

## **PP325 A comparison of fish diversity in different habitats in the Peruvian Amazon**

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The Amazon River basin is home to the greatest richness of freshwater fish species in the world; as many as 8,000 species in total and at least 750 of these have been recorded in the Peruvian Amazon, with an estimated total in excess of 1,100 species in Perú.

Fish provide many local people with the largest proportion of protein in their diets as well as being the source of food for many other species within Amazonia. It is important that this rich diversity of freshwater fish is protected not only for its intrinsic value, but more importantly for its far-reaching value to humans and entire ecosystems.

The sustainability of fish as a resource in the Peruvian Amazon is a concern as demand is increasing with development. Studies suggest that overall biomass of catches is not increasing annually in the Peruvian Amazon as a whole, but harvests of some of the most popular commercial fishes are declining. This would suggest an overall unsustainable harvest of the most popular fish species and a compensating move by fishermen to other species.

The main threats to the fish communities of the Peruvian Amazon include the use of toxic plant substances in harvesting methods, large-scale fish extraction near the mouth of the rivers, and erosion and reduction in habitat through timber extraction. Whilst these threats are currently minimal in relation to the expanse of the region, the importance of the seasonally flooded forests in the reproductive cycles and juvenile stages of commercially important species, make the Pacaya-Samiria national Reserve a vital area for conservation and the development of effective management plans.

Monitoring of the fish populations, especially species used by fishermen is important in developing appropriate fisheries management in and around the reserves. Research will be conducted at the Samiria River research sites in the Pacaya-Samiria National Reserve on the species composition of catches, abundance estimated by CPUE, size and weight classes for demography, and habitat analyses of catches. These data will allow for a comparison of catches between river, lake and channel habitats to determine the current abundances and composition of the fish commonly used by local fishermen.

The Amazon basin is going through dramatic climate changes that will impact the largest rainforest on Earth. In 2010 the water levels of the Amazon River were at a historic low resulting in extreme dry conditions. In 2009, the same river was at a historic high, flooding huge area of Amazonian forests. More recently in 2011, the high water was again at historic highs, and then drained to historic low levels. Each year the Amazon River goes through seasonal changes between the flooding period from December to June and the low water period between July to November. However, these normal seasonal changes are now becoming more intense, which is impacting the wildlife and local people.

Research on fish populations is being conducted to understand how the ever increasing climatic changes are impacting their ecology and populations. The research team is also working with the local Indian communities to see how the changes are affecting their fishing that they depend on for their daily livelihood.

The wildlife of the Samiria River lives in an ecosystem that is driven by the large seasonal fluctuations occurring between high and low water seasons. The ecology of the aquatic and terrestrial wildlife revolves around these seasonal changes in water level.

The aquatic wildlife is affected by the large seasonal inundations. During the flooded periods the fish enter the water laden forests and feed on the abundance of vegetative and animal production, especially the abundance of fruits, invertebrates and other living organisms trapped in the annual floods. Indeed, many tree species fruit during this season and rely on the fish as their primary means of seed dispersal. During the flooded period many fish populations reproduce within the inundated forests. When the waters recede during the dry months, fish populations become condensed in the reduced lakes, rivers and channels with ever increasing competition and predation. During this period many fish populations migrate out of the smaller rivers and into the larger rivers.

The people who live in the flooded forests also have adapted to the seasonal changes in both the use of the natural resources and their agriculture. During the high water season fishing is more difficult, since the fish are dispersed throughout the inundated forests. In contrast, during the low water season the fish become easy prey being trapped in the reduced water bodies of the lakes, channels and rivers. The local indigenous people of the floodplain forests alter their fishing accordingly, with a greater emphasis on fishing during the low water season.

The normal cycles in the Amazon forests are now being disrupted by the extreme flooding and drought events that are occurring. The flooded forests are particularly important at understanding the impacts of climate change in the Amazon, since the aquatic and terrestrial interface between high and low water seasons makes this habitat sensitive to greater seasonal variations.

Results from this research show some important consequences of the extreme variations in water levels that have been occurring over the past several years.

The fish were impacted by the extremely low water levels of the Samiria River during 2010. In June, prior to the receding waters the fish had a greater abundance than average in the Samiria. However, as the waters receded the abundance of fish started to decline and in July fish numbers were below average. As the season progressed and the water levels sank below the long term levels the fish abundance became obviously lower than average with a 63% decrease from normal years.

The drought ended in late October 2010 and the fish numbers recovered from the drought. Fish populations generally recover faster than larger, slower reproducing animals. This is a good sign for the ecosystem and the local people who rely on the fish for subsistence.

## **Methods**

Censuses will be carried out at the Lago Preto and Samiria sites. During the census green gill nets of 3.5'' will be used in lakes and channels with weak currents and white gill nets in the river. Fishing points will be located on shores or banks where there is aquatic vegetation or shrubs, although meanders are the preferred areas. Individuals will be identified, measured and weighed. Catch per unit effort will be calculated by the number of individuals per

species caught and the effort spent fishing at each zone.

Habitats will also be compared (lake, channel, river). The diversity index will be used. Productivity of fish will be shown in terms of catch per unit effort, using the 'biomass captured per effort' method. The CPUE method is a robust indicator over time for the level of abundance, density and pressure fishing in a given zone. The length-frequency analysis helps to predict biological impacts of fisheries. A harvest focused on juveniles, for example, causes greater impact than a harvest of adult fish not in their breeding period.

Statistical analyses will compare different fish species in term of abundance, size and weight classes (demography), and habitat use. These analyses will be compared within and between sites. In addition, data from previous years will allow for a longitudinal analysis between years to measure trends in the fish community. Results from the analyses will be used to improve current management plans for the fisheries.