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LAND COVER CHANGES AND SEDIMENT CONNECTIVITY IN A TORRENTIAL REACH OF THE CENTRAL SPANISH PYRENEES

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The Ijuez River drains a sector of the Eocene flysch in the southern Pyrenees, The basin includes natural forests and afforestations in the montane belt, as well as extensive grasslands in the subalpine belt, over 1700 m a.s.l. At the beginning, the streambed develops a narrow canyon with a very steep longitudinal profile that ends in a torrential alluvial plain plenty of cobbles and boulders arranged in a chaotic manner. Several check dams in the middle and lower stretches of the river have contributed to reduce sediment transfer downstream. The upper reach, however, maintains it torrential character. There, the Ijuez River shows the occurrence of various changes in the hydromorphological regime: (i) a terrace level above 3 m of the actual channel, with matrix-supported cobbles indicating a fluvio-torrential regime; (ii) above the terrace level the accumulation of a large number of debris flows occurred; (iii) recently a strong incision of the actual channel occurred, contributing to the dismantlement of fluvial terrace and debris flow deposits. This evolution reflects, most likely, the changes underwent in the subalpine and montane belts due to deforestation and the consequent transformation of the forests into cultivated fields (below 1600 m a.s.l.) and subalpine grasslands to feed the transhumant sheep flocks. Such changes occurred between 2500–2000 years ago and between 1200–900 year ago, according to the deforestation ages obtained from charcoal remnants in soils and lacustrine sediments. Radiocarbon dates obtained for debris flows (from woody remnants located within the debris-flow deposits) in the Ijuez basin indicate an age of approximately 100 years ago, coinciding with the moment of maximum population pressure and the maximum extent of the cultivated area. Along the 20th century, farmland abandonment, afforestations and natural reforestation, as well as the decline of the livestock pressure has reduced sediment yield and connectivity, thus explaining the recent reduction in sediment supply and the consequent channel incision.