Impacts of the Fundão Dam Failure in the Doce RiverWatershed

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The failure in the Fundão dam, Minas Gerais, Brazil, in November of 2015, was one of the biggest accidents involving dams already reported in the literature. It is estimated that more than 35 million m^3 of Fe ore wastes were released into the environment, changing the environmental quality of about 600 km of rivers (Gualaxo do Norte, Carmo and Doce rivers).

Water, sediment and suspended particulate matter (SPM) were collected in twenty-eight sites in order to cover the whole river extension downstream from the dam burst to the Doce River plume, in the Atlantic Ocean. The objective of this study was evaluate the impacts by the dam failure.

Results indicated that tailing spill promoted significant transformation of drainage basins, causing a substantial increase in suspended sediment loads, as well as a large deposition of waste along rivers and flood plains. SPM ranged from 11 mg L^{-1} at the mouth of the Doce River to 33 g L^{-1} at the Gualaxo do Norte River. Most samples of sediments and suspended particulate material presented Fe, Al and Mn levels above recommended sediment guidelines (AET). Reactive (bioavailable) fraction of these elements represented up to about 20% of the total fraction, in the case of Fe and Al. High levels of As observed in sediments, dissolved and particulate phases were associated to small-scale Au mining activities. There is an enormous amount of tailing residue deposited in the Doce River watershed. Future heavy rain episodes will likely cause enhanced erosion, remobilization and transport of contaminated particles from floodplains and streambeds. Potentially remobilized contaminated sediments will sustain the inputs of SPM and metals for the years to come and may pose a risk for the Doce River watersed.