

Paper Number: 1429

Erosion and Deposition in the Alluvial Plain of the Mogi Guaçu River, Brazil

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In Brazil, groundwater behaviour has been extensively studied in regard to its interaction with alluvial plains, and its evolution associated with sedimentation processes. This study objective was to understand the seasonal spatial distribution of erosion processes, and sedimentation with the methodology and concepts of semi-empirical hydrological USPED model (Unit Stream Power Erosion and Deposition) [1]. The results focused on areas of streams, and sediment deposition, as well as areas with great capacity for water storage (less erosion) in a 465-hectare sub-basin located in the alluvial plain of Mogi Guaçu River.

The results of the erosion/deposition analysis by USPED are in Figure 1. The deposition areas represent approximately 40% of the total area of the sub-basin in the wet season, and 60% in the dry season. Despite the higher incidence of erosion in the wet season, when the rainfall erosivity is higher (December, January and February), and the increase of deposition areas in the dry season, it is found the existence of a pattern of erosion and deposition sites in the sub-basin for both seasons. Roadways are the major cause of erosion in the sub-basin (Figure 2), because they interfere in natural drainage patterns by promoting the concentration of water, and its course out of the system. The highest deposition of sediments occurs in flat areas near Mogi Guaçu River (Figure 1), where there is an alluvial geomorphology and unconsolidated sediment terraces of Cenozoic age. In areas to the north and northeast, erosion is more intense, corresponding with more undulating relief in the hills of Palaeozoic clastic rocks.

The soils of the sub-basin have great thickness and permeability, favouring the percolation of water into the subsurface. However, due to the source material consists of sandstones from the Itararé Group and Aquidauana Formation, soils have sandy texture and consequently low particle aggregation. This slope-transported material is deposited in the flood plain. Moreover, the native forest present in flat areas retains sediments, and favours water infiltration into the soil to the deepest layers, supplying the aquifers. *FAPESP 2013/ 22729-2.

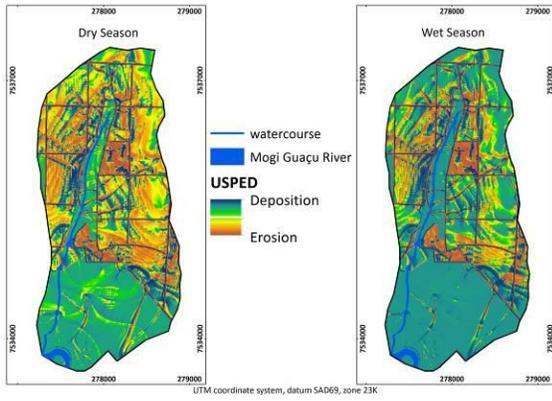


Figure 1: USPED to dry and wet seasons



Figure 2: Erosion on forest roadway

References:

- [1] Mitasova H et al. (1996) International Journal of GIS 10(5): 629-641

