CONTENTS

DYNAMICS OF SOME SOIL PARAMETERS CAUSED BY EROSION

Introduction

The area of eroded soil in the Ukraine is some 13,000 km^2 (Dolgilevich et al. 1992). The rate of soil loss and changes in soil properties as a result of erosion need further research. The usual method of determining the rate of soil loss is to compare the thickness of the soil horizons in soils situated on the plateau and on slopes. However, this method does not allow the present rate of erosion to be determined in rapidly-eroding agricultural landscapes. Yet the latter information is vital for soil erosion monitoring and estimating the effectiveness of soil erosion control.

Materials and methods

The research area is situated in the Zhytomir region, Ukraine. The land comprises 2-9° slopes, 80 to 365 m long. Annual precipitation is 570 mm and rainstorms are the cause of the erosion. Storm rainfall can reach 72 mm with intensities of 1.4 mm/min. Data on the morphology and chemistry of the chernozem soil was obtained from soil mapping carried out between 1960 and 1970. The 1:10,000 scale soil maps show the location of the soil pits used in this survey. Data on soil parameters are documented for all the maps.

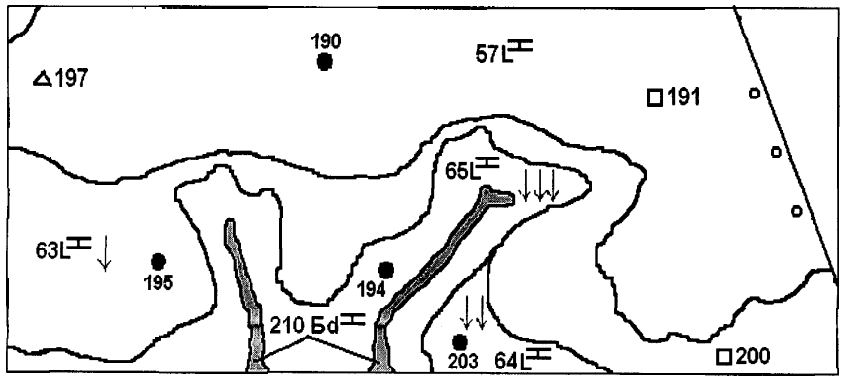
We repeated an investigation of the same properites of the eroded loamy chernozem soils between 1997 and 1999. Using the soil maps, we made new soil pits in the same places as those of the original survey. At every new pit, we made four additional pits using the envelop sampling method shown in Figure 1. Altogether, 225 soil pits from the 1960-1970 survey were resampled and data were obtained from an additional 1,275 soil pits. The morphology of the soil was investigated and samples taken for chemical analysis. As in the 1960-1970 survey, humus content was determined by wet combustion using potassium bichromate (Arinushkina 1962). The cation exchange capacity was determined by the Kappen method (Arinushkina 1962) and the granulometric composition by the Kachinsky method (Kachinsky 1965).

Results and discussion

It was found that the morphology and chemical properties of the eroded chernozem have changed over the 29-37 year period (Table 1). Compared to the 1960-1970 survey, the depth of the slightly, moderately and severely eroded soils has decreased by 0.8, 3.8 and 4.7 mm/y respectively under arable crop rotation. With soil-protecting crops, the loss on the moderately and severely eroded soils was 2.0-2.1 mm/y. For both cropping systems, the annual soil loss amounted to 10-61 t/ha. These values should be considered as the mean annual erosion rate. These rates are much higher than the tolerable level of 3 t ha^{-1} y^{-1} (Arinushkina 1962; Dolgilevich et al. 1992). At the same time, there was scarcely any soil loss on the moderately and severely eroded slopes under grass.

The soils on the plateau are not being destroyed by water erosion. On the contrary, the soil increases in depth by 0.1 mm every year (Table 1). Chernozem soils in the same

condition are expected to increase in depth by 0.1-0.5 mm every year. These results indicate that neither arable crop rotation nor soil-protecting crops create the conditions for optimum soil development. Only the growing of grass provides appropriate soil conditions.



Soil series

57L — Modal chernozem non eroded

63L↓ — Modal chernozem slightly eroded

64L↓↓ — Modal chernozem moderately eroded

65L↓↓↓ — Modal chernozem severely eroded

210 Бd — Drift meadow gley soil

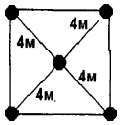
The soil pits made in 1960 -1970

●190 — the main soil pit

□191 — subsidiary soil pit

△197 — half soil pit

The scheme of soil sampling near the pits in 1997 - 1999



The method of envelope

Figure 1. Extract of soil map showing system used for sampling

Table 1. Morphological characteristics of a typical chernozem (n = 1500)

	Soil depth (cm)		Change after 29-37 (33) years (cm)
	1960-1970	1997-2000	
Arable crop rotation			
Non-eroded soil	114.4 ± 1.8	114.7 ± 2.0	+ 0.3
Slightly-eroded soil	105.6 ± 1.4	102.8 ± 1.3	– 2.8
Moderately-eroded soil	84.8 ± 1.5	72.1 ± 1.8	– 12.7
Severely-eroded soil	46.7 ± 1.7	31.2 ± 1.2	– 15.5
Soil-protecting crops			
Moderately-eroded soil	81.6 ± 1.3	75.1 ± 1.6	– 6.5
Severely-eroded soil	45.3 ± 1.5	38.2 ± 1.2	– 7.1
Grassed slopes			
Moderately-eroded soil	74.4 ± 1.3	74.7 ± 1.5	+ 0.3
Severely-eroded soil	39.1 ± 1.4	39.7 ± 1.1	+ 0.6

Table 2. Dynamics of humus content in the organic topsoil layer of eroded chernozem soils

	Humus content (%)		Change after 29-37 (33) years
	1960-1970	1997-1999	
Arable crop rotation			
Non-eroded soil	3.20 ± 0.18	2.88 ± 0.19	– 0.32
Slightly-eroded soil	3.17 ± 0.23	2.52 ± 0.28	– 0.65
Moderately-eroded soil	2.90 ± 0.27	2.02 ± 0.12	– 0.88
Severely-eroded soil	2.20 ± 0.32	1.38 ± 0.13	– 0.82
Soil-protecting crops			
Moderately-eroded soil	2.66 ± 0.19	2.20 ± 0.27	– 0.46
Severely-eroded soil	2.21 ± 0.28	1.67 ± 0.24	– 0.54
Grassed slopes			
Moderately-eroded soil	2.19 ± 0.12	2.33 ± 0.10	+ 0.14
Severely-eroded soil	1.79 ± 0.13	1.87 ± 0.07	+ 0.08

As shown in Table 2, the humus content of the organic topsoil layer decreased by 0.46 to 0.88 per cent over the 33-year period. The humus loss was greater on the land under arable crops than on land under soil-protecting crops. On the grassed slopes, the humus content increased by 0.08 to 0.14 per cent. Over the same period, due to

erosion the chernozem soils lost 2.4 per cent of their clay particles and the cation exchange capacity decreased from 28.6 to 21.0 per cent.

Summary

Using chernozem soils for agriculture over a period of 33 years has affected some of the soil parameters. The plateau soils did not show any features of destruction and new soil formed at a rate of 0.1 mm/y. At the same time, soils on slopes lost between 0.8 and 4.7 mm of soil depth. Due to erosion, the clay content, humus content and cation exchange capacity decreased by 2.4, 0.88 and 7.6 per cent respectively. Soil-protecting crops did not prevent the erosion process. Only grassed slopes provided an adequate level of soil protection with a rate of soil formation of 0.1-0.2 mm/y.

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INCREASE IN SOIL EROSION RISK IN THE SOUTH UKRAINE: THE RESULT OF CLIMATE CHANGE

Present-day transformation of the global carbon cycle is important for every component of natural and anthropogenic landscapes. One of consequences of this phenomenon is an augmentation of atmospheric CO_2 content which causes an increase in the radiation-thermal potential in the temperate and cold zones of the Earth. This process results in the reorganization of atmospheric circulation and repartition of precipitation as well. A stable warming of climate and modification of annual precipitation in Ukraine for the last 20-25 years is proven by empirical observation (Boychenko et al. 2000).

Using a method of sixth-level polynomial approximations of data rows and the linear function we have completed graphical analysis of the average annual precipitation rates for 22 Weather Stations located in the continental part of Ukraine and the Crimea Peninsula (Fig. 1). For the last 25 years (1975-1999) precipitation has increased by 30-35 mm in comparison with the preceding quarter century. Sometimes precipitation increased by even more. For example, for the Weather Station at Kherson the average long-term precipitation was 380.1 mm between 1950 and 1974 and 455.3 mm between 1975 and 1999; for the same dates, the respective values at Velika Olexandrivka were 419.6 mm and 483.1 mm and at Bashtanka were 429.9 mm and 467.8 mm. Based on data for different Weather Stations, the variability of precipitation has also increased over the last 25 years. In some cases the coefficients of variation have increased almost twice.

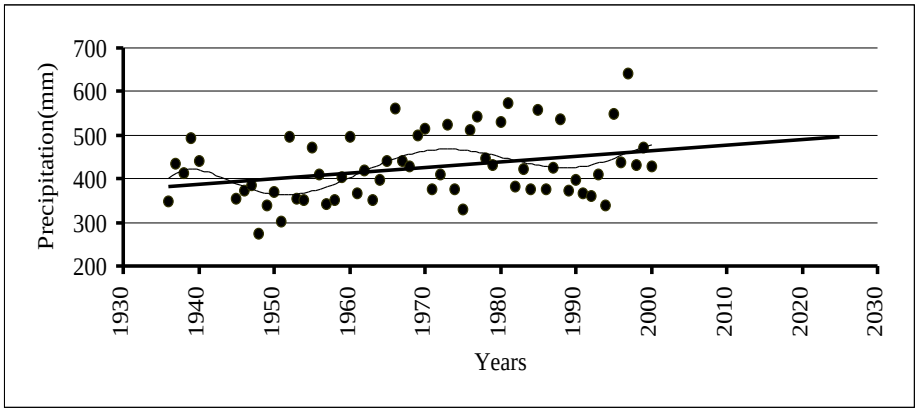

Figure 1. The dynamics of annual precipitation in the South Ukraine

The evolution of regional climate towards higher precipitation has positive consequences for the droughty steppe area. It will partially compensate the processes of desertification which contributed to a great extent to the economic dislocation in the 1990s. That decade saw the destruction of the cropping systems, the diminution of the irrigated area and the neglect of forest amelioration. However the growth of precipitation in the South Ukraine has a negative effect too. It leads to an intensification of soil erosion.

In the South Ukraine soil erosion is due mainly to heavy shower activity, particularly in winter when it is the cause of frequent thaws which prevent the formation of a stable blanket of snow. The most intense soil erosion occurs in the area between Dnipr and Dnistr rivers, the foothills of the Crimean Mountains and the Priazovskaya Hills. In these regions, eroded soils occupy more than 60 per cent of the agricultural land.

The influence of future increases in precipitation on soil erosion process can be precisely described by means of a mathematical model of water erosion. The optimal solution to describe the processes of rain erosion in the South Ukraine environment is "the logic-mathematical model of surface erosion" by Shvebs (1974). According to that model, the hydrometeorological index depends on soil moisture at the time of start of the rain, precipitation intensity and precipitation duration. The general form of the hydrometeorological index is (Shvebs et al. 1992):

$$K_{gm} = \sum_{j=1}^{n} \left(1 + 17.5 i_j\right)\left(i_j - i_{zmj}\right)^{2.7} \cdot \Delta t_j + \sum_{g=1}^{m} \left(1 + 17.5 i_g\right)\left(i_g - i_{zmg}\right)^{2.7} \cdot \Delta t_g \cdot \lambda \quad (1)$$

where K_{gm} = the hydrometeorological index of surface soil erosion by rain; i_j = the precipitation intensity in time interval, Δt_j; i_{zmj} = the intensity required for surface washing in time interval, Δt_j; j = the numbers of time intervals, $i > i_{zm}$; g = the quantity of soil moisture at the first interval time, $i < i_{zm}$ (they have periods of Δt_g), and λ = the index of diminution in the ability to transport sediment during recession flow. Values K_{gm} are calculated using pluviographs of individual storms. The long-term simple mean index and indices with probabilities of occurrence of 1%, 5%, 10% and 20% index are the parameters that are usually calculated.

Figure 2 shows the relationship between the annual hydrometeorological indexes, calculated with the initial soil moisture at 80 per cent of field capacity and annual rainfall. The graph reveals that the hydrometeorological index of erosion increases exponentially with the increase of annual precipitation (P), in other words an increasing proportion of the precipitation is made up of erosive rains. The following equation describes the relationship:

$$K_{gm} \approx 0.02\, e^{0.01P}$$

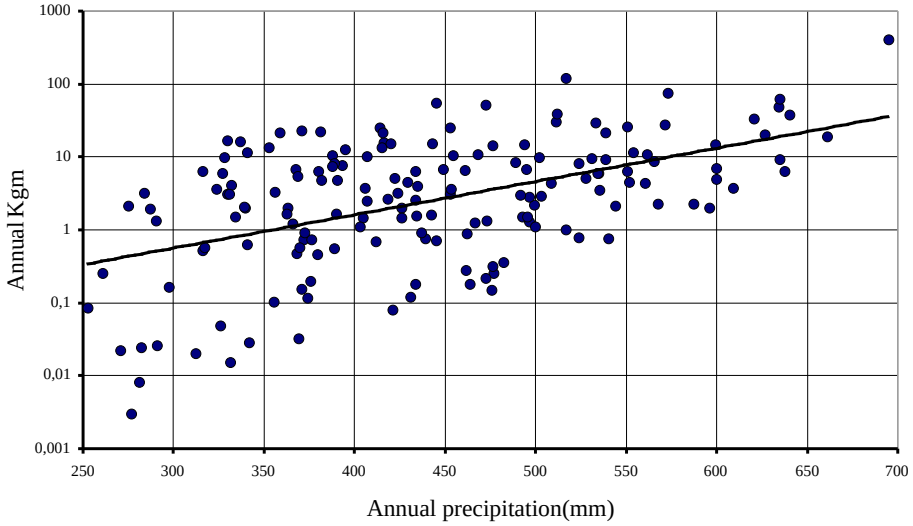

Figure 2. Relationship annual hydrometeorological indexes and annual precipitation.

Based on Figure 1, in years 2020-2030, the annual precipitation will be some 30-40 mm higher than today which will increase storm erosion risk by 40-60 per cent compared with the last quarter of the 20th century. Therefore climatic change will increase erosion risk in the near future in South Ukraine.

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LAND USE, EROSION AND CARBON SEQUESTRATION: AN ABSTRACT OF THE MONTPELLIER COLLOQUIUM, 23rd - 28th SEPTEMBER 2002

The problem

With the fast growth of population this century, the extension of cities and the intensification of cropping, soil degradation, flood frequency and erosion problems are extending to areas not yet degraded. Remember the catastrophic floods of the last three years in Europe and the Maghreb. Till now mechanical methods have been used to drain runoff waters from the fields into channels and then into natural waterways with a minimum of ground losses. But the mechanical approach, as well as being very expensive, was not able to reduce soil degradation and erosion on land between the soil and water conservation structures. The latter may even increase peak river flows during storms.

The central objective of the colloquium was to demonstrate the effects of biomass management not only on the reduction of erosion/runoff risks but also its positive influence on soil organic matter sequestration, soil erodibility, soil fertility and the reduced emission of greenhouse gases with associated impact on global climate warming. A specific theme was how land husbandry may reduce carbon transfer by erosion from the hillslopes to the rivers and oceans with acceleration of carbon mineralisation or C sequestration in colluvium, alluvium and sea sedimentation.

Practical organisation

The colloquium was organized by a team of researchers from the « French Erosion Network » and the laboratory MOST (Organic Matters of Tropical Soils) : a cooperation of IRD-ex-ORSTOM (Institut de Recherche pour le Développement) with CIRAD (Centre International de Recherche Agronomique pour le Développement) of Montpellier, France. The scientific committee included personalities from French research institutes (IRD, CIRAD, CNRS, INRA), Universities (Grenoble, Strasbourg, Paris, Lleida (Spain), Ohio (USA), CENA from São Paulo (Brazil)), Soil and Water Associations (Réseau Erosion, ESSC, WASWC). We thank the founding organisations like IRD, CIRAD, CNRS of Toulouse, CTA of Wageningen, EU Cost 623 Program, French Ministries of Environment, Culture and Foreign Affairs, and the General Council of Hérault region for giving us the possibility of inviting 24 participants from Africa and America.

From 23rd to 28th September 2002, 123 researchers from 5 continents and various disciplines presented 98 communications and posters in the Agropolis International Campus of Montpellier. The communications presented very rare data from tropical, mediterranean and temperate regions. A book of 130 extended abstracts is available. Proceedings will be published in 2003 in the « Bulletins du Réseau Erosion N° 22 & 23 » and in various English Scientific Journals. A mid-conference tour was organised in the Banyuls - an area of very old and famous vineyards in the piedmont of Pyrenees

mountains - to appreciate the evolution of traditional and modern management systems of runoff management on steep schist hillslopes susceptible to gullying and mass movements and also to taste the quality of wines famous from the Phœnician times some 2000 years ago.

In the meeting, scientists from various disciplines working at various scales from aggregates to fields, rivers and oceans had the opportunity to explain their data. Those from the human sciences also had their word about the influence of the societies on the evolution of the environment and the planetary equilibrium.

The colloquium content

The two symposia succeeded in gathering as much data as possible on the 'win-win' action of biological techniques to fight environmental risks (erosion, floods, gas emission) and to restore or improve the soil fertility (OC storage, nitrogen, phosphorus and oligo-elements regulation, aggregate stability, infiltration rate and erodibility improvement).

Symposium 1 : Influence of erosion on soil carbon sequestration from the hillside to the ocean.

1. Erosion effect on carbon sequestration at the plot scale

Many data were presented on the importance of carbon losses by various erosion processes, selective and aselective, at the plot scale in tropical and mediterranean areas. Compared with biomass production (1 to 20 t ha^{-1} y^{-1}), losses of particulate organic C (POC) by erosion are limited, 1 to 50 kg ha^{-1} y^{-1} in stabilised environments (forest, prairie, mulch, cover crops etc), but 50 to 600 kg ha^{-1} y^{-1} under annual weeded crops. Losses of soluble organic carbon (SOC) by runoff and leaching are increasing from 1 to 600 kgC ha^{-1} y^{-1} with the drainage volume in areas ranging from the Sahel to the moist evergreen forest. Sheet erosion only is really selective for C with enrichment ratios generally ranging from 1.2 to 3 and a maximum of 10.

As a first approximation, POC losses depend on erosion volume and the C content of the top ten centimetres of soil. Losses of C by erosion and drainage are at a similar level to the potential of C sequestration in the soils (0.2 to 2.5 t ha^{-1} y^{-1}). Consequently, the biological approach to combatting erosion, covering better the soil so as to reduce runoff and erosion, will bring more C into the topsoil. This double win effect of land husbandry is larger when restoring clay soils. This C sink must be evaluated for the potential of obtaining funds from pollution industry.

2. Erosion effect on carbon sequestration at the hillslope scale

On hillslopes, fluxes and stocks of C vary in relation to erosion processes, slope forms, soil roughness and the density of vegetative cover on the soil surface. Tillage erosion is often higher than sheet erosion on cropped areas, with abundant colluvium at the bottom of the hillside and embankments at field boundaries.

Grazing compacts the topsoil, producing much runoff and incision of gullies. Animals destroy the biomass on large grazing lands and concentrate fertility on the parking areas and on the fields near settlements (home fields are richer than fields far away). In particular, C decreases when the distance of livestock movement increases on the hillsides and the POC ratio decreases also during the flood peak because the runoff erodes more deeply in the soil profile which is poorer in carbon.

3. Erosion effect on carbon sequestration in relation to rivers

Hydrologists and sedimentologists have shown with various markers that the importance of C fluxes in rivers varies in relation to season, the amount of C eroded or drained, C dissolved by weathering of carbonate or silicate rocks (these alone are able to fix carbon) and the development of phytoplankton. In a clayey-calcareous area of Tunisia, most of the organic matter sequestered in sediments of two hillside reservoirs originated from vegetation and soils in the contributing watershed.

On a small reservoir in Venezuela, on very steep schist and sandstone slopes, C losses by erosion are 1.6 kg ha^{-1} y^{-1} as an average over 37 years. The higher the flood peak, the lower is the C content because the river has cut down to the underlying rock. In Niger, the SOC is weak (1 to 2 mg l^{-1} y^{-1} but double the content of POC (0.6 –0.8 mg l^{-1} y^{-1}). In large river basins, most of the SOC originates from drainage waters and from weathering of carbonate and silicate rocks.

Organic carbon coming from the soil humus is rapidly used for microfauna development in the river (eutrophication).

The biggest store of carbon in the world is in the ocean sediments (40 000 Gt of organic C) and the flux of the continents C (1.2 GtC) is relatively modest. Other C sinks (C in soils = 1500 GtC, and trees and vegetation = 650 GtC) are degraded by mineralization following human activities like deforestation, burning of crop residues, deep tillage and grazing.

Symposium 2 : Influence of biological land husbandry on carbon sequestration and erosion

Once the carbon fluxes on the soils and in the rivers have been estimated, it is important to show the ‘double win’ of land husbandry to sequester C in soils, to restore vegetation and soil fertility and to protect C against losses by runoff, erosion , drainage and mineralization.

4. Role of forests in storing C

It is already known that forests can store a lot of C in the wood and in the soil - up to 100 t/ha in 30 cm of topsoil. It was demonstrated in the Rif mountains of Morocco that intensive grazing destroys the vegetation and produces a loss of 26% of the soil C stock, but burning the matorral and cropping cereals produces a loss of 46 % of the C

stock in the topsoil. Hopefully, reforestation with quick growing tree species (like *Pinus halepensis* or *Eucalyptus camaldulensis*) can rebuild about 93% of the initial C stock in 40 years. But this radical solution will never satisfy the rural population who will lose the land for grazing. Agroforestry (olives and other fruit trees with cereals and leguminous rotation) is potentially interesting for environmental protection. It can rebuild 71% of the primitive C stock, increase the net income of the population and allow « run-on agriculture » on the hillslopes, giving localised areas of intensive production.

The influence of bush fires is complex. They accelerate mineralization of the biomass, but produce charcoal which is more resistant to mineralization than humic acids in the soil. The impact of fire on runoff and erosion is very temporary: it improves the regeneration of certain species which cover and very rapidly protect the denuded topsoil.

5. Influence of breeding and overgrazing on erosion and SOC

Animals consume 50 to 60% of biomass but give back 40% as faeces. The management of these residues which are richer in nutrients than plants allows organic fertility to be concentrated in the intensive cropping areas. For centuries it was the only source of soil amendments. Complementary studies seem necessary about the influence of the type of breeding and also leguminous cropping on greenhouse gas emission (CO_2 but chiefly N_2O and, much more dangerous, methane), runoff and gully development along paths used by the animals for access to watering points. The positive role of leguminous short fallows was well illustrated by many researchers, but its introduction in Africa needs a deep change of habits concerning bush fires and grazing crop residues. Anyway, assimilable phosphorus is needed for the programmes of soil and water conservation to have value. Organic manure and compost increase the grain production but leave very little SOC in the soil after the cropping season.

6. Studies concerning cultural practices

No-tillage under residue mulch in Latin America (Brazil, Argentina, Mexico) and Africa (Cameroun, Mali, Morocco) gives a good demonstration of the double positive impact of this strategy on erosion risks and on C sequestration in soils (0.5 to 2.5 t C ha^{-1} y^{-1}). Although the trial duration is still too limited, one can confirm environmental benefits (less erosion and more carbon stored in the soil) and economic benefits (less gazoline, labour and machinery but more herbicides/pesticides). Data are missing in semi-arid areas. To avoid the effect whereby decreasing erosion losses are offset by an increase in leaching, evapotranspiration must be increased by agroforestry, intensification of cropping with reasonable fertilisation, high plant density, crop residues and weed management on the topsoil and use of cover crops. Residues on the topsoil will dissipate the rainfall amd runoff energy much better than if they are buried and their mineralization will be reduced. In the same way, taking the stones off the field can increase the topsoil surface that can be used for grain sowing, but at the same time the soil is denuded and more exposed to rain and runoff energy. An arrangement could be to collect big stones to construct stone lines, but leave the smaller pebbles on

the soil surface to make a stone mulch which can be very efficient in limiting erosion.

7. Influence of antierosive techniques on soil carbon sequestration

Where large-scale terracing has failed, biological approaches (live hedges, agroforestry, leguminous short fallows, crop residues and weed management on the soil surface) can be hugely efficient in reducing runoff and erosion in humid areas. But at the same time, the management of the topsoil surface and reasonable fertilization is necessary to improve the soil productivity and labour efficiency.

Conclusion

The management of biomass, nutrients and physical soil properties by land husbandry may provide acceptable solutions to meeting the double challenge of feeding an increasing population and reducing the environmental risks. The carbon sequestered in soil aggregates has certainly an economic value. We may imagine that the biologically-based soil and water management could be financed by those industries that produce greenhouse gases.

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Editor's Note:

The abstracts of the symposium are available as « Land use, Erosion & Carbon Sequestration » abstracts of the Montpellier colloquium 23 28 September 2002 , 130 pp. IRD-Cirad, Montpellier, France.

Please contact Eric Roose, IRD Montpellier, if you wish to have a copy.

SOIL CONSERVATION IN A CHANGING EUROPE

EUROPEAN SOCIETY FOR SOIL CONSERVATION
FOURTH INTERNATIONAL CONGRESS
BUDAPEST
25-28 MAY 2004

FIRST ANNOUNCEMENT

Objectives
Europe is changing. The European Union will be extended with new members in 2004, i.e. exactly when the 4th ESSC Congress will take place.

- What are the main objectives, methods and problems of soil conservation in the present EU States?
- How is the situation in the countries which are going to join the EU in 2004? How is it in other European countries?
- Is there a way to harmonize soil conservation measures in Europe including EU countries, future EU countries and other countries?

Year 2004 is the beginning of a new era. Countries who have never dreamed of EU membership a few decades ago are now entering the community. Agriculture is one of the most delicate issues of the extended EU. Agricultural activity is being practised on soils. How can soil fertility be preserved, soil erosion and other degradation processes be controlled, reduced or avoided?

Bearing all these burning problems in mind, the 4th Congress of the ESSC has the following objectives:

- to bring European and overseas scientists together to discuss European and world-wide problems of soil degradation and soil conservation;
- to present research results in the field of soil conservation in “old” and “new” EU countries;
- to discuss the applicability of new scientific findings in the practice of soil conservation.

Location: The Hungarian Academy of Sciences, Roosevelt tér 9, H-1051 Budapest, Hungary

Main topics:

Land use and land cover change
One of the most important issues of global environmental change is landuse and land cover change. Alterations in the earth's surface hold major implications for the global radiation balance and energy fluxes, contribute to changes in biogeochemical cycles, alter hydrological cycles, and influence ecological balances and complexity. Through these environmental impacts at local, regional and global levels, landuse and land cover changes driven by human activity have the potential to affect significantly sustainable agriculture in the world.

Soil erosion measurements at different scales
Estimates of erosion are essential to issues of land and water management, including sediment transport and storage in lowlands, reservoirs, estuaries, and irrigation and hydropower systems. Field and laboratory measurements carried out at different scales help us to obtain runoff and soil loss data.

Modelling of soil erosion
Modelling is a very powerful tool to estimate rates of soil erosion. Erosion-prediction equations have been developed during the last decades. Among these algorithms are the Universal Soil Loss Equation (and its recent update the Revised Universal Soil Loss Equation), the Water Erosion Predict ion Project model, and the European Soil Erosion Model.

Tillage erosion
Tillage erosion, the progressive downslope movement of soil through the action of tillage, is an import problem that needs to be addressed with in conservation management. The concept that tillage erosion is a serious problem has only recently been recognized. Recent research has established the importance of tillage erosion in both mechanised and more simple agricultural environments. In topographically complex areas, tillage erosion rates are equal to or exceed water erosion rates.

Wind erosion
Wind erosion occurring mostly in flat, dry areas and moist sandy soils along bodies of water, removes soil and natural vegetation, and causes soil loss, dryness and deterioration of soil structure, nutrient and productivity losses, air pollution, and sediment transport and deposition. Surface texture is the most important factor of wind erosion potential. It is a serious environmental problem damaging land and natural vegetation by removing soil from one place and depositing it in another.

Land degradation and desertification
Land degradation can be defined as a reduction in the soil's producing capacity. Desertification, defined as land degradation in arid, semiarid and subhumid areas, occurs in more than one third of the earth's land surface in over 110 countries.

Degradation caused by overcultivation, overgrazing, deforestation and inefficient irrigation affects an estimated 20%of the world's drylands, an area as large as China. Land degradation and desertification are important problems in the developed world, i.e. in Europe, too.

Soil conservation and water management

The soil water regime is of crucial importance for plant production. Water surplus and the lack of water can cause big environmental problems including flooding and drought. Good soil and water conservation strategies are needed to handle these problem.

Legislation issues of soil conservation, harmonization of soil conservation policy in the EU

Soil conservation is always connected with legal issues. Because of the EU extension legal aspects and the harmonization of the EU soil conservation policy are very important issues.

Socio-economic aspects of soil degradation

Soil degradation is associated with a wide range of human activities, natural processes, and the wider economic, political and social aspects of their setting. The chemical and physical deterioration of soils severely compromises agricultural productivity and the incomes of some of the poorest members of the global society.

Soil pollution

Major causes of soil contamination include illegal dumping of waste and leakage of wastewater from factories and business facilities. A characteristic of soil pollution is depositing of hazardous chemicals. When toxic substances in soil dissolve to contaminate water or air or when polluted soil is exposed to human skin, human health may be affected. Soil pollution is closely related to groundwater pollution. Once either is contaminated, remediation takes a long time and requires appropriate remediation measures.

Call for papers

All interested persons are invited to give oral or poster presentations on any of the above themes. For submission of presentations it will be required that at least one of the authors is registered at the Congress.

Abstracts should be limited to two A4 pages, written in Times New Roman (TNR) 12, 1.5 spacing with margins of 2.5 cm. The heading to be adjusted left as follows: *Title* in TNR 14, bold; Blank line; *Author(s) name(s)* in TNR 12, Normal, including telephone and fax numbers and e-mail of the first author; Two blank lines before text.

All abstracts received by 15 December 2003 and accepted by the Scientific Committee, will be included in a Volume of Abstracts.

Special issues of refereed journals (to be decided later) will be associated with the conference, with submission of the manuscripts, either at the meeting or one month after, with selection and peer-review of papers thereafter.

Conference language: English

Mid-conference field trip: All day visit to Lake Balaton Catchment

Post-conference tour: Soil conservation problems on the Great Hungarian Plain (2 days)

Programmes for accompanying persons:

Sightseeing in Budapest
Parliament
The Danube panorama
Hebrew Budapest
Vörös Csillag Tour
Szentendre (city of artists)
Royal Tour: Gödöll
Budapest by night (dinner with folkore programme)
Danube Tour (Visegrád, Esztergom)
Lake Balaton and Herend
Puszta Tour

Contact: Prof Dr Ádám Kertész, Geographical Research Institute, Hungarian Academy of Sciences, H-1112 Budapest, Budaörsi út 45, Hungary
tel/fax: + 36 - 1 - 309 - 2686
e-mail: kertesza@helka.iif.hu

Further details of prices will be available soon in the First Circular

NEW PUBLICATIONS

Lozet J. et Mathieu C. **Dictionnaire de Science du Sol**, 575 pages, Collection Tec et Doc, éditeur Lavoisier, Paris, 85 euros.

La 4e édition du Dictionnaire de Science du Sol a pour objectif une large diffusion du langage mis à jour de la Science du Sol et devient ainsi le référentiel actualisé du langage pédologique.

Cet ouvrage présente plus de 4000 termes spécifiques à toutes les disciplines traitant du fonctionnement, de l'amélioration et de la gestion des sols, de l'analyse des paysages, de la fertilisation et de la classification des sols. Cette 4e édition intègre le nouveau vocabulaire et la nouvelle classification internationale « Base de Référence Mondiale pour les ressources en sols » connue en anglais sous le sigle WRB. Elle comporte aussi plus de 600 mots nouveaux par rapport à l'édition précédente et de nombreux mots ont été actualisés. Cette édition a été également enrichie par de nombreuses illustrations, photographies,, schémas, figures et tableaux qui agrémentent la présentation de ce travail rigoureux et en facilitent la compréhension.

Un chapitre particulier est consacré à la biographie des personnages illustres de la Science du Sol. Les annexes rappellent d'une part les principes d'élaboration des principaux systèmes de classification ou taxonomie (référentiel pédologique français, classification française, allemande, russe, de la FAO, Soil Taxonomy et classification internationale « WRB »), d'autre part, les distinctions permettant l'appellation des horizons.

Cet ouvrage tient compte de toutes les zones climatiques aussi bien tempérées que méditerranéennes, arides ou tropicales. L'index avec la traduction systématique des mots en anglais constitue un véritable dictionnaire anglais-français de Science du Sol.

NEW PhD THESES

Spatio-temporal dynamics and hydrogeomorphic implications of soil water repellency within *Eucalyptus* forests in north-central Portugal

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This thesis investigates spatio-temporal variations in soil water repellency and their hydrogeomorphic effects within eucalyptus plantations in north-central Portugal. Rainfall simulation with and without wetting agents was used to quantify the effects of repellency on overland flow, slopewash, splash detachment and wetting patterns at the small-plot scale on long-unburnt and recently burnt terrain. Monitoring over 16-months (>9000 paired repellency and soil moisture measurements) was carried out at four different sites at meso- (2 m) and micro-scales (10 cm) to establish spatio-temporal repellency patterns.

Repellency increased overland flow generation 16-fold on unburnt terrain at the small-plot scale. Responses on burnt terrain were similarly enhanced with a mean overland flow coefficient of 70% being recorded. Where present, eucalyptus litter layer greatly reduced overland flow and erosion by providing considerable moisture storage and protection. Repellency extent varied seasonally, being widespread following prolonged dry periods and minimal following prolonged wet periods. At its maximum, it was spatially contiguous under 10-year-old eucalyptus stands, but discontinuous under younger stands (≤5 years). Discontinuously repellent terrain included wettable soil columns dispersed over the slope area. Regardless of season or extent of repellency, where repellency was recorded it was mainly of extreme severity (⩾36% Ethanol).

Repellency begins to break down following >50 mm but ≤140 mm rainfall and may become re-established (from minimal extent to contiguous surface repellency) after ≤22 days of generally dry weather. Where soils were contiguously repellent following long dry periods, these soils were wettable at moisture contents ⩾27% by volume and repellent at ≤14%. Between these thresholds soils could be wettable or repellent.

Implications of the spatio-temporal repellency patterns found for slope and catchment hydrogeomorphic responses are explored. Critically, repellency is most likely to enhance responses where it is contiguous or-near contiguous and storms are intense, and sufficient in size to exceed the litter storage capacity. Responses are likely to be limited to the first storms where they are of considerable size and intensity following a prolonged dry period, after which repellency begins to break down. On partially repellent slopes, the well-dispersed and vertically connected wettable soil areas provide sinks for locally generated overland flow and hence reduce the hydrogeomorphic effects of even extreme severity.

FORTHCOMING MEETINGS

15-17 October 2003
Ravinement en montagne: processus, mesures, modélisation, régionalisation
Digne, Alpes-de-Haute-Provence, France

L'unité de recherche « Erosion torrentielle: neige et avalanches (ETNA) » du Cemagref de Grenoble et le Groupement d'intérêt scientifique (GIS) « Draix, étude de l'érosion en montagne » organisent du 15 au 17 Octobre 2003 à Digne, dans les Alpes du Sud de la France, à proximité du site expérimental de Draix, une conférence sur le thème du ravinement en montagne. Cette conférence, à vocation nationale et internationale, a pour objectifs de confronter les recherches sur l'érosion hydrique dans les bassins versants de montagne, de favoriser les échanges entre chercheurs et d'amorcer des collaborations, en particulier entre les équipes réalisant des mesures dans des bassins versants de recherche. Une excursion scientifique d'une journée dans les bassins versants expérimentaux de Draix permettra de visiter les sites d'étude des équipes intervenant sur ces bassins et de confronter les expériences acquises par les chercheurs des différents pays dans ce domaine.

Les principaux thèmes abordés seront : métrologie; processus; vitesses d'érosion; facteurs de l'érosion; rôle de la végétation; modélisation; effets d'échelle temporelle et spatiale; régionalisation; aspects historiques du ravinement. Une attention particulière sera portée aux études visant à mieux intégrer les travaux de terrain et les approches de modélisation, notamment l'assimilation des données expérimentales dans les modèles.

Langue : Les langues utilisées seront le français et l'anglais.

Appel à communication : Les auteurs désirant présenter une communication orale ou un poster sont invités à adresser au comité d'organisation un résumé d'une page maximum, en Français ou en Anglais avant le **15 avril 2003**.

L'avis du comité scientifique sera notifié aux auteurs avant le **20 juin 2003**. Les auteurs seront invités à fournir un résumé étendu (2 à 4 pages) pour le **15 septembre 2003**. Le recueil de ces résumés étendus sera imprimé dans les Actes de la Conférence et distribué au début de la conférence. A défaut d'envoi de résumé étendu, le résumé d'une page sera imprimé dans le recueil de communications.

Les communications pourront être soumises pour la parution dans une revue scientifique à comité de lecture (numéro spécial). Le titre de la revue sera précisé dans la deuxième circulaire. Les auteurs devront adresser leur manuscrit avant le **15 décembre 2003**.

Calendrier :

15/4/2003 -	Pré-inscription et envoi de résumés
20/6/2003	Notification de l'acceptation des présentations orales et/ou posters
15/9/2003	Date limite d'envoi des résumés étendus pour insertion dans les actes du séminaire
15-17/10/2003	Conférence à Digne (visite de terrain le 16 octobre)
18-19/10/2003	Excursion sur des sites intéressants du point de vue de l'érosion dans les Alpes
15/12/2003	Date limite d'envoi des articles pour publication dans une revue scientifique

La seconde circulaire (15 mai 2003) précisera l'organisation du colloque et le montant des frais d'inscription (€200 à 250, comprenant Actes du séminaire, pause-café, repas de midi, visite de terrain et dîner du séminaire – tarif réduit €120 à 160 pour les étudiants et doctorants). Si le nombre de participants est suffisant (minimum 20), une excursion post conférence de deux jours sera organisée dans les Alpes du Sud, sur différents sites intéressants du point de vue de l'érosion (Coût prévisonnel de l'excursion, transport, hébergement et nourriture, environ €200-300).

Contact :

e-mail : digne-2003@cemagref.fr

martine.girier@cemagref.fr or nicolle.mathys@cemagref.fr

Ces informations sont disponibles sur le site du Cemagref (also includes English-language version):

http://www.cemagref.fr/Informations/Actualites/colloque/Draix/index.htm

17-19 November 2003

GCTE Soil Erosion Network: Soil erosion under climate change: rates, implications, and feedbacks

Tucson, Arizona, USA

The theme of this GCTE-SEN meeting is climate change and soil erosion. This includes considerations of rates, processes, impacts, and feedbacks within the context of an interdependent hydrologic system. Both the impacts of climate change on erosion and its feedback to the climate may be addressed, and both wind- and water-induced erosion will be considered. All scientific issues related to the topic are encouraged.

A specific theme of the meeting is evaluation of erosion models for global change studies. To quantify the impacts of future climate change and major land use change upon erosion, we need to identify the most appropriate tools. This is being addressed in the third stage of the GCTE-SEN comparison of erosion models. The models will be

run using common datasets which include a number of scenarios for future climate and land use. Participants are encouraged to contact the meeting organizers to learn more about participating in the model comparison exercise.

The program will include two days of meetings and a day touring the Walnut Gulch Experimental Watershed in Tombstone, AZ.

Deadlines: Abstracts (1 page) by 31 July 2003.
Send to: mnearing@tucson.ars.ag.gov

or mail to: Dr Mark Nearing, GCTE Meeting 2003,
2000 East Allen Road, Tucson, AZ 85719 USA

Abstracts will be e-mailed to participants prior to the meeting

Accommodation:
We have arranged a block of rooms for 16-23 November 2003 at The Windmill Inn, 4250 North Campbell Ave., Tucson, Arizona 85718, United States. You can take a cab to the hotel from Tucson airport.

tel: + 1 - 520 - 577 - 0007
fax: + 1 - 520 - 577 - 0045
e-mail: tucgm@windmillinns.com
http://www.windmillinns.com/ie40/tuc/tuc.htm

Cost is approximately US$60 per night which is the US Government per diem rate (currently US$58 per night but is adjusted annually).

Please identify yourself as an attendee of the GCTE meeting to obtain this special rate when you reserve your room.

Meeting Location: USDA-ARS Southwest Watershed Research Center, 2000 East Allen Road., Tucson, Arizona 85719 (Just off North Campbell Street, south of River Road). This is within walking distance of the hotel.
Tel: + 1 - 520 - 670 - 6380 X171
Fax: + 1 - 520 - 670 - 5550

Further details:
See more at: http://soilerosion.net/tucson2003/

15-20 May 2004

International conference on River/catchment dynamics: natural processes and human impacts

Solsona, Catalonia, Spain

The Organising Committee invites you to attend the Conference in Solsona (Catalonia, Spain) which is to take place on the occasion of Maria Sala's retirement. The Conference will explore issues concerning river and catchment processes, with special reference to Mediterranean environments. Of central interest are the linkages between human impacts and catchments and river dynamics, as basis for environmental management. The conference is sponsored by the IGU Commission on Land Degradation, the Forestry Institute of Catalonia, University of Lleida, University of the Balaeric Islands and the University of Barcelona. The Conference will include excursions to sites of geomorphological interest in Catalonia, where Maria Sala and her former students have undertaken research during the last decade.

The Conference will take place at the Forestry Institute of Catalonia, Pujada de Seminari s/n, E-25280 Solsona.

Contributions are invited in any field of process geomorphology, but particularly on:

- sediment sources and transfer to the fluvial system
- river processes and sediment transport
- erosion processes and land degradation in drainage basins
- human impacts on Mediterranean fluvial environments
- water and sediment management

Participants are encouraged to address one or more of the following issues:

- the last two decades of progress in process geomorphology and future prospects.
- understanding anthropic impacts on the environment causing land degradation.
- present-day diagnosis and future key strategies of environmental management in Mediterranean rivers and catchments, and
- linking process geomorphology with other earth and environmental science disciplines.

Symposium Programme

- May 15 (Saturday): registration, get together in Solsona
- May 16 (Sunday): registration, opening session (invited speaker), sessions (including keynote lecture)
- May 17 (Monday): sessions (morning, (including keynote lecture) / excursion to the Ribera Salada Experimental Watersheds (afternoon)

- May 18 (Tuesday): excursion to the Tordera River
- May 19 (Wednesday): poster session, sessions (including keynote lecture), concluding remarks (invited speaker), farewell dinner
- May 20 (Thursday): post-Conference excursions (optional: 1day/ Ebro River, 1day/ Anoia Watershed, 2 days/ Watersheds of the Island of Mallorca

Language: The official language of the Conference will be English.

Registration Fees

€300 early registration (students €50) before January 1, 2004

€400 late registration (students €100)

Includes Conference documentation (plus book of papers and excursion guides), get-together reception, coffee breaks and lunch during sessions, farewell dinner and excursions to the Tordera and the Ribera Salada rivers.

Unrefereed papers submitted by participants will be available to attendees prior to the conference at the Forestry Institute of Catalonia web site (*www.ctfc.es*). Final registration will be accepted if accompanied by the entire paper (short version) at least two months before the conference. Details on how to submit pre-conference papers will be available in the second circular. Geomorphological journals are being contacted to determine which may be most suitable to publish papers after completing their review process.

Accommodation:

Residence cost (estimated): €100 per person (single occupancy). Includes 5 nights and breakfast in a very quiet residence attached to the Forestry Institute of Catalonia. Limited number of rooms; booking on a first come first served basis. To reserve accommodation in the residence a €50 deposit is required by January 1, 2004.

Hotel cost (estimated): €250 per person (single occupancy). Includes 5 nights and breakfast in a '3-star' hotel in Solsona. To reserve accommodation in the hotel a €100 deposit is required by January 1, 2004.

Further details: If you are interested in further details, and/or wish to make a presentation (Oral or Poster), contact Ramon J. Batalla, Forestry Institute of Catalonia, Pujada del Seminari s/n, E-25280 Solsona, Catalonia, Spain, by September 1, 2003.

e-mail: rbatalla@macs.udl.es

tel: + 34 - 973 - 481752

fax: + 34 - 973 - 481392

2-6 August 2004
International symposium on Sediment transfer through the fluvial system
Moscow, Russia

Significant progress has been achieved in understanding how various individual fluvial processes act in different conditions and environments. Now is a good time to review work on the functioning of fluvial systems as a whole. The aim of the symposium is to encourage people from various scientific backgrounds to share their knowledge and views on different aspects of sediment transfer through fluvial systems at all scales, from small first order catchments to large river basins. Topics to be covered include:

- sediment redistribution within small catchments in different environments: temporal and spatial interaction of various geomorphic processes (soil erosion, gully erosion, slope processes); quantification of sediment delivery ratios for different time-scales, sources and sinks
- interaction of rivers and river catchments in undisturbed and intensively cultivated basins: detemination and comparison of natural and human-induced trends in small fluvial systems; linkage and interactions between hillslopes and channel networks in different environments
- large river system functioning: channel processes and changes; floodplain development; sediment transport through river systems
- modelling of erosion and deposition processes
- implications for nutrient and contaminant transfer: sediment-associated nutrient and contaminant transfer; contaminant sinks.

The symposium is sponsored by the International Association of Hydrological Sciences (IAHS) and the International Commission on Continental Erosion (ICCE); and co-sponsored by Moscow State University.

The programme will include a reception, symposium dinner and a mid-symposium field excursion to the Satino field research station, the old Russian town of Borovsk and a local monastery.

A six-day post-conference tour is planned by ship from Moscow to St Petersburg to see large systems of artificial waterways, historical cities, monasteries and numerous natural attractions.

Language: The official language of the symposium is English. No simultaneous translation will be available.

Deadlines: Abstracts (in English): 30 April 2003
Replies to authors: 30 June 2003
Full papers: 30 November 2003

The proceedings, containing all orally presented papers, will be pre-published as an IAHS Red Book.

Registration: US$350 (includes the Red Book proceedings, mid-symposium excursion, lunch each day and the symposium dinner).

Contact: Dr Valentin Golosov, Laboratory of Soil Erosion and Fluvial Processes, Department of Geography, Moscow State University, GSP-2, 119992, Lenin Hills, Moscow, Russia.
tel: +7 - 095 - 9395044
fax: + 7 - 095 - 9395044
e-mail: river@river.geogr.msu.su with 'Moscow2004 ICCE Symposium' in the subject line.

20-24 October 2004
Agroenviron 2004: Role of multi-purpose agriculture in sustaining global environment
Udine, Italy

The AGROENVIRON 2004 symposium is a scientific cooperation following on from the 1st International Symposium held at the University of Agriculture, Faisalabad, Pakistan in 1998, the 2nd held at Trakya University, Tekirdag, Turkey in 2000 and the 3rd hosted by the National Authority for Remote Sensing and Space Sciences (NARSS), Cairo, Egypt in 2002. The University of Udine, Italy, will be organizing the 4th of the series with the collaboration of the International Agroenviron Network, Turkey. The organizers of this event are hopeful it will be an instrument for sharing ideas, exchanging knowledge and developing international links between organizations involved in sustaining global environment.

Presentations are invited on the following topics: (1) land, water, air pollution in agricultural areas; (2) precision agriculture and yield forecasting; (3) landscape ecology, forestry and range land management; (4) climate changes and global agricultural environment; (5) biotechnology and agricultural biodiversity; (6) desertification and land degradation control; (7) agricultural waste reuse and field management; (8) wetland and coastal ecology in humid environment; (9) RS/GIS techniques in agriculture; (10) Current advances in restoration of rural areas for sustainability.

Deadlines: Abstracts (250 words) by December 30, 2003.

Further details: Registration form and updated information are available at www.dpvta.uniud.it/~agroenv or from the organizers: Prof. Dr. Giuseppe Zerbi**,**

Symposium Secretary General, Università degli Studi di Udine, Udine, Italy.
Mobile telephone: + 39 - 328 - 0908099
Fax: + 39 - 043- 2558603
e-mail: zerbi@dpvta.uniud.it

or Eng. Sajid Mahmood (Azeemi), International Coordinator, University of Agriculture, Faisalabad, Pakistan.
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Treasurer and Editor's note:

We intend to publish addresses of new members and details of changes of address on a regular basis. If you change your address, please let the Treasurer, Dr Katharina Helming, know.