

Conservation Spotlight

Project Piaba: Working Toward a Sustainable Natural Resource in Amazon Freshwater Fisheries

Scott Dowd

Senior Aquarist, New England Aquarium, Central Wharf, Boston, 02110; 617-973-5243; sdowd@neaq.org

Michael Tlusty

Aquaculture Specialist, New England Aquarium, Edgerton Research Lab, Central Wharf, Boston, MA, 02110; 617-973-6715; mtlusty@neaq.org

Abstract

A non-endangered species has become the focus of an ongoing research project in the Amazon and may prove to be the key to preserving the ecology and way of life for the people of the mid-Rio Negro Basin. The cardinal tetra (Paracheirodon axelrodi) is one of the most abundant vertebrates in the Amazon. It is a very small fish, reaching a size of about one inch. This species' adaptability to environmental fluctuations has made it extremely resilient and though at least 20 million are harvested annually for the pet trade, the populations have shown no detected decline from the commercial fishery. Project Piaba, coordinated by Dr. Ning Labbish Chao, Professor at the Universidade do Amazonas, is becoming an international model for sustainable development. The Project includes partners from Brazilian agencies, members of the ornamental fish industry, and the American Zoo and Aquarium Association (AZA). The AZA Conservation Action Partnership: Brazil and the AZA Freshwater Fishes Advisory Group have both made Project Piaba a priority, and have placed it on their action plans.

Introduction

The Amazon rainforest ecosystem is one of the richest and most diverse on the planet. Some of the world's most spectacular animals, many of which are endangered, come from the Amazon. The large cats, primates, parrots, river dolphins, and all other species we associate with the Amazon depend on the integrity of the ecosystem.

There is another species dependent on the Amazon ecology—our own. Although the people living in the rainforest know better than anyone the uniqueness and value of the Amazon, life there is difficult and people will do what they need to do to feed their families. Most of the available options for making a living have disastrous results on the ecosystem—gold mining introduces mercury to the environment and timber harvesting, cattle ranch-

ing, and agriculture dramatically reduce biodiversity and have severe impacts on aquatic ecosystems. Furthermore, these environmentally destructive practices are usually unsustainable and remove options for future ecologically sound development.

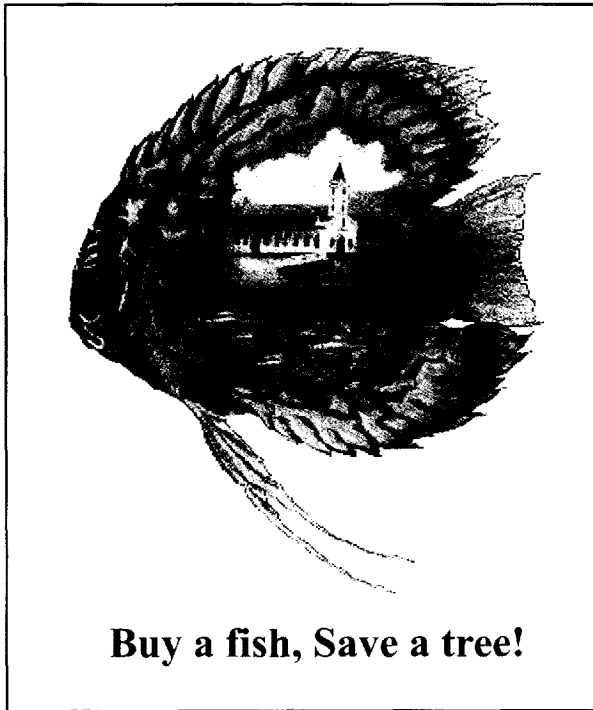
In a developing country with limited resources to apply to conservation projects and land management, it is difficult to deploy successful programs that increase the likelihood of preserving biodiversity. In addition, the vastness of the region and sparse population make regulations very difficult to enforce. If the rainforest is to be preserved, it cannot be saved species by species. Rather, preservation must be addressed in a systematic fashion at the ecosystem level. Project Piaba is a community-based project established to work with the

ecological and cultural systems of the middle Rio Negro basin, Amazonas, Brazil. The project began in 1989 to promote the sustainable commercial harvest of aquatic resources that will ensure the survival of both the Amazonian rainforests and its human inhabitants.

Project Piaba

In the Amazon rainforest, the aquatic ecosystem and its resources are the basis of the economic and socio-cultural systems. More than 20 million live fishes are exported from the region (Chao 1993) and represent in excess of \$100 million in worldwide retail trade value (Prang 1996). The mid-Rio Negro basin is the primary fishing ground and the municipality of Barcelos is the principal trading post for the ornamental fish trade. Barcelos depends on the export of ornamental

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Buy a fish, Save a tree!

Logo for Project Piaba.

fishes—the industry now contributes over 60% of the local revenue (Chao 1993). Food fishes comprise the principal component of the Amazonian diet (67 kg/capita/year [Chao and Prang 1997b]) thus increasing the importance of aquatic ecosystems.

A single species, the cardinal tetra (*Paracheirodon axelrodi*), constitutes over 80% of the total ornamental fish export from the Rio Negro basin (Chao and Prada-Pedreras 1995; Prang 1996; Chao 1998). Natural fluctuations in fish populations, fish mortality rate during capture and transport, and market demands significantly impact local fishing communities. As an adaptation to the extreme habitat fluctuations, many ornamental fishes have a short life cycle (1-2 years) and high fecundity (500 eggs, 0.55mm in diameter) (Chao 1992, 1993). These life history traits appear to allow tetra populations to endure the ornamental fishery. Though the ornamental fish stocks are very resilient, they are sensitive to long term environ-

mental disruptions. In order for the ornamental fishery to thrive, the entire aquatic ecosystem must be intact and functional. Project Piaba helps develop fishery management procedures, which give local people incentive to preserve the integrity of their aquatic ecosystems and maintain their cultural and terrestrial environment as well.

The Rio Negro is the largest tributary of the Amazon basin in terms of annual discharge. At three times the size of the Mississippi, it covers an area of 0.75 million km², and it extends over 1,700 km (Prang 1996; Chao and Prang 1997a). To date, deforestation in the Barcelos area has been minimal, due in part to the infertile sandy soils, which are not suitable for agriculture. Perhaps more important, though, is the fact that the local people are largely engaged in limited subsistence activities, such as the ornamental fishes and piassava (palm fiber) trade, which generate enough cash to provide for basic necessities. Low human population densities, typical of the black water areas of Amazonia, play an important role as well (Chao and Prang 1997). The Project Piaba study area extends from the mouth of Rio Negro (Manaus) to Tapuruquara (600 km up river), including the lower Rio Branco and Rio Demini in the municipality of Barcelos, an area approximately the size of the State of Pennsylvania (Figure 1) (Chao 1993; Chao and Prada-Pedreras 1995).

To develop an appropriate management strategy, a firm under-

standing of the ecosystems and sociocultural perspectives of the ornamental fishery is essential. Despite the economic and social importance of the fishery, fishes are frequently overlooked in conservation or development projects in the Amazon despite their enormous diversity (over 3,000 species) (Chao 1992, 1993, 1998). All stakeholders, fisherfolk, exporters/importers, distributors, and retailers must understand their role in this important industry. Furthermore, local control of the ornamental fishery and trade practices will better establish long-term sustainability of a quality livelihood for the fisherfolk.

Since 1989, Dr. Ning Labbish Chao and students of the Universidade do Amazonas and National Institute of Amazonia Research (INPA) have studied aquatic biodiversity and collected baseline data on ornamental fishery and socioeconomic aspects of the riverine communities in the Rio Negro basin. In 1991, Project Piaba, in collaboration with the New England Aquarium, began to involve members of the American Zoo and Aquarium Association in field programs. The team concluded that the ornamental fishery in the region is likely to be manageable, and more importantly, is a key to protecting the Amazon rainforest. Conditions needed to maintain a thriving fishery include an intact rainforest.

Concepts of sustainability inevitably reflect societal choices at the local, regional, and global levels. Balancing ecological with economic and other considerations is the fundamental problem in defining sustainability. Biological inquiry alone will not satisfy the needs of a sustainable ornamental fishery. Thus, Project Piaba has gradually evolved from a fish biology study into a community-based, interdisciplinary project, which is

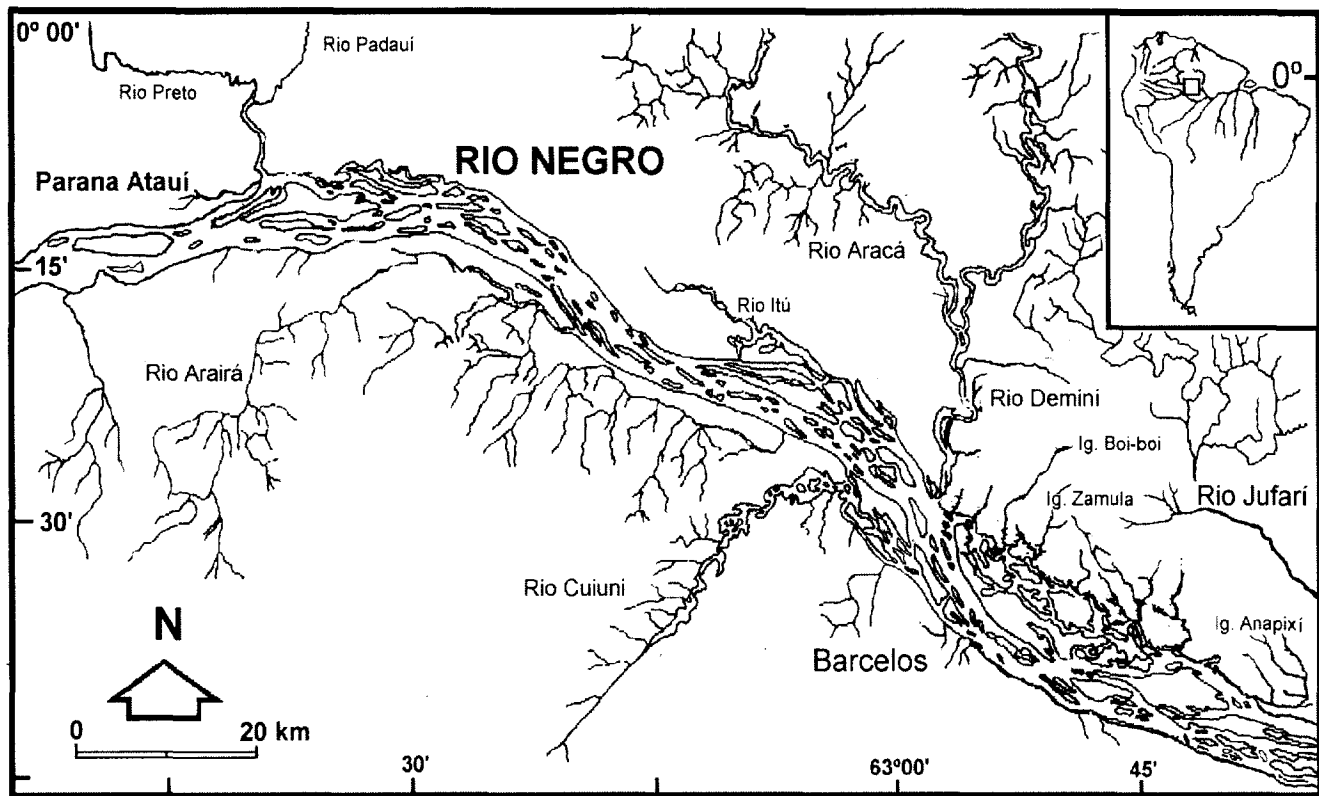


Figure 2. Principal study areas of Project Piaba in the mid-Rio Negro basin.

aimed at understanding the relationship of the ecological and cultural systems of the middle Rio Negro basin. It also aims to conserve and maintain the live ornamental fishery resources at commercially feasible and ecologically sustainable levels.

For the next three years, Project Piaba will expand the areas of research to include the study of genetic diversity of fishes, habitat/stream gradient, ecosystem function, shipping and handling of live fish, fish pathology, and the various trade mechanisms. We are working with the fisherfolk to develop improved techniques for fish collection, transport, conditioning, and exports to produce high quality fishes of the region and maximize the economic benefit to local communities. Project Piaba actively contributes to the sustainable use of aquatic resources and the long-term conservation of the Amazon ecosystem.

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