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Dams on Brazil's Jamanxim River: The advancing assault on the environment and Indigenous peoples in the Tapajós basin (commentary)

Commentary by Philip M. Fearnside on 29 March 2022

https://imgs.mongabay.com/wp-content/uploads/sites/20/2022/03/29185624/rio-tapajos-march-2022-2400x890.jpg

- *Brazil's electrical authorities have given the go-ahead for studies to prepare for building three large Amazonian dams that would flood Indigenous lands and protected areas for biodiversity.*
- *The decision shows that Brazil's presidential administration is confident that the National Congress will approve the bill submitted by President Bolsonaro to open Indigenous lands to hydroelectric dams, and probably also allow dams to continue to be built without consulting impacted Indigenous peoples.*
- *The decision also shows that Brazil's electrical authorities continue to ignore inconvenient information on climate change, the financial viability of Amazonian dams and their many social and environmental impacts, as well as the country's better energy options.*
- *This text is translated and expanded from the author's column on the Amazônia Real website. The views expressed are those of the author, not necessarily of Mongabay.*

Brazil's Amazon dam plans have been slowed down over the past decade due to realization by the country's electrical authorities that obtaining environmental licenses would be difficult when Indigenous peoples are impacted, despite the government's success in forcing approval of dams such as Belo Monte. Teles Pires (see here and here) and São Manoel that clearly violate the rights of these people as guaranteed by Brazil's constitution Article 321, Laws (Decree nº 10.088/2019; formerly Law No. 5051 of 19 April 2004) and commitments under International Labor Organization Convention 169. Three of the planned large dams that had been stalled would be built in the state of Pará on the Jamanxim River, a tributary of the Tapajós River, which is a major tributary of the Amazon River. A clear sign that this hesitancy has changed has now surged forth with Brazil's parastatal electrical holding company (ELETROBRÁS: Centrais Elétricas do Brasil) and its subsidiary ELETRONORTE (Centrais Elétricas do Norte do Brasil, S.A.) requesting (and on 24 January 2022 obtaining) an extension of a deadline from the National Agency for Electrical Energy (ANEEL) to allow drafting economic viability studies for these dams (see here and here).

This shows that the Brazilian federal government continues to refuse to recognize both the enormous environmental and human costs of Amazonian dams and the fact that Brazil has energy options far better than dams not only in terms of impacts but also on financial grounds (see here, here, here and here). It also shows that the government authorities are counting on the enactment of President Jair Bolsonaro's bill 191/2020, now rapidly advancing in the National Congress, to open Indigenous lands to hydroelectric dams, as well as to mining, logging and agribusiness operations by non-Indigenous entrepreneurs. President Bolsonaro has even used the war in Ukraine as a justification for opening Indigenous lands for mining by approving bill 191/2020, which would also open them for dams. The false excuse that this bill must be passed so that potassium can be mined in Indigenous lands to replace imports from Russia was successful in winning approval of the lower house of congress for conceding "urgent" status to the bill and bypassing committee procedures, thus allowing the bill itself to be voted by as soon as mid-April.

The three dams just announced (Cachoeira do Caí, Jamanxim and Cachoeira dos Patos: Table 1) were the subject of preliminary studies during the 2008 inventory of the Tapajós River basin (see here, pp. 111-142). The Cachoeira do Caí Dam would flood part of the Sawré-Mubyu Indigenous area, which would also be partly flooded by the planned São Luiz do Tapajós Dam on the Tapajós River (Figure 1). All three reservoirs would flood in the Jamanxim National Park, and two of the dams themselves would be located inside the park (Figure 2).

Table 1. Dams announced for viability studies

Dam	**Installed capacity (MW) Fearnside (2015)**	**Reservoir area (km²)**	**Indigenous areas**	**Conservation units** Alcaron et al. (2016)
Cachoeira do Caí	802	420	Sawre Muybu Indigenous territory	Jamanxim National Park, Itaituba I &II national forests
Jamanxim	881	75	Parque Nacional de Jamanxim	Jamanxim National Park
Cachoeira dos Patos	528	117	Parque Nacional do Jamanxim, Jamanxim National Forest	Jamanxim National Park, Tapajós Environmental Preservation Area (APA Tapajós)

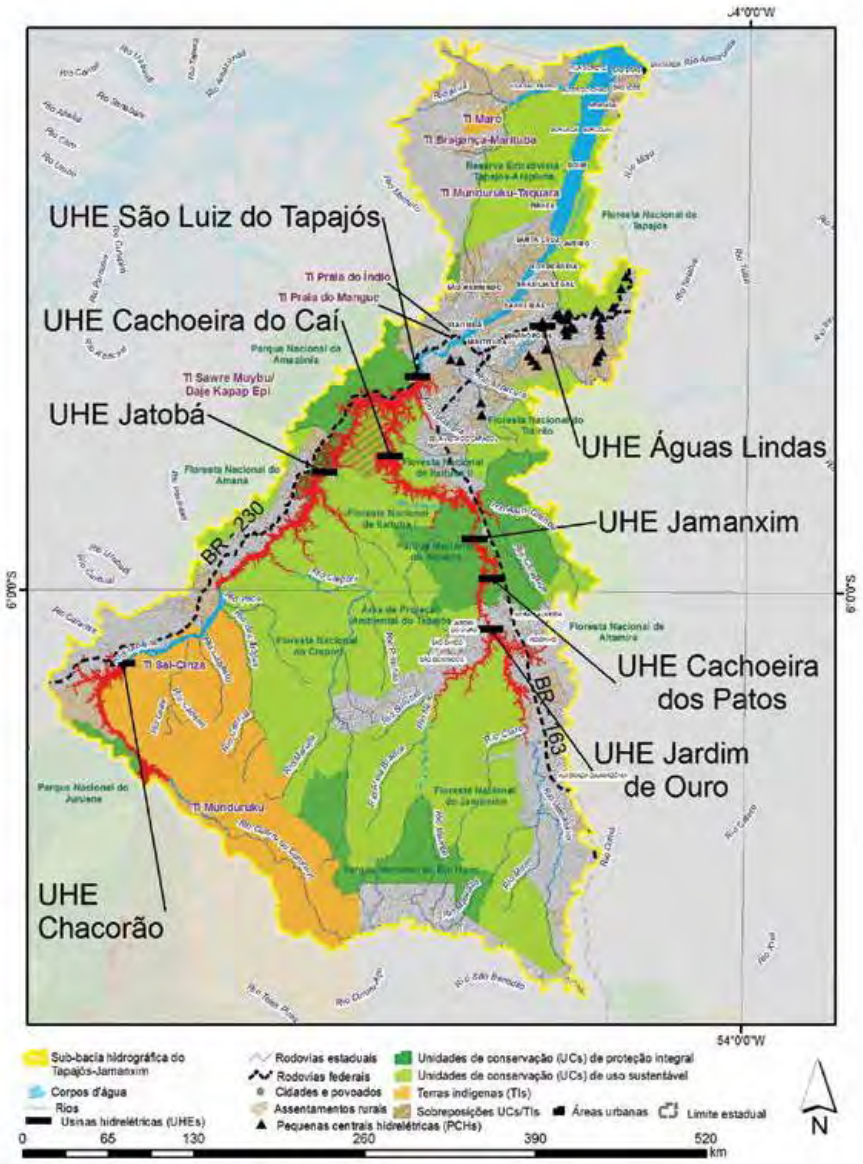

Figure 1. Dams and conservation units. Source: Millikan (2016)

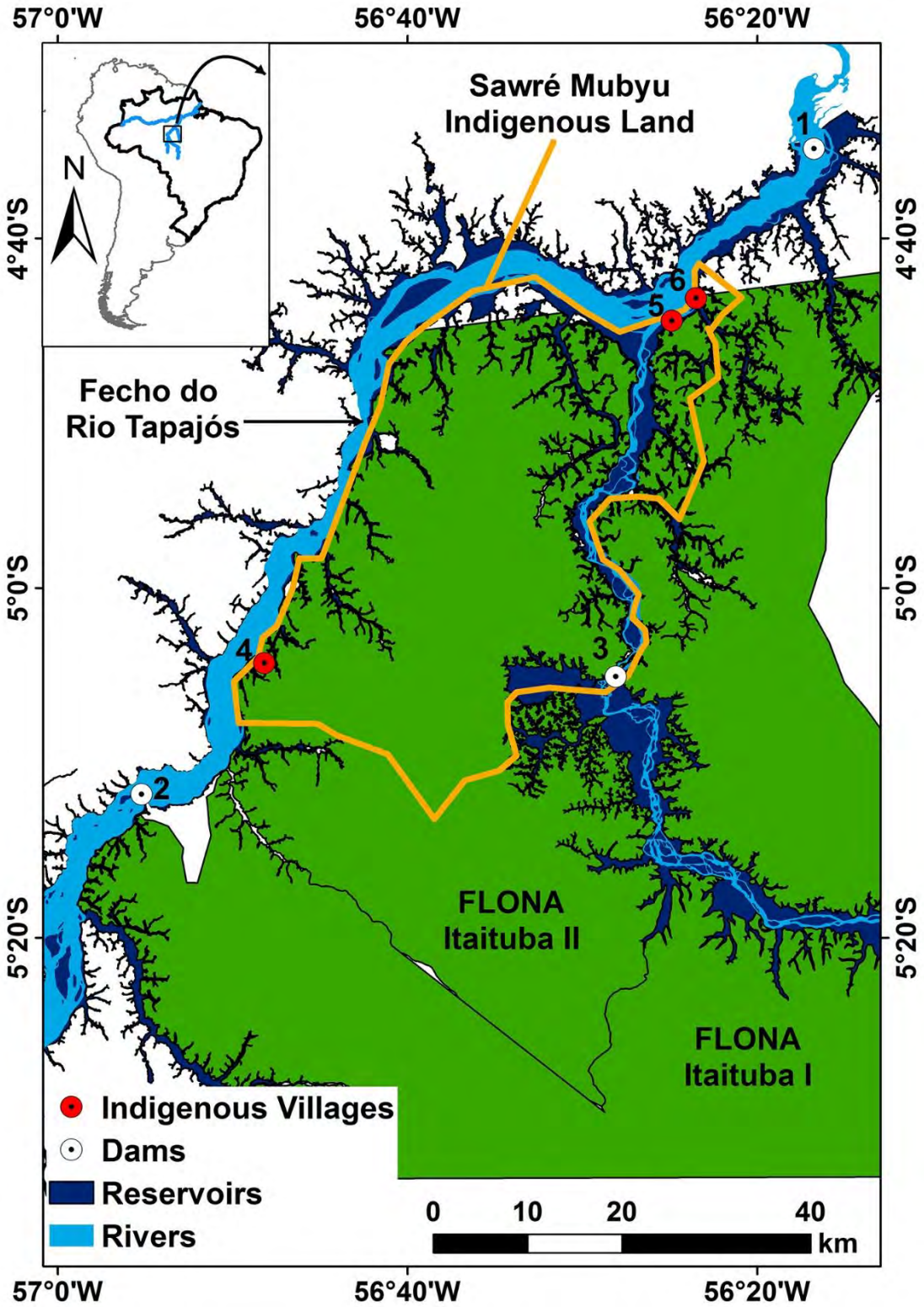

Figure 2– Map of the Sawré Muybu Indigenous Territory: 1) São Luiz do Tapajós Dam, 2) Jatobá Dam, 3) Cachoeira do Caí Dam, 4) Karo Bamamaybu Village, 5) Sawré Muybu Village, 6) Dace Watpu Village. The area in green is the national forests. Source: Fearnside (2015)..

Dam impacts

The three hydroelectric projects are all storage dams, meaning that they have reservoirs where the water level can be drawn down to continue generating power during the dry season when the river's unregulated flow is insufficient. This type of dam has greater impacts than run-of-river dams, which use the natural flow to generate power. Storage dams generally have larger reservoirs compared to their installed capacities, thus flooding more land (and people), and the water in the reservoir usually stratifies into layers, thus providing ideal conditions for producing a powerful greenhouse gas: methane. In 2013 then President Dilma Rousseff announced a change in policy to prioritize storage dams over run-of-river dams, and this has been maintained by subsequent presidents.

Environmental impacts include loss of both aquatic and terrestrial ecosystems, as with other Amazonian dams. Amazonian dams can also emit substantial amounts of greenhouse gases, particularly methane (see here and here). The three proposed dams have been calculated to cause a greater impact on global warming than generating the electricity from gas, oil and even coal (Figure 2). This considers impact of the gases over a 20-year period, which is the time frame within which global warming must be brought under control to avoid the catastrophic consequences of passing tipping points in the global climate system.

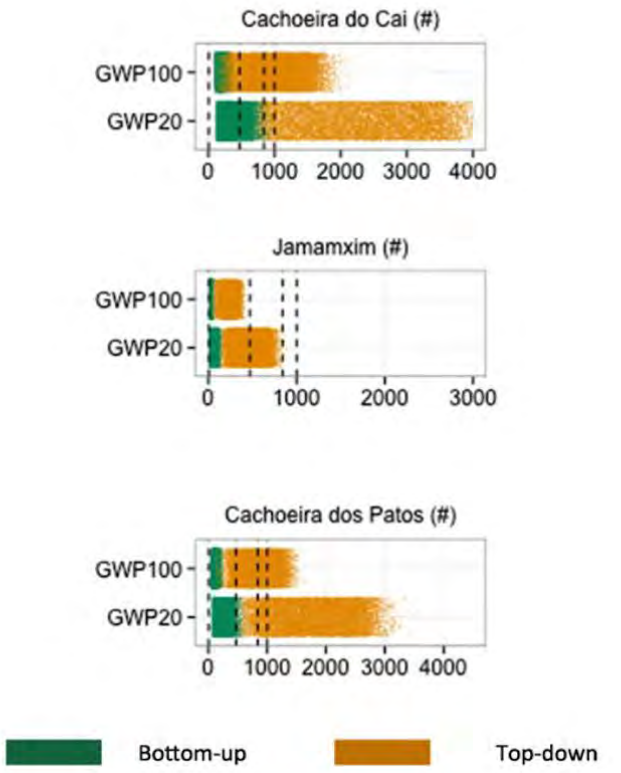

Figure 3. Greenhouse gas emissions for the three planned dams on the Jamanxim River in kilograms of CO_2-equivalent per megawatt-hour of electricity generated (Calculated by de Faria and coworkers, 2016). The green color indicates a "bottom-up" method of calculation, and orange "top-down" calculation method. The bars are made up of points representing the results of 10,000 simulations. The GWP100 bar uses a time horizon of 100 years to convert methane into CO_2 equivalents, while GWP 20 uses a time horizon of 20 years, which is the relevant time horizon to comply with the Paris Agreement and avoid passing climatic tipping points. Conversion factors ("GWPs") are from the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report (AR5): 34 for 100 years and 86 for 20 years. The vertical dotted lines in the graph represent the median emissions used by Moomaw *et al*. 2013 for emissions from power plants. The lines, from left to right, are for hydro, natural gas, oil and coal.

The virtually total lack of oxygen at the bottom of a reservoir like those of the planned dams results in methane being produced when organic matter decays in the sediments. The same conditions lead to the chemically similar process of mercury methylation, converting elemental mercury into the highly toxic methylmercury. Mercury has accumulated naturally over millennia in the ancient soils of Amazonia (see here and here) and in this part of Amazonia there is also a large amount of mercury that has been released by gold mining. Use of mercury is widespread as the cheapest way to separate the gold from the alluvial sediments, and mercury has been found at

concentrations of 0.060-0.126 milligrams per liter in the water at the locations of these dams (see Forsberg, 2015, p. 35). Mercury concentrations increase through bioconcentration as it is passed up the food chain, with the concentration rising by about a factor of ten with each link in the chain. Predatory fish such as tucunaré (*Cichla ocelaris*), which often dominates in Amazonian reservoirs, are at the top of the aquatic food chain, and humans provide the next link. This results in human populations near reservoirs having dangerously high concentrations in their bodies (see here, here and here).

The Brazilian government's move to initiate preparations for these three dams bodes ill for the Amazon in many ways. Brazil's 2050 National Energy Plan and the ten-year plans contain ominous passages suggesting that there would be a great expansion of dams in addition to those currently listed for construction if dams in Indigenous areas and conservation units (protected areas for biodiversity) are allowed. The Tapajós Basin is the scene of plans for 30 large dams, including the three that are now to be prepared.

NASA satellite image of the Rio Tapajos in March 2022.

The impacts of Amazon dams have routinely been grossly understated in the environmental impact assessments used in the licensing process. These dams also fail to justify themselves on purely monetary grounds (see here and here). This is a global phenomenon, as shown by a world-wide study of existing dams. Brazil is fortunate to have much better options, including not exporting electricity in the form

of aluminum and other electro-intensive commodities, and developing the countries enormous potential for wind and solar power (see here, here, here, here and here).

ELETRONORTE stated to the newspaper *O Estado de São Paulo* that "all the projects are technically viable and would bring great gains to the Brazilian population, as they are clean, renewable energy projects with a potentially lower cost than other generation sources." For the reasons explained in the studies cited above, this author contests all of these claims.

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