CONTENTS

INTERNATIONAL SYMPOSIUM ON 'THE SIGNIFICANCE OF SOIL SURFACE CHARACTERISTICS IN SOIL EROSION', UNIVERSITÉ LOUIS PASTEUR, STRASBOURG, FRANCE, 20-22 SEPTEMBER 2001

Strasbourg! My guidebook suggested it to be a city for the gourmet, and the book was not wrong. The scope of the entry was, though, too narrow: it failed to point out that soil erosion conferences in Strasbourg are also mouth-watering. Full with the finest ingredients, everything done to a turn and stylishly presented – this was indeed soil erosion science for the connoisseur.

This international symposium was supported by COST623, ESSC, PNRH, INRA, UNESCO and Université Louis Pasteur. It was the first of a pair of meetings[1] focusing on soil surface patterns within the EU's highly successful COST Action 623 'Soil Erosion and Global Change'. The spotlight of this pair is on recent developments in understanding the influence of soil surface characteristics (SSC) on infiltration, and on the hydraulics and spatial organisation of runoff and sediment transport. With such an aim, it is appropriate that the COST623 mini-series is, in true fractal fashion, part of a larger series of meetings: the first, *Assessment of soil surface sealing and crusting* (Ghent, Belgium, 1985), the second, *Crusting symposium* (Georgia, USA, 1991) and the third, *Symposium on sealing, crusting and hard-setting soils* (Brisbane, Australia, 1994). This Strasbourg meeting was organized by the RIDES/PNRH group (a network comprising several research groups within CNRS, INRA, IRD and a number of universities).

After making our way across bustling, busy but beautiful-in-parts Strasbourg to the monumental PEGE (Pôle Européen d'Economie et de Gestion) building, the morning of Thursday 20th September began with John Boardman (Oxford, UK) introducing both COST623 and Emil Fulajtar, the new COST Scientific Secretary based in Brussels (with a background in soil science, good man!), who then brought us up-to-date on COST environmental activities. Following, Véronique Auzet (Strasbourg, France) asked us '*Why the focus on soil surface characteristics?*' making her point by showing pictures of the same soil, but with very different soil surface characteristics. Then into the first of the formal sessions, '*Elementary processes and thresholds in soil surface dynamics*', with a keynote paper of the same name by Richard Greene (Australian National University). He noted that different disciplines tend to focus on different aspects of water moving on soil surfaces, thus the erosion mechanic considers runoff, sediment concentration, detachment, and erodibility; the soil chemist, clays, floculation, aggregate stability, sodicity, and slaking; and the soil physicist, hydraulic conductivity, crust formation, slaking, and runoff. Next was Louis-Marie Bresson (Institut National Agronomique Paris-Grignon, France) who focused on soil crusts, their classification – there is a need for consistent terminology – and their formation. A useful review of the notable French work on crusting for all non-French scientists, this!

1 *The second of the pair will be 'Soil Erosion Patterns: Evolution, Spatio-Temporal Dynamics and Connectivity' at Müncheberg, Germany, on 10-12 Oct 2002. See* http://www.zalf.de/essc/symp-pattern.html

And next was Lorenzo Borselli (CNR-IGES Firenze, Italy) on ponding, with some thought-provoking ideas about the different stages of ponding and a useful-looking quantitative description of it. Now it was the turn of Michel Esteves (LTHE-IRD Grenoble, France) with a description of his spatially explicit PRIM-2D hydrological model. Preliminary results using data from plots in Niger were very interesting indeed. Watch for this one when it has an erosion component added! Last up before coffee was David Favis-Mortlock (Queen's Belfast, UK) with first results from an evaluation of his RillGrow 2 model using laser-scanned data of developing rill systems by Katharina Helming (ZALF, Germany). Then to coffee, both to revitalise and to sooth certain throats, hoarse with the number and incisiveness of the questions fired at the morning's speakers.

After coffee, the 'one-minute poster presentations'. This is a fine idea which, to the best of my knowledge, originated at the '*Gully erosion under global change*' meeting in Leuven in 2000. The idea is that each poster author makes a one-minute presentation about their poster (here with only one overhead, although some deviously managed to circumvent this rule: you know who you are!) with each presentation being kept strictly to time. A big advantage of this approach is to help the audience to prioritise their time in the poster sessions, which are always too short (how many times have I glanced at the list on post-conference journey home, thinking "How did I manage to miss that poster?"). And prioritised we were; after Véronique Auzet gave us some details of tomorrow's field trip, it was off to Poster Sessions 1 and 2 to begin discussions that animatedly continued over a satisfyingly-Strasbourgeois buffet lunch.

Replete (though still hungry for knowledge), we started Session 2, '*The effects of soil surface characteristics on wind and water erosion*'. The keynote to kick this one off came from Mike Singer (California Davis, USA): insufficient emphasis is placed on characterisation of the temporal and spatial variability of soil surfaces, he noted, and then went on to consider the roles of wetting rate, antecedent conditions and other factors, and the implications of surface condition for management e.g. irrigation. There is much work for future modellers here! Then Patrick Andrieux (INRA Montpellier, France) shifted the focus to the Mediterranean, specifically to prediction of infiltration's spatial variability in Mediterranean vineyard environments. Javier Casalí followed, presenting a paper on runoff and sediment yield in central Navarra, Spain, concentrating on winter grains and vineyards. Over to Jeroen Nachtegaele (Leuven, Belgium), deputising for Gerard Govers (Leuven) who intended to deputise for Ingrid Takken (Leuven)… tillage marks were the subject of study, important in low-gradient catchments since they ensure that water does not always flow down the line of steepest slope. Some very interesting modelling here. Last before coffee was Chantel Gascuel (INRA Rennes, France) deputising (what, another?) for Frédéric Darboux (NSERL Purdue, USA): more interesting work, this time utilising laboratory experiments, on surface depressions and their effects on runoff.

Coffee (much needed), then we split from plenary into two parallel discussion groups. One of these focused on '*Linking erosion processes across temporal and spatial scales*' (the theme of COST623 Working Group 1) while the other considered '*Key thresholds for soil erosion*' (the theme of COST623 Working Group 2). An hour later, we returned to plenary for the report-back. The leader of WG1, Mike Kirkby (Leeds,

UK), summarised the lively discussion that had gone on in his group. The need to look at the variation of soil properties across temporal and spatial scales, rainfall dynamics, delivery of tools to end users, and delivering results at scales of interest to politicians: all these had come up. Also follow-up meetings and their relationship to the issues addressed by WG1. For example, how will global change affect scale relationships between erosion processes? Can we expect these to remain constant? There was to be a COST623 WG1 meeting in Belfast[2], Mike explained, which aimed to shed some first light on these questions. To be held in April 2003, this would evaluate field/hillslope- and catchment-scale erosion models using changed-climate data. Next, Christian Valentin (IRD Laos), the leader of WG2, summarised his group: discussants had generally agreed that the best points of WG2 activities to date had been the high scientific levels and the successful integration of many European countries, but the weaker points had been the somewhat inconsistant focus on climate change and land use change. Christian also listed many still-unanswered scientific questions (some labelled "See WG1"!). General discussion then followed: consistent with the pattern of the day, this was lively, friendly, and open.

Off then (unfortunately through pouring rain. 'At least this is good for erosion!', mumbled some soggy philosophers) to a reception by the Town Council of Strasbourg in the Town Hall. This of course included some of the wine for which Alsace is famous! Thus consoled for our lingering dampness, the conversation reignited and for some burned throughout the evening in one or other of Strasbourg's highly desirable eating places.

On the next day (Friday 21st September) it was off early on the field trip, enticingly titled '*Runoff and erosion in maize fields and vineyards*'. After some early where-are-the-coaches? concerns, we split into two parties and drove out through the green fields of Alsace. We heard about the geomorphology of the south-western Rhinegraben; saw sustainable viticulture and heard it explained with infectious enthusiasm at the 'Agriculture Durable Site de Rouffach'; ate lunch and discussed ways of obtaining funding to work on sustainable viticulture ourselves; and saw the experimental field site at Geispitzen which concentrates on water quality, filter strips, and informing farmers and farm advisors (the sequence of these events depended on which coach you were on, constrained of course by the law of cause and effect). All too soon, though, both coaches arrived at the Alsatian Ecomusée for the promised wine tasting. The poet Mohammad Urfi cautioned us to:

> *Be content with three glasses, three glasses of pure wine.*
> *And if three are not granted you, then drink one gladly.*

But in this case, three glasses and more of the pure wine of Alsace were forthcoming, and the nonlinearly inebriated company then spent the evening eating, talking about soil erosion, telling rambling anecdotes about unknown third parties, and poking fun at each other's national characteristics. This continued till a late hour, and during the coach ride home.

The challenging task of beginning Session 3, '*Surface characterisation at point to catchment scales*' at 8.10am on Saturday 22nd September fell to Christine King

2 See http://soilerosion.net/belfast2003/

(BRGM Orléans, France) with a keynote presentation on the use of remote sensing to provide data for runoff and erosion models. Papers this session included Paul Farres (Portsmouth, UK) on furrows and photogrammetry, Olivier Cerdan (Leuven, Belgium) describing the STREAM model, Nikolas Kuhn (Hebrew University, Israel) on work which he and Aaron Yair had carried out on hydrological zoning and rill formation in the Negev badlands, and Paul van Dijk (Strasbourg, France) summarising erosion research in Alsace: studies at various scales here, from microrelief evolution to changes in soil surface characteristics at the catchment scale, plus modelling with LISEM and others. Coffee came as manna to the parched, then a second one-minute poster presentation session followed by more vociferous around-poster discussions during Poster Sessions 3 and 4.

After an appropriately tasty buffet lunch in this city of the gourmet, it was on to Session 4, '*Drivers and management of soil surface characteristics*', which commenced with a keynote presentation by Philippe Martin (INA-PG Paris, France) who exhorted us to '*Try to understand why farmers do not behave as we would like them to behave*'. This well-thought-out talk covered a lot of ground, including identification of various erosion risk situations using Jean Boiffin's characterisation of soil crusts as a basis. Other papers in this session were Christian Roth (CSIRO, Australia) looking at the effects of the North Australian beef industry on grazing land, Miloš Stankoviansky (Comenius University, Slovakia) on the erosional effects of extreme rainfall and snowmelt events in the Slovakian Myjava hill area, and Vincent Kakembo (Vista University, South Africa) who gave us an account of erosion due to Blue Bush invasion, which changed soil surface characteristics in the Mgwalana study catchment in the Eastern Cape, and used GIS to model this.

A coffee break came next; during this, a small group met (led by Katharina Helming and David Favis-Mortlock) to discuss an idea for a network to share equipment for simulated rainfall, runoff and erosion studies: the idea being that such equipment is rather expensive but used only occasionally, and that practical expertise gained in its use would be of greater value if shared. Then it was into parallel discussion groups as on the first day (an excellent feature of COST meetings, these) before coming back into plenary. Christine King again emphasised the importance of roughness for the assessment of depression storage or as a brake to flow, and asked what is the right description and the right scale for sampling it? For efforts during Poster Session 1 and 2, prizes were then given to Hazel Faulkner (University of Hertfordshire, UK) and Jeroen Nachtergaele (Leuven, Belgium). Next followed some discussion on the use of roughness criteria: is it enough to have a spatially invariant roughness? Dino Torri (Firenze, Italy) pointed out that techniques are now available to capture the spatial patchiness of roughness, and Katharina Helming added that we also need to be clear about the processes which generate roughness at different scales. Richard Greene then gave his comments, including the importance of having a crust typology and of characterising ponding conditions, and asking just how complex does our modelling of microrelief variability need to be? Anton Imeson (Amsterdam, Netherlands) added that we need to consider slaking too, and speculated that what we are seeing in the evolution of soil surface characteristics is self-organisation at a range of scales. Mike Singer then spoke 'on behalf of the small but enthusiastic American contingent'. He gave a number of thoughtful and controversial questions and comments, including:

Can we transcend the notion that different scientists see things from different perspectives? Do we really need to bother over microtopography? (Really, Mike!) And how do we make better use of case studies? The prize for Poster session 3 went to Tom Wassenaar (INRA Montpellier, France), and specific mentions were given to Joël Angles (Sherbrooke University, Canada), Eva Kamphorst (UC Louvain, Belgium) and Olivier Planchon (IRD, Sénégal). More discussion, then Christian Roth gave his comments, reminding us that socio-economic issues can be the key driver of erosion, and so we need to look at what the farmer does on the land and not just at biophysical issues. From Poster Session 4, Paul van Dijk and Saturnino De Alba (Firenze, Italy) were singled out for special praise. Still more discussion from this irrepressible group (including the comment on how few international meetings there have been on soil surface characteristics, and a request to look more at faunal influences on them). Then it was left to John Boardman to 'make the closure', to Véronique Auzet to thank all who helped with the meeting, and the rest of us to leave this charming and thoroughly European city after one of the more satisfying meetings of the COST623 series.

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This report appears in the ESSC Newsletter, Geophemera (BGRG newsletter), and on the COST623 website (http://www.cost623.leeds.ac.uk/cost623/)

LARGE-SCALE DIGITAL SOIL MAP OF ESTONIA AND ITS APPLICATION FOR SOIL CONSERVATION PURPOSES

In order to ensure sustainable land use together with ecologically sound exploitation of soil resources, and to avoid soil degradation (or to guarantee conservation of soils), it is very important to have easily accessible information on soil properties (soil databases - by soil taxonomic units and by location), and to be skilled in soil identification (local soil taxonomy, specific soil characteristics). Therefore comprehensive information on the distribution of dominating soil types (soil maps in different scales) is very valuable, as well as knowledge on the peculiarities of soil types and possibilities for their utilisation.

The preliminary soil survey of Estonian territory was performed mainly in the years 1954-1980 (first agricultural, later forest lands) by the Soil Survey Department of Estonian Agriproject (now SE Estsurvey). In the course of this survey the large scale (mostly 1:10,000, but on some places also 1:5 000) soil maps were prepared for different land users (collective farms, sovkhozes, forest enterprises) on the whole territory of Estonia. In the 1980s these maps were updated with particular attention to the depth of the humus horizon, stoniness, drainage condition and soil texture. These revised maps were compiled on map sheets corresponding to 6600 – 6900 hectares in nature (Sepp & Lutsar, 1994). Soil information (maps, soil analytical databases) gathered in the 1970s and 1980s (Estonian Soils in Figures, 1974-89) is highly appreciated by stakeholders until today.

Soil species, which is the smallest genetic subdivision in Estonian soil classification (ESC), is used as the large-scale soil mapping unit (SMU). The list of SMUs contains approximately 90 soil species). The profiles of soil species in soil databases are characterised by profile formulae (occurrence of diagnostic horizons and their depths), whereas in case of forest soils the forest floor is also taken into account. For the characterisation of the properties of soil (diagnostic) horizons the following parameters were used: particle size distribution (texture); organic matter (carbon), total nitrogen and carbonate content; active (pH_{H2O}, pH_{KCl}), hydrolitic and exchangeable (H^+, Al^{+++}) acidity; cation exchange capacity; exchangeable bases (Ca, Mg, K) and the degree of base saturation; specific surface; bulk density and some others to a limited extent. In the calculation of soil species (or reference soils) mean characteristics (done separately for arable and forest soils) of the dominating soil species are divided into different varieties (subdivision of soil species in ESC) by their texture (sandy, loamy and clayey soils).

In the years 1998-2001, the large-scale (1:10 000) soil map of Estonia was digitised by E.O. Map Ltd. in collaboration with soil surveyors using *MicroStation (MS)* software and linked with the soil geographical database. The main information displayed (by *MS GeoGraphics, MS GeoOutlook* and other software*)* in the soil contour is: the SMU code, formulae of soil texture and humus profile (layers of soil organic matter accumulation, paying special attention to forest and natural grassland floor), as well as

stoniness (fine and coarse stones separately). The application of geographical (contour) soil data is possible with *Microsoft Access*. The names of soil species (or SMU) in the ESC may be easily converted into WRB, USDA and other systems, but this is rather approximate, as a one-to-one correspondence is not achievable (FAO, ISRIC, ISSS, 1998).

Among the mineral soils, which occupy 76.8% of the territory of Estonia, the dominating ones are *Luvisols (haplic, gleyic, cutanic), Albeluvisols (stagnic, umbric), Podzols (haplic, gleyic, carbic)* and *Cambisols (calcaric, gleyic).* Approximately one-third of the mineral soils is over-moistened, because the *Gleysols (mollic, calcaric, histic)* form 27.1% of the total territory. The role of *Histosols (fibric, sapric)* is also remarkable (23.2%). Loamy (moderately coarse- and medium-textured) soils with the highest productivity form less than half (44.8%) of the territory. From the rest of the area, 26.7% of soils are sandy, 4.8% clayey and 23.7% peaty (Kokk, 1995).

The owner of the copyright and the distributor of Estonian large-scale soil map licenses is the Estonian Land Board (ELB). To find the area of interest fast, it is possible to use the Estonian comprehensive map, on which the Estonian territory is divided into quadrates (Estonian Land Board, 1998). It is also possible to use maps with names and borders of villages, parishes and counties. The large-scale soil maps and databases related to it were traditionally widely used in agriculture and forestry, but lately they have been used more and more in solving problems of environment protection.

Due to its geographical location the soil cover of Estonia has certain limitations in thermal resources (*frigid*) and in duration of the vegetation period. Certain soils may be washed out, over-moistened or waterlogged each year, which provokes the processes of paludification and podzolization. The typical natural constraint for such areas is high acidity and low humus quality. Most of coastal and *alvar* soil profiles are undeveloped and shallow. Some constraints are connected to certain soil properties, such as low clay and humus content, extremely fine or coarse texture, deficiency of trace elements, one-sidedly high content of carbonates. But at the same time the susceptibility of soil to water and wind erosion is not remarkable.

The features of soil degradation occurring are:

(1) on the entire territory - destruction of the normal functioning of the soil cover, degeneration of the biological diversity and activity, contamination by wastes, new anomaly (deficiency or exuberance) in trace element contents, loss of arable land due to urbanisation;

(2) on arable lands - the depletion of nutrition elements from soils under the critical level due to unbalanced fertilisation, the loss of soil fertility due to the worsening of its humus status, the compaction of soils, appearance of water and tillage erosion, acidification, waterlogging on formerly drained hydromorphic soils;

(3) on certain soil types - wind erosion of over drained sandy and peaty soils, accelerated mineralisation of peat on drained shallow *Histosols*, floodings on *Fluvisols*,

- formation of ironstone hardpan on *Gleyic* and *Histic Podzols;* and
(4) locally - soil pollution (military areas, lands around petrol stations and repair workshops), blockage of natural drainage in connection with road building, underground mining of oil shale, increasing alkalinity by flying cinders, dumping of oil shale mining residues, radioactive contamination. Some soil degradation processes, which are important globally (desertification, salinisation, degradation by inappropriate irrigation), are absent all together.

As it is known, the comprehensive soil degradation map of Estonia (1:2 500 000) was compiled in the framework of SOVEUR (Reintam et al., 2001). But a large-scale soil map serves as a good systematic basis for the identification constraints (hazardousness) in soil cover degradation at farm (or more detailed) level in different places and circumstances. It is also understandable, that for a more profound approach to soil conservation, systematic soil monitoring of dominating SMU is needed.

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NEW PUBLICATIONS

Lozet J. et Mathieu C. 2002. *Dictionnaire de science du sol.* 575 pages, Collection Tec et Doc, éditeur Lavoisier, Paris, €85.

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.

***Man and soil at the Third Millennium.* Edited by Rubio, J.L., Morgan, R.P.C., Asins, S. and Andreu, V. Geoforma Ediciones, Logroño.**

With strategy documents on soil emerging at both European and national levels, soil is being recognised again as an important resource, alongside air and water, underpinning future sustainable development. Since implementation of strategies needs to be based on sound science, this two volume proceedings of the Third International Congress of the European Society for Soil Conservation (held in Valencia, Spain, 28 March-1 April, 2000) is timely in providing a clear statement of scientific understanding and knowledge of soils at the start of this century. The volumes are organised around ten themes: soil and society; soil and water cycle; interlinkages between biodiversity, climate change and water resources; traditional soil and water conservation systems; soil indicators; soil functions and soil quality; desertification and soil degradation

processes; soil contamination; new technologies and soil assessment; and soil conservation. Although this was a European meeting, its focus was worldwide with contributions from the USA, Africa, Asia and Latin America as well as papers from European scientists relating to work undertaken in the developing world. In addition to the sectional papers, there are twelve keynote papers, providing reviews of the main themes of the congress and a specially-invited contribution by Professor Rattan Lal on 'Soil conservation and restoration to sequester carbon and mitigate the greenhouse effect'. In his preface to the volumes, the Crown Prince of Spain encourages soil scientists to explore their subject with depth and efficiency to understand better the functioning of one of the essential components of the earth's ecosystem. The volumes demonstrate how soil scientists and others with an interest in soils are doing just that. The result is a comprehensive statement of the issues, methodologies and research findings on soils as they affect society.

NEW PhD THESES

Analysis and assessment of water erosion and soil productivity on the sloping cultivated lands in the southern Loess Plateau (P.R. China)

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In the Loess Plateau, China, soil erosion is a major problem endangering human existence and restricting the economic development of the region. Due to the long-term soil loss and unreasonable land use, soil productivity is rather low. In order to control soil and water loss and to improve soil productivity on sloping cultivated land, the study discusses systematically the regional features and rules of erosion, mechanisms of soil nutrient losses and impacts of erosion on soil physical properties, and assesses the long-term effect of soil erosion on soil productivity under different conditions. Field investigations, laboratory experiments and computer simulations are used.

The objective of this study was to (1) determine the properties and rules of soil erosion on sloping lands in the southern Loess Plateau, (2) determine the rule of soil nutrient loss and effects of soil erosion on soil physical properties, (3) assess the soil productivity and its change rules caused by soil erosion. Data for this study were obtained from 5 field sites located in southern Loess Plateau, P.R. China. In order to show the relationship between soil erosion and soil productivity, physical, chemical and biological soil properties were determined, and the crop yields were also measured from 1993 to 1997 on erosion plots and cultivated lands.

Average annual rainfall in the investigated five counties of the southern Loess Plateau is about 860 mm. Runoff coefficients range between 0.3 and 66.6% depending on management type. Average runoff coefficients are 10.6% for uncovered land, 14.1% for cropland and 3.5% for fallow. Amount of infiltration decreases with increasing slope gradient. Main erosion forms are rill and ephemeral gully erosion which account for approximately 22 and 42.5% of total erosion, respectively.

Soil erosion results in change of soil texture. As slope gradient increases, soil bulk density increases and content of soil aggregates and pore space decrease. Soil bulk density and pore space are linearly related to slope, while soil aggregates are power related.

Average annual nitrogen (N) and phosphorus losses (P_2O_5) range between 0.3 and 12.2 kg N per ha and 0.2 and 3.8 kg P per ha. Nutrient losses are mainly caused by soil loss. The content of nutrients (especially P) in sediment is obviously enriched by 1.2 – 1.7

times compared to surface soil. Concentration of nutrient in runoff depends on amount of sediment and origin of sediment. As slope gradient increases, nutrient concentration in runoff decreases. Total nitrogen and soil organic carbon decline faster than other nutrients. Soil fertility declines about one grade per five years.

Soil and water loss contributes also to loss of soil enzymes. Soil microorganisms and soil enzymes are necessary for many functions of the soil, including productivity, mineralisation of nutrients, and filtering and buffering and transformation of contaminants. The lost quantity of soil enzymes per unit mass of soil decreases as slope increases. Activities in eroded sediments are higher than *in situ* soil. Loss of enzymes in fertile soils is higher than in non-fertile soils.

The productivity index model (PI) was used to assess long-term effects of soil erosion on soil productivity. A loss of 1 cm of surface soil will decrease yield of winter wheat by 1.69 to 2.88 kg/ha while 1 mm of runoff results in a 34.5 to 39.0 kg lower yield per ha. Therefore, improving infiltration will be the best way to lead to higher yields.

Soil productivity on sloping crop land is rather low. An average PI value of 0.125 for eroded areas is calculated which equals only 25% of that for uneroded cropland in the Yangling region. The sequences with decreasing PI are: forest > meadow > orchard > crop land. Absolute reduction is higher for gentle slopes than for steep slopes. Simulations of two soil conservation measures showed that measures can greatly reduce the declining velocity of soil productivity. Highly productive soils have a lower productivity decline in early stages of erosion. As the processs continues, a rapid decrease in productivity follows. The conservation efforts should therefore be made before soils productivity enters the rapid decline period.

FORTHCOMING MEETINGS

21-24 September 2003
International symposium on sustainability of dehesas, montados and other agro-silvopastoral systems
Cáceres, Spain

The symposium will provide a forum for the presentation and discussion of the following key issues regarding agro-silvopastoral systems, namely: (1) the definition of distinctive features of hydrological, degradational and soil erosion processes in pasture lands with sparse tree cover including, in some cases, rotational cultivation; (2) the relationship between different land uses and management techniques and soil erosion and degradation. Of special interest is the role of different domestic livestock species, their grazing management and stocking rates; and (3) the definition of soil quality indicators as an essential part for evaluating sustainability of agro-silvopastoral land use.

Conference themes are:

- soil degradation and soil erosion (mechanisms and magnitude) as related to the diverse spectrum of land use systems and management techniques, regarding (a) forestry, (b) domestic livestock and big game, (c) cultivation, (d) abandonment and fire
- surface hydrology of open evergreen woodlands
- conservation and sustainable management of agro-silvopastoral systems
- soil quality indicators.

The first day of the conference (21st September) will be a field visit to research sites; conference sessions will take place on the second and third days; the final day will comprise a field visit to Montado and Dehesa farms.

Conference organised by the European Society for Soil Conservation, the University of Extremadura and the University of Evora.

Deadlines: Abstracts by 15 January 2003; notification of acceptance by 15 March 2003. Registration by 15 May 2003.

Publication: Abstracts will be published in a book and made available to participants at the beginning of the Conference. Papers will be reviewed and selected by a scientific committee for publication in a book.

Further details from: Dr Susanne Schnabel, Dpto. de Geografía, Universidad de

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Visit: http://geot.unex.es/symposium

22-26 September 2003
25 years of assessment of erosion
Ghent, Belgium

It is 25 years since the Workshop on *Assessment of erosion in America and Europe* was held at the Faculty of Agricultural Sciences, State University of Ghent with the aim of examining methods of universal applicability for assessing degrees of soil erosion and measuring quantitatively its effect on soil productivity. The proceedings of the Workshop were published as *Assessment of erosion* (edited by M.De Boodt and D.Gabriels, Wiley, 1980). The time is ripe to review what has been achieved since that time. The symposium will focus on techniques, technologies and methods for assessing the different parameters and processes governing erosion by water.

The symposium will cover a wide range of topics including:

- climatic factors: rain erosivity, events, inclined rainfall, rainfall simulation
- soil parameters: erodibility, roughness, sealing, soil management
- topography: slope degree and length, short slopes, shape
- vegetation and stone cover
- scale of assessment: point, field, watershed, upscaling, mapping
- infiltration, runoff, sediment transport
- type of erosion: sheet, rill, gully, mass movement, tillage erosion
- modelling: empirical, conceptual, physical
- non-point source pollution by erosion and runoff.

Presentations can be either oral or as poster. Review papers on specific syntheses of assessment of parameters in the erosion process are welcome for consideration as keynote presentations. A scientific committee will select the papers and decide whether the presentation should be oral or poster.

Deadlines: As the number of participants will be limited, the intention to participate should be given by 15 October 2002.

Contact: Symposium “25 years of assessment of erosion”. p/a ir. Greet Oltenfreiter,

Department of Soil Management and Soil Care, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium.

Tel: +32 - 9 - 264 60 66

Fax: +32 - 9 - 264 62 47

e-mail: erosion@soilman.rug.ac.be

Visit: http://soilman.rug.ac.be/symposium_erosion where you can complete on-line a form of intention to participate.

17-19 November 2003

Soil erosion under climate change: rates, implications and feedbacks

Tucson, Arizona, U.S.A.

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 hydrological system. Both the impacts of climate change on erosion and its feedback to the climate will be addressed. Both wind and water erosion will be considered. All scientific issues related to the topic are encouraged.

A specific theme will be the evaluation of erosion models for global change studies. To quantify the impacts of future climate change and major land use change on 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 data sets which include a number of scenarios for future climate and land use. Participants are encouraged to contact the meeting organisers to learn more about participating in the model comparison exercise.

The programme will include two days of meetings and a one-day tour of the Walnut Gulch Experimental Watershed.

Deadlines: One page abstracts can be submitted up to 31 July 2003. E-mail them to: mnearing@purdue.edu (this address may change to mnearing@tucson.ars.ag.gov after 1 January 2004).

Accommodation: A block of rooms has been arranged for 16-23 November 2003 at the Windmill Inn, 4250 North Campbell Avenue, Tucson, Arizona 85718, U.S.A.

Tel: + 1 - 520-577-0007. Fax + 1 - 520-577-0045.

e-mail: tucgm@windmillins.com

http://www.windmillins.com/ie40/tuc/tuc.htm

Cost is approximately US$60.00 per night. Please identify yourself as an attendee of

the GCTE meeting to obtain this special rate.

Further details from: Dr Mark Nearing, GCTE Meeting 2003, 2000 East Allen Road, Tucson, Arizona 85719, U.S.A.
e-mail: as above; or contact smoran@tucson.ars.ag.gov or jstone@tucson.ars.ag.gov

6-12 September 2004
Eurosoil 2004
Freiburg-im-Breisgau, Germany

The second congress of Eurosoil will provide an opportunity for soil scientists and practitioners from all over Europe to consider the part played by soils in terrestrial ecosystems. Actual research results will be presented and discussed in twenty or so different symposia. There will also be an on-going poster presentation giving an overview of the whole spectrum of soil research and providing a forum for small group discussion.

The themes of the symposia are:

- soils as living space
  convenor: Richard Bardgett (r.bardgett@ lancaster.ac.uk)
- education in pedology
  convenor: Mireille Dosso (dosso@cnearc.fr)
- soil protection
  convenor: Stephen Nortcliff (S.Nortcliff@reading.ac.uk)
- preferential flow
  convenor: Hannes Flühler (fluehler@ito.umnw.ethz.ch)
- gas exchange in soils
  convenor: Jan Glinski (jglinski@demeter.ipan.lublin.pl)
- soil and society
  convenor: to be announced
- organo-mineral interactions
  convenor: Claire Chenu (chenu@versailles.inra.fr)
- regionalisation of soil data
  convenor: Luca Montanarella (luca.montanarella@jrc.it)
- forest soils
  convenor: Etienne Dambrine (dambrine@nancy.inra.fr)
- remediation of polluted soils
  convenor: John Scullion (jos@aber.ac.uk)
- soil deformation
  convenor: Rainer Horn (rhorn@soils.uni-kiel.de)

- soil erosion
  convenor: José Rubio (jose.l.rubio@uv.es)
- soil and water
  convenor: Ryszard Walczak (rwalczak@demeter.ipan.lublin.pl)
- desertification and salinisation
  convenor: Ildefonso Pla Sentis (Ipla@macs.Udl.es)
- soil information systems
  convenor: Vincent van Engelen (vanengelen@isric.nl)
- mapping of soil associations
  convenor: Tengiz Urushadze (tengiz.urushadze@mailcity.com)
- buffering functions of soils
  convenor: David Powlson (david.powlson@bbsrc.ac.uk)
- international soil politics
  convenor: Jaume Bech Borras (jabechbo@porthos.bio.ub.es)
- significance of soil forming processes
  convenor: to be announced
- beneficial plant and micro-organism interactions
  convenor: Angela Sessitsch (angela.sessitsch@arcs.ac.at)
- functional genomics of soil organisms
  convenor: Elizabeth Wellington (eg@dan.bio.warwick.ac.uk)
- soil organic matter
  convenor: Alesandro Piccolo (alpiccolo@unina.it)
- soil monitoring
  convenor: to be announced
- urban soils and land resources
  convenor: Wolfgang Burghardt (wolfgang.burghardt@uni-essen.de)

The following excursions are planned:

- 2-days: the Rhine Valley from west to east; the Hegau and Lake Constance; the South German cuesta landscape; Switzerland
- 1-day: the River Rhine floodplains; the Black Forest foothill zone; the Tuttlingen Field Research Station; the Kaserstuhl volcano
- ½-day: Black Forest mining and soil pollution; the Conventwald forest ecosystem study.

Contact: Dr Thorsten Gaertig, Institute for Soil Science and Forest Nutrition, Eurosoil 2004, Albert-Ludwigs-Universität Freiburg, D-79085 Freiburg-im-Breisgau, Germany.

Tel: +49 - (0)761 - 203 - 9144

Fax: +49 - (0)761 - 203 - 9144

e-mail: Thorsten.Gaertig@bodenkunde.uni-freiburg.de

Visit: http://www.forst.uni-freiburg.de/eurosoil/ where you can find details of the convenors for each of the symposia.

13-17 September 2004
Eco-engineering: the use of vegetation to improve slope stability
Thessaloniki, Greece

The conference aims to bring together civil and mechanical engineers, soil scientists, geomorphologists, foresters and ecologists from both scientific and professional backgrounds. The congress will serve as a forum for researchers to discuss the latest advances in all aspects of eco-engineering research with a special emphasis on new methodologies and techniques.

Conference themes:

- vegetation and eco-engineering
- interactions of vegetations and structures
- soil reinforcement by roots
- hydrology and land use
- soil erosion
- geotechnical methods and applications
- slope degradation and forest dynamics
- applications of land restoration
- modelling of slope stability
- decision support systems
- riverbank and coastline protection measures
- plant growth versus engineering stability
- benefits and liabilities in slope protection and erosion control

Meeting organised by: National Agricultural Research Foundation (NAGREF) and INRA in connection with the European Society for Soil Conservation and IUFRO WP 8. 04.00 Natural Disasters.

Deadlines: Notification of intention to attend the conference together with the title of any proposed oral or poster presentation or demonstration of method/software/ technology by 30 September 2003. Download form from web-site and return to the Conference Administration. Potential presenters of oral and poster communications will be invited to submit an abstract before 1 January 2004.

Further details from: Sanna Dupuy (conference administration), Laboratoire de Rhéologie du Bois de Bordeaux, (Mixed unit: CNRS/INRA/Université Bordeaux 1), Domaine de L'Hermitage, 69 route d'Arcachon, 33612 Cestas cedex, France.
Tel: +33 - 5 - 57 - 12 28 36
Fax: + 33 - 5 - 56 - 68 07 13
e-mail: ecoconf@lrbb3.pierroton.inra.fr

Visit: http://www.ecoslopes.com
http://lrbb3.pierroton.inra.fr

15-17 September 2004
Digital soil mapping
Montpellier, France

The meeting focuses on developing new, rapid and economic methods for digitally mapping soil classes and attributes (and their uncertainties) at resolutions of 20 m to 500 m.

Topics to be discussed:

- environmental covariates for digital soil mapping
- spatial decomposition of data layers
- sampling methods for creating digital soil maps
- quantitative modelling for predicting soil classes and attributes (including generalised linear and additive models, classification and regression trees, neural networks, fuzzy systems, expert knowledge and geostatistics)
- quality assessment of digital soil maps
- presentation of digital soil maps
- progress of digital soil mapping programmes worldwide
- economics of digital soil mapping
- examples of digital soil maps and mapping

The Workshop proceedings will be published as a book in the series *Developments in soil science.*

Further details from: Philippe Lagacherie
e-mail: lagacherie@ensam.infra.fr