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ENVISION

BOOK of Abstracts
27th January-2nd February
Barcelona, Spain



 **OECD**
a conference sponsored by BETTER POLICIES FOR BETTER LIVES

Catchment hydrology and soil degradation following farmland abandonment A comparison between different land management scenarios

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Farmland abandonment has been one of the major changes in many Mediterranean mountainous areas throughout the 20th century. Abandoned areas are often considered of marginal interest from an economic perspective; however, they are essential from an environmental and societal point of view as they provide important ecosystem services, such as water supply, soil and biomass, carbon storage, or recreational services. Large areas of former agricultural land have undergone natural revegetation. In other cases, extensive afforestation programs have been conducted to reduce land degradation following farmland abandonment. On terraced landscapes, the lack of maintenance may cause failures in the terrace risers, resulting in new sediment sources on the hillslopes. The heterogeneity of landscapes present in mountainous regions of the Mediterranean increases the uncertainty in forecasting changes in water resources and soil conservation after farmland abandonment: is the hydrology of these revegetated areas comparable to that of a natural forest? What are the off-site effects of the increasing soil degradation in abandoned terraced landscapes?

This study presents several key hydrogeomorphological results obtained from research undertaken in three small headwater catchments in northern Spain, representing different farmland abandonment scenarios (natural revegetation, afforestation and terraced fields), and one small catchment, representing an undisturbed forested environment. The hydrological responses of these catchments differed significantly, showing the influence of not only vegetation cover but of the properties of soil remaining after previous agricultural activities. Land abandonment resulted in a general reduction in computed hydrological connectivity at the catchment scale, except in localized areas close to the main channel, new forest roads, and upstream of terrace wall collapses, all areas of increased hydrological connectivity.

Land and water management should pay attention to the large heterogeneity of post farmland abandonment scenarios when assessing the hydrological implication of farmland abandonment and establishing restoration measures to mitigate soil erosion.

keywords: farmland abandonment; storm-flow; hydrological connectivity; sediment sources; catchment; Mediterranean mountain