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**Book of Abstracts**

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# Differences in streamflow after farmland abandonment –a comparative study in four small mountain catchments

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## Abstract

Farmland abandonment usually leads to vegetation expansion with important environmental consequences. In this study, we assess the streamflow response at the flood event scale in five long-term monitored small headwater catchments in northern Spain. Three of them are representative of different post farmland abandonment scenarios: natural revegetation dominated by shrubs (Arnás), afforestation (Araguás\_afforestation) and abandoned terraced fields (Munilla). Two more catchments, covered by dense natural forest (San Salvador) and badlands (Araguás), were used as reference for undisturbed and degraded environments, respectively.

The five catchments registered a larger number of flood events in late autumn and spring, showing the influence of the Mediterranean climate. While the badlands, shrubs and afforested catchments generated events over the entire year, the terraced and forested catchments showed very limited response during the summer. Furthermore, the badlands, shrubs and afforested catchments recorded more than twice floods per year than the other two catchments. At the flood event, the mean runoff coefficient was higher in the badlands and shrubs catchments. However, under wet conditions, both the forested and afforested catchments could registered high hydrological responses, with similar runoff coefficients than those recorded in the badlands and shrubs. The terraced catchment showed the lowest runoff coefficients. The highest peakflows were observed in the badlands catchment, characterized by sharp flood hydrographs, suggesting the dominance of overland flow processes. The flood hydrographs of the abandoned catchments differed significantly, suggesting the influence of both vegetation cover and soil properties inherited from past agricultural activities. In the shrub catchment, peakflows were always greater; however, under very wet conditions and/or intense rainfalls, the afforested catchment recorded high peaks, comparable to that of the shrub catchment. The response time in both catchments were fast and recession limbs were short, suggesting the occurrence of overland flow processes, probably over localized degraded areas. This greatly differed from the hydrographs of the terraced and forested catchments, characterized by gentler hydrographs, with long response times and recessions, indicating subsurface flow processes associated with thick and well developed soils. Differences in the land use legacy, which affects vegetation cover but also soil properties, may explain the differences in the hydrographs characteristics, suggesting contrasting dominant runoff generation processes in each catchment. These results highlight the need to consider these differences to reduce future uncertainties in forecasting water resources and soil conservation in areas affected by farmland abandonment.