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The Role Of Terrain Variables And Human Activity On The Development Of Erosion Features; A Case Study In The State Of Sao Paulo, Brazil

M. Dantas-F (1), O. Pejon (2), L. Zuquette (4) and A. Cendrero (4)

(1, 2 and 3) Univerdidade de São Paulo, Escola de Engenharia de São Carlos, Departamento de Geotecnia; Av. trabalhador São Carlense, nž 400, 13566-590. São Carlos, São Paulo, Brazil, (4) Universidad de Cantabria, Departamento de Ciencias de la Tierra y Física de la Materia Condensada, Av de los Castros S/N, 39005. Santander, Spain.

Land degradation due to erosion is a prevalent process that increasingly affects many parts of the world. This is related, to a great extent, to human activities and land management practices. In Brazil erosion is very widespread, affecting many areas of the country and generating large losses. In the state of São Paulo gully erosion features are very abundant, particularly on sandy geological materials. The Piracicaba river basin, in the centre of the state, in which the sandy Pirambóia Formation (Triassic-Jurassic) is predominant, shows a high density of erosion features. A small watershed (Barra, 56 Km2) within that basin has been selected to analyse the distribution and temporal evolution of erosion features and assess the relative importance of terrain variables and human activity on their development. About 80% of the watershed is occupied by the slightly-consolidated sandstones and sands of the Pirambóia Formation. Most of the area is devoted to agriculture, and substantial land use change has taken place during the last four decades. The annual rainfall is 1175 mm (20-40 mm monthly in dry periods and 140-220 mm in wet ones). There are three distinct relief and rainfall units: “Planalto ocidental” (sandstone plateau, around 900-1100m altitude; with 1.150 mm rainfall), “ Cuestas basalticas”(a basalt and sandstone scarp between 500 and 900 m; 1892 mm); “Depressão periférica”(an undulating lowland between 400 and 500m, formed by the loose, sandy Pirambóia Formation, 950 mm). Terrain units have been identified, mapped and described on the basis of bedrock, regolith type and thickness, slope gradient and land cover, Hydraulic conductivity (10 -5 to 10-6 m/s) and erodibility (E40 0,43 - 0,97) have been determined using both field and labora-

tory methods. The distribution of different types of erosion features (sheet, rill, ravine, gully, stream bank and piping) was mapped by means of air photographs (years 1962, 1965, 1972, 1978/79, 1988, 1995 and 2000) and field surveys. Erosion features form mainly between November and March, when intense rainfall and tillage activities coincide. However, the distribution and nature of those features show differences which can be related to the terrain characteristics analysed. Erosion freatures density and distribution has also changed significantly in response to land use changes during the period considered. An analysis and discussion of the relative importance of terrain and human factors, as well as a quantitative estimate of erosion rates in the study area are presented.