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Erosion and sediment yield from an agroforestry catchment in Galicia, NW Spain

P. Sande-Fouz, J.M. Mirás-Avalos and E. Vidal-Vázquez

Facultad de Ciencias, Universidade da Coruña, Campus A Zapateira, 15071 Coruña, Spain. Phone: (34) 98116700; Fax: (34) 981167065; e-mail: psande@udc.es

Analysis of sediment discharge information is considered as one of the most objective methods for evaluating erosion intensity. As a part of a project on water quality, a survey of suspended sediment yield and erosion rates was carried out at a small agroforestry catchment near to A Coruña, in the temperate humid area of Spain. Rates of erosion and sediment yield were assessed during a eight year period, from 1999 to 2006, at the 36.3 km^2 Valiñas River catchment. Soils are mainly sandy-loam textured. Soil use was 45% forest and 55% agricultural. Water samples were obtained during base and storm flow conditions. Yearly rainfall ranged from 786.1 to 1451.5 mm. Mean suspended solid concentrations over the eight year study period were 29.07 mg/l and the yearly figures varied from 13.67 to 91.12 mg/l. Taken into account individual samples, a maximum of 1044 mg/l of suspended solids was recorded during stormflow, whereas base flow figures were below 1 mg/l. Solid sediment concentrations were over 100 mg/l for a limited number of samples, namely three in 1999, nine in 2000, zero in 2001, twelve in 2002, nine in 2003, four in 2004, four in 2005 and two in 2006. Patterns of suspended sediment transport at the catchment outlet presented similarities with previous studies in temperate humid regions: (i) a few events of intense rainfall are responsible for the transport of suspended sediment and (ii) suspended solid peaks occur at the beginning of each event and decrease before the maximum of water discharge. Yearly erosion rates varied from about 0.05 to 0.6 t/ha during the study period. Low erosion rates during 2004 were due to the extreme dryness of this year. The largest cause of interannual sediment yield was discharge. Spatial variability of sediment yield was also assessed. Suspended solids concentration was 4 to 5

times lower in the forest than in the agricultural area. The main sources of sediments were agricultural land and river banks. However, the sediment discharge of a river is not a precise measure of all erosion occurring within the drainage basin. At the agricultural hillslope scale, erosion rates within the arable land were as high as 2 to 5 t ha^{-1} $year^{-1}$, but the situation is considered as sustainable from the viewpoint of soil conservation. In contrast, overland flow is an important source of phosphorus reaching surface waters and contributes both to dissolved and particulate P. Thus sediment contributions due to concentrated erosion of agricultural land and bank erosion during periods of high flow suppose an important contribution to eutrophication risks.