



Erosion and sediment yield in Mediterranean badland areas

Estela Nadal Romero (1), Juan Francisco Martínez Murillo (2), Matthias Vanmaercke (1), and Jean Poesen (1)

(1) Katholieke Universiteit Leuven, Geography, Heverlee, Belgium (mariaestela.nadalromero@ees.kuleuven.be), (2) Department of Geography, University of Malaga, Campus de Teatinos. 29071 Málaga, Spain.

Badlands are usually defined as “intensely dissected natural landscapes where vegetation is sparse or absent and which are useless for agriculture”. Badlands are characterized by features such as the absence of vegetation, steep slopes and high density drainage network, and hence tend to be among the most significant areas of erosion in the world.

The main objectives of this study are to investigate the relationship between area-specific sediment yield (SY) and contributing area (A) in Mediterranean badland areas, and to study and discuss the effects of several possibly controlling factors of SY in badlands: i.e. measuring methods, dominant erosion process, lithology, mean slope gradient, the fraction of bare areas or badland areas, mean annual precipitation and mean annual air temperature.

A database is currently compiled with 154 entries and 16 571 plot- and catchment-year data on specific sediment yield at 87 study sites in badland areas of the Mediterranean (Spain, France, Italy, Albania, Greece, Turkey, Israel, Morocco and Tunisia). The sediment yield data used in this study were obtained by bathymetric surveys in reservoirs, sediment transport measurements at gauging stations, detailed topographic surveys, erosion pins, and runoff plot data. The results show a high variability of sediment yield. A complex A-SY relationship is identified: for areas < 10 ha, SY is very high (mean SY = $475 \text{ t ha}^{-1} \text{ y}^{-1}$), whereas for areas > 10 ha, SY decreases non-linearly (power law) with increasing A (mean SY = $75 \text{ t ha}^{-1} \text{ y}^{-1}$ and drops from $164.5 \text{ t ha}^{-1} \text{ y}^{-1}$ for $10 \text{ ha} < A < 200 \text{ ha}$ to $9.3 \text{ t ha}^{-1} \text{ y}^{-1}$ for $A > 100\,000 \text{ ha}$). The A-SY relationship observed for badlands is different from relationships for different types of environment. Likewise, complex relationships have been identified between the different factors (lithology, slope gradient, annual rainfall, and mean air temperature and drainage area) and the sediment yield.