

5. The energy-related Plano 2010 and its possible impacts on Amazonia

The Plano 2010 developed by Eletrobras, the Brazilian umbrella organisation of the national electricity industry, was a threatening regional plan in Amazônia Legal in 1987. The programme to expand hydropower generation using the natural hydropower potential of the Amazon envisaged the construction of numerous power plants and thus the creation of large reservoirs (Eletrobras 1987a; 1987b).

The 2430 km² Tucuruí reservoir had already shown that clearing forest areas to be flooded later was an extremely costly procedure that was hardly profitable, depending on the location. The organisational problems were enormous due to the peripheral location.¹⁵³ In view of this fact and the lack of relief energy in the Amazon basin, most of the planned reservoirs flood large areas of still intact rain forest.

For example, the 2360 km² Balbina reservoir, located 150 km northeast of Manaus, required 31 times the area per MW of installed capacity compared to Tucuruí (Fearnside 1989a; Kohlhepp 1998c). Originally, this project, which started producing electricity in 1989, was planned to supply the regional conurbation of Manaus with 250 MW. However, due to the relatively small catchment area of the Rio Uatumã and the extremely low gradient of the river, only a secured capacity of 110 MW could be realised. More than a third of the reservoir area with 1500 islands was covered by rain forest and was less than 4 m deep, the water exchange extremely slow at 14 months. High acidity, low oxygen content, toxic gases and the rapid spread of macrophytes characterised the environmental impacts in the reservoir. The loss of rainforest and the displacement of about one third of the Waimiri-Atroari, one of the most persecuted tribes, were the tragic consequences.¹⁵⁴ Balbina was probably the most glaring example of the misplanning of hydropower strategies for the Amazon region.

The planned reservoirs flood the habitats of Indigenous tribes that are naturally located near the rivers. In the case of Tucuruí on the Rio Tocantins, the Paracaná were affected. The planned damming of the Rio Xingu for the construction of the huge Babaquara power plant with a huge reservoir of more than 6100 km² was discussed, which would drive the Arara and Kararaô tribes out of their traditional settlement areas (Comissão Pro-Índio 1988).¹⁵⁵

According to the framework plans of Eletrobras, the financing of which was still completely open, a total of 79 reservoirs were to be built in Amazônia Legal by 2010

153 Cf. chapter I.4.3; Kohlhepp (1987b; 1991a).

154 Cf. chapter I.3.2.2.

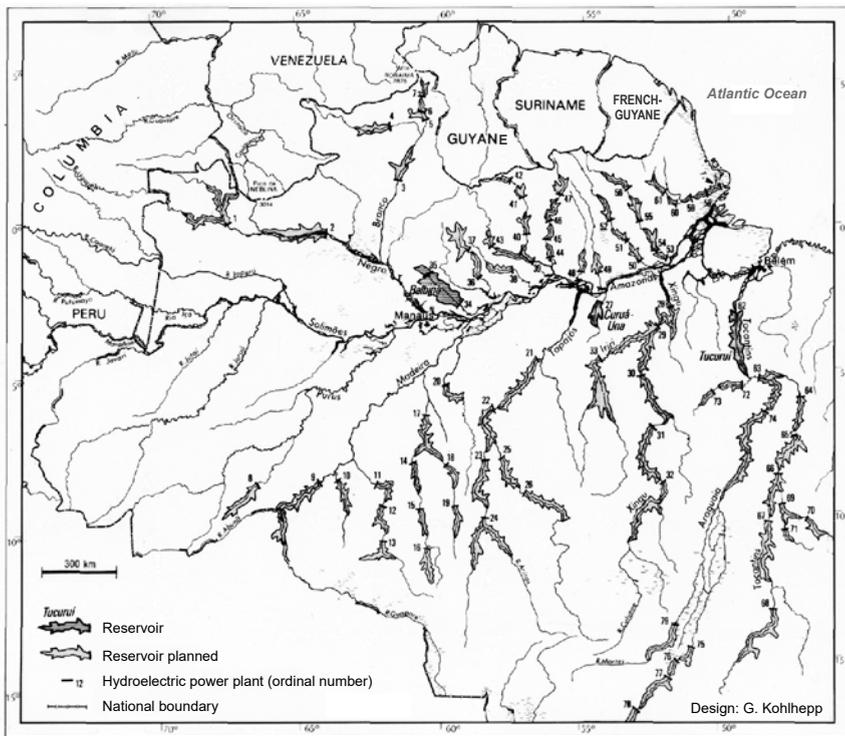
155 Cf. Kohlhepp (1991a, Fig. 7: Flooding planned along the Xingu and Irirí rivers).

with an installed capacity of around 86 000 MW (Fig. 19). In 1985, the total capacity of Brazil was 44 000 MW! All but one of the planned reservoirs were to be located in the tropical rain forest. The exaggerated vision of the regional electricity company Eletro-norte for the Tocantins-Araguaia Basin can be seen in Fig. 20.¹⁵⁶

Fortunately, this programme was unrealistic and financially unfeasible. However, its existence shows the strategy of “modernisation” supported by the powerful lobby of construction companies, without taking into account environmental or social criteria. In the meantime, however, some power plant projects have been realised. In total, there are five dams on the Rio Tocantins, besides the Tucuruí dam and reservoir: Estreito, Luiz Eduardo Magalhães (Lajeado), on the upper Rio Tocantins Peixe Angical as well as Cana Brava and the Serra da Mesa dam in the state of Goiás (Fearnside 2015a). These power plants are located in the *cerrado* region, some have run-of-river reservoirs.

All the estimates of the total area to be flooded in rain forest areas remained largely speculative, but the eight largest reservoirs are likely to cover about 20 000 km². An overall planning figure of almost incredible 100 000 km² had been mentioned (Fearnside 1989a).

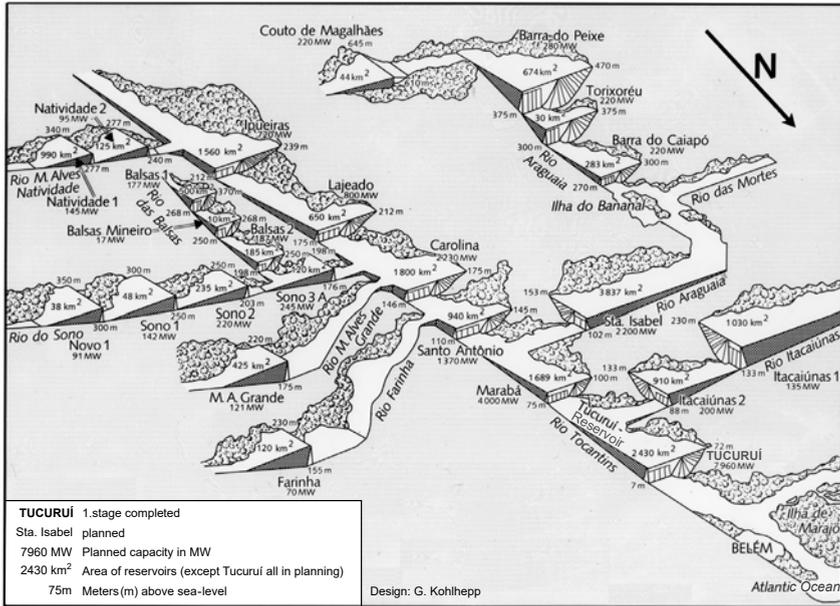
Figure 19. Hydroelectric power plants and reservoirs planned in Amazonia in 1988



Source: Comissão Pro-Índio (1988); Cf. Kohlhepp (1989a; 1991a, Fig. 6).

¹⁵⁶ The energy potential in the Tocantins-Araguaia- Basin was estimated at 19 430 MW, with Tucuruí alone accounting for 38%.

Figure 20. Eletronorte's vision of hydroelectric power plants and reservoirs in the Tocantins-Araguaia river basin



Source: Eletronorte (1986) and additional information of Eletrobras (1987a).

In addition to the destruction of vast areas of rain forest and the irreplaceable loss of species and gene pools, the realisation of these projects would result in an accumulation of severe ecological and regional climate impacts, which have already been empirically documented in the reservoirs under construction or recently completed. These irresponsible and megalomaniac visions of the planners not only led to the end of the biodiversity of tropical forests in the floodplains, but also threatened the existence of endangered Indigenous tribes through the associated infrastructural facilities. These included construction workers' camps, roads, airfields, company towns, power transmission lines, settlement of industrial plants as well as spontaneous and planned waves of migration.

The strong protests of the regional population, also at national and international level, against the possible granting of the second loan for the energy sector by the World Bank to Brazil had shown that the public was increasingly against the plans to build the reservoirs. Scientists, NGOs and even some technicians and engineers stressed that Amazonia should not simply become a power supplier for the industrial centres in the Southeast, as this would not be economically viable even in the long term (Sternberg 1988). The demand for electrical energy in the Southeast must be met from other sources. For local and micro-regional power supply in the Amazon, there are alternative solutions such as the construction of small-scale power plants, but the underlying technology is of no interest to the powerful hydropower and dam lobbies.

In 1989, the World Bank announced a new official policy on dams and reservoirs (Goodland 1989; 1990a). "The overall aim of this policy parallels economic least cost: That is to ensure that borrowers promote their environmentally and socially low-cost

project investment options and exclude environmentally and socially high-cost projects, while maintaining optimal environmental and social standards” (Goodland 1989, 7). Other Bank policies had to be considered, such as resettlement, tribal groups, biodiversity, cultural assets, riparian rights and dam safety. The cost-benefit analyses had to include estimates for all mitigation measures and for quantifiable environmental losses due to the project. The new policy required a systematic environmental assessment by independent experts selected and approved by the Bank. The environmental impact assessment had to be completed before project implementation. This was particularly important in Brazil, where the consequences of sometimes dubious environmental impact assessments (EIA/RIMA) were very destructive processes and prevented highly problematic projects from being stopped. The World Bank encouraged the participation of community organisations of the project-affected population, research institutes and NGOs in consultations with project authorities and – often non-existent in the 1980s – public hearings. In Brazil, government authorities interested in World Bank loans for hydropower projects must have perceived this new Bank policy as a “revolution.”

In 1989, massive demonstrations by the Kayapó in Altamira had convinced the World Bank to cancel funding for the Babaquara/Kararaô project on the Rio Xingu, which came to a halt. Unfortunately, this project was later resurrected under the new name Belo Monte,¹⁵⁷ but without a loan from the World Bank for the construction of the dam.

157 See chapter II.6.