



RISKS OF SUPPRESSING NATURAL FLOWS WITHIN A SOURCE-TO-SEA SYSTEM

THE CASE OF LAKE JUPARANÃ, ESPÍRITO SANTO, BRAZIL

Lake Juparanã is the largest of several marginal lakes in the lower reaches of the Rio Doce coastal plain. Connections between marginal lakes and their main rivers ensure the renewal of lake waters and provide a natural mechanism for the enrichment of nutrients for both the lakes and the river following rising and falling waters.

The Lake Juparanã is originally connected to the Rio Doce through the Rio Pequeno. After the Fundão Dam failure and the overflow of tailings, a temporary dam was constructed on the Rio Pequeno to prevent the tailings from the Rio Doce contaminating the lake. The barrier interrupted the natural flows, interfering with the physico-chemical and biological processes that depend on the exchange of water between the lake and the river



THE ROLE OF NATURAL WATER CONNECTIONS AND THE IMPACTS OF INTERRUPTING NATURAL FLOWS

Barriers hinder the exchanges of water, sediments and organisms, affecting water quality and biodiversity. In the case of Juparanã, the temporary dam also flooded the surrounding areas during rainy periods, affecting communities, but also increased the availability of water for irrigation.



WHAT SHOULD BE DONE

Decisions to interrupt the natural flow of water should consider:

- Monitoring of water and sediment quality
- Long-term impacts, such as very high water levels or droughts
- The precautionary principle
- Engineering standards related to a dam
- Social impacts



RIO DOCE FACTS

1. The work carried out firstly by Samarco and then by the Renova Foundation was a precautionary measure to guarantee that the level of Lake Juparanã remained between 6.5 and 7.5 metres above sea level during the rainy season.
2. With a surface area of 63 km² and a drainage basin of 2,406 km², Lake Juparanã is the primary water source for Linhares, Sooretama and Rio Banana, which are located downstream on the Rio Doce.
3. Discharge of untreated sewage from the surrounding villages, along with the impacts from the coffee, banana, papaya and cocoa plantations in the region, also impact water quality in the lake.

Recommendations

Important: Since the release of the recommendations in August 2019, the situation at Juparanã has evolved as a result of judicial decisions



1. Conduct a permanent monitoring programme for Lake Juparanã. This entails studies describing the impacts on water quality, aquatic communities, local fisheries and natural flows, investigating in detail the synergistic effects of contaminants which can result in 'reactive chemical cocktails' capable of causing further effects on the biota composition and the local environments.



2. Based on the studies mentioned in Recommendation #1, and on the awareness that the risk of lake contamination due to the release of tailings in the Rio Doce is higher than the risk of jeopardizing the source-to-sea system, **further research should be conducted to determine the need for and potential location of a dam with floodgates.** The ecological conditions of the natural flows, as well as the maintenance of sustainable environmental conditions in Lake Juparanã, Rio Pequeno and its connecting ecosystems with the Rio Doce, should be taken into consideration in any decision-making process.



3. Should a dam be built, implement a management model for the proposed dam that considers the adjustment of functions of the artificial system, including the definition of clear indicators and triggers for a rapid decision making process, which will guarantee the well-being of the source-to-sea system. In addition, its supervision should be a part of the terms of reference of the Pontões e Lagoas do Rio Doce Watershed Committee.