

Wind and Water Erosion on Abandoned Land in High Andalusia – First Results of a Portable Wind and Rainfall Simulator

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Introduction

Wind and water erosion are the main driving factors causing soil degradation on abandoned land in semi-arid environments. Recent research has proven the existence of very complex interactions between both processes. A portable wind and rainfall simulator was constructed and used in a field study in High Andalusia to assess the influences of these interactions on soil erosion rates.

Main objective

The main objective is to get first results for comparison of erosion rates with and without the influence of wind on abandoned land in a semi-arid environment on plot scale.

Study area



Location:
Hoya de Baza
sedimentary basin

Land use:
Old fallow land

Geology:
Pliocene Marls

Soils:
Calcareous Lithosols

Climate:
Semi-arid

Vegetation:
Low shrubland
Stipa tenacissima

Acknowledgement

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Method

Portable wind and rainfall simulator



Built up wind- and rainfall simulator at Freila (Andalusia)

Specifications: plot size 2,2 m²; water discharge per nozzle (Lechler: 460,608) 60 l/h; rainfall intensity 88 - 96 mm/h; pressure ~ 0.2 bar; wind velocity Ø 7.5 m/s

Combined sediment trap



Wedge trap after Gullish-Trent Wedge Trap
NICKLING, W.G. & MCKENNA-NEUMAN, C. (1997): Wind tunnel evaluation of a wedge-shaped aeolian sediment trap. - Geomorphology, 16, p. 333-346.

Bottle sampler after Modified Wilson and Cooke Sampler
WILSON, S.J. & COOKE, R.J. (1980): Wind erosion. - In: Kirby, M. J. & Morgan, R.P.C. (ed.) Erosion, Chichester.

Runoff and sediment collection (0.5 l bottle)

Experimental setting



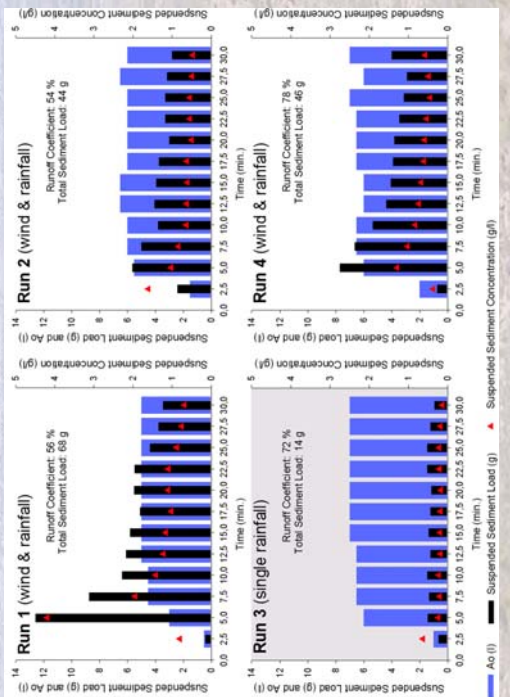
Plot characteristics:
Vegetation cover: 25%
Rock fragment cover: 50%
Position: upper hillside

Test procedure:
Test duration: 30 min/run
Measurement interval: 2.5 min

Test runs:
17/09/2008
Run 1: wind & rainfall
Run 2: wind & rainfall

18/09/2008
Run 3: single rainfall
Run 4: wind & rainfall

Results



Conclusions

- The preliminary results indicate the influence of wind on the kinetic energy of raindrops and consequently on the detachment and provision of soil particles.
- A problem with interpreting the results might be caused by the order of the test runs on one plot. Therefore, a regular order still needs to be specified (e.g. Run 1: single wind / Run 2: single rainfall / Run 3: single rainfall / Run 4: combined wind & rainfall). Further field measurements are necessary to solve this problem and to improve data quantity and quality.
- If future results confirm these results, it could be concluded that the inclusion of wind in addition to conventional rainfall simulations will assist a better understanding of soil erosion processes.