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BETTER HYDROPOWER DECISIONS: ECONOMIC FEASIBILITY OF THE PROPOSED CASTANHEIRA DAM

The proposed Castanheira Dam is prioritized in the latest version of Brazil's Ten-Year National Energy Expansion Plan. Planned to be built on the Arinos River in Mato Grosso State, the proposed dam is considered strategic for the energy sector by Brazil's federal government. Among more than 100 projects proposed for the Juruena sub-basin, the Castanheira Dam stands out as one of the few that, according to official project documents, would not flood areas designated for indigenous peoples or conservation areas. However, despite careful planning with regards to flooding, the benefits associated with the project might not be large enough to justify the costs.

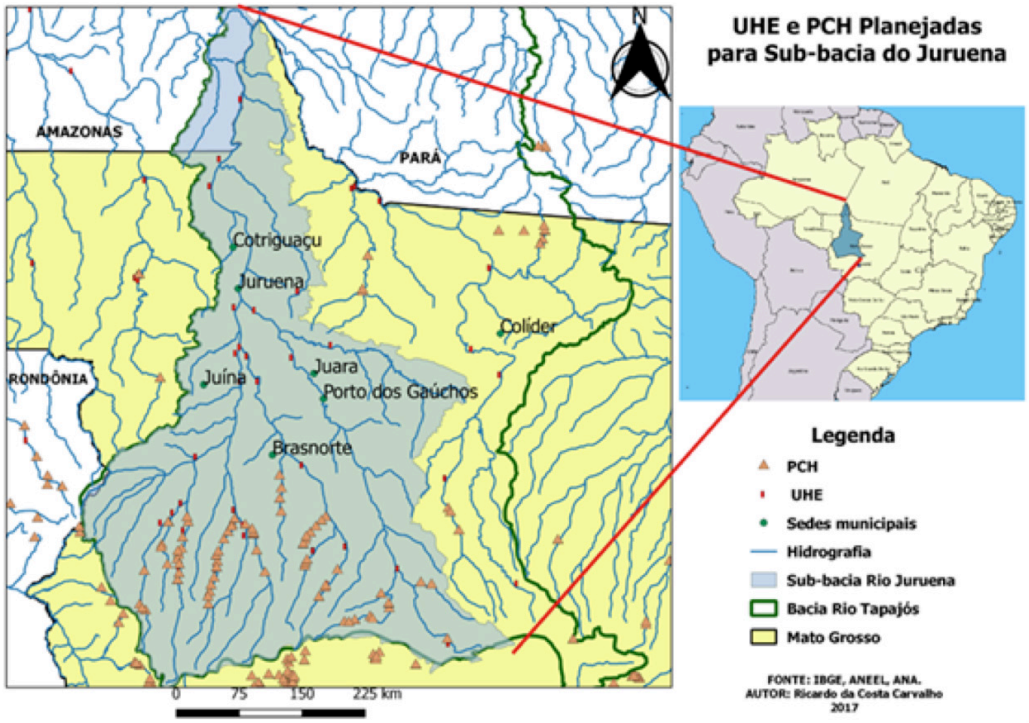
Arinos River, Juruena River sub-basin, Mato Grosso, Brazil.

A recent study conducted by Conservation Strategy Fund, in partnership with Operação Amazônia Nativa, Instituto Centro de Vida, and International Rivers, showed that the proposed Castanheira Dam might not be financially feasible. Using official data from the Technical and Economic Feasibility Study (EVTE for the Portuguese acronym), we showed that, if built and operating according to parameters given in the EVTE, the dam would generate an estimated financial loss equal to R$ 239 million (US$ 81 million; 2015 prices) to investors over the 50 year lifespan of the dam.[1]

This loss was calculated using an energy price of R$ 130 per MWh, as specified in the EVTE. At this price, the gross financial return for the dam operator from sales of electricity over the lifespan of the dam would be R$ 887 million (US$ 302 million; 2015 prices). The financial cost, determined by investment and maintenance expenses including the construction of transmission lines, is estimated in the EVTE to be R$ 1,125 million (US$ 383 million) over 50 years. For the project to be financially feasible at this cost, the actual energy price - to be determined in an auction - would have

[1] *Exchange rate in June 2015, R$ 1 = US$ 0.34. Source: www.xe.com.*

Proposed dams in the Juruena Sub-Basin



Credit: Ricardo Costa Carvalho, OPAN. UHE and PCH refer to large and small hydropower plants, respectively.

to be greater than or equal to R$ 165 per MWh. This is 14% higher than the average energy prices obtained in the most recent auctions for hydropower plants, and slightly above the median price for all hydropower plants auctioned between 2005 and 2015.

The study also identified and quantified three potential socio-environmental impacts: greenhouse gas emissions, flooding of productive areas, and loss in local income from fishing. Greenhouse gas emissions were calculated using the Biome Carbon Loss model, which makes use of data on the carbon content in the area that would be flooded. To calculate losses in agricultural production and fishing, we used primary and secondary data. The study showed that the Castanheira hydropower plant would generate a socio-environmental loss equivalent to R$ 181 million (US$ 62 million) over 50 years, considering all three impacts. Flooding of productive areas is the largest impact, estimated at R$ 142 million (US$ 48 million) over the dam's lifespan. Greenhouse gas emissions and lost fishing profitability are estimated at R$ 34 million (US$ 12 million) and R$ 5 million (US$ 2 million), respectively.

These losses are in addition to financial losses to the operator, suggesting that the dam could result in a total loss to society of R$ 419 million (US$ 142 million). The actual energy price needed to make the project economically feasible (i.e., net present value great than zero) considering all financial and external costs, would need to be equal to or greater than R$ 187 per MWh (US$ 64 per MWh). Prices at this level are only recorded in 22% of projects in the past auctions. Even if prices did reach that level, the high cost of electricity would be born by Brazilian citizens through high energy rates.

These results suggest that the Government should review the financial assumptions in the EVTE, as well as the monetary quantification of the externalities associated with the proposed Castanheira Dam project. More broadly, the analysis carried out reinforces the need to quantify all potential externalities in addition to calculating financial feasibility. Most important, however, is the existence of an open and transparent discussion among different sectors of the economy, including policymakers and civil society organizations, on the potential benefits and adverse effects caused by dams. Such discussion should also consider the costs and benefits of alternative sources of energy so the trade-offs could be compared.

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