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Analysis of the land-use and climate changes on sediment discharged from cultivated field in a rural hilly basin in Italy

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Abstract

The social and economic development, which took place during the past sixty years in many regions of Italy, has led to a change in traditional activities and population to a gradual abandonment of rural areas in favour of those more urbanized. These factors, accompanied by the Italian and EU agricultural policies, have determined significant changes in land use and management practices. In particular, the development of mechanization of agriculture led to the replacement of small heterogeneous cultivation patterns with large extension of homogeneous cultivations and to the reduction of the extension and intensity of drainage system, thus reducing the effectiveness of its function. Consequently, the introduction of modern land-use management techniques has led to an increase in soil erosion, with both on-farm and off-farm impacts. This paper presents the methodology for quantifying and analyzing the erosive responses to land use and climate changes by means of ArcSWAT model. The case study was the Elsa river basin which were analysed by climate and land use change along more than fifty years (1954-2007). The results indicated that under the same climatic conditions, changes in land-use and management increase the runoff formation and may have larger impacts on sediment discharges from cultivated field. This type of analysis proved to be effective in analysing past and future hydrological dynamics of the basin. Therefore, this approach could help policymakers integrate climate and land use change into land planning and rural development programs.

Keywords

Rainfall pattern; land use change; soil erosion; ArcSWAT model