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Hydrologic and landscape changes in the Middle Ebro River (NE Spain): implications for restoration and management

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Abstract. The changes of landscape (1927–2003), discharge regime and anthropic activities with the river-floodplain of one reach at the Middle Ebro River (NE Spain) were investigated with the objective to identify the factors that best explain the natural ecotone succession and propose a realistic restoration option with consideration of the landscape dynamics during the last century and the socio-economic context. Our results indicate that hydrological and landscape patterns have been dramatically changed during the last century as a consequence of human alteration of the fluvial dynamics within the studied reach. The magnitude and variability of river discharge events have decreased at the end of the last century, and flood protection structures have disrupted the river floodplain connectivity. As a result, the successional pathways of riparian ecotopes have been heavily modified because natural rejuvenation no longer takes place, resulting in decreased landscape diversity. It is apparent from these data that floodplain restoration must be incorporated as a significant factor into river management plans if a more natural functioning wants to be retrieved. The ecotone structure and dynamics of the 1927–1957 period should be adopted as the guiding image, whereas current hydrologic and landscape (dykes, raised surfaces) patterns should be considered. Under the current socio-economic context, the more realistic option seems to create a dynamic river corridor reallocating dykes and lowering floodplain heights. The extent of this river corridor should adapt to the restored flow regime, although periodic economic investments could be an option if the desired self-sustained dynamism is not reached.

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