

## Ornamental Fishery in Rio Negro (Amazon region), Brazil: Combining Social, Economic and Fishery Analyses

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### ABSTRACT

The cardinal tetra is the number one export species in the ornamental fish trade industry in Brazil, accounting for 70% of the total amount of Brazilian fish exports [1]. The cardinal tetra inhabits the middle and upper Negro River, and its trade corresponds to 60% of the economy of the Barcelos municipality. However, fishery data have yet to be collected to better evaluate the effects of this artisanal fishery on fish populations. The present work presents data obtained from field collection interviews and a sample fishery. The data correspond to the quantity of fish caught per collection region, how many people were involved in the activity, the number of nets used, and the catch volume. Data from fisherman interviews and the type of fishing were compared for corroboration of the findings and to assist in calculating the number of fish extracted from the collecting areas during different times of the year. Altogether, these data were used to determine whether ornamental fisheries are sustainable. The present study shows that a fisheries observatory program is viable for the ornamental fish market and can be combined to increase sales, which emphasizes the preservation and wellbeing of the local communities that are active in this trade, as accomplished by the “fair trade coffee market”. We hope this idea can be pursued further by local authorities, and with better data, the preservation of the aquatic fauna can be prioritized because aquatic fauna preservation increases sales. Approximately 60% of all ornamental tropical fish exported from Brazil originate from Rio Negro and are transported to Manaus by boat. The export activities start in Manaus [1] which is one of the most remote capitals in Brazil. Practically all Manaus cargo leaves and arrives via airfreight. Due to this dependency on airfreight, Manaus has one of the highest costs of living in the world. For instance, the price to transport 1 Kg of goods from Manaus to Germany is approximately US\$ 6 (six American dollars), which is double the price of freight in Singapore, which is another country that exports ornamental fish; there, the price to export one kilogram of goods to Germany is only US\$ 3 (Benzaken et al.). Considering the high freight prices charged by the Brazilian air companies, the fish market has become more expensive and less competitive. Thus, most North American and European customers prefer to buy ornamental fish from Asia given the decrease in their buying power

decreased the competitive power of the Brazilian market compared to that of the neighboring countries, which commercialize a larger number of fish species. Although created to protect biodiversity, the Brazilian list encourages fishermen to trade larger numbers of a smaller group of species. In neighboring countries, fishing efforts are distributed across more species.

### Strengthening of the Brazilian currency

Brazil has one of the highest interest rates in the world, and because of the current global economic situation, has experienced a large influx of investments making the Brazilian currency relatively strong. Due to this change in the currency's value, when a company sells tropical fish in dollars it receives fewer Brazilian Reals, making the company less profitable and making it more difficult to cover local expenses. The solution to compensate for this change in the currency exchange rate is an increase in prices, which is not viable during a period of economic crisis.

### Brazilian bureaucracy

This problem is well known in various sectors of the Brazilian economy, and the problem also affects fish export activities. A shipment requires more than 12 hr to clear customs and depart from Manaus. During this time, the fish must stay packed at the airport, awaiting clearance, which decreases the quality of the packed water. To compensate, fish trading companies must add more water to their packing bags, which causes an increase in the weight and increased freight costs, making the price of Amazonian tropical fish less competitive worldwide.

### Methodology

The Barcelos region is located approximately 300 Km from the city of Manaus in the middle Negro River [Figure 2] it is the second largest Brazilian municipally and the third largest in the world. To proceed with this project, we designed a study to acquire data on the amount of fish captured in the middle Negro River. There are three possible ways to determine the amount being fished:

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