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Estimating sediment loads in an intra-Apennine catchments: balance between modeling and monitoring

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In this study we compare the results of a soil erosion model applied at watershed scale to the suspended sediment measured in the stream network affected by a motor way construction. A sediment delivery model is applied at watershed scale; the evaluation of sediment delivery is related to a connectivity fluxes index that describes the internal linkages between runoff and sediment sources in upper parts of catchments and the receiving sinks.
An analysis of the fine suspended sediment transport and storage was conducted for a streams inlet of the Bilancino reservoir, a principal water supply of the city of Florence. The suspended sediment were collected from a section of river defined as a close systems using a time integrating suspended sediment sampling. The sediment deposited within the sampling traps was recovered after storm events and provide information of the overall contribution of the potential sediment sources.
Hillslope gross erosion was assessed by a USLE-TYPE approach. A soil survey at 1:25.000 scale and a soil database was create to calculate, for each soil unit, the erodibility coefficient K using a new algorithm (Salvador Sanchis et al. 2007). Erosivity coefficient R was obtained applying geostatistical methods taking into account elevation and valley morphology.
Furthermore, we evaluate a sediment delivery factor (SDR) for the entire watershed. This factor is used to correct the output of the USLE Type model. The innovative approach consist in a SDR factor variable in space and in time because it is related to a fluxes connectivity index IC (Borselli et al. 2008) based on the distribution of land use and topographic features.
The aim of this study is to understand how the model simulates the real processes that intervene in the watershed and subsequently to calibrate the model with the result obtained from the monitoring of suspend sediment in the streams.
From first results, it appears that human activities by highway construction, have resulted in an 8 time increase in suspended sediment load. Furthermore, the fine-grained (<62.5 μm) sediments have been stored in the gravel river bed, where from deposit become a sediment supply. The presence of check dams and pools causes sedimentation, that plays an important role on degradation of fluvial habitat. Also, intrinsic to the process of mobilization, transport and sedimentation is the chemistry of the stream water, such as a high pH (8.15 – 9.15) and the E.C. (5.0-12.4 μs cm-1) that cause the dispersion of the sediments. On the other hand, the use of flocculants, Ca-salts, by the construction firms retards the sediment mobility. The sediment delivery is therefore the result of this interactions, that are not take into account by the soil erosion model.

Salvador Sanchis M. P. , Torri D. ,Borselli L.,Poesen J.(2007). Climate effects on soil erodibility. Earth Surface Processes and Landforms 33 (7): 1082 – 1097.
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