



## Sediment yield and connectivity in a gullied sandy catchment

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Badland areas are considered to have high connectivity of sediment at the catchment scale; however, little is known about processes occurring in gullies and badlands developed in sands. This type of gullies is quite common in the Central-Eastern Iberian Peninsula and is associated with historic mining. The sandy badlands also appear in both abandoned and traditionally reclaimed mines, generating on- and offsite environmental effects. Our aim is to quantify the rates of the different processes occurring in the sandy gullied catchments, as well as their coupling and connectivity at a catchment scale. This may allow application to improve reclamation practice in mines and quarries located in sandy materials.

The study site is a small (1.32 ha) gullied catchment, the *Barranca de los Pinos*, which is located in the Northern Piedmont of the Guadarrama Mountains (Central Spain). The catchment area has been divided into Homogeneous Response Units (HRUs) attending to the dominant active process. The sediment produced in the different HRUs has been monitored by a variety of methods: repeat Terrestrial Laser Scanning of high gradient slopes, closed microplots in low gradient slopes and automatic (Reid type) slot bedload samplers and siphon samplers to monitor suspended sediment transport in the channel.

During the 2010-11 monitoring period the sediment yield due to gravitational movements in high gradient slopes varied from 20 to 200 kg m<sup>-2</sup>y<sup>-1</sup>. In the low gradient slopes the splash and non-concentrated runoff generated 0.1 - 6 kg m<sup>-2</sup>y<sup>-1</sup>, while the channel yielded 7.44 ± 1.08 kg m<sup>-2</sup>y<sup>-1</sup> with a very high proportion (>70%) of bedload.

Despite the difficulties of extrapolating and comparing the results obtained at different spatial and temporal resolutions, annual patterns of erosion and transport of sediments within the sandy gullied catchments have been identified. These confirm that the transport of sediment in this catchment is limited by the capacity of flow events to transport sand and not by the supply of sand. This is interpreted as a tendency towards landform stabilization. Detailed study of the areas acting as sinks or temporary storage areas is required, as well as further understanding of the processes interacting with vegetation that has been colonizing the gullied area during the last decades.