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Erosive Potential of Rains in the Climate Change Scenarios in the Upper Taquari River Basin, Ms, Brazil

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Abstract

Brazilian Centre-Western Region has become a great producer of grain crops along the last forty years. The vegetation is formed by “Cerrado” composed by bushes and grasses and “Cerradao”. Soil studies in the region have pointed predominantly nutrient poor soils, iron- and aluminum-rich, good physical properties. These conditions, added to the management system used without conservationist practices and not obeying the environmental laws brought drastic consequences to the region such as the water erosion process, especially severe in the Upper Taquari Basin (UTB). Around 90% this area of UTB is in the north region of Mato Grosso do Sul state, and the erosion effects are reflected downstream in the river, that is connected to the Pantanal Basin. Focused on these problems and based on the IPCC assumptions, Climate Change scenarios were estimated to UTB, seeking to identify the areas with high vulnerability to erosion. Using dynamic modelling of TerraME topopluvial scenarios were generated up to 2100, considering increases and reductions of 15% in precipitation, by integrating the isoietes to the Shuttle Radar Topography Mission (SRTM) data to generate topopluvial isolines and their attributes were exported to the cell grid of TerraView. UTB is considered more vulnerable to erosion process caused by rains. Estimated rain erosivity in the UTB varies between 6.995,2 and 8.422,1 MJ mm. ha⁻¹ h⁻¹ ano⁻¹, and the higher values are in the north region, in the areas of the municipalities Alto Taquari and partially, the areas of Alto Araguaia and Costa Rica. In the municipalities Rio Verde de Mato Grosso, Camapua and Sao Gabriel do Oeste, the erosivity is lower than 7.120 MJ mm. ha⁻¹ h⁻¹ ano⁻¹. These values increase severely in incremental annual pluvial precipitation scenarios, showing that North of UTB the process will be worst in 2100 if conservationist management systems is not adopted, such as No-tillage cropping associated to the environmental laws application, such as the maintenance of vegetation in the riparian zone and in the areas with slopes higher than 45 degrees, considered by law as Permanent Preservation Areas.

Keywords: Cerrado Bioma, Permanent Preservation Areas, TerraME, topopluvial scenario