



Policy Forums

Neglect of ecosystems services by mining, and the worst environmental disaster in Brazil



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Introduction

On 5 November, 2015, Brazil watched one of the worst environmental disasters in its history unfold. A wave of mud buried Bento Rodrigues, a village in the municipality of Mariana, located in the Espinhaço Mountains in the state of Minas Gerais (Escobar, 2015). Sixty-two million m³ of sludge overwhelmed houses and the historical, cultural and natural heritage of the village, leaving 19 dead, 3 missing and over 600 homeless. On its way to the Atlantic Ocean, the wave of mud reached the Rio Doce (literally “Fresh” or “Sweet River”) – a major drainage of the Southeastern Atlantic hydrogeographic region, which provides key ecosystem services to part of the country’s most populous and industrialized region. It is also one of the main rivers to supply water and nourishment to the endangered Atlantic Forest. The disaster instantaneously

caused the turbidity of the Rio Doce to reach a level 12,000 times higher than that allowed for consumption, and the oxygen level to suddenly drop below 1 mg/L (IGAM 2015), causing the death of several tons of fish and many other living organisms. Forty-one municipalities in the states of Minas Gerais and Espírito Santo were affected by the disaster and hundreds of thousands of people were left without access to clean water. The harm done to biodiversity has yet to be precisely estimated, but various institutes and scientists decreed the death of the Rio Doce along its ~600 km. The mud reached the Atlantic Ocean on 22 November, expanding the impacts to the fragile, yet diverse estuarine and coastal region.

The mudflow was caused by the failure of the Fundão iron-ore tailings dam owned by the mining company Samarco, a joint venture between BHP Billiton and Vale (Fig. 1). To make matters worse, Samarco has admitted that two more dams in the same mining complex where the tragedy struck are at

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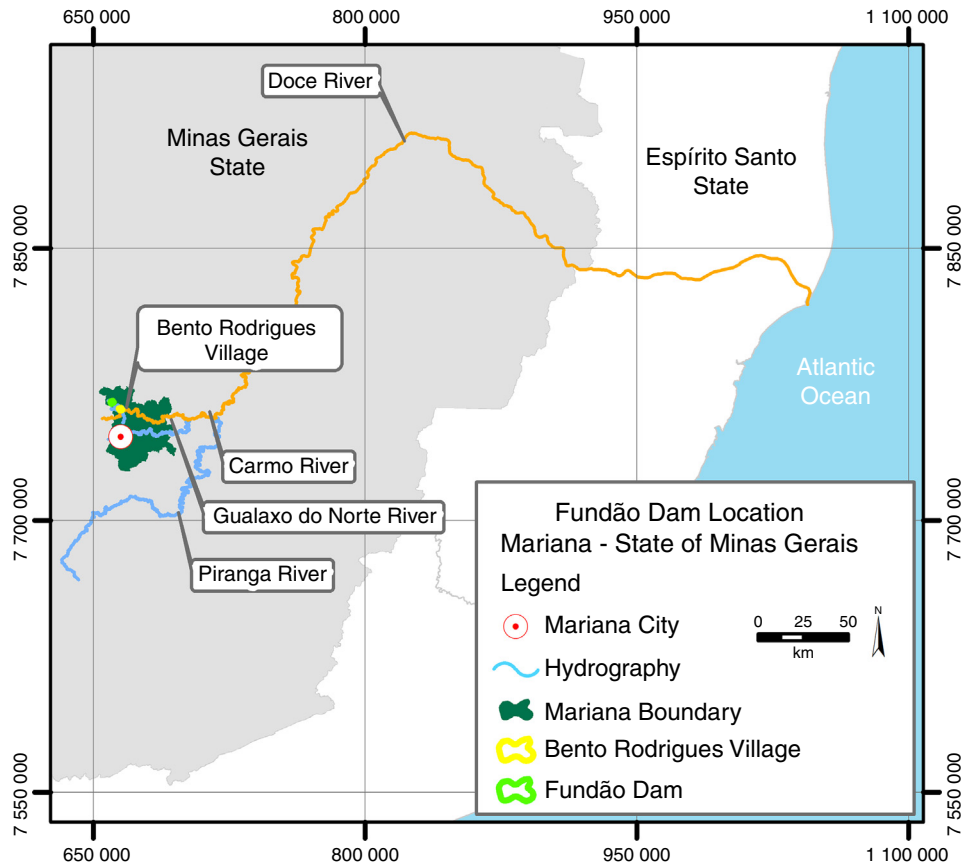


Fig. 1 – The Fundão iron-ore tailings dam location and the extension of the environmental damage caused by the dam break.

threat to collapse, as they present levels of stability of only 37% and 22%, while Brazilian standards recommend above 50% (O Globo, 2015). This is at least the seventh tragedy resulting from the failure of tailings dams in Minas Gerais in less than 30 years. Actually, forty-two out of the 735 dams in operation in the State have no guarantee of stability (FEAM, 2014).

Conflicts between mining and ecosystem services and goods

Mining involves important trade-offs between industry and ecosystem services/biodiversity conservation, because it converts multifunctional landscapes, that provide a myriad of ecosystem services, into monofunctional, mineral-provisioning landscapes (Neves et al., 2016). Some of the most affected ecosystem services by mining are those related to freshwater, such as water provisioning for agriculture, households and to support traditional livelihoods, water filtration, groundwater recharge, control of erosion and flood, and cultural services (Carpenter et al., 2009; McIntyre et al., 2014). The delivery of these services are generally compromised by direct water consumption by mining and pipelines, pollution of surface/groundwater, decrease of groundwater level and flow, and occasionally by environmental disasters such as the breaking of tailing dams and pipelines (Li et al., 2011; Neves et al., 2016). Also, mining deeply alters landscapes and destroys landmarks

with geographical, historical or identity value, compromising the delivery of cultural services such as tourism, recreation and existence values (Neves et al., 2016). Notwithstanding the private and short-term benefits, the damage to ecosystems by mining has been harmful to society. In a simple cost-benefit analysis the disadvantages of such landscape conversion is not crystal-clear, as the cost of lost ecosystem services is not internalized, private/short term gain is prioritized over public/long term needs, and the cost-benefit ratio is distorted by tax or governmental incentives (MEA, 2005). Research on the valuation of ecosystem services has been trying to make the positive externalities offered by natural ecosystems visible by assigning them a monetary value (TEEB, 2010). However, these values were not assessed in determining the environmental fines for the disaster of Mariana and Rio Doce. The federal and State environmental authorities (IBAMA and SEMAD) imposed the maximum fines allowed by Brazilian law, while the Federal and Minas Gerais Public Prosecution Service made an extrajudicial agreement with Samarco regarding the recovery of damages. Obviously, the total amount of these fines, US\$349.2 million (current dollar exchange rate of US\$1 = R\$3.90), does not equate with the value of ecosystem services and biodiversity lost, and is not even sufficient to recover the degraded area of the Rio Doce. For a comparison, the oil company BP was charged more than US\$40 billion in fines and other payments for causing a massive oil spill in the Gulf of Mexico off the coast of the United States in 2010 (Wikipedia, 2016).

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