

Decade of Project Piaba: Reflections and Prospects



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We would first of all like to thank all OFI members and officers for your continued support of *Project Piaba*, and let you all know what we have accomplished since we began our research on the ornamental fish trade.

The principal objective of *Project Piaba* is to determine whether the ornamental fisheries

of the Rio Negro help to conserve the floodplain and rainforest ecosystems, while providing a viable economic alternative for rural Amazonians.

We believe that a managed ornamental fishery in the region is one way to ensure the survival of both the ecosystem and its human inhabitants. Many forest fishes have a short life cycle (1-2 years), and fish populations can be quickly replenished if the ecosystem is maintained undisturbed and functioning in its pristine state. Thus, it may be possible through proper management to protect the habitat from other harmful use, while maintaining sustainable and 'bountiful' harvests. Well-managed fisheries may also promote the reduction of environmentally destructive economic practices, and prevent migration to overcrowded urban areas.

Thus, '*Buy a fish, save a tree*' becomes our wishful slogan. After a decade of insisting this very goal, have we been successful? Are the 'bottom up' doctrines of green philosophy working? Have the appropriate scientific findings reached the policy makers? Are the various needs and objectives of each of the stakeholders along the supply chain understood by the others? These and more questions, we have often asked ourselves, but the answers are not straightforward and change over time.



History of Project Piaba

In 1989, researchers and students from the Universidade do Amazonas (UA) and National Institute of Amazon Research (INPA) initiated an ecological baseline study on floodplain fishes of mid-Rio Negro basin. During this initial phase, we discovered the importance of the ornamental fisheries for local livelihoods and wondered about the environmental impact of fishing activity. Subsequently, we started *Project Piaba* in 1991, with our first grant awarded by CNPq (National Research Council of Brazil). We strengthened our roots in the municipality in the January of 1994 when we inaugurated the 'Dr. H. R. Axelrod Laboratory of Ornamental Fishes' during the first Ornamental Fish Festival in Barcelos.

The mayor of Barcelos at the time, Valdeci Raposo, provided us with a classroom. We built 20



aquariums with local fishes on exhibit and a desk with stereo-microscopes donated by a group of aquarium enthusiasts who are known as the 'gringos', 'doidos', or 'crazy foreigners'. The small exhibition provided an opportunity for the local, 'urban' children see the ornamental fishes up close and through magnifying scopes.

In January 1997, we moved the laboratory to the 'Center of Aquatic Conservation' during the 4th Ornamental Fish Festival. Dr. Axelrod and TFH Publications were the major donors to *Project Piaba* at the time. In the 'Center', we greatly expanded our exhibition, and set

up a laboratory/classroom and dormitories. Since that time, we have provided scholarships for several local youths to run the Center.

In 1999, ACEPOAM (Association of Ornamental Fish Breeders and Exporters of Amazonas) implemented a levy system to raise funds for research on ornamental fishes and the welfare of fish collectors. Members of ACEPOAM collect \$0.50/box of fish from importers, and match these funds. The 'Center' is now maintained by this fund through *Project Piaba* under an agreement between ACEPOAM and the Universidade do Amazonas.

In 2001, *Project Piaba* received long-term funding from CNPq and now more than 20 Brazilian and international researchers are involved in the project. This modest research grant and other gifts received by Bio-Amazonia Conservation International (a US-based NGO) have kept the research team together for the time being. Other donations from the New England Aquarium, National Aquarium in Baltimore, Ornamental Fish International and Thermo-Orion Corp. also support the Project, providing us with much-needed equipment and human resources. The Newport Aquarium and many hobbyist clubs from Vancouver to Boston have also made fund-raising efforts to support *Project Piaba*. An annual hobbyist expedition has helped us to make long-term monitoring studies in the Rio Branco and in several forest streams.

For the next phase of the *Project Piaba*, we intend to deepen the areas of research to include genetic diversity of fish populations, habitat/stream gradients, ecosystem function, mapping and characterising of production areas, shipping and handling of live fish, fish pathology and the trade processes. We have started to test new industrial products and are now using new techniques to improve and identify water quality and fish health throughout the trade chain. We are keen to develop techniques for fish husbandry and help fisher folk to produce quality fishes of the region. We will also expand our information database and make it accessible to broader user groups. By providing a scientific basis for management, we will contribute to the sustainable use of aquatic resources, and the long-term conservation of the Amazon ecosystem.

What Progress has Project Piaba Made?

Conservation projects at the local level, especially those related to natural resources that local people utilise for their livelihoods, are not easily accomplished.

Wild-caught ornamental fishes provide instant revenue for fish collectors in the Rio Negro basin. During 2000 and 2001, over 58 million fishes were shipped from the port of Barcelos, creating nearly US \$250,000 dollars for the local economy. The value of these fish would be over \$ 9 million (FOB \$0.15/fish). More fishes exported means better income for producers and exporters, and more tax revenue for government agencies (18 types of taxes and fees per shipment from Manaus). However, increasing production and export volumes may drive down the price for producers and exporters. The sheer number of 60 million fishes extracted from the wild may also 'scare' regulatory agencies and animal and environmental rights organisations.

We have generated baseline data on the aquatic resources and socio-cultural implications of the ornamental fishery. Our research has demonstrated that producer exploitation has frequently been overstated by outside observers of the ornamental fishery of the Rio Negro basin, and that over-fishing does not seem to have been a major issue for the fishery that has continued to be an important source of income for local people since 1960. Additionally, a revised list of exportable fish



species has been elaborated for IBAMA (Brazilian super-agency on all renewable natural resources and environmental issues) to protect vulnerable species and to enhance the economic viability of the region; this list was well received by the industry (*OFI Journal*, No24, May 1998).

We have defined issues that are necessary for community-based management strategies by recognising the informal nature of the trade and the role of patronage in procuring community support. We have obtained federal fishing licenses for more than 250 ornamental fish collectors, guaranteeing their eligibility for

government-sponsored rural retirement. We have stimulated fish folk to form an association in 2001.

Currently, we are working in a new licensing system, which would provide unemployment benefit to fish folk during the low fishing season. We now also sponsor a local radio programme to provide important information for ornamental fishing communities. We have worked long and hard to establish an ongoing dialogue with regulatory agencies to promote environmentally-friendly policies which least punish trade chain stakeholders.

Worldwide, wild-caught freshwater fishes constitute a small portion of aquarium fish market (5-10%). Locally, a single species, the Cardinal Tetra, constitutes 80-90% of total catch; the fluctuation in quantity and quality of catch and shifting market interest are the main constraints on the further development of the ornamental fishery. If commercial fish breeders outside the region are successful in producing Cardinal Tetras in large quantities that are more competitive in the international marketplace, the ornamental fishery and the socio-economic base of the Rio Negro basin may collapse.

Some green organisations have advocated a total ban of the wild-caught ornamental fish trade in fear of the extinction of wild fishes due to over-exploitation, or on issues of animal welfare rights. If any of these scenarios become true, local people will be forced to seek alternative means for their sustenance. Unfortunately, most of the available alternatives are not sustainable and are more damaging to the environment.

Since July of 1998, our field team has started to collect data on fishes shipped every week on every transport boat leaving Barcelos. Our statistics have shown that the exports are much higher than exporters would like to admit. Even so, taking the Cardinal Tetra as an indicator species (over 85% of total catch), each weighs less than 0.2 g and 50 million Cardinal Tetras would weigh less than 10 tons. The biomass extracted from such a large area is negligible (two municipalities, 185,000 km² x 2% floodplain = 3,700 km²; that is, 3.7 million hectares or 9.14 million acres; an average 180 tons of plants and animals/acre of rainforest). In spite of inflation and the US dollar exchange rate, the price of Cardinal Tetras bought from producers has remained at \$4-5.00 per thousand since the beginning of *Project Piaba*.

The ornamental fishery of the Rio Negro basin does not seem to have an immediate problem that may threaten either the livelihood of rural Amazonians, or cause an ecological disaster. The fishery has sustained many local people since the 1960s and exports have remained steady at 20 million fishes for over two decades. The sharp drop in exports in 1983-84 coincided with the strongest El Niño of the 20th century (or inaccurate statistics), but the production recovered soon after. Unexpectedly, export volumes increased after the strong El Niño of 1997 to 1998.

Finally, we have demonstrated that fish mortality is related to water quality, yet mortality while fish are in the possession of fish collectors and in exporters' facilities in Barcelos and Manaus, is negligible. Mortality is generally no higher than 2-3% in the fisheries (although variation is prevalent), constant water changes are made during fishing trips, storage netting and tubs are regularly cleaned, and the fish are well fed. Transportation from the middle Rio Negro to Manaus and handling practices from exporter to retailer/hobbyist must be more profoundly understood.

Importance of the Ornamental Fishery for the Local Economy and Society

Ornamental fishes are principally collected from two municipalities: Barcelos and Santa Isabel do Rio Negro (or Tapuruquara) in the Rio Negro basin. As the largest numbers of fish exports from Brazil originate in Barcelos, it is the self-proclaimed 'capital of ornamental fish.' Barcelos is also home to the largest archipelago in the world, Mariu - the original name of the city before becoming the first capital of Amazonas - with more than 700 islands; this is the principal feature of the largest municipal ecological reserve in Latin America. Below are some basic facts about the fisheries of the Rio Negro and global trade in ornamental fishes.

Municipalities of Barcelos and Santa Isabel do Rio Negro (Tapuruquara):

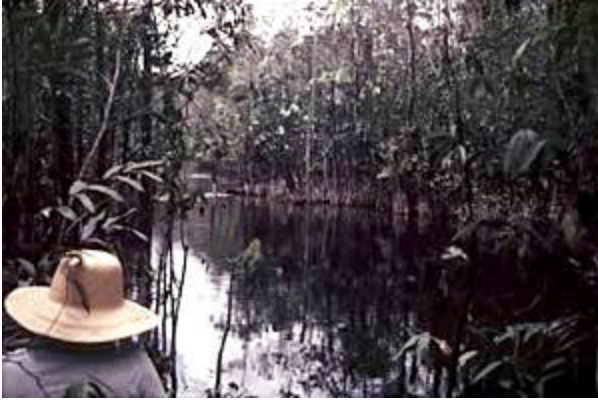
Area: 185,000 km²; population 34.000; 30-50 millions ornamental fishes extracted per year; ~ 60% of income revenue for rural communities; >80% of all fish captures are Cardinal Tetra (*Paracheirodon axelrodi*).

Kinship, family, marriage and compadrio relations (created in the Catholic ritual of baptism) mediate the organisation of production. Marriage alliances increase the density of kinship relationships; 17 of the 60 - 70 intermediaries are linked through kinship and marriage. This core group of intermediaries makes up roughly 30% of the total number of patrons and 15 of the intermediaries are the sons of current or former intermediaries.

Although some collectors and intermediaries lament that it now takes a week to capture the same number of fish that once took one day about thirty years ago, the number of collectors has grown considerably in the last twenty years due to the lack of economic alternatives in the Rio Negro basin. In fact, as the table below demonstrates, the population of Barcelos has more than doubled since 1991. The effect has been to swell the number of potential and actual producers.

In 1999, the FAO stated that the export value of ornamental fish and invertebrates was over US\$200 million. More than 60% of that money, some US\$130 million, went into the economies of developing countries. The international trade in aquatic organisms for ornamental purposes has been increasing at an average rate of 14% annually since 1984. Although organisms caught in the wild represent only a small percentage of the ornamental trade, it is this aspect of the industry that is most likely to directly affect fishing communities in developing countries.

Municipality	Total Population	Rural Population	% Rural Population		Population Change	
Novo Airo	14,024	9,656	57.3%	27.6%	-9.78%	-31.14%
Barcelos	11,055	23,465	63.6%	66.1%	+9.89%	+112.25%
Santa Isabel do Rio Negro (Tapuruquara)	15,421	19,547	86.3%	60.0%	-3.42%	-31.60%
Sao Gabriel da Cachoeira	*23,140	29,951	70.5%	58.7%	+2.63%	+29.43%
*mostly military personnel increase.						
State of the Amazonas, Brazil IBAMA reported 20-25 million ornamental fishes exported per year. Ornamental fishes generated US\$ 3 million revenue for the state, the third largest extractive product of the state.						
The world (source: OFI & FAO) 350-400 million ornamental fishes are traded annually (over 70% are captive-bred).						
Worldwide ornamental fish imports value: US\$ 321 million (US\$ 287 million from freshwater fishes).						
~63% are exported from developing countries (US\$ 202 million).						
The world ornamental fish industry moves US\$ 15 billion annually (including equipment, accessories, supplies and publications).						



The Future of Project Piaba

In the new millennium, Project Piaba aims to generate integrated data relating to a wide range of issues that will help improve the lives of the riverine people as well as aquatic resources and ecosystems. Our specific objectives are to:

- investigate the spatial and temporal variation of aquatic habitats and resources to preserve the integrity of the ecosystems which sustain the food chain and diversity of aquatic fauna;
- study the genetic diversity of floodplain fishes to understand the phylogeography of the region to set a comprehensive management strategy for the target species;
- improve the technology on water quality control, fish health management and handling techniques at all levels of commerce (producers, traders and hobbyists), and develop an educational programme for the stakeholders;
- investigate the feasibility, logistics and the political/business environments of establishing a locally controlled ornamental fishery and its trade processes.

How can the Ornamental Fish Industry Contribute to the Sustainable Harvest of Wild-Caught Fishes?

In the case of the ornamental fishery of the Rio Negro, it would seem that fishing activity has not significantly impacted the environment in any drastic fashion and is, thus, sustainable. Although it is apparent that the fishery contributes greatly to the local economy, it is by no means a panacea; it is able to support but a fraction of the local population.

With new biotechnology development, the industry and breeders should respect existing bio/environmental ethics, the Bio-diversity Convention of Rio 92, and other international treaties.

Extractive products tend to be replaced by cultivated species or synthetic products. We can predict, for example, that the Cardinal Tetra will eventually be produced in captivity like so many Amazonian species. This has already happened with numerous species from Amazonia such as the Discus (*Symphysodon* spp.), the Neon Tetra (*Paracheirodon innesi*), and the Angelfish (*Pterophyllum* spp.), to name a few. Mass producing ornamental fishes outside of their native ranges will not only cause economic damage to local people, it may also introduce invasive and exotic species to local waterways.

One of the greatest deficits of information is after the fish leave Manaus. To show that the industry is making progress in terms of good practices, we need to be able to get information from the entire chain. We need to seek to understand the needs and objectives of all stakeholders in the trade chain, as well as the environmental impacts of the global movement of domestically bred and wild-caught fishes.

There is also a need for more equitable remuneration of the fishermen. Sustainability and poverty alleviation can only be achieved by equitable redistribution of the wealth produced by the commodity.

We thank Dr. Paulo Petry for his valuable comments on this article. More information on Rio Negro ornamental fishes can be found in our recent book: Ning Labbish Chao; Paulo Petry; Gregory Prang; Leonard Sonneschein; Michael Tlusty (Eds.) 2001 Conservation and Management of Ornamental Fish Resources of the Rio Negro Basin, Amazonia, Brazil. (Project Piaba).

Editora da Universidade do Amazonas, Manaus, Brasil. 309 p. (ISBN 85-7401-083-9). It is available from Bio-Amazonia Conservation International, 1295 William St. Baltimore, MD 21230, USA. Project Piaba (E-mail: piabas@aol.com or website: www.angelfire.com/pq/piaba).



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