

Problem dam leads to power struggle in the rainforest

ENVIRONMENT

IT IS a half-hour flight over steaming Amazon rainforest from Manaus to Balbina, the most notorious dam in the world. As the 18-seat Bandeirante — named after the Portuguese plunderers who first colonised Brazil — turns to land, you can see the town carved out of the jungle for 7,000 workers, and the huge lake itself, which still refuses to fill.

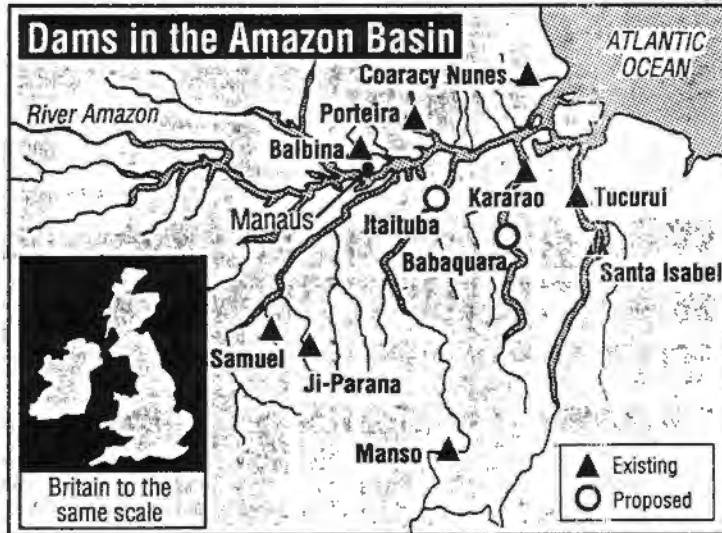
Balbina has been called an environmental disaster by concerns as different as the World Bank, Brazilian politicians and Western environmentalists. Many mistakes have been made in developing the Amazon, one of the last and most unforgiving wildernesses on earth, and Balbina is an example of most of them.

So far the lake has flooded 1,454 square kilometres of rainforest. Brazil's environmentalists have, for the first time, won a temporary stay on the filling for when it reaches 46 metres above sea level; but next year, if the protests die down, the state power company Eletronorte will raise the surface to 50 m above sea level, covering a total 2,360 sq km of forest.

Balbina, which added \$770 million to Brazil's foreign debt, is not even a technical success. Conceived in the mid-1970s, it will not have one turbine running before the end of the year. It is too shallow, at an average of eight metres deep; it has serious evaporation problems and the small river which feeds it has provided less water than expected.

Opinions differ as to how much power Balbina will provide. If filled to the brim it might generate 250 megawatts. However that gives it the output of Bradwell, one of Britain's oldest nuclear reactors, and makes Balbina the least efficient hydroelectric scheme in the world.

Dr Philip Fearnside, a scientist at the Amazon research institute INPA, calculates that Balbina will provide only 109 megawatts in Manaus — less than half the power needs of the city it was built to serve. He and others criticise the dambuilders for spending too much of their foreign loans on comfortable quarters in the jungle.



Map: PETE WILLIAMS

In theory, the hydroelectric potential of the Amazon and its tributaries cries out to be exploited — a staggering 130,000 megawatts, or 10 per cent of the hydroelectric power in the world. As Eletronorte spokesman Laercio Silva argues: "Brazil has very little oil and less coal. All its hydroelectric energy could be had by flooding only 60,000 sq km, or the size of Holland. That would still be only one per cent of the Amazon basin."

But dams can inadvertently destroy vast tracts of biologically unique forest, and the roads and construction workers they bring can wreck the traditions of primitive tribes. It is reasonable to ask how much of this energy resource is necessary, so remote from the industrial centres of the south.

Some Amazonian dams have been quite successful: the 5,000 megawatt Tucuruí dam generates more power than Yorkshire's Drax, the largest coal-fired power station in Europe.

But as Balbina shows, there is a growing list of mistakes to avoid. First there is the disruption of the Indians: 300 Waimiri Atroari had to be resettled at Balbina by FUNAI, the Indian agency. But the Environmental Defence Fund in Washington now accuses FUNAI of incompetence, using unqualified staff and destructuring Indian communities.

Then what happens to the

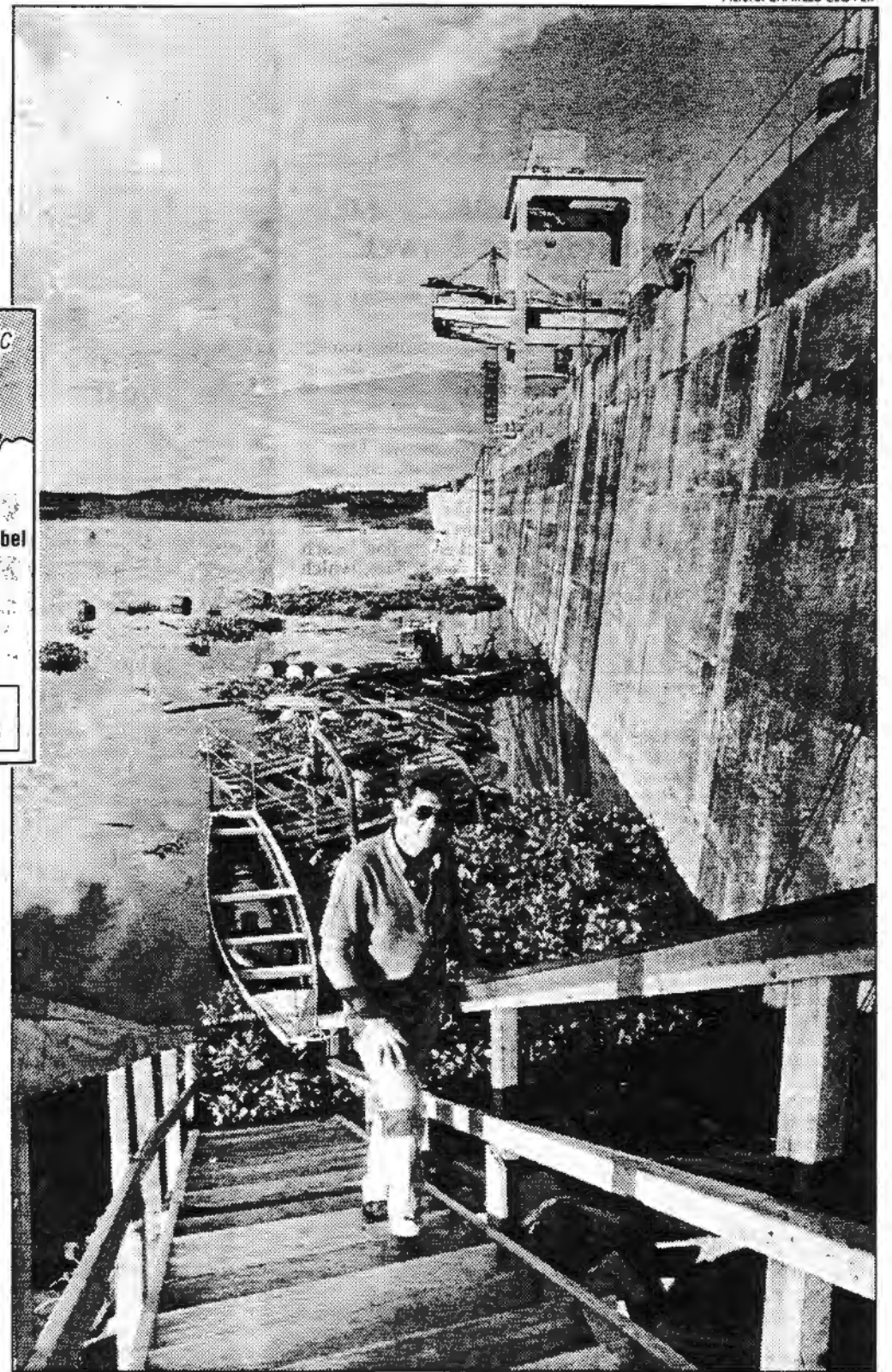
water when the trees, which were not felled before flooding, begin to rot? There are fears for the 300,000 people who live downstream of the dam when the water eventually flows.

At Turua-Una it was found that rotting vegetation created strong acids which ate away turbine parts ... the Amazon exacting its revenge perhaps. (At Tucuruí, an enterprising firm discovered a way of felling trees under water, which they then towed out by boat at far less cost than overland transport. They hope to do the same at Balbina.)

A far-fetched Eletronorte/INPA scheme to introduce the manatee, the Amazon's walrus, to eat the turbine-threatening quantities of water weed failed miserably. The manatee died and INPA withdrew in disgust.

The slow filling has at least favoured the forest animals. Over 300,000 strange monkeys, snakes and weird Amazonian nocturnal creatures have been rescued from shrinking islands at Balbina. Only 18,000 were saved at Tucuruí. At Balbina there was time also for a belated survey to be carried out of ancient Indian archaeological sites, some more than 1,000 years old.

Intriguingly, power projects are among the few areas where "First World" environmental concern is beginning to affect Brazil — because the World Bank controls many of the purse-strings. The bank is con-



Laercio Silva at Balbina, where virulent water weed is only one of the dam's many problems

sidering loans of \$500 million and \$900 million to Brazil for power projects, four of which are in the Amazon.

The four dams Eletronorte wants to build in the Amazon by the end of the century, Porteira, Jiparana, Manso and Cararao, would generate a total of 13,500 megawatts. But the company is investigating many more, including a colossal 10,000 sq km, 15,000 megawatt plant on the Tapajós river, which would be the largest man-made lake in the world.

Some are meeting with greater support from the environmentalists, principally the hyper-efficient 11,000 megawatt, 1,000 sq km Cararao dam on the Xingu river. Particularly since Eletronorte seems to have given in to World Bank pressure and postponed the controversial second stage of the projected Xingu dam complex, known as Babaquara, which threatened to flood several Indian reservations.

The President of Eletronorte even said recently: "If there is a bad environmental impact, in

future we will do smaller projects."

Equally welcomed is the Jiparana dam in Rondonia, an area with some of the greatest biological diversity in the Amazon basin, where Eletronorte have set aside an 80,000 hectare reserve.

But it remains to be seen whether the agreements made as a condition of these loans will be carried out. For Brazilian governments are past masters at what one seasoned observer calls "playing three-card monte with the gringos".