



The impact of land use changes and hydrological control works on hydrological connectivity and sediment yield at the catchment scale

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A modeling approach is used to evaluate the hydrological connectivity and the sediment yield in a medium-sized catchment (53.5 km²) of SE Spain under different land use conditions since 1956. The catchment experienced a considerable change in land use between 1956 and 1997. Dense forest has increased 5-fold, medium-density forest 2-fold and the dryland agricultural areas have decreased 2-fold. The spatial distribution pattern of land uses has also changed, decreasing the connectivity between source areas of runoff and sediments. For instance, the connectivity between the dryland agricultural areas was affected, in 1997 the remaining agricultural patches were highly disconnected, alternating with shrubland and forested areas. This change in land use was mainly caused by the abandonment of agricultural activities and the reforestation and hydrological control works of 1976. The sampling of sediments retained by 58 check-dams within the catchment was used to estimate the erosion rates and to calibrate and validate the erosion model. The WaTEM/SEDEM model (K.U. Leuven, Belgium) is used to simulate soil erosion and sediment yield spatially distributed within the catchment. The model illustrates spatial and temporal dynamics of sediment transport capacity. The erosion rates estimated in the field oscillated between 104 t ha⁻¹y⁻¹ and 0.04 t ha⁻¹y⁻¹ with an average of 5.14 t ha⁻¹y⁻¹. The analysis of a precipitation series shows a slight decrease of the rainfall in the area during the study period, however the different land use scenarios analyzed revealed the important role of land use changes in the erosion processes at the catchment scale.