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Brazil's Tucuruí Dam: lessons from its planning and impacts

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The presentation will review environmental and social impacts of Brazil's Tucuruí Dam, the mitigation measures that were and were not taken, how the environmental studies were carried out and reported, and the role that these considerations played (or failed to play) in the decision-making process. Often presented by authorities as a model for hydroelectric development because of the substantial power that it produces, Tucuruí's social and environmental impacts are also substantial. The power station has 4000 megawatts (MW) of installed capacity in its present first phase (Tucuruí-I) and is being increased to 8400 MW in a second phase (Tucuruí-II). Authorities have systematically overestimated benefits and underestimated impacts of Tucuruí. Given Brazil's ambitious plans for hydroelectric development in Amazonia, much use could be made of the lessons from this dam. Many of these lessons are not unique to Brazil.

Flooding the forest leads to loss of timber, loss of natural ecosystems and to greenhouse gas emissions. Aquatic ecosystems are heavily affected by the blockage of fish migration and by creation of anoxic environments. Decay of vegetation left in the reservoir creates anoxic water that can corrode turbines, as well as producing methane and providing conditions for methylation of mercury. Defoliants were considered for removing forest in the submergence area but plans were aborted amid a public controversy. Another controversy surrounded impacts of herbicides used to prevent regrowth along the transmission line. Mitigatory measures included archaeological and faunal salvage and creation of a "gene bank."

Decision-making in the case of Tucuruí was virtually uninfluenced by environmental studies, which were done concurrently with construction. The dam (closed in 1984) predates Brazil's 1986 requirement of an Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS, known as the RIMA in Brazil). Despite limitations, research sponsored by the electrical authority (ELETRONORTE) provides valuable information for future dams. Extensive public-relations use of the research effort and of mitigatory measures sometimes misrepresented research findings, creating tension with researchers who had signed ELETRONORTE contracts that demanded confidentiality.

Social costs of Tucuruí include impacts on indigenous people, resettlement of displaced population, loss of fish and other resources to downstream residents, and health problems such as malaria, a plague of Mansonia mosquitos, and accumulation of mercury in fish in the reservoir and in the people who eat them. The subsidized aluminum industry that consumes two-thirds of Tucuruí's power distorts the entire Brazilian energy economy and leads to tremendous impacts as other dams (such as Balbina) are built to supply power to cities that could have been supplied by Tucuruí had the output of Tucuruí not been committed beforehand to smelting aluminum for export. Employment generation is minimal in the aluminum industry. The wide-ranging social impacts of Tucuruí's role as a supplier of power to the aluminum industry include the opportunity cost of not having used the nation's financial and natural resources in ways more beneficial to the local inhabitants.

Social and environmental costs received virtually no consideration when the actual decisions were made. A curtain of secrecy that surrounded many aspects of the project contributed to

this. Since its inception, Tucuruí has been intimately tied to military and security agencies. Testimony at the Parliamentary Commission of Inquiry (CPI) on Tucuruí, held in the Pará State Legislative Assembly in 1991, accused some of the most powerful men in Brazil of corruption in arranging the foreign financing and purchase contracts for Tucuruí, and also linked Tucuruí to one of Brazil's most notorious political assassinations (Alexandre Von Baumgarten, who was killed 2 October 1982). While these charges remain unproven, they have also never been properly investigated. The charges come from Lúcio Flávio Pinto, a highly respected source who has also published them in his books.

Tucuruí-II is one of the highest priorities in the federal government's "Brazil in Action" program, and is expected to be completed by 2002. On 15 June 1998, during a visit to Tucuruí, President Fernando Henrique Cardoso signed the order releasing funds for Tucuruí-II, without an environmental impact study. Only 21 days before the order was signed an ELETRONORTE Environment Department representative stated publicly that an environmental study was underway but not yet completed. This illustrates the continued fragility of Brazil's environmental impact assessment system, which, despite great advances since the Tucuruí Dam was built, continues to function as a mere formality to rubberstamp decisions that have already been taken based on other criteria. It also serves to emphasize a general problem with the planning and licensing of hydroelectric development, in which the approval of one dam project (such as Tucuruí-II) sets in motion a chain of events that leads to much more damaging impacts from upstream dams that are needed to take full advantage of the first dam. In this case, the Santa Isabel Dam, upstream of Tucuruí, is expected to displace at least 80,000 people (probably well over 100,000). An urgent case in point is the dams planned for the Xingu River: the extraordinarily cost-effective Belo Monte Dam would lead to tremendous pressure to complete much more damaging dams upstream that would flood large areas of indigenous land. Brazil's current system of impact assessment is incapable of dealing with the sequence of events in river basin development because analyses are restricted to one dam at a time. Brazil also currently lacks legal mechanisms by which irrevocable commitments can be made not to undertake damaging developments such as the Xingu Basin dams upstream of Belo Monte.

The planning process for dams focusses on engineering features until the last phases in decision-making. All sites with hydrological potential for power generation are considered in preparing the initial lists of future dams. Social and environmental considerations are largely left to the EIA and EIS (RIMA) to incorporate into the decision process. Preliminary information on social and environmental impacts needs to be used to eliminate especially damaging sites from the list of proposed dams at an early stage, before the dams are formally proposed and the interests in favor of construction become unstoppable in practice. In addition, the EIA and EIS (RIMA) need to be fortified to insure that environmental and social impacts have a real role in decision making once dams are formally proposed. The pernicious role of secrecy is evident in many aspects of planning and execution of the Tucuruí project, and indicates the need for informed public participation in Brazil and throughout the world.