Impacts of land use changes in soil erosion processes: from plot to experimental catchment scales

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Potential Vegetation

Floey et al. 2005. Science
Black dots correspond to erosion rates obtained from experimental plots, and crosses from experimental catchments.
García-Ruiz et al., 2015. Geomorphology
TO PRESENT THE MAIN FINDINGS CONCERNING
CHANGES IN SOIL EROSION AND SEDIMENT TRANSPORT PROCESSES
IN RELATION TO LAND USE AND LAND COVER VARIATIONS
AT VARIOUS SPATIAL SCALES IN THE CENTRAL SPANISH PYRENEES
At plot scale

- Agriculture activities: problem for soil
- Cropland abandonment: decrease runoff
- Pasturelands: the lowest soil erosion
At catchment scale

**SAN SALVADOR**
- Area: 0,92 km²
- Altitude: 1100-1325 m

**IZAS**
- Area: 0,33 km²
- Altitude: 2060-2280 m

**ARNÁS**
- Area: 2,84 km²
- Altitude: 900-1340 m

**AFFORESTED ARAGUÁS**
- Area: 0,12 km²
- Altitude: 900-1105 m

**ARAGUÁS**
- Area: 0,45 km²
- Altitude: 780-1105 m
IZAS CATCHMENT
Suspended sediment: 70%, Solute: 15%, Bed load: 15%

ARNÁS CATCHMENT
Suspended sediment: 39%, Solute: 6%, Bed load: 55%

SAN SALVADOR CATCHMENT
Suspended sediment: 30%, Solute: 70%

ARAGUÁS CATCHMENT
Suspended sediment: 96%, Solute: 2.5%, Bed load: 1.5%

Nadal-Romero et al., 2012. ZfG
Conclusions and remarks

1. Our studies confirm the critical importance of land cover and the history of land use in explaining total sediment output, the proportion of each type of sediment, and seasonal variability.

2. Cereal cultivation of steep slopes represents a major problem for soil conservation.

3. Cropland abandonment (i.e. Arnás catchment) resulted in a marked reduction in water and sediment yield because of rapid plant recolonization and the protective effect of dense forest and shrub cover.

4. Grazing meadows also had a low water and sediment yield, suggesting that replacement of the dense shrub cover with grazing meadows will not result in particular environmental problems.

5. The greatest mobilization of sediment was observed in the Araguás catchment, where the badland area reacted to any rainfall event and yielded enormous quantities of sediment.

6. The sizes and locations of sediment sources are also important in different land uses, in particular the occurrence of connectivity between eroded areas and the fluvial network.

7. Effective measures for soil conservation need to focus on spatial patterns of plant cover that reduce sediment connectivity.
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