of the fish fauna.

Mr. Alves stresses that although there have also been numerous benefits from these introductions, including increased fish production and improvements in the sport fishing industry,

the maintenance of biodiversity is a much more important issue than fish production and should be given priority.

Minas Gerais (MG) is known as Brazil's headwater state. The number of exotic species found in the six largest basins in MG has increased dramatically since 1997. Dr. Mascarenhas Alves expressed concern about the situation in which two species, one exotic and one native, live in the same area, feed on the same food, and utilize the same habitat. He feels that in all likelihood, under these conditions, the native fish fauna would become extinct in the near future. In fact, he estimates that approximately one third of native species could become extinct within 30 years.

Tilapia is a very good example of the impact of an introduced species on native populations. They are now known to be established in more than 90 countries, and have negatively impacted native species in many ways. These include: hybridizing with native fish (where native Tilapia exist), causing declines in other native species populations and fisheries production; and ultimately leading to extinction of endemic fish and mollusk species. In fact, the introduction of *Tilapia* to northeastern Brazil was followed by a decline in fisheries production of all native species.

Future Recommendations:

- Aquaculture operations should always try to use species that are native to the specific basin within which they are operating. This will require improved technical knowledge relating to the culture of native fish species.
- Improve the control of live fish transportation between sites.
- Educate people regarding the dangers associated with the introduction of exotic species.
- Stimulate the development of native fish culture techniques.

Gerald Kurten, Texas Parks & Wildlife

"Practical considerations for Inland aquaculture in environmentally sensitive areas"

Mr. Kurten's main area of study is how to manage an aquaculture facility while being sure that the facility is adhering to the highest standards of environmental considerations. He presents experiences from the A.E. Wood Fish Hatchery, situated on the San Marcos River in Texas as an example.

The key issues that Mr. Kurten considers are: water quality issues related to fish hatchery effluents; water rights; and genetic "pollution", (including escape of introduced species of fish,

their hybridization with native fish and competition for resources between native and introduced species).

Water quality:

In 1994 all aquatic chemicals were made illegal by the US government, forcing all hatcheries to apply for permits to release effluents into the environment. The government has regulations and legislation specifically dealing with the use of fresh and saltwater and its release back into the natural environment. In addition to these government regulations, the public in San Marcos demanded that the water of the San Marcos River remain clear and clean in order to protect the local ecosystem. The San Marcos River provides critical habitat for at least 4 threatened or endangered species (2 fish, 1 plant and 1 reptile).

A recent study of effluent discharge into the San Marcos River revealed that water quality was highly variable but good, and that no measurable difference in water quality and microorganisms was found between water upstream and water downstream of the hatchery.

In order to achieve such high standards, the hatchery had set up a "best practices guideline" that includes: slowing down the rate of pond drainage*;* using the minimum effective fertilization regime; removing excess sediment in rearing ponds; and diluting effluent, as necessary. Analysis of the removed sediment was done, and since no chemicals had been used, it was even feasible to sell or use it as plant fertilizer.

A draft permit required a maximum of 10 ppm Total Suspended Solids (TSS), which was less than the hatchery's current average of 17.6. The hatchery employed a variety of techniques to meet this standard and improve effluent management. This was accomplished by: increasing the capacity of the treatment system to 8,000 gpm; developing a system to re-use the water; installing a gravity flow system; and improving control of escapees. (Note that escapees are considered pollution, just like chemicals and solid wastes.)

The new effluent filtration system, with a 40μ screen size, decreased solids in the effluent by 50%. The total cost of the system was $3 million, which is a big investment for a facility that is valued at about $28 million. The high cost of such a system may make this an impractical solution for most managers in Brazil, but some alternatives to removing particles from solutions include improved screening and disinfections.

Genetic and Exotic Pollution:

In order to avoid the problems associated with genetic and exotic pollution, Mr. Kurten recommended that the production of non-native fish should be avoided, unless they already exist in the river. The regionalization of hatchery production was suggested as a way of limiting disease transmission. Finally, he suggested that monitoring fish for disease at the time of harvest; putting new fish into quarantine; and monitoring both the water source and ponds, for disease should be carried out on a routine basis.

In reality, Texas stocks substantial numbers of non-native species and any hatchery produced fish, even of native species, can be considered “genetic pollution” of the native fish fauna. The hatchery is diligent in its attempts to reduce the level of this genetic “pollution”. This is accomplished by investigating triploidy and tetraploidy stocks, ensuring that genetic certification of broodstock is carried out, doing genetic screening of offspring and ensuring massive stocking of genetically pure fish in order to overcome hybridization issues.

Fátima Pereira de Sá, Universidade Federal de Alagoas

Dr. Pereira de Sá works in the lower São Francisco (SF) River, with a project concentrating on the Várzea da Marituba. (Note that a “várzea” is the area of low, flat, floodplain along a waterway.) The lower SF River is negatively impacted by a myriad of problems which originate in the upper SF. Millions of people who live below the dam have seen their lives affected, especially those that depend on small-scale fisheries. This situation has severely impacted the lives of Brazilians living in the lower reaches of the SF River.

Deforestation related to sugar cane production is one example, which has had many negative repercussions. It has caused massive loss of habitat and high levels of siltation, resulting in the formation of large islands at the mouth of the river, which didn’t exist in the past. Since large areas of the shoreline are now covered by microphytes rather than forests, these communities no longer have a source of wood for such things as crafts, boats and oars, all of which are essential to their traditional livelihoods. The sugar cane industry has also caused extensive air and water pollution, which has further compromised quality of life in this region.

The building of the dam has also had other far-reaching consequences. For one thing, it acts as a barrier to fish migration so that fish from the lower river are unable to reach their spawning grounds, resulting in deceased native fish populations. Those involved in the sugar cane industry have even begun to put up small dams on the tributaries in the headwaters in an attempt to improve irrigation during the dry season. As a result, the water has become inappropriate for fish and many fishermen have been forced to turn to harvest sugar cane in order to support their families.

Agricultural practices used to also depended on periodic flooding along the river. The absence of flooding imposed by the dam has resulted in the loss of fertile land and decreasing levels of production. Thus, the large tracts of floodplains along the river’s edge and lagoons have been lost and the water has become stagnant. This has had a negative effect on fish populations as well.

Aquaculture has also impacted the traditional livelihoods of the people of the SF River Basin. Exotic species have disturbed the natural biodiversity of this river system. Fátima notes that the introduction of species such as the Tucunaré, that are native to other parts of Brazil, into the SF River has been just as damaging as the Carp or Tilapia from other countries. Problems such as

higher levels of pathogens, competition and eutrophication are typical in areas of the SF River with large concentrations of aquaculture nets and pens.

Fátima describes a situation in which the fishermen in the lower SF River complain that aquacultural activities have divided the community. She notes that it is very difficult to change people's opinions and to get them to embrace modern technologies and ideas. Thus, introducing technical knowledge and methods to people in these communities is a very sensitive issue and must be very well planned and done very carefully.

Fátima feels that it is very important to first define small-scale vs. large-scale aquaculture, the positive measures that can be taken to ensure their successful implementation, and the positive impacts they can have on fishing communities. For example, it will be very important for CODEVASF (Companhia de Desenvolvimento do Vale do São Francisco) to provide training for fishermen moving into the aquaculture industry, and to make it clear that it can ultimately lead to higher incomes and increased sources of food for the community.

The Federation of Fishermen has proposed that aquacultural activities be conducted through them, rather than on an individual basis, so that they can better control and regulate environmental impact as well as adding value to the resource through increased organization.

Dr. Pereira de Sá concludes her presentation by emphasizing the importance of paying serious attention to the devastation that have been caused to the traditional life along the SF River. She cites an example in the Várzea da Marituba, in which the main native species, the Marituba, are rarely seen anymore. She refers to them as the "living dead", because only one or two individuals might be caught or seen per year. Since they can no longer reproduce, it is only a matter of time before they are gone for good.

OPEN DISCUSSION – RECOMMENDATIONS FOR PROTOCOLS

Carlos Eduardo Proença – SEAP (new Secretariat of Aquaculture & Fisheries)

Dr. Proença wanted it to be understood that IBAMA still controls Brazilian fisheries and that there are laws in place to regulate aquaculture. Unfortunately, they are rarely followed or enforced. One example he cites is the introduction of the African Catfish, which is prohibited by law but was introduced to Brazil by CODEVASF in direct contravention of the law. He does not know of a single case of illegal introduction that has been punished and emphasized that it is crucial that laws that already exist, also be enforced.

Comment (A CODEVASF representative): CODEVASF itself did not introduce the African Catfish. Rather, it was introduced by an individual working for CODEVASF, but was done on that person's own initiative after returning from vacation in Africa. CODEVASF only works with tambaqui in the lower SF River.

Question: How can this be avoided in future?

Answer (Carlos): It is very difficult to control these types of introductions. These species should never have gotten through customs. While working at IBAMA he received requests to introduce at least six different exotic species, all of which were denied. Enforcement is the main issue to prevent future introductions. Offenders must be prosecuted and fines and punishments must be given for infractions such as this.

Question: Is education important?

Answer (Carlos): Yes. Education can help to dissuade people from doing these types of things on their own initiative. Anybody can get to the river and it is impossible to enforce laws 24 hours a day, so it is important that people understand the negative consequences of these introductions to their communities.

Question: Is it possible that this person got past customs because he worked for CODEVASF?

Answer: We think he snuck it by customs in his luggage.

Comment (IBAMA representative): In IBAMA many things don't get done, not because we don't want to do them but because we just don't have the staff. Thus far in this discussion, we have been isolating aquaculture from other types of food production. If you look at it in an isolated way, the problem looks much bigger than it actually is. I feel we should shift the focus of the discussion more toward the strengthening of aquaculture legislation.

Answer (Carlos): Aquaculture operations have a huge number of registration processes to go through before they are fully licensed. Operators need to pay 15 different taxes to 15 different agencies before they can legally operate. It is important that these licensing bodies start to co-ordinate their processes. An operator should have only one document to prepare that will register him as a rural producer. I suggest that licensing be centralized so that what a producer needs to do in order to operate an environmentally and legally sound operation, is both manageable and affordable. In Brazil there are over 2,000 aquaculture operations, but not a single one is fully legal because it too complicated to get all the correct paperwork in order. The bureaucracy is much too complicated.

Question (Raimundo): From personal experience, I can attest to how difficult it is to get all the paperwork that is necessary to start a legal aquaculture operation. It is so difficult that most people start to operate before they are legally licensed and continue to operate regardless of the licensing. This also happens in forestry. Can we throw away the whole Brazilian system? How can this be improved?

Answer (Carlos): It is almost impossible to regulate after the fact. When the law was enacted in 2001, more than 1,000 aquaculture operations were already in service. It is only more recently that regulations for aquaculture have been created. I only know of two cases in which producers

were made to stop production or move their operations based on infractions. People are taking the easy route – they build their installations first and then think about making it legal.

Comment (Raimundo): The law has already been modified. There needs to be a clear beginning to the process.

Question (CODEVASF representative): I work for CODEVASF near Três Marias and we are developing an experimental unit to look into net culture. We started the documentation process for licensing and copies were sent to all the different associations and ministries, but authorization did not come. Is it true that if you don't get authorization within 30 days, that authorization can be assumed?

Answer (Carlos): The decree has a mistake in it. It doesn't specifically deal with water rights, but deals with the occupation of federally controlled areas. The federal government can concede the use of these areas, which includes water rights. There are two distinct processes that need to be followed: one for the physical space and another for the water rights. We want to bring these two processes together, but are experiencing delays in accomplishing this. Approximately 80% of requests for water and land use are given authorization, but it is also necessary to get an environmental license from IBAMA. Environmental license applications are usually denied or take a very long in coming because they have no specific legislation relating to aquaculture. Currently you have go through the same process to build a major bridge as you do in order to put three aquaculture tanks in a river.

Comment: I think we have to think of a new licensing system. I don't think we put enough faith in technical knowledge and experience. I think if there were a single law, aquaculture professionals and technicians within IBAMA could be responsible for licensing and helping small producers out on an individual basis.

Answer (Carlos): Ninety-nine percent of aquaculturists are not capable of preparing their own documents because the licensing process is so complex and expensive. Farmers are forced to hire expensive consultants to help them with their applications. For example: For each application you must have the exact GPS location of proposed installations. This has to be done by an expert. These experts are not experts in aquaculture.

Comment: The cost of licensing can be about 12% of the total cost of production. This makes licensing impossible for small producers.

Comment (Carlos): It is not only necessary that the environmental application process be simple and cheap, but it is also important that after approval is given there be regulations in place to control operation. These operational protocols must be prepared by the appropriate experts and must lay out detailed and specific methods of operation that meet all environmental regulations. It takes six to eight years to change a law in Brazil. We have been trying to get a new fisheries law approved for over 10 years, but the process is continually stalled by bureaucracy.

Antonio Gomes dos Santos

Antonio, 71 years old, is a long-time artesanal fisherman and member of the Federation of Professional Fishermen of Alagoas and the National Basin Committee for the São Francisco River. He felt that he had to participate in the meeting when he found out this discussion would be dealing with issues relating to the lower SF River. He feels that it is the area of the river most affected by environmental degradation. The islands and areas where soils accumulate from annual flooding are used by local fishing families to harvest shrimp and plant rice. These important areas are disappearing. He also feels that it is not true that the river water is wasted in the ocean. The mouth of the river is crucial to many people's livelihoods. In the past any fisherman in the lower SF River could catch 20 kg of fish per day. Now if they can get 5 kg a day it is unusual.

Antonio felt that a lot has been said about aquaculture here today, but that the activity has also caused destruction. He felt that the small-scale fisherman needs to be better respected. He was involved in a CODEVASF project in his community that bought six tanks to start an aquaculture operation. However, they were unable to get these tanks into the water because of bureaucratic delays. This cost the community a lot of money. The people that ended up being successful were those that operated completely illegally.

Antonio appreciates the people who have come from all over the world and are interested in improving the situation here in Brazil. It is so important that fishermen be given the opportunity to control their own destiny. Government aide programs would be unnecessary if fishermen were able to work to sustain themselves, their families and their communities.

Antonio then read and sang a poem that he wrote about the life of a fisherman on the SF River and their dependence on, and unity with, the natural world.

PRESENTATION

Given by: Raimundo Ferreira Marques (FPMG) and Norberto dos Santos (Colônia Z5)

PROJETO PEIXES, PESSOAS e ÁGUAS
SEMINAR ON CONTINENTAL AQUACULTURE IN BRAZIL

THEME: ENVIRONMENTAL CONCERNS OF THE FISHERMEN'S FAMILIES

Presented at the World Aquaculture Society Conference,
Salvador, Bahia
May 19-24, 2003

Norberto A. dos Santos
Raimundo F. Marquez
Federation of Artesanal Fishermen of Minas Gerais

Good afternoon, moderator Joachim Carolsfeld

Dear friends:

I am Raimundo, President of the Federation of Artesanal Fishermen of the State of Minas Gerais (FPMG) and I am with my colleague, Norberto, a member of Colony Z5, a fisherman of the São Francisco River. We will give a brief report on the environmental concerns that affect the fisheries sector and our families, which also represent a range of socio-economic impacts.

1) Dams on rivers interfere with fish migrations and the flooding of the lagoons along the margins of the river that are nurseries to the native fish.

2) The control of flooding by the hydroelectric companies, and the reservoirs, cause a slowing of the water flow in the rivers. In the first kilometer below [the dam at] Três Marias there are banks of invasive plants, large quantities of mud and excessive sediments. A diver would have difficulty perceiving that the bottom is a gravel bed.

A substance attaches to these invasive plants that we think are chemicals used for cleaning CEMIG's equipment and turbines as we can detect the presence of a thin layer of liquids on the water surface in the first kilometer of the river that doesn't mix with the water.

These substances cause very serious cutaneous eruptions in cast-net fishermen that affect their arms, torso and reproductive area**,** wherever this "water" comes in contact with the body. We already expressed our concern in recent years, however CEMIG doesn't take responsibility and claims not to know anything about any such cleaning practices for its equipment.

3) The compensatory measures for damming the São Fransicsco River in Tres Marias, are summarized by the agreement between the Hydrobiological and Fish Culture Station – CODEVASF and CEMIG - for the production of native fishes, with which we do re-stocking.

Methods of re-stocking are questionable and the Station, with its high scientific calibre, deserves more financial endowment and incentives to develop research that actually promote the sustainability of fishery resources and of fishermen of the São Francisco River.

4) Indiscriminate introduction of species to the São Francisco are highly damaging to the maintenance of native stocks, such as:

- Tucunare (Peacock Bass)
- Bagre americano (Channel Catfish)
- Cachara (Pacu)
- Tilapia tailandesa (Thailand Tilapia) - recently introduced in a cage culture program
- Tilapia comum (Common Tilapia)

5) Support for introductions by agencies and companies of the government: EMATER, IBAMA, CODEVASF, the organizations that allege to be “monitoring” the illegal process of introduction, should guarantee security against escapement. (Consider the example of transgenic soya in the south of the country).

“We are throwing the Amazon into the Sao Francisco River” without a notion of the losses of native treasures, not yet even catalogued. The environmental agencies don’t use the Precautionary Principle. There are no resources from the governments for research that is relevant to the fisherman and his family.

6) Governments and their companies hold control of the genetic stocks introduced into the river basins.

7) Existing research isn’t communicated to the public, nor consolidated for use and or supporting appreciation of the productive fisheries sector.

8) The scientific group, environmental agencies and other institutions, collect traditional knowledge to give a social basis to their research, and apply the practical knowledge of the fisherman and their families, yet confer neither the credit due nor the financial compensation owing.

World-wide there is a consensus that those who deserve to be paid for their knowledge are doctors that have gone to University.

9) Governments and other groups looking for financing need to “create” situations that interest investors. For example: “the fishery stock is at risk” is an example of a negative affirmation, which doesn’t take into account the social impact that these affirmations can cause.

10) There is no publication of projects and research in the areas that are ongoing or were already completed. In this case, there is not prioritization of local interests or incentives for the participation of the communities involved, neither for contesting the data, nor even for the methods used in the evaluation of stocks.

Communities don't have access to the information gathered, as this becomes the monopoly of the financed groups and institutions and the funders.

11) Market demands, as related to quality control of the catch and the lack of: specific training programs on increasing the value of the catch; transportation; [and] storage, and on policies that are accessible to colony members, even something like co-operatives; are all impacting factors.

We are forced to carry on partnerships with economically stronger groups, which have a great ability to organize their membership, even though we are the biggest collector-producers of fish.

12) The police don't have the training to lead on environmental and social questions. They don't know the fishery. They are educated to work with robbers and bandits - the police are highly repressive.

Enforcement should be educative and community driven. This depends upon training and conversation together [with fishermen].

13) The media has great power to mold social preconceptions labelling the fisherman as predators of fishery resources, with neither scientific data nor technical knowledge of the reality of the national fishery.

Fishermen don't have financial resources to promote public awareness about the truth of the fish and the fishermen as food producers and [as] those the most interested in the preservation of stocks because this is what their livelihood depends on.

14) To the imagination within Brazil and the world, few Rivers exist besides the Amazon, and today the São Francisco River has become a new star. The danger is that we will not delve into the problems – we will forget the small springs and veredas (oases) that are "out of sight" of the cameras and films, but that guarantee waters that make the river flow.

The Fishery Federation of Minas Gerais, only as an example, possesses thirteen colonies, only six of which are on the São Francisco. Minas Gerais is a state that is formed by an incredibly vast but unknown hydrographic network.

In Brazil there is no data about the extent, geography, impacts and populations, other than for the principle tributaries of the São Francisco.

15) The absolute disregard for the laws that preserve the national landscapes, natural resources, socio-economic heritage**,** represented by the veredas or what's left of the savannah and permanently preserved areas (APP). Even though enforcement is insipid, the terms of adjustment aren't discussed at the municipal level or with those directly affected by the laws, nor is any investment in divulging the values of those ecological systems. There is no public communication about any of these businesses, their production or their planning, and they are never incriminated or publicly criticized.

16) Vast devastation is caused by a lack of: enforcement, monitoring, mapping, and creation of databanks with real data. There are fictitious studies about impacts, and integrated licensing system are nonexistent; for example the system of the National Department of Mineral Production, the drilling of artesian wells by CODEVASF based on indiscriminate criteria and processes, and, finally, the Eucalyptus plantations in the state of Minas Gerais that are licensed by IEF and other agencies that are active in the municipalities, without consulting the communities or public authorities.

IEF's data about vegetation and reforestation are from 1994 and CODEVASF doesn't know exactly where and how many artesian wells are already in place. The DNPM gives exploration and extraction licences without consulting or prioritizing the landowners.

17) Investments of governmental and business interest are noticeably focussed on larger wealth like mineral extraction, vast plantations, solicited research**,** amongst others.

Even with the propaganda about the value of nature, there is little investment in "what's left of the savannah," preservation of springs and other aquatic resources, because the population and the media don't see them, access to rural locations is more difficult. So the focus remains on the mainstem of some river that is the star of the moment.

"Sao Francisco River – Historical and Cultural Heritage of Humanity"

" … fishing is prohibited in the section between Três Marias and Pirapora, in the name of saving the environment; however extinguish the people - exist the fisherman, who has made the history and culture of the River live. Humanity is left out ..."

18) The large environmental liabilities of companies on the margins of the São Francisco River are a national scandal. The practice of Public Audiences does not exist, and we are contaminating our children with a totally vague notion of what "heavy metals" represent, or other technical terms generally used to minimise the reality of the facts.

19) The cities don't worry about their garbage and sewage that pollute the water and the soil. The poor social classes don't have access to the norms of cleanliness and environmental health.

How are the great aquifers and groundwater levels that percolate to join together with the river waters? If what we see flowing on the surface is already scandalously poorly known and undervalued, how will we preserve the subterranean waters?

20) Is not knowing how to read [illiteracy] an environmental impact to you?

The fisherman doesn't need to read to put fish on the people's table.

Today we complain about the lack of schooling because the participative methods and systems and the communication are from structures and logic exclusively of people from the formal teaching network.

When the fisheries sector is invited to participate, it ends up being just a mass of signatures of those present, sirs: there is nothing less democratic than the pretence of participation.

We need to understand the laws and our rights, by paying the lawyers we are giving them our blind trust. We sign to show our presence in planning meetings that can usher in our own extinction: the meandering words that the river people don't use and document details that appear to have nothing to do with their daily life.

Prepared by:

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