

## **Impacts of afforestation on water and sediment connectivity in NW Iberia**

João Pedro Nunes (1), Léonard Bernard-Jannin (1,2), Mariluz Rodríguez-Blanco (3), Juliana Marisa Santos (1,4), María Ermitas Rial-Rivas (1), Saskia Keesstra (5), and Jacob Keizer (1)

(1) CESAM & Dept. Environment and Planning, University of Aveiro, Aveiro, Portugal, (2) École Nationale Supérieure Agronomique de Toulouse, Institut National Polytechnique de Toulouse, Toulouse, France, (3) Faculty of Sciences, University of A Coruña, A Coruña, Spain, (4) Institute of Geography, Friedrich-Schiller-Universität Jena, Jena, Germany, (5) Wageningen University and Research Centre, Wageningen, Netherlands

The northwestern Iberian peninsula has experienced strong afforestation in the XXth century. Plantation forests have mostly replaced a traditional agricultural landscape consisting of irrigation terraces, which probably imposed strong limitations on water and sediment connectivity. The new forests have their own impacts on connectivity, including occasional enhancements due to landscape disturbances caused by wildfires, clearcutting and soil management operations. However, both the ancient and new landscapes have been poorly studied; in consequence, the impacts of afforestation on hydrological and sediment processes in this region are not well understood, posing a challenge for watershed managers to understand the hydrological and sediment processes in their systems and how to make them comply with the Water Framework Directive.

This work analyses these issues using observations from an agricultural and forested catchment in northwestern Portugal. The valley is still occupied by traditional terraced agriculture, while the slopes are planted with eucalypt and maritime pines. Observations include 2 years of hydrological and sediment data from a representative terrace, and 4 years of erosion features mapping and hydrological and sediment data at the catchment scale. During this time, a wildfire burned part of the catchment, which experienced important post-fire management operations (plowing and replanting), allowing a comparison of the hydrological and sediment connectivity impacts of terraces and forests in their normal and disturbed conditions.

Preliminary results indicate a strong impact of terraces in delaying lateral flow, creating saturated zones behind them and promoting surface runoff. Possibly this leads to slower hydrograph recession when compared with forested catchments. Terraces also limit sediment export; in contrast, the burnt forest slopes experienced strong erosion and sediment export, particularly after soil management operations. Preliminary results indicate that sediment yield in forested slopes could be one order of magnitude higher than that from terraced fields, or two orders of magnitude if subjected to large-scale management. The next step is using spatially-distributed modelling to assess these results in depth, and to better understand hydrological and sediment connectivity in the study catchment.