

Earth & Space

Go with the flow: dams could have a far-reaching impact on fisheries in tropical rivers

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Dams can disrupt the life cycle of Amazonian fish, impacting the livelihood of local communities. By interviewing fishers from many communities located downstream of the proposed dam, we showed that it may negatively affect their food security and income on a much larger area than the current official estimates.



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We need energy to sustain modern life. In most tropical developing countries, such as Brazil, energy is produced mainly through hydropower. This usually requires building dams, which negatively impacts the environmental and socioeconomic situation in the area.

Many such dams are planned in tropical rivers, such as those in the Brazilian Amazon. These same rivers exhibit an astonishing diversity of fish (more than 2,000 species). Many in the local populations make a living from small-scale fisheries and rely on fish for food. Amazonian rivers extend for hundreds of kilometers and interactions between people and fish

occur in a dynamic landscape formed by the main river, smaller tributaries, adjacent lakes and forests, which are seasonally flooded over periods of several months. These forests and seasonal flooding are very important to the lifecycle of Amazonian fish. For example, they use the start of the flooding as a cue to initiate spawning as floodplain forests offer shelter and food for fish and their offspring.

Building a dam in the tropical river systems may impact the rivers' natural flow regime, harming fish and subsequently fisheries. The dam could interrupt upstream reproductive migrations of some commercial fish, reduce the floodplain forest areas,

or impede fish to reach them. In Brazil, current legislation requires that, prior to dam construction, the companies conduct environmental impact assessments, which should ideally foresee these consequences and outline compensation strategies. There are however limitations. Firstly, the assessment is usually done by a small research team and within a few months, which may be not enough to properly understand the biological characteristics of the fish and how the dam might impact them. Secondly, the dam building companies themselves hire the technicians who outline the extent of the impacted area. This conflict of interest adversely impacts fishers, because the impacted areas and mitigation measures are usually defined in the best interest of the companies. The fishers living outside the defined area-of-impact will not be considered for financial compensation to cover losses in fishery yields, and may suffer from food insecurity and lower well-being.

The focus of our study is the Tapajos River, which flows into the Lower Amazon River and currently has no dams along its main course. The government plans to build a massive dam there, and construction - currently on hold - could resume at any time. This dam would be Brazil's fourth largest, but the environmental impact assessment determined that only around 50 km downstream of the dam are considered as an affected area. By contrast, we evaluated the socio-ecological impact of this planned dam on small-scale fisheries located up to 275 km downstream from it.

We interviewed 171 fishers in 16 communities in the Tapajos River, and asked about their main fish

caught, fishing techniques and fishing locations, as well as the relevance of fish as source of food and income for them. We then checked the relevant literature on the fish mentioned during interviews. We considered information on the ecology of the different fish species, to evaluate how they might be affected by the dam. Do they need the floodplain forest for food or spawning? Do they rely on spawning cues triggered by seasonal flooding? Do they have other biological characteristics that could be adversely affected by the damming, such as certain migratory behavior?

The results of our approach showed that the proposed dam would negatively affect small-scale fisheries in all the fishing communities that participated in the study, including those located far downstream. We also showed that more than half of the most-caught fish species would be affected by the dam in all communities. We showed that fishing is an important economic activity in all of these communities and provides a key part of their everyday meals. Fish shortage could have negative consequences to fishers' economic well-being and cause food insecurity for entire communities.

Our results thus show that dams in Amazonian rivers may have an impact farther downstream and on more people than what is suggested in the official reports used by decision makers. We argue that the whole system of environmental impact assessments would be considerably improved through a public procurement and oversight. The professionals in charge could then be contracted and supervised by the governmental environmental agency, thus eliminating the current conflict of interest.