Abstract book

Final COST 634 International Conference

"On- and Off-site Environmental Impacts of Runoff and Erosion"

30th June – 4th July 2008
Aveiro, Portugal

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CESAM
Centre for Environmental and Marine Studies
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Escola Superior Agrária de Coimbra

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ORGANIZATION

Scientific Committee

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Katharina Helming (DE)

WG 1
John Boardman (UK)
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WG2
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WG3
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Special Session
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António Ferreira (PT)
J. Jacob Keizer (PT)

Organizing Committee

Celeste Coelho, Jacob Keizer, António Ferreira, Anne-Karine Boulet, Dina Calado, Maruxa Malvar, Sergio Prats, Sandra Valente.

Host Institution

CESAM – Centre for Environmental & Marine Studies
University of Aveiro
Department of Environment & Planning
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Final COST 634 International Conference

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Aveiro, Portugal, 30th June – 4th July 2008

Edited by

Celeste de Oliveira Alves Coelho

Printed and bound by

TeQ, Comércio Internacional, lda

4410-236 Canelas VNG

Portugal

"On- and Off-site Environmental Impacts of Runoff and Erosion"
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Introduction

Objectives and Scope

Runoff and soil erosion are among the major environmental threats related to agricultural and forest land uses in Europe. The main consequences of erosion are not only on-site: soil degradation, declining soil fertility, limiting infiltration capacity and water storage. Off-site impacts include eutrophication of watercourses and lakes, destruction of wildlife habitats, siltation of dams, reservoirs, rivers, and property damage by flooding (muddy floods). Runoff prevention and soil protection have beneficial effects in reducing flood risk, especially against a background of climate change.

The main aim of this final conference of the COST Action 634 (2004-2008) is to present the achievements of the action and to discuss the results of soil erosion research in the context of land management and policy formulation that encourage soil protection and reduce the on-and offsite impacts of runoff and erosion; identify and analyse the barriers for effective soil protection at all levels (scientific, political, administrative and management), develop tools and methods to support decision making in the sustainable management of erosion-sensitive areas at the farm level; develop an integrated understanding of on-and off-site impacts at the catchment scale.

Conference Focus Topics

WG1 - The challenge of implementing soil conservation
- Sustainable Land Use,
- Policy Issues,
- Attitudes towards soil conservation practices

WG2 - Sustainable Farm-Scale Management

WG3 - Sediment Sources and Sinks

Special Session - Runoff and erosion modelling, socio-economic & policy issues in areas subject to forest fires

Wednesday, 2nd of July 2008

8h30 - Field trip to Aveiro region

20h00 - Dinner

Thursday, 3rd of July 2008

9h30 - WG3 Sediment Sources and Sinks (Part 1)

11h00 - Coffee Break

11h30 - WG3 Sediment Sources and Sinks (Part 2)

13h00 - Lunch

14h30 - Special Session
Runoff and erosion modelling, socio-economic & policy issues in areas subject to forest fires (Part 1)

16h00 - Coffee Break

16h30 - Special Session
Runoff and erosion modelling, socio-economic & policy issues in areas subject to forest fires (Part 2)

18h00 - Poster session (WG3 & Special Session)

19h00 - Closure of the Conference

Friday, 4th of July 2008

9h00 - Cost Evaluation meeting

12h00 - Departure

"On- and Off-site Environmental Impacts of Runoff and Erosion"
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Content

14h00 - Special Session

Runoff and erosion modelling, socio-economic & policy issues in areas subject to forest fires (Part 1)

Moderator: ***Antonio Ferreira*** ◙ Portugal

Keynote speaker

"Post-wildfire soil erosion in pine and eucalyptus plantations of the Águeda Basin, north-central Portugal: a twenty-year perspective"
Shakesby, R.A. ◙ United Kingdom

"Post-fire erosion measurement and modelling using repeat rainfall simulations in two eucalypt stands in Portugal"
Prats, S.A.*, Malvar, M.C. , Ferreira, R.S.F., Nunes, J.P., Keizer, J.J.* ◙ Portugal

"Soil erosion modeling with rainfall simulations on burned areas"
Menci, S.*, Keizer, J., Malvar, M., Moretti, S.* ◙ Italy

"Field assessment of the impact of fire severity on soil"
Fernández, C.*, Vega, J.A., Pérez-Gorostiaga, P., Fonturbel, T., Jiménez, E.* ◙ Spain

"Contribution of rural abandonment to forest fires occurrence and its hydrological and erosional consequences. A study case in Central Portugal"
Nunes, A.*, Coelho, C.O.A.* ◙ Portugal

15h45 - Coffee Break

16h15 - Special Session

Runoff and erosion modelling, socio-economic & policy issues in areas subject to forest fires (Part 2)

Moderator: ***Rick Shakesby*** ◙ United Kingdom

Keynote speaker

"What Causes Runoff and Sediment Yields to Increase After Wildfires?"
MacDonald, L.H.*, Larsen, I.J., Brown, E., Rough, D., Welsh, M.J., Pietraszek, J.H., Libohova, Z., Schaffrath, K.* ◙ USA

"Wildfire effects on water repellency severity of pine forest soils in north-west Spain and their implications for post-fire soil erosion"
Varela, M.E.*, Rodríguez-Alleres, M., Benito, E., Keizer, J.J.* ◙ Spain

"Mitigation techniques and strategies to reduce soil and water degradation immediately after forest fires"
Prats, S.A.*, Amaral, L.P., Coelho, C.O.A., Ferreira, A.J.D, Pinheiro, A., Barragán, F., Boulet, A.-K.* ◙ Portugal

17h30 - Poster (WG3 & Special Session)

WG3

Moderator: ***Josef Krasa*** ◙ Czech Republic

"Quantitative spatial distribution of gullies in Lebanon using GIS regression-tree models"
Bou Kheir, R., Abdallah, C. ◙ Lebanon

"How can wind-driven rains influence erosion? "
de Lima, João L. M. P. ◙ Portugal

"Soil erosion survey for Saxony using the EROSION-3D simulation model"
Schindewolf, M., Schmidt, J. ◙ Germany

"Study of surface runoff and water erosion characteristics using rainfall simulator"
Jakubikova A., Schwarzova P., Dvorakova T., Dostal T., Klik A. ◙ Czech Republic

"Comparative analysis of continuous turbidity measurements and discharge based auto sampling to calculate catchment sediment load"
Eder, A., Strauss, P. ◙ Austria

"Erosion processes in the mountainous drainage basin of the torrent Lagada Grias, Lefkada island, Greece"
Verikiou – Papaspiridakou, E. ◙ Greece

"Interrill erosion in shrub areas of Montesinho Natural Park: results of a rainfall simulation field study"
de Figueiredo, T., Fonseca, F., Bompastor, A. ◙ Portugal

"Soil loss and runoff measurement under rainfall simulation in the Matlaq catchment (Rabat region, Morocco) "
Antari, M., Laouina, A. ◙ Morocco

"Identifying areas prone to rill erosion in the watershed of Lake Balaton"
Sisák, I. ◙ Hungary

"Soil erosion and sediment yields in some construction areas in Spain and its impact on rivers"
Navarro, J., Sanz, F.J., Sáiz, A. ◙ Spain

"Sediment Transport in the Czech Part of the Elbe Catchment"
Becvar M., Dostal T., Krasa J. ◙ Czech Republic

"Application of catchment scale erosion and sediment delivery model INCA-SED to four small study catchments in Finland"
Rankinen, K., Thouvenot-Korppoo, M., Butterfield, D. ◙ Finland

"On- and Off-site Environmental Impacts of Runoff and Erosion"
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Interrill erosion in shrub areas of Montesinho Natural Park: results of a rainfall simulation field study

de Figueiredo, T.[1], Fonseca, F.[1], Bompastor, A.[1]

[1] *Escola Superior Agrária de Bragança, Apartado 1172, 5301-855 Bragança, tomasfig@ipb.pt*

Abstract

Vegetation communities known as shrubs cover around one third of the 750km2 of Montesinho Natural Park (PNM), located in NE Portugal. Those communities are grouped according to the dominant species in: "estevais" (*Cistus ladanifer*), "giestais" (*Cytisus striatus*), and "urzais" (*Erica umbellata*). In spite of the different phyto-sociological significance of each one of these groups, shrubs are stable elements of PNM landscape. Due to the large areas covered and also to their spatial distribution within PNM, shrubs play an important role in hydrological processes and soil protection in such a mountainous territory.

Research leading to this presentation is part of a project designed and carried out to better know PNM shrub areas in terms of: (i) soil erosion risk; (ii) C sequestration in soil and vegetation strata; (iii) C dynamics in these systems. The presentation addresses to the first objective mentioned.

Based on the vegetation map of PNM, an experimental site was selected to conduct field work, which accommodated in a short spatial range the design requirements: single soil type; a range of slope gradients, the three main vegetation communities.

Field work comprised rainfall simulation runs with a portable spray-nozzle simulator calibrated for intensity and raindrop distribution and kinetic energy of simulated rain shower. Each run included: 30min rain over a square meter plot representing the vegetation community; runoff and washed sediment measurements in 10min steps; vegetation height and cover percentage; below and above ground vegetation biomass; organic soil horizon thickness; local average slope gradient; soil sampling down to 30cm depth; rock fragment contents. C content was determined by ignition loss in vegetation components, organic horizon and soil layers. Prior to runs soil was sampled for moisture content.

Runs, 36 in total, were carried out according to experimental design: 3 vegetation communities ("estevais", "giestais", "urzais"), 3 topographic positions (slope gradient: low, 5%; medium, 15%; high, 24%), 3 replicates. A run where vegetation and organic horizon were entirely removed was also carried out on each one of the vegetation communities at topographic positions. This allowed the assessment of potential erosional conditions.

Global runoff and soil loss results rank vegetation communities as follows: "urzais" > "giestais". Yet, "giestais" showed clearly lower runoff than the other. Average runoff, but not soil loss, "estevais" had clearly higher soil loss than the other. Average runoff, but not soil loss, increased with slope gradient. Vegetation and topographic effects on runoff and soil loss are not statistically significant. The general pattern for runoff is found in medium and high slope; vegetation communities rank differently in low slope ("urzais" > "estevais" > "giestais"); soil loss, in medium and high slope the rank is the latter one; in low slope "estevais" > "giestais" > soil and "urzais" less.

Canopy characteristics partly explain results obtained namely the size and distribution of leaves. Local factors also contribute to explain results, such as: organic horizon thickness, "estevais" and shallower in "urzais"; decreasing thickness with slope increase; soil moisture (higher in "urzais" and lower in "giestais") and estimated surface flow (higher in "giestais" and "urzais").

Soil loss and runoff measurement under rainfall simulation in the Matlaq catchment (Rabat region, Morocco).

Antari, M.[1]*, Laouina, A.[1]

[1] *University Mohammed V-Agdal, Faculty of Human Sciences, UNESCO-GN Chair, BP.1040, Rabat, Morocco, antari.mostafa@gmail.com*

Abstract

Water erosion and runoff constitute a major factor of the land degradation in the sub-humid and semi-arid Mediterranean environments. These phenomena can be at the origin of the fall of land productivity, the generation of floods, the destruction of infrastructures, the silting of dams and the pollution of water.

These processes result from the interaction of many parameters of which some, like precipitations and vegetation cover, are variable in time, and others, like those relating to the soil and topography characters are much more stable.

With a concern of taking part in the protection of the environment, the main purpose of this work is to study the land behaviours in the Matlaq catchment (Rabat region, Morocco) under simulated rain. A portable rainfall simulator was used as a tool for rain simulation at the plot scale (0,25m²) under different land uses and a constant rain (55mm/h).

The results obtained on the plot scale permitted to identify a large variability of soil behaviour in the Matlaq vis-a-vis the rain event according to their land use, their vegetation cover and their aptitude to develop a superficial crust. In the croplands, if runoff is less important in comparison to the fields in fallow and the pastures, the soil loss is, in contrary, more important and can vary from 20 to 30 times between crop and pastures. This is due to the great detachability of the materials in the croplands under the rain impact. In term of runoff volume, the runoff coefficients can exceed 50% in the abandoned fields. The transported sediments are essentially fine elements of which nearly 25% are organic residues.

These notable differences of runoff and soil loss in the plots are controlled, in a large extent, by the sealing stage development on the loamy soils. In the cropland, the crust, lately formed, regulates the runoff but it does not reduce erosion because it is not yet sufficiently consolidated to avoid being destroyed by the runoff. In the fallow and abandoned lands, the formerly consolidated crust (absence of tillage) reduces the particles detachability but increases the runoff. In the plot where remains a vegetation residue, runoff and soil loss are reduced by comparison with the bare soil because the vegetation increases the surface roughness and the friction forces which involve the deceleration and the dispersion of the runoff in favour of the infiltration.

The essential conclusion of this study shows that the crusted surfaces (fallow and bare land) and low surface roughness decrease strongly the infiltration capacity and water surface runoff. However, the crusted surfaces assure a strong cohesion of soil aggregates and limit erosion. Whereas, the tillage decrease the soil cohesion and contribute to the mobilization of particles by runoff. The ploughed lands in the catchment thus deliver most of the fine sediments whereas the fallow and bare areas provide the great part of the runoff volume.

Interrill erosion in shrub areas of Montesinho Natural Park: results of a rainfall simulation field study

Tomás de Figueiredo, Felícia Fonseca, Alice Bompastor

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