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Linking sediment fingerprinting and modeling outputs for a Spanish Pyrenean river catchment.

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Indirect techniques to study fine sediment redistribution in river catchments could provide unique and diverse information, which, when combined become a powerful tool to address catchment management problems. Such combinations could solve limitations of individual techniques and provide different lines of information to address a particular problem. The Barasona reservoir has suffered from siltation since its construction, with the loss of over one third of its storage volume in around 30 study years (period 1972-1996). Information on sediment production from tributary catchments for the reservoir is required to develop management plans for maintaining reservoir sustainability. Large spatial variability in sediment delivery was found in previous studies in the Barasona catchment and the major sediment sources identified included badlands developed in the middle part of the catchment and the agricultural fields in its lower part. From the diverse range of indirect techniques, fingerprinting sediment sources and computer models could be linked to obtain a more holistic view of the processes related to sediment redistribution in the Barasona river catchment (1509 km2, Central Spanish Pyrenees), which comprises agricultural and forest land uses. In the present study, the results from a fingerprinting procedure and the SWAT model were compared and combined to improve the knowledge of land use sediment source contributions to the reservoir. Samples from the study catchment were used to define soil parameters for the model and for fingerprinting the land use sources. The fingerprinting approach provided information about relative contributions from land use sources to the superficial sediment samples taken from the reservoir infill. The calibration and validation of the model provided valuable information, for example on the timescale of sediment production from the different land uses within the catchment. Linking results from both techniques enabled us to achieve a more holistic view of the erosion processes taking place in the Barasona river catchment.