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Essays and Perspectives

Fundão tailings dam failures: the environment tragedy of the largest technological disaster of Brazilian mining in global context



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ABSTRACT

After the collapse of the Fundão dam, 43 million m³ of iron ore tailings continue to cause environmental damage, polluting 668 km of watercourses from the Doce River to the Atlantic Ocean. The objectives of this study are to characterize the Fundão Tailings Dam and structural failures; improve the understanding of the scale of the disaster; and assess the largest technological disaster in the global context of tailings dam failures. The collapse of Fundão was the biggest environmental disaster of the world mining industry, both in terms of the volume of tailings dumped and the magnitude of the damage. More than year after the tragedy, Samarco has still not carried out adequate removal, monitoring or disposal of the tailings, contrary to the premise of the total removal of tailings from affected rivers proposed by the country's regulatory agencies and the worldwide literature on post-disaster management. Contrary to expectations, there was a setback in environmental legal planning, such as law relaxation, decrease of resources for regulatory agencies and the absence of effective measures for environmental recovery. It is urgent to review how large-scale extraction of minerals is carried out, the technical and environmental standards involved, and the oversight and monitoring of the associated structures.

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Introduction

One year after the collapse of the Fundão tailings dam, more than 43 million m³ (Samarco, 2016a) of iron ore tailings are still causing environmental damage, polluting 668 km of watercourses from the Doce River Basin to the Atlantic Ocean. The volume of pollutants and the extent of ecosystems affected have assumed unprecedented proportions, involving the Brazilian Atlantic Forest – one of the world's biodiversity hotspots (Mittermeier et al., 2005), estuarine, coastal and marine environments. Furthermore, it affected other priority areas for the conservation of biodiversity and cultural heritage (MMA, 2007), such as the iron geosystems of the Quadrilátero Ferrífero (Carmo and Kamino, 2015).

In less than 48 h after the collapse of the Fundão dam, a task force was created by the Attorney General's Office of the State of Minas Gerais, whose main objective was to ascertain the facts of the environmental tragedy and the repercussions on the 17 districts and 36 municipalities directly affected by the mud wave. The Minas Gerais State Public Prosecutor's Office (MPMG) worked intensively and produced, through related teams, hundreds of technical documents and expert reports. Among these studies, the 120 technical documents of the Prístino Institute (inspection reports, technical reports, studies and maps), developed in partnership with the MPMG Geoprocessing Nucleus, identified the main environmental damage, which supported most of the results of the present work (CAOMA, 2016).

The mining company Samarco Mineração S/A (a joint venture between Vale S/A and BHP Billiton), responsible for the Fundão dam, produced technical documents stating the main emergency measures adopted and the initial planning for environmental recovery. According to the company, the emergency recovery work

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