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Environmental Impact of an Informal Settlement on A Headwater Area at High-Risk Of Erosion in Brazil

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Extended Abstract

One of the most preserved remaining areas of Atlantic Forest in the Belo Horizonte City (Minas Gerais, Brazil) is located at the Izidora basin, a tributary of thw Sao Francisco River, comprising 950 hectares and hosting around 280 headwaters. The preserved Macacos stream (2,6 km²) regarding water quality receives many tributaries small streams, highlighting three main headwaters (19°48'27.43"S, 43°54'26.82"O) with a topographical factor from 0 to 9.83.

However, these streams are located in an area that has faced an intense informal urbanization process by 4.500 low-income families ("Victoria settlement"), resulting in vegetation losses and a disorderly urbanization, including the occupation of riparian areas with high degradation of soil and water. Using the QGis software to assess satellite images, it was possible to verify that the stream sediment increased mainly downstream of the outfalls. The granulometric characteristic of the sediment was dominantly sandy and the sediment load along the Victoria´s streams increased by 5.2 cm³ of sediment per section while in the preserved Macacos streams, this volume was around 2.15 cm³ per section. Indeed, the erosivity was estimated as 12,895.50 MJ.mm.ha $^{-1}$.h $^{-1}$ per year and the estivated natural erosive potential was as high as 2045,6 t.ha $^{-1}$.ano $^{-1}$. This impact changed the water flow in the stream bed and the free flow was estimated as 982.85m³/s by the Hydrometric Sheet in the disturbed streams. In contrast, a high flow of 20,903.86 m³ was found in the preserved stretch of the Macacos stream. Two main consequences resulted from this impact. Firstly, damages to the houses built around the riparian and headwaters areas, which showed some architectural pathologies as wall cracks and infiltrations and lastly a significant loss and changes in biodiversity. While Macacos' riparian Atlantic Forest presented a richness of 40. 66 and Shannon index of 2.62, the riparian areas of the informal settlement showed a reduction of richness to17.29 and Shannon index around 1.6. Besides, a strong impact was verified on the interface of soil- water ecosystems. In the preserved stretch of Macacos stream, the riparian area showed an occupation of 74% with a dominance of the following species: *Lasiacis sp* (Poacae), *Pothomorphe umbellata* (Piperacea) and *Serjania sp* (Sapindaceae). In contrast, in Victoria settlement streams, there was a massive invasion (77.1%) by exotic and pioneer species not only in the soil-water riparian interface but also inside the streams, particularly by *Urochloa sp* (Poaceae), *Typha domigenisis* (Typhaceae) and *Megatyrsus maximus* (Poaceae). In conclusion, the loss of native vegetation promoted by the disorganized urbanization process resulted in a severe environmental impact to the watershed. However, the rehabilitation of this site may be feasible by restoring the streams and its riparian sites as well as repairing the housing.

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