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Cover photo: Graded terraces being prepared for growing vegetables, cereals and potatoes in the Atlas Mountains of Morocco (photo from Eric Roose, Montpellier, France).

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Contents

This issue of the ESSC Newsletter presents the 13th of our 'Guest Editorials.' This is an opportunity for leading authorities in the soil science community to offer their perspectives on issues relating to soil conservation. This contribution is from Eric Roose (IRD, Montpellier, France). Eventually, we envisage this collection of essays developing into an authoritative book.

Water and soil resource rehabilitation in Africa

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Introduction

During the world economic crisis, it is important to reduce water misuse, fertilizer loss and soil degradation and to simultaneously protect biodiversity and decrease the effects of greenhouse gases on climate (Roose *et al.,* 2005). Africa, with its growing population and high demographic pressure, suffers more than other continents from the degradation of its vegetal cover, humus, soil fertility and rivers. As soon as North Americans and Europeans decided to decrease their cereal exports in order to produce biofuels, food prices grew so fast that starvation appeared again in many underdeveloped countries. In that economic context, it is urgent not only to preserve water and soil resources, but to notably increase the productivity of soils and labour. Soil conservation will not be adopted by farmers, who know how much labour is necessary to "conserve the soil with terracing" but need significant improvements in food yields to justify the additional labour inputs. Now it is time to develop new agricultural systems, which not only protect the rural environment, but also pay reasonable salaries to farmers, places due value on water, biomass and nutrient resources and produces sufficient food for farmers and citizens. Notice that these changes generally developed during crisis periods (Restauration des Terrains de Montagne (RTM) in 1860 in France, the Soil Conservation Service in the 1930s in the USA and Défense et Restauration des Sols (DRS) after World War II in Europe (Roose, 2004).

Some conclusions on soil conservation research in Africa over the last 50 years

Runoff and erosion hazards have long been known in Africa. For instance, see 'Afrique, Terre qui Meurt' ('Africa, Dying Ground'), the book written by the Belgian geographer J.P. Harroy (1944). Harroy focused on the importance of ploughing and terracing on humus resources and soil degradation. But intensive research on soil conservation only began after 1950 (Colloquium of Leopoldville (1954), and Khartoum, (1965)) which discovered that soil erosion is more complex than previously thought. The impact of litter cover on the soil

surface, and topography (slope steepness but also the position in the landscape in relation to oblique drainage and springs) are very important to reduce the energy of both raindrops and runoff. Deep soil tillage was firstly encouraged in Africa, as in Europe, because it increases soil porosity, root development and infiltration. But in the long term, deep tillage also reduces humus content and degrades soil structure. In reality the only production system that improves soil structure and fertility is the forest. Forest systems efficiently protect the soil surface and recycle the nutrients leached deeply under crops roots and in weathered rocks. From these observations minimum and zero-tillage systems were recently developed, with direct drilling under the litter residues and using crop rotations with deeply rooted legumes.

Recent studies (such as FAO, IRD and WOCAT) have shown the limited impact of mechanical approaches for water management (terracing) in large 'top-down' programmes. Numerical data are now available demonstrating the low impact of these approaches on decreased sediment transport and siltation in lakes and increased crop yields and soil fertility (Roose *et al.,* 2008).

Historical evolution of soil and water conservation approaches

Recent data on the effects of slope, landscape position and soil surface features, and observations on the cultural and socio-economical situation of rural societies, led to the conclusion that water management techniques (runoff energy dissipation along the hillslopes more than total infiltration or runoff concentration in channels) must be changed and that farmers' opinions must be integrated in order to develop sustainable management strategies. New strategies are being proposed in order to integrate the whole farming system. They take better account of local physical conditions, but also their perception of the problems at different scales of time and space, their cultural traditions and their socio-economic conditions. Furthermore, in Africa it is imperative to solve land tenure problems. The soil could belong to the village community, but the annual production to the manager of the ground and the fruits of some natural trees to several local women. In some countries the nomadic herds may graze the crop residues as soon as the grains have been collected. In those conditions, it is difficult to introduce agroforestry or direct planting into crop residues. At the same time, national administrations promulgated laws declaring that all unmanaged land belongs to the State. This is an important reason for the disappearance of long fallow periods.

After half a century of terracing and reducing slope lengths, the strategies come back to the ideas that it is essential to maintain crop residues on the topsoil and to reduce soil tillage. Farmer poverty and economic restrictions favour the selection of simple, low-cost, progressive conservation techniques. These include stone bunds, living hedges, tree lines or grass lines, and multi-purpose systems (such as hedges of leguminous trees producing forage during the dry season, and some firewood and mulch during the rainy season). Building nice terraces exerts very high labour demands, requiring 300-1500 days of labour to manage one hectare of terraces, depending on the type of embankment needed (i.e. with stones or not). Terrace systems also require large amounts of manure and mineral fertilizers in order to restore soil fertility and intensify food production. Where the ground is missing, gully management is reserved for poor farmers, which are extremely problematic to develop. New terraces are seldom developed, except when farming systems are not able to control runoff or when people want to privatize the ground surface.

Perspectives

Even if most researchers are able to observe the diversity of erosion processes and factors which can reduce soil losses, soil conservation services have difficulties in simultaneously integrating the heterogeneity of the physical environment and the complexity of human constraints. These constraints include the technical competence of technicians, labour availability, ethnic and cultural issues, the proximity of markets and traditions of local agriculture and cattle breeding. Each hill-slope has its own unique conditions that the farmer tries to take into account. In contrast, we can also observe how technocratic approaches are inappropriate. For instance, models take into account slope gradient excluding slope morphology, slope functioning during exceptional rainstorms, lithology and economic or cultural restrictions. Spatial repartition of erosion problems with GIS produces aesthetic solutions, with nicely coloured maps. However, often realistic 'ground truthing' is not undertaken. For instance, it is clear that the slope is the main factor to consider in potential erosion assessment if the soil surface is bare. However, in the reality of the mountains, sediment sources are not necessarily the steepest hillslopes (often protected by stones or forests), but from soft slope materials of marl, clay, schist and highly-weathered soft rocks.

In the same way, it is difficult for SWC technicians to perceive the complexity of interactions between physical aspects of the landscape and human factors. In Africa, an example is the recent arrival of cattle breeding communities who exploit the biomass without any soil/runoff management. They simply move when the biomass and soil become degraded. It should be useful to develop research on both positive (transfer of nutrients through manure) and negative (reduction of vegetal cover and infiltration and increased topsoil compaction) influences on soil fertility and erosion caused by various breeding systems.

Before the selection of SWC techniques, it is necessary to evaluate their local efficiency, acceptability and potential profitability for beneficiaries. Although terracing is generally much less profitable than carefully designed fertilization and irrigation technologies, many terraces are built in semi-arid areas because the objectives of new proprietors are more concerned with land security than soil conservation.

In the mountains, traditional techniques of water and soil fertility management have been adapted during decades to the diversity of climatic, ecological and human conditions (Plates 1 and 2). These systems were long despised by SWC engineers, who believed knowledge written in soil conservation books is more efficient than traditional knowledge. Nevertheless, these systems can give precious information on the major risks of rainfall, gullies, mass movements and floods. Some traditional farmer techniques were abandoned because of increasing labour costs and the emigration of young people. To save these efficient techniques, it is important to introduce profitable crops and build efficient fertilizer and irrigation use into systems (Roose *et al.,* 2002).

Deep ploughing with tractors, or beef traction as recommended for half a century in Africa, first improved crop yields and then the technical expertise of farmers. Now researchers have proved that ploughing each year accelerates the mineralization of soil organic matter (SOM), the formation of a sealing crust, the destruction of soil macro-aggregation, runoff rates and topsoil erosion. For over 10 years, researchers in Africa have tried to develop minimum or zero-tillage systems drilling seeds directly under a litter of crop residues or leguminous fallow. Similar systems, which are very efficient in the large 'haciendas' of Latin America, are difficult

to extend in Africa because the cattle breeding systems allow free grazing in extensive areas as soon as the grain yield is collected. There are also complications due to the local tradition of annual bush fires. Research data showed that these mini-tillage systems can be as efficient at limiting runoff and erosion as they are in the USA. However, maize yields can be low due to the compaction of sandy soils deficient in SOM, which are very common in Africa.

Large forest plantations have locally improved the water balance of the natural environment and significantly reduced erosion risks. Nevertheless, introduced species (pines and Eucalyptus) have led to the prohibition of grazing on these terrains. The reaction of local traditional cattle breeders has been to reject catchment scale reforestation. However, fruit trees cultivated in the cropped fields and agroforestry systems are better accepted by farmers and have significant positive impacts on topsoil fertility and SOM (Sabir and Roose, 2004).

The impact of (micro)-finance is essential to intensify cropping systems. This will enable farmers to fertilize their fields at the right time, to bring fertilizers, irrigation and other inputs to obtain profitable production levels and sufficient vegetal cover on the soil surface all year. At the level of techniques of evaluation of erosion risks, it is still necessary to locally validate the numerous models predicting runoff and erosion with regional measurements at different scales. If soil loss measurements are prolonged and costly, it is possible to test the local soil surface features that are the best indicators of runoff and erosion risks under simulated rainfall on local fields (Simonneaux, *et al.,* 2008; Cheggour *et al.,* 2008). With GIS, the interpretation of aerial images and indicators selected with the assistance of rainfall simulations, it is possible to spatialize erosion risks and the priorities for SWC actions (Roose and De Noni, 2004).

Plate 1. *Terraced field systems in Morocco.*

Conclusions

With its diversity of landscapes and aggressive climate, Africa is a remarkable area to study erosion processes and to quickly test convenient farming systems and water and soil management techniques on different slopes. Because of the hard pressure on food prices and demographic pressures, it is urgent to manage water, biomass and soil fertility in order to optimize both crop productivity and vegetal protection of the soil resource. Soil conservation alone is no longer sufficient!

Restaurer durablement les ressources en eau et en sol en Afrique (Projet de guest editorial de ESSC Newsletter)

Introduction

Alors que le monde subit une crise financière et économique sévère, la gestion des ressources en eau, en nutriments et en sol exige une évolution rapide pour réduire les abus de l'usage des ressources non renouvelables, pour protéger la diversité biologique et ralentir les émissions de gaz à effets de serre.

Or l'Afrique, soumise à une pression démographique, économique et politique sans précédant, souffre plus que d'autres régions (qui ont de meilleurs sols ou des conditions climatiques plus tempérées), de la dégradation du couvert végétal, de l'humus, de la fertilité des sols et du réseau hydrographique. Dés que les producteurs américains et européens cessent d'inonder le marché mondial de leurs excès de céréales pour produire des biocarburants, le prix des denrées alimentaires s'affole dans les pays en développement et on assiste aux protestations des pauvres incapables de se procurer le minimum vital: des famines, évitées depuis des décennies, réapparaissent dans les pays arides ou densément peuplés comme le Rwanda, le Burundi, le Soudan, le Tchad, l'Indes, le Bengladesh, le Mexique, le Sénégal, et une vingtaine d'autres pays.

A l'évidence, il n'est plus temps de «conserver les sols déjà épuisés». Qui accepterait d'investir de nombreuses journées de travail pour tenir en place des «terres dégradées» (mortes comme disent les paysans haïtiens) sans espoir d'en tirer des revenus acceptables, capables de nourrir la famille rurale et les citadins? Le temps est venu, et la crise va nous y forcer, où il nous faut lancer de nouvelles approches qui devront résoudre à la fois les problèmes liés à l'environnement rural, mais qui répondront aussi à l'espoir d'un monde meilleur où les paysans profiteront du fruit de leur travail, où les sols verront leur capacité de production améliorée en même temps que les eaux de surface seront maitrisées et utilisées pour alimenter les cultures, les populations et les usines. On notera que c'est généralement en temps de crise que, dos au mur, l'homme met au point des approches nouvelles de la gestion durable des ressources naturelles indispensables : qu'on se rappelle la Conservation de l'Eau et des Sols (CES) proposée en 1931 par Bennett pour réduire l'incidence négative de la mise en culture de la grande plaine américaine et de la DRS proposée dans le bassin méditerranéen au début de la guerre de 1939 – 45.

Les fruits de la recherche en Afrique ces 50 dernières années.

Les dangers de l'érosion et du ruissellement sont connus depuis longtemps en Afrique (lire «Afrique, Terre qui meurt» de J.P. Harroy, 1944). Mais la recherche sur la lutte antiérosive n'a débuté en Afrique que vers les années 1950 (colloques de Léopoldville, 1954, et Khartoum, 1965). Réalisées d'abord sur bassins versants et parcelles, puis sous pluies simulées, avec modélisation et SIG, les recherches ont bien montré le rôle de l'énergie des pluies (érosion en nappe) et du ruissellement (ravinement), l'importance majeure du couvert végétal et surtout des litières, la complexité du facteur topographique (la longueur et la forme, mais surtout l'inclinaison et la position dans le paysage en fonction des résurgences et de la rugosité de la surface du sol). Le travail du sol d'abord améliore l'infiltration, l'enracinement et la production, mais à plus long terme, accélère l'oxydation de l'humus, dégrade la structure du sol et le rend plus fragile et moins perméable. Finalement, le seul système de production qui améliore le

sol c'est la forêt multi spécifique, qui protège très efficacement le sol de l'énergie des pluies et du soleil grâce à sa canopée et surtout à sa litière: son enracinement profond récupère les nutriments entrainés au-delà des racines des cultures et dans la roche altérée. De ces observations sont nées les techniques du travail du sol réduit au minimum et du semis direct sous litière (maitrisée aux herbicides) combiné aux rotations avec des légumineuses herbacées à enracinement profond.

Les études récentes (IRD, FAO, WOCAT, Reij, etc.) ont montré l'échec des approches mécaniques de gestion des eaux de surface (terrassements, banquettes), des grands projets (top-down) parachutés depuis les grands organismes internationaux s'occupant de l'environnement rural. On dispose enfin de données chiffrées démontrant le faible impact de ces grands projets à la fois sur les transports solides, le rendement des cultures et la fertilité des sols (Roose *et al.,* 2006).

Evolution des stratégies de lutte antiérosive

Suite aux récents résultats de la recherche (rôle relatif de la pente et surtout des états de surface du sol), mais aussi aux enquêtes sur le rôle de l'homme, de sa culture (éleveurs, cultivateurs, semi-ruraux, nomades, etc.) et des conditions socio-économiques (disponibilité en crédits et en main d'śuvre), on s'est aperçu qu'il fallait non seulement changer de technique de gestion des eaux (capter le ruissellement sur les cultures ou dissiper leur énergie plutôt que tout infiltrer ou le concentrer dans des canaux), mais aussi associer le monde rural dès la phase de conception des projets en vue d'un développement durable.

Face à l'échec des approches technocratiques des grands projets de lutte antiérosive/ de conservation des sols, se sont développées des stratégies de développement rural intégrés (pas seulement en fonction d'un seul objectif) et participatifs tenant mieux compte des problèmes locaux de dégradation des terres et des eaux, de leur évaluation par les gestionnaires des terres, de leurs contraintes économiques, techniques ou sociologiques. En plus, en Afrique il faut tenir compte des problèmes fonciers: en effet la même terre peut appartenir à la communauté villageoise qui délègue les droits d'usage des arbres fruitiers aux femmes et la production annuelle au chef de famille qui l'a aménagé (plusieurs propriétaires sur une même terre). Enfin l'Etat prétend être propriétaire de toutes les terres non utilisées : il en résulte l'abandon de la jachère longue.

Après un demi-siècle de terrassements en vue de réduire la longueur des pentes (banquettes, etc.), on en est revenu à couvrir la surface des parcelles cultivées et à réduire le travail du sol pour garder une litière de résidus de culture. La pauvreté des paysans et les restrictions économiques poussent à favoriser le choix de techniques simples, progressives (cordons de pierres, haies vives, lignes d'arbres ou d'herbes), à objectifs multiples (buissons de légumineuses produisant du fourrage, du bois de chauffe et du paillage) plutôt que des admirables terrasses en gradins protégées par des murs de pierres dont l'aménagement exige beaucoup de travail (500 à 1000 jours de travail) et l'apport de matières organiques et minérales pour restaurer la productivité du sol. La pression foncière est telle que les ravines sont confiées à des paysans sans terre qui les stabilisent en les aménageant comme des jardins intensifs. On ne développe plus de structures antiérosives que si la gestion de la surface du sol et les systèmes de culture ne suffisent pas à maitriser le ruissellement.

Perspectives

Même si la communauté des chercheurs commence à maîtriser la diversité des

processus d'érosion et les facteurs qui modifient leur importance, il reste rare que les services de conservation des sols perçoivent toute la complexité des techniques de lutte antiérosive qui doivent tenir compte à la fois de l'hétérogénéité du milieu physique, des variations climatiques, des contraintes du milieu humain (niveau technique, disponibilité en main d'śuvre et en moyens financiers, traditions ethniques, proximité des marchés, etc.) et de l'historique des terres (dégradations passées, traditions de l'élevage). Chaque colline, chaque terre a ses exigences propres dont le paysan traditionnel s'efforce de tenir compte: or on peut observer à quel point les approches technocratiques sont pauvres en nuances (ex les équations qui ne tiennent compte que de l'inclinaison de la pente, à l'exclusion de la forme des pentes et des averses exceptionnelles, de la lithologie, des restrictions économiques et culturelles). La spatialisation des problèmes d'érosion à l'aide de SIG risque de satisfaire plus notre sens de l'esthétique (de jolies cartes en couleur) que notre désir de se rapprocher de la vraie diversité de la nature si on ne vérifie pas sur le terrain l'influence réelle de chaque indicateur de risque.

Il est par exemple clair que la pente en général a une influence majeure sur les risques d'érosion si le sol reste nu. En réalité en montagne, les transports solides les plus importants ne viennent pas des versants les plus raides (souvent protégés par des roches dures et/ou des forêts denses), mais des zones en pente douce mais sur roches argileuses, marneuses ou schisteuses, roches tendres se délitant facilement.

De même, il est difficile pour les techniciens de la CES de percevoir la complexité des interactions entre les facteurs physiques du paysage et les facteurs humains tels que la fixation récente de communautés d'éleveurs habitués à exploiter la biomasse sans aménagement du sol et à migrer dès que la situation s'est dégradée. Il serait souhaitable de développer des recherches sur les influences positives (fumier et transfert de nutriments) et négatives (compaction de la surface du sol, dégradation du couvert végétal, réduction de l'infiltration) de divers types de systèmes d'élevage sur les risques de ruissellement et d'érosion.

Le choix des techniques à mettre en śuvre demande qu'on évalue leur efficacité locale, leur acceptabilité par les bénéficiaires et leur rentabilité. Or les terrassements sont souvent moins rentables que l'intensification des cultures par la fertilisation et l'irrigation raisonnées (Zougmore, De Graaf). Si on peut observer de nombreuses terrasses en milieu semi-aride c'est que les propriétaires poursuivent d'autres objectifs que la lutte antiérosive (par exemple la sécurité foncière).

Les techniques traditionnelles de gestion de l'eau et de la fertilité des terres en montagne ont été adaptées durant des décennies à la diversité des circonstances climatiques, des milieux écologiques et humains. Elles ont été longtemps méprisées par les techniciens de la LAE, alors qu'elles peuvent apporter des informations précieuses sur les risques majeurs et les capacités des populations rurales à perfectionner des techniques complexes et coûteuses en travail. Certaines techniques très exigeantes en maintenance ont été abandonnées, non pas parce qu'elles ne sont pas efficaces mais par manque de main d'śuvre (émigration des jeunes) et faible rentabilité du travail. Pour les sauver il faut y introduire des cultures rentables et des techniques d'irrigation et de fertilisation raisonnées, tout en réduisant les travaux.

Le travail profond du sol à la charrue avec traction bovine ou tracteur qui a été préconisée pendant un demi-siècle par nos ainés a dans un premier temps relevé le niveau technique des paysans encadrés et les rendements, mais accéléré la minéralisation des MO du sol et

dégradé la structure des horizons labourés: la macroporosité entretenue artificiellement par la charrue, s'effondre à chaque saison des pluies, entrainant la création de croûtes de battance et l'augmentation du ruissellement. On tente depuis une dizaine d'années de mettre au point des systèmes de semis direct sous litière des résidus de culture ou de cultures intercalaires décalées de légumineuses. Ces systèmes si efficaces dans les grandes haciendas d'Amérique latine, ont du mal à s'installer en Afrique à cause des traditions d'élevage libre en saison sèche et des feux de brousse fréquents. Cependant, les recherches ont démontré localement que ces systèmes peuvent être aussi efficaces qu'ailleurs pour lutter contre l'érosion mais que les rendements en maïs souffrent de la compaction des sols sableux, pauvres en MO.

Les plantations forestières à grande échelle ont localement rétabli le fonctionnement hydrique du milieu naturel et réduit fortement les risques d'érosion. Cependant, les essences introduites et l'interdiction d'y faire paitre le bétail sur des terrains qui traditionnellement appartenaient aux tribus, ont entrainé le rejet de cette technique de gestion des bassins versants. Par contre la culture d'arbres fruitiers au milieu des terres cultivées (en céréales), et certaines formes d'agroforesterie sont bien mieux acceptées par les paysans et ont un impact non négligeable sur la fertilité et le stockage du carbone dans les horizons superficiels du sol (Sabir et Roose, 2004).

Le rôle de la micro finance est essentiel pour l'intensification des cultures permettant l'apport au bon moment des engrais, de l'irrigation et des autres intrants indispensables sous les tropiques pour obtenir des niveaux de production rentables et le couvert végétal couvrant bien le sol durant toute l'année. Au niveau des techniques d'évaluation des risques d'érosion, il est plus que jamais nécessaire de valider localement les innombrables modèles d'écoulements et d'érosion à partir de mesures locales à diverses échelles. Si les mesures de perte en terre sont longues et coûteuses en personnel, il est possible de tester sur le terrain quels sont les indicateurs de la surface du sol qui sont les plus efficaces pour prédire les

***Plate 2**. New woodland plantations and irrigated fruit cropping system, Asni, High Atlas Mountains, Morocco.*

risques de ruissellement et de transport solide sous pluies simulées (Simonneaux, Cheggour, Sabir, Roose, 2006). L'interprétation des images satellitaires ou aériennes permettent souvent de spatialiser les risques d'érosion et les priorités à donner à la LAE, à l'aide d'un SIG et de quelques indicateurs bien calibrés (Roose et De Noni, 2004).

Conclusions

L'Afrique, milieu diversifié aux climats très agressifs, nous parait particulièrement intéressante pour tester rapidement l'intérêt et les inconvénients de systèmes de culture et des techniques de gestion durable de l'eau, de la biomasse et de la fertilité des sols. Suite aux pressions sur les prix des productions alimentaires, il est urgent de dépasser la simple conservation des sols et de gérer en même temps la ressource en eau et la nutrition équilibrée des cultures.

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From the 'guest editorial' by Don Gabriels (Ghent, Belgium) (in ESSC Newsletter 2009/1 'Priorities in Research on Soil Degradation and Desertification' (page 5), we can quote:

More research?

"Grass-buffer strips, properly designed and placed at the foot of the slope, can stop off-site erosion. And here our colleague Roy Morgan is right: "any erosion control measure needs to be designed." We probably need more research (models?) for determining buffer strip dimensions. But does this mean that we have to wait until that problem is solved before putting in buffer strips? Do we have to wait for more research findings to make the 'optimum' medicine against one or other disease before trying other (less?) effective ones?

In Flanders, we have an 'Erosion Plan' and a 'Code for Good Farming Practise' and there are ways and means for controlling on-site and off-site erosion, with or without financial compensation for the farmer. One of the off-site erosion control measures is putting in **grass buffer strips.**

Buffer strips are not considered as on-site erosion control measures as such, unless they are placed within the field (Plate 1). When situated downslope of fields, they can collect runoff water and transported sediment with nutrients and other pollutants, such as pesticides, herbicides and insecticides.

Plate 1: *Grass buffer strip placed in the field cutting the slope length.*

Buffer strips have a seeded, planted or spontaneous grass vegetation and can have several metres width (Plates 2 and 3) depending on the length and steepness of the slope, but also on the tillage practise on the sloping field. Plate 4 shows a grass buffer strip at the bottom of a potato field tilled in the direction of the slope. Note: the width of the buffer strip is also in part determined by (x times) the width of the mowing machine.

Popular grasses used in Flanders are *Lolium multiflorum Lam., Lolium perenne L., Poa pratensis subsp.pratensis, Festuca rubra subsp.rubra, Arrhenatherum eliator* and *Dactylis glometara*. The latter is seeded on loamy soils in a mixture of, for example, 30% *Poa pratensis,* 20% *Lolium perenne,* 30% *Festuca rubra* and 20% *Dactylis glomerata.*

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Plate 2: *Combination of grass buffer strip and planted vegetation at the bottom of the slope.*

Plate 3: *Grass buffer strip and spontaneous vegetation at the bottom of a fallow field.*

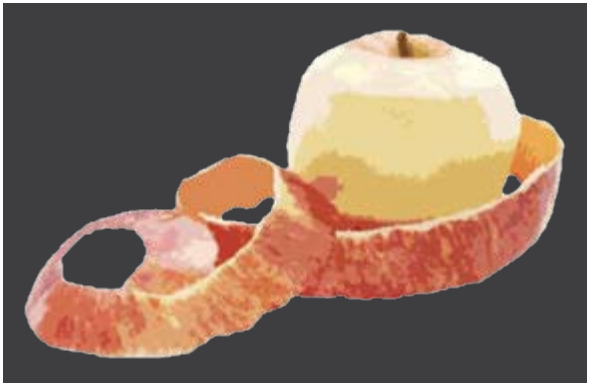
Plate 4: *Grass buffer strip at the bottom of a potato field.*

J.L. Rubio (2010). Soil. The forgotten resource. In: Biodiversity, Climate Change and You. European Environment Agency (EEA) Signals.

Web site: http://www.eea.europa.eu/signals/articles/soil

José Luis Rubio,
President of the European Society for Soil Conservation

Soil is a crucial link between global environmental problems such as climate change, water management and biodiversity loss



Soil is a limited resource

Pretend that this apple (1) is the planet Earth. Cut the apple in quarters and throw three of them away. The quarter apple left represents dry land. Fifty per cent of that dry land is desert, polar or mountains:* where it is too hot, cold or high to grow food. Cut the dry land quarter in half. Forty per cent of what remains is too rocky, steep, shallow, poor or wet to support food production. Cut this away and you are left with a very small piece of apple. Notice its skin, hugging and protecting the surface. This thin layer represents the shallow cover of soil on Earth. Peel it and you have some idea of how little fertile soil we depend on to feed our entire population. It must compete with buildings, roads and landfills. It is also vulnerable to pollution and the impacts of climate change. Soil often loses out. [* As you will read, much of the land that is unsuitable for food production is important in terms of soaking up CO_2].

SOIL: the forgotten resource. Why should I care about soil?

Dirt, mud, clay, earth, soil: we have many words for it but few do it justice. In today's virtual world many of us have, literally, lost our connection with the soil. But soil is the Earth's living skin, overlying the bedrock below and making life on Earth possible. Like air and water, soil is part of our life support system. Our ancestors had a much closer relationship with soil. Many of them would have worked with it every day. Then, as now, soil played a crucial role in supplying food. What was not understood in the past is the crucial role soil plays in climate change, serving as a huge, natural store of carbon.

Soil and carbon

Soil holds twice as much organic carbon as vegetation. Soils in the EU contain over 70 billion tonnes of organic carbon or around 7% of the total global carbon budget (2). More than half of the ground-stored carbon in the EU is held in the peat bogs of Finland, Ireland, Sweden and the United Kingdom. This figure is put in context when you think that EU Member States emit 2 billion tonnes of carbon every year from all sources. So, soils play a decisive role in climate change. Even a tiny loss of 0.1% of carbon from European soils emitted into the atmosphere is equivalent to the carbon emission of 100 million extra cars on the road. That is an increase of about half the existing EU car fleet.

Soil organic matter

The key substance in the relationship between soil and carbon storage is 'soil organic matter' (SOM). This is the sum of living and dead matter in soil and includes plant residues and micro-organisms. It is an extremely precious resource that performs essential functions for both the environment and economy, and it can do so because it is a whole ecosystem at a microscopic scale.

SOM is a major contributor to soil fertility. It is the elixir of life, particularly plant life. It binds nutrients to the soil, storing them and making them available to plants. It is the home for soil organisms, from bacteria to worms and insects, and allows them to transform plant residues, and hold onto nutrients that can be taken up by plants and crops. It also maintains soil structure; thereby improving water infiltration, decreasing evaporation, increasing water-holding capacity and avoiding soil compaction. In addition, SOM accelerates the breakdown of pollutants and can bind them to its particles, so reducing the risk of run-off.

By photosynthesis, all growing plants absorb CO_2 from the atmosphere to build-up their own biomass. However, just as we see the plant grow above the ground, a hidden growth of similar magnitude takes place beneath the surface. Roots release various organic compounds continuously into the soil, feeding the microbial life. This increases biological activity in the soil and stimulates the breakdown of SOM, so that mineral nutrients are released, which plants need to grow. It also works in the opposite direction: some carbon is transferred into stable organic compounds that lock the carbon and keep it out of the atmosphere for hundreds of years.

Depending on a farmer's management practises, soil type and climatic conditions, the net result of the biological activity can be either positive or negative for SOM. Increasing SOM creates a long-term sink for carbon from the atmosphere (in addition to other benefits). Decreasing SOM content means that CO_2 is emitted and, thus, our management practises have added to total man-made emissions. So, how we use land has a huge impact on how soil deals with carbon (C). Crucially, soil releases C when grasslands, managed forest lands or native ecosystems are converted to cropland.

Deserts move to Europe

The process of 'desertification'- whereby viable, healthy soil is drained of nutrition to the extent that it cannot support life and may even blow away - is a very dramatic illustration of one of the issues facing soil across Europe.

"The natural conditions: aridity, variability and torrential nature of rainfall, vulnerable soils, together with the long record of past and present human pressure, mean that large

parts of southern Europe are being affected by desertification" says José Luis Rubio, President of the European Society of Soil Conservation and Head of the Soil Research Unit of the University of Valencia and the City of Valencia (Spain).

In southern, central and eastern Europe 8 % of the territory, about 14 million hectares, currently show high sensitivity to desertification. This increases to over 40 million hectares if moderate sensitivities are included. The most affected European countries are Spain, Portugal, southern France, Greece and southern Italy (3).

The gradual degradation of soil by erosion, loss of organic matter, salinization or destruction of its structure is transmitted to the other ecosystem components (water resources, vegetation cover, fauna and soil micro-organisms) in a spiral mechanism, which eventually creates a desolate and barren landscape.

"It is often hard for people to understand or even see the consequences of desertification because, in general, these occur hidden and unnoticed. However, their environmental impact on agricultural production, increased economic costs by floods and landslides, their impact on the biological quality of the landscape, and the overall impact on the stability of the terrestrial ecosystem, means that desertification is one of the most serious environmental problems in Europe" says Professor Rubio.

Protecting Europe's soil

Soil is a key and very complex natural resource, yet we are increasingly ignoring its value. EU law does not address all the threats in a comprehensive way and some Member States lack specific legislation on soil protection. The European Commission has been developing proposals for soil policy for many years. Several Member States regard them as controversial, however, and policy development has stalled. As a result, soil is not protected in the same way as other crucial elements, such as water and air.

Focus: For peat's sake

Peatland ecosystems are the most efficient C store of all terrestrial ecosystems. Peatlands cover only 3% of the world's land area but contain 30% of all global soil C. That makes peatlands the most efficient long-term carbon store on earth. However, human interventions can easily disturb the natural balance of production and decay, turning peatlands into net C emitters. Current CO_2 emissions from peatland drainage, fires and exploitation are estimated to be at least 3000 million tonnes a year: equivalent to over 10% of global fossil fuel emissions. The current management of peatlands is generally unsustainable and has major negative impacts on biodiversity and climate (4).

Did you know?

Soil is formed from rocks and decaying plants and animals (2).

Soil and the plants growing there capture about 20% of global CO_2 emissions (2).

Soil helps clean the water we drink and the air that we breathe; for free! (2).

As much as five tonnes of animal life can live in one hectare of soil (2).

Healthy soil reduces the risk of floods and protects underground water supplies by neutralizing or filtering out potential pollutants (2).

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Laboratory of Environmental Geomorphology and Land Degradation of the Federal University of Rio de Janeiro (Brazil): History, Research Themes and Achievements

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Introduction

This article outlines the work of the 'Laboratory of Environmental Geomorphology and Land Degradation' (LAGESOLOS), which is part of the Geography Department, Institute of Geosciences, Federal University of Rio de Janeiro, since its foundation in 1994 to present. Throughout these years, several research projects have been carried out, all of them within four main research themes: soil erosion and mass movements; environmental geomorphology and integrated landscape analysis; soil micromorphology; and soils and water contamination. The research on these issues has been carried out in different parts of Brazil. These include: Petrópolis, Macaé, Jacarepaguá and Grumari (Rio de Janeiro State); Sorriso and Cáceres (Mato Grosso State); Natal and Parnamirim (Rio Grande do Norte State); Recife (Pernambuco State); Manaus and Coari (Amazonas State); Palmas (Tocantins State); Açailândia and São Luís (Maranhão State); and the electricity transmission line between Mimoso and Campo Grande (Mato Grosso do Sul State).

Through environmental monitoring and analyses of soil and river systems it has been possible to evaluate the time-space evolution of different erosion and deposition processes, both on slopes and in rivers. Furthermore, monitoring allows us to assess the role of factors related to soil degradation, on both the slope and catchment scale, such as: erodibility (chemical and physical properties), and rainfall erosivity.

History

LAGESOLOS has its historical roots with the creation of the 'Research Group on Soil Erosion and Mass Movements,' at the Geography Department, Geosciences Institute, Federal University of Rio de Janeiro, in 1991. Initially it was named 'Laboratory of Experimental Geomorphology and Soil Erosion,' because at that time, the main research topic was soil erosion, surveyed with the help of several experimental stations in different parts of Brazil.

The founder and Co-ordinator of LAGESOLOS was and remains Professor Dr Antonio Jose Teixeira Guerra. 'Tony' completed his Ph.D. at King´s College, University of London (UK), between 1986-1991, on soil erosion ('Soil characteristics and erosion, with particular reference to organic matter content') and his Post-Doctoral Fellowship was undertaken at the University of Oxford (UK) on rill formation. Today LAGESOLOS has around 40 members, including: undergraduates, trainees, M.Sc. students, Ph.D. students, associate researchers, and three additional Co-ordinators (Dr Monica Marçal (Lecturer at the Federal University of Rio de Janeiro), Dr Antonio Soares da Silva (Lecturer at the State University of Rio de Janeiro) and Dr Rosangela Botelho (Geographer at the Brazilian Institute of Statistics and Geography). Some of the LAGESOLOS members are lecturers or researchers in other Brazilian Universities and Research Institutes.

Research on soil erosion and land rehabilitation has been conducted in several Brazilian municipalities, such as: Petropolis (Rio de Janeiro State), Sorriso and Cáceres (Mato Grosso State), Manaus and Coari (Amazonas State), Natal and Parnamirim (Rio Grande do Norte State), Açailandia and São Luís (Maranhão State), Macaé and Jacarepaguá (both Rio de Janeiro State). Nowadays LAGESOLOS has four research themes. The first is co-ordinated by Antonio Guerra and is on soil erosion, mass movements and land rehabilitation, mainly in Petropolis, São Luís and Macaé (Plate 1). The second research theme is co-ordinated by Dr Monica Marçal and is related to fluvial and applied geomorphology in the Macaé Catchment, in Macaé Municipality. The third research theme is led by Dr Antonio Soares da Silva, on soil micromorphology and soil contamination within Rio de Janeiro State. The fourth research theme is co-ordinated by Dr Rosangela Botelho, on drainage basin environmental planning in different Brazilian municipalities. Nowadays, the Laboratory has several current research projects, with financial support from bodies such as CNPq (Brazilian Agency for Scientific Development), FAPERJ (Rio de Janeiro State Foundation for Research Development) and the European Union (EU).

Between 2005 and 2009 LAGESOLOS has conducted a research project in São Luís City, (Maranhão State), supported by the EU. We have monitored several urban gullies, and we have selected one of them to be rehabilitated, in Sacavém District, in February 2008. We have employed local people to make 3,000 Buriti mats (Plate 2), and people to rehabilitate the gully. This Project has provided data and involved a team of undergraduate and postgraduate students. Currently, three undergraduates have finished their final essays and two MSc dissertations and one Ph.D. thesis has been completed. A further Ph.D. thesis is near completion.

Plate 1. *Land degradation in the Macaé Catchment (photos: Antonio J.T. Guerra).*

Research themes

LAGESOLOS has several research themes, including:

- Soil erosion and mass movements in Brazil.
- Environmental geomorphology and integrated landscape assessment.
- Soil micromorphology, soils and water contamination.
- Urban gully assessment and rehabilitation in São Luis City (Maranhão State).
- The dynamics of slope-floodplain geomorphological systems in the Macaé drainage basin (Rio de Janeiro State).
- Micro-drainage basin environmental planning.
- Soil erosion assessment, across ELETROSUL energy transmission lines, in Mato Grosso do Sul State.

Another LAGESOLOS target is to survey and classify soils and assess their erodibility. This task has already been carried out in: Petrópolis (Rio de Janeiro State), Sorriso and Cáceres (Mato Grosso State), Açailândia and São Luís (Maranhão State), Manaus and Coari (Amazonas State), Natal and Parnamirim (Rio Grande do Norte State), Palmas (Tocantins State), Campo Grande and Mimoso (Mato Grosso do Sul State), Recife (Pernambuco State) and Macaé (Rio de Janeiro State) (Figure 1). Mapping soil types, erosion features and erosion risk are also LAGESOLOS aims, to offer Brazilian municipalities this understanding, so that they complete preventative works.

The beginning of the rehabilitation work.

Partial view of the protected soil surface, with Buriti geotextiles.

People fo Sacavém Community and Borassus Project Researchers in Brazil.

Partial view of the rehabilitation gully with grass cover, one month after rehabilitation work.

Plate 2. *BORASSUS Project rehabilitation of Sacavém Gully in São Luís City (Maranhão State). Photos by Fernando Bezerra.*

Scientific production

During the lifespan of LAGESOLOS (1994 – present), 91 works have been completed (Figure 2) and 20 are in progress (Figure 3). The scientific production presented in this article is divided into four categories. These are: (1) Ph.D. theses, M.Sc. dissertations and monographs, (2) Books, (3) Articles and (4) full papers published in Conference Proceedings. The Ph.D. and M.Sc. dissertations and monographs concluded in the period 1994-2009 are both theoretical and applied topics and are concerned with soil erosion, land degradation and rehabilitation, fluvial geomorphology and mass movements.

To date, 18 books have published. These correspond to different topics, organized by Antonio Guerra, Monica Marçal, Antonio Soares da Silva and Rosangela Botelho. We have divided them into several categories. These include Geography Atlases (2); Dictionaries (3); Geographical Texts (1); Geomorphology (3); Legislation and Environmental Impacts (6); Conservation Areas (1); Philosophy in Physical Geography (1); and Soil Erosion and Conservation (1) (Figure 4). All these books are now between their 2nd and 9th Editions.

In the last 10 years, 29 articles have been published (Figure 5). Ten articles have been published in international journals and 19 in Brazilian journals. These articles have been divided into several categories (Figure 6). In addition, to date, we have published 85 papers in Conference Proceedings (Figure 7).

Figure 1. *LAGESOLOS research sites.*

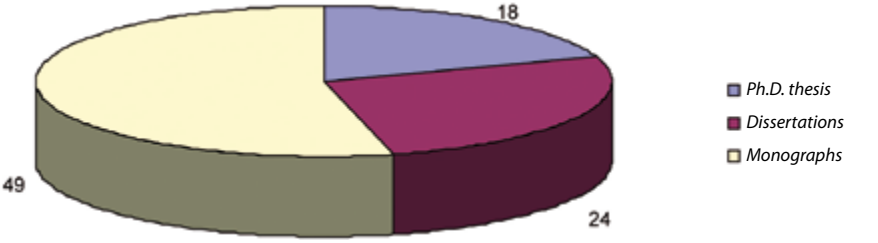

Figure 2*. Ph.D. theses, M.Sc. dissertations and monographs concluded in the period 1994 – 2009.*

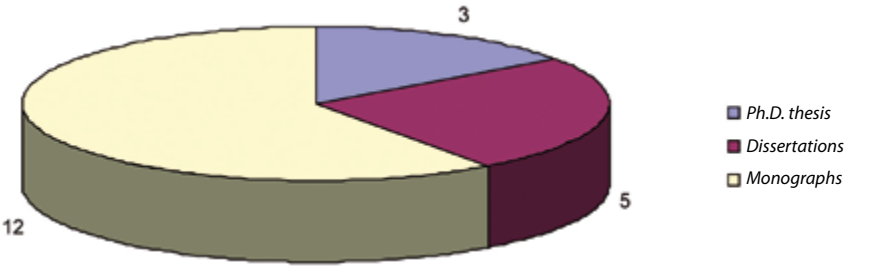

Figure 3. *Ph.D. theses, M.Sc. dissertations and monographs in progress.*

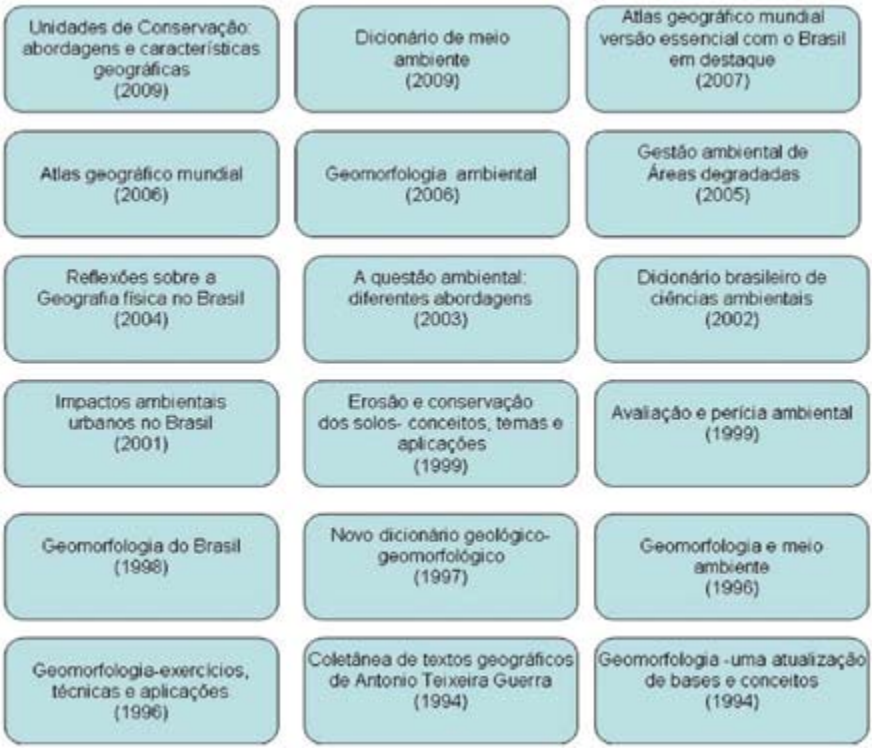

Figure 4. *Book Editions.*

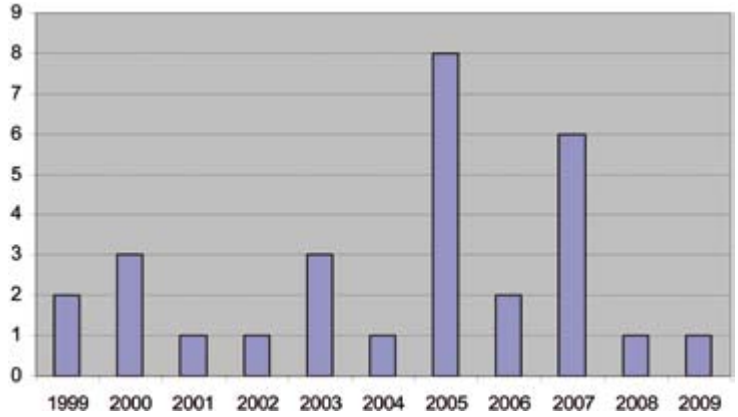

Figure 5. *Number of articles published in international and national journals, between 1999 and 2009.*

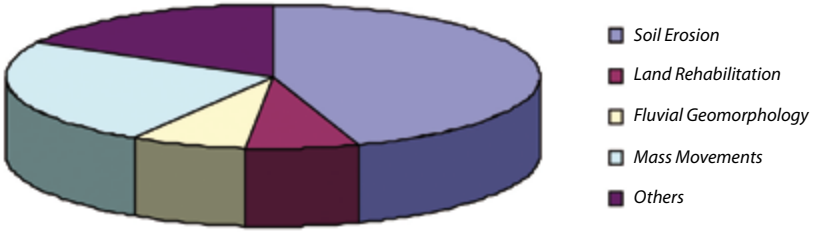

***Figure** 6. Topics addressed in published articles.*

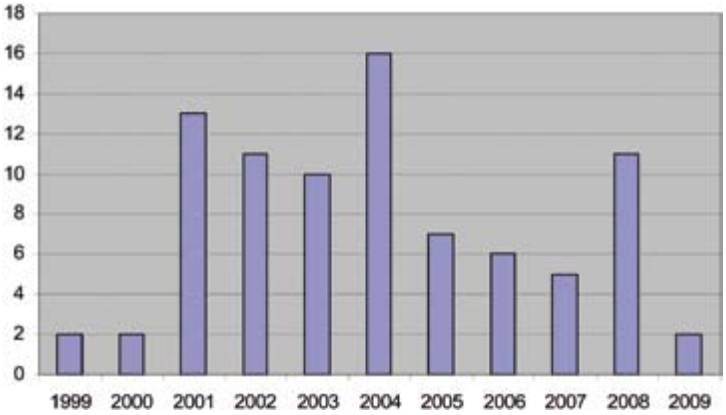

***Figure 7.** Full papers published in national and international Proceedings.*

Perspectives and challenges

Besides scientific production, LAGESOLOS also pursues the continuity of national and international agreements, aiming to develop research and applied projects related to these issues. We welcome open discussion with potential research partners.

For further information, please visit the LAGESOLAS web site: www.lagesolos.ufrj.br

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The Newsletter and supporting Ph.D. research

Editor's note:

At the ESSC Council meeting in Lleida (Spain) in September 2006, the interactions between the ESSC and younger soil scientists were discussed (see Newsletter 2006/3, p. 5-8). It was decided that the ESSC should be more proactive in its support of younger scientists. As part of that initiative, we welcome articles from both Ph.D. researchers and supervisors. We would like to hear from recent Ph.D. graduates; what advice and experience do you have which you would like to share with your colleagues in earlier stages of their research? We would also like to hear from current Ph.D. researchers; what are the factors which both encourage and limit progress? What are the particular challenges facing part-time Ph.D. researchers? We also invite contributions from experienced Ph.D. supervisors. What experience would you like to share with less experienced colleagues? If you are a less experienced Ph.D. supervisor, what supervisory issues do you find challenging? In short, please tell us "what I know now, which I wish I knew then!

Editor's note:

The citation details of Ph.D. theses by ESSC members since and including 2004 have been added as an additional page to the ESSC web site. To date, 49 Ph.D. theses are quoted. On the ESSC web site, please look under 'Publications.' Please forward the citation details of any additional Ph.D. thesis completed since the year 2000 by an ESSC member to any of the Editorial team. We will then add the thesis citation details to the web site.

Recent publications by ESSC members

Included are the citation details of papers and books produced by ESSC members. These provide a growing resource for exchange of valuable information to both research and teaching. The cumulative citation list is being added to and updated on the ESSC web site. Students of ESSC members (both undergraduate and postgraduate) are increasingly accessing this facility in their literature searches. Currently, the number of quoted publications cited on the web page is 525. Please e-mail the citation details of papers in international refereed journals since and including the year 2000 to any member of the Editorial team.

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In Memoriam:
Professor William (Bill) Moldenhauer (1923-2010), R.I.P.

It is with great regret that we must report the passing of Professor William (Bill) Moldenhauer (27/10/1923-21/05/2010). William C. Moldenhauer (86), of Brookings, South Dakota, USA, died on Friday 21 May 2010 at Sanford Foundation Cottage in Sioux Falls, South Dakota. Professor Moldenhauer was a distinguished scientist of global stature.

William C. Moldenhauer was born on 27 October 1923 in New Underwood, South Dakota, the son of Calvin Fredrick and Ida (Killam) Moldenhauer.Bill graduated from New Underwood High School in 1941. He then graduated from South Dakota State University in 1949 with a degree in Agronomy. He married Catherine Ann Maher on 26 November 1947, in Brookings, South Dakota. In 1953, Bill received his Ph.D. from the University of Wisconsin.

Bill Moldenhauer was one of the founders of the World Association of Soil and Water Conservation (WASWAC), former President of the Soil and Water Conservation Society (when it was the Soil Conservation Society of America), and the First Director of the USDA-ARS National Soil Erosion Research Laboratory in Lafayette, Indiana. Bill served in the United States Army during World War II and on General MacArthur's staff in Guam and The Phillipines. Bill spent his retirement years in rural Minnesota.

Bill Moldenhauer with friends (Chi-Hua Huang, Donald Gabriels and Stan Livingston).

Bill was a member of the St Thomas More Catholic Church in Brookings, The Knights of Columbus and the Volga Burrows-Young American Legion. Bill especially enjoyed writing poetry. He had a ready smile for everyone and enjoyed life wherever he was.

Bill is survived by his three daughters; Jean Ann Cash, Patricia (Alan) Bortnem and Barbara (Rick); two sons; James (Renee) and Thomas; seven grandchildren (Jason, Angie, Nick, Lora, Stef, Drew and Allison); one brother (LeRoy); three sisters (Pauline, Mary, and Fern) and many nieces and nephews. He took great joy in his great grandchildren (Sydney, Ryen, Sabren, Greyson, Emily, Emersyn, Clover and Hayes). Bill was preceded in death by his parents and his wife, Catherine Maher Moldenhauer, and two brothers, George and Glen.

In Memory of William, his family would like to request that relatives and friends do something loving and generous for your neighbours in need.

Dr Chi-hua Huang
USDA-ARS National Soil Erosion Research Laboratory
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West Lafayette
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USA

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Editor's note

Top scientific award for Dr Ranjan Bhattacharyya (World Association for Soil and Water Conservation (WASWAC) Asian Scientist of the Year, 2009)

Many ESSC members will remember Dr Ranjan Bhattacharyya. Ranjan won an ESSC Scholarship to attend the ESSC Congress in Palermo in June 2007 and played a very active role in the Congress. We are delighted to announce that Ranjan has been named 'Asian Scientist of the Year 2009' by the World Association of Soil and Water Conservation (WASWAC). This was awarded by the WASWAC Election Committee, who met to deliberate nominations at their meeting in Tokyo in November 2009.

Ranjan is a scientist of the Vivekananda Institute of Hill Agriculture (VIHA) in Almora (India). He was awarded his Ph.D. degree by the University of Wolverhampton (UK) in September 2009. He was selected for the WASWAC Award on the basis of his scientific contributions to soil and water conservation in the Indian Himalayas.

Ranjan said: "I was amazed, but also delighted to have won this award. The award reflects the hard work I put in, but it is also a testament to the academic and

emotional support I received from so many staff of the VIHA and from the University of Wolverhampton."

Ranjan was nominated for the award by Professor Mike Fullen. Mike said: "Ranjan is an excellent, dedicated and hard working researcher. I am confident his work will make a valuable contribution to soil conservation in Asia and beyond."

Mike was the Director of Studies of Ranjan's Ph.D. programme and Dr Colin Booth (from the School of Engineering and the Built Environment, University of Wolverhampton) was co-supervisor. Ranjan's research formed a major contribution to the EU-supported BORASSUS Project. Ranjan received a Ph.D. studentship from 2006-2009 from the BORASSUS Project to pursue his Ph.D.

The WASWAC Asian Network bestows the Asian Scientific Award on an individual in Asia who has made a remarkable contribution to research or the implementation of soil and water conservation in Asia.

On behalf of the ESSC, we offer our sincere congratulations to Ranjan on his excellent success. Although Ranjan's work is now focused on the Indian Himalayas, we are confident Ranjan will actively engage with his European colleagues and we know he is very keen to promote Indian-European collaborative research.

Well done, Ranjan!

E-mail: Ranjan_vpkas@yahoo.com

Ranjan presenting his research poster to Mr. Rob Marris M.P. (Member of Parliament for Wolverhampton South-West, UK) at the 'Science and Technology' Exhibition in the House of Commons (UK Parliament) in Westminster, London, in March 2008.

Web Based Bulletin Board

The ESSC wishes to rapidly disseminate information to its members. Please forward information to the ESSC web site to be placed on our ESSC Bulletin Board. These could include searches for potential collaborators for research proposals, calls for research proposals, job opportunities, research studentship opportunities, impending conferences and other items of important information for rapid dissemination. Of course, we will also continue the regular circulation of information via our Newsletter. The ESSC web site is:

http://www.essc.sk

ESSC membership list and contact details

The full ESSC membership list is held on the ESSC web site. Under 'members' you can obtain a full listing. Also under 'members' you can click on any member country and find a listing of members in the selected country.

We are trying to keep the membership list on the web site up-to-date. Please check your details and let us know if there are any necessary correction(s). If your details change, also please let us know. Some members have requested that we do not add their e-mail addresses to the web site, to avoid uninvited 'spam' e-mails. Of course, we respect this request. Therefore, while we retain a list of the e-mail addresses of ESSC members, this list will not be available on the web site.

Editorial matters in Bratislava are handled by Ida Kurincová Kriegerová. In terms of membership lists, contact details and the ESSC web site, please send updated information to Ida at:

E-mail: i.kriegerova@vupop.sk

Please also use and refer to the **'Directory of European Organizations and Persons Working on Soil Protection'** as a reference source for European colleagues, both members and non-members of the ESSC. This publication contains the e-mail addresses of most ESSC members and will be subject to periodic updates. The reference citation is:

Rubio, J.L., Imeson, A.C., Bielek, P., Fullen, M.A., Pascual, J.A., Andreu, V., Recatala, L. and Ano, C. (2006). **Directory of European Organizations and Persons Working on Soil Protection.** Soil Science and Conservation Research Institute, Bratislava, 190 pp. (plus CD-Rom).

FIRST ANNOUNCEMENTS

International Workshop on Soil and Water Conservation Models at Different Scales, Baeza (Spain), 27-29 September 2010

OPTIMIZING AND INTEGRATING PREDICTIONS OF AGRICULTURAL SOIL AND WATER CONSERVATION MODELS AT DIFFERENT SCALES

This Workshop is aimed at improving our understanding of the inter-related issues of land degradation, agricultural performance and the effects of soil and water conservation measures.

The Workshop will bring together scientists that work with predictive models and scientists that are active in gathering field data and information on the spatial variability of environmental factors (e.g. soil and climate). Special attention will be devoted to:

(i) Optimization of models for soil and water conservation.
(ii) Integration of models with field data.
(iii) Scale issues.

Some 17 international leaders in this field are invited as speakers. Additional contributions are invited in poster format. The number of participants is limited.

Venue
Baeza (Spain), 27-29 September 2010.

Registration cost
€325 euros, including lodging in university residence and meals.

For more information and registration, please see:
http://www.unia.es/content/view/798/537/
http://www.unia.es/images/stories/workshops/Medio_Ambiente/poster20101.jpg

or contact Dr Tom Vanwalleghem
E-mail: eag2vavat@uco.es

International Conference on Combating Land Degradation in Agricultural Areas and the First Annual Councillor Meeting of WASWAC (LANDCON1010)

Invitation

You are cordially invited to participate in the 'International Conference on Combating Land Degradation in Agricultural Areas' and the First Annual Councillor Meeting of WASWAC (LANDCON1010) to be held in Xi'an, Shaanxi Province (China) from 11 – 15 October 2010.

Land is the foundation of human survival and development, but land degradation is intensifying in many parts of the world because of unreasonable land use and global climate change. According to the FAO (2008), 1.5 billion people, or a quarter of the world's population, depend directly on land that is being degraded. Land degradation can induce the deterioration of the ecological function and productivity of land directly through such processes as soil erosion, desertification, salinization and loss of biodiversity. Furthermore, land degradation is threatening socio-economic and cultural development at regional and global scales.

Fortunately, increasing attention has been paid in combating land degradation all over the world. Examples include the soil and water conservation engineering projects in the Upper and Middle Reaches of the Yellow River since 1980 and the 'Grain for Green Project' of China, the ACIAR-AusAID Landcare Project in Australia, the GEF UNEP/FAO Program on Land Degradation Assessment in Dryland Areas (LADA) and EU FP6 Integrated Project on Desertification Mitigation and Remediation of Land (DESIRE).

We sincerely hope that you will join us in making LANDCON1010 a success. We look forward to welcoming you to LANDCON 2010 and Xi'an, China.

THEMES

Situation and evolution of land degradation.
Mechanisms and driving factors of land degradation.
Control measures of land degradation.
Evaluation of land degradation and land management of the environment.
Land degradation and regional social-economic sustainable development.
Effect of global change on land degradation.

ORGANIZATION

1 Initiative organizations

World Association of Soil and Water Conservation (WASWAC).
Soil and Water Conservation Society of China (CSWCS).

2 Sponsors

Chinese Academy of Sciences (CAS).
Ministry of Water Resources, China (MWR).
Shaanxi Provincial People's Government.

3 Host

Institute of Soil and Water Conservation, CAS and MWR.

DATE AND VENUE
Dates: 11-15 October 2010.
Venue: Xi'an, Shaanxi Province, P.R. China.

SECRETARIAT
Secretariat of LANDCON 1010
Address: Institute of Soil and Water Conservation, CAS & MWR.
Xinong Road 26, Yangling, Shaanxi Province, China
Post Code: 712100
Secretary General: Professor Guo Binliu, Deputy-Director of ISWC, CAS and MWR.
E-mails: landcon1010@ms.iswc.ac.cn, landcon1010@gmail.com
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Please submit Annex 1 and 2 as soon as possible.
Annex 1: Participant Feedback of LANDCON1010.
Annex 2: Format of abstract.

Annex 1:
World Association of Soil and Water Conservation (WASWAC), International Conference on Combating Land Degradation in Agricultural Areas (LANDCON1010)

Participant Feedback

Name	*(Given name, middle name and Surname)*
	Male ❑ Female ❑
Title and position	
Work unit	*(Name of Organization or Institute) (abbreviation)*
Research field (3 maximum)	
Address (Post code)	
Telephone	
Mobile phone number	
Fax	
E-mail	
Note	

Please e-mail or fax (Note *Landcon1010,* please) to Secretariat of LANDCON 1010: landcon1010@ms.iswc.ac.cn, landcon1010@gmail.com.

Annex 2

Please use Word for Windows (Microsoft) to prepare your abstract using size A4 paper with 2.5 cm margin on each side and with a fix 18pt row space.

(Delete information above before you submit it, please!)

Title of the Paper
(16pt Times New Roman, Bold, Centred)

(One blank line)

Author 1 name, Authors 2 name, etc

(12pt Times New Roman, centred)

Author's title, Department, University, City, Post zone number, Country (12pt Times New Roman, centred)

(One blank line)

Abstract (12pt Times New Roman, Bold, Left)

(1) Use single spaced, 12pt Times New Roman for your text.

(2) Manuscripts should be written in English and maximum 200 words in length.

Keywords (12pt Times New Roman, Bold, Left):

Write your keywords (5 words max.) here with 12pt Times New Roman.

International Soil Conservation Conference (ISCO 16), Santiago, Chile, 8-12 November 2010

Dear Colleagues

Following up on my earlier communications, I am pleased to inform you that the 16th International Soil Conservation Conference (ISCO 16), scheduled for 8 – 12 November 2010 in Santiago, Chile, has now established an active website with most of the information needed by potential contributors and participants.

Please visit: http://www.iscochile2010.cl/

for pertinent details, and inform your associates, colleagues and ISCO friends accordingly. Expedient publicity in your organization's bulletins and newsletters will be particularly appreciated.

I urge you to participate in this very timely Conference and look forward to seeing you in Santiago.

With best regards,

Samir

Samir A. El-Swaify
Co-ordinator, ISCO Board of Directors
Emeritus Professor
Director, HAWAII-IRAQ Higher Education Partnerships
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College of Tropical Agriculture and Human Resources
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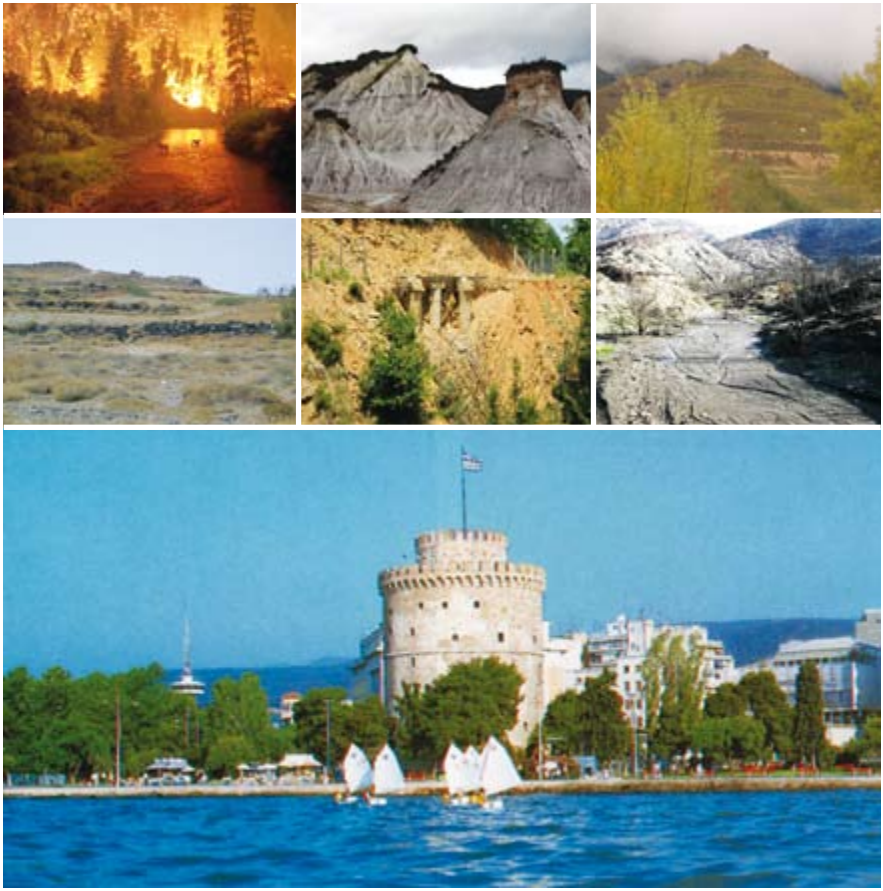
http://manoa.hawaii.edu/kahead/
http://www.ctahr.hawaii.edu/nrem/expt/staff/elswaify.html
http://www.hawaii.edu/ahead/

THIRD AND FOURTH ANNOUNCEMENTS

EUROPEAN SOCIETY for SOIL CONSERVATION

6TH INTERNATIONAL CONGRESS OF THE EUROPEAN SOCIETY FOR SOIL CONSERVATION

"Innovative Strategies and Policies for Soil Conservation"



9-14 May 2011

NAGREF

EUROPEAN SOCIETY for SOIL CONSERVATION

Dear Colleagues

On behalf of the Organising Committee, I have the pleasure to invite you to the **6th International Congress of the European Society for Soil Conservation entitled *"Innovative Strategies and Policies for Soil Conservation".*** This event will be held in Thessaloniki, GREECE, from 9-14 May 2011. It is a golden opportunity to participate at a major scientific event where the latest research findings and scientific and technological developments will be presented in numerous thematic fields. Special focus is given in the multi-disciplinary coverage of the selected themes to be covered by the Congress and you are invited to honour the scientific sessions with your contribution. Scientists from all over the world will be participating in a scientific forum to deliver the state-of-the-art in the selected scientific themes, meet with old colleagues, make new friends and start new co-operations.

Thessaloniki is at the crossroads between East and West; a marvellous seaside city with quaint historic districts, museums, cultural heritage, night life, transportation infrastructure and good connection with other European countries and Athens. The blend of high quality scientific sessions with what the host city and its surroundings have to offer will ensure that your participation will be a memorable one. We do hope you will take this opportunity to contribute to the overall success of this Congress and invite you to fill in the attached pre-registration form. Details of the Congress will be soon available through the official web site of the Congress and the circulars that will be posted to all pre-registered participants.

Please visit: www.esscthessalonikicongress.gr.

We look forward to seeing you in Thessaloniki

Dr Theodore Karyotis

President of the Organizing Committee

THEMATIC Sessions

1. Policies and thematic strategies for soil protection.
2. Soil mapping and land evaluation for land use planning.

PRE- REGISTRATION FORM

"Innovative Strategies and Policies for Soil Conservation"
9-14 May 2011
GRAND HOTEL PALACE***, Thessaloniki, GREECE**

First Name	
Surname	
Organization	
E-mail address	
Telephone Number	
Contact Address	
I intend to present a paper(s) under thematic unit(s)	
I will probably participate without a presentation	

Please complete the congress pre-registration form and send it by e-mail to karyotis@nagref.gr or karyotis@hellasnet.gr

Please visit the new official Congress website: **www.esscthessalonikicongress.gr.**

1. Forest fires impacts on natural resources.
2. Sustainable management of wetlands.
3. Policies and strategies for combating desertification.
4. Socio-economic aspects of land degradation.
5. Soil and water management under global climatic change scenarios.
6. New generation biofuels and their environmental effects.
7. Conservation and management of soil biodiversity.
8. Restoration and remediation of degraded lands.
9. Special session on 'Education in soil conservation and public awareness.'

Welcome to Thessaloniki

Articles, reports, letters, views or comments on any aspect of soil erosion and conservation in Europe are always welcome.

We invite proposals for special thematic issues of the Newsletter. We also welcome any comments on the ESSC Newsletter and suggestions on how it can be improved and developed.

Do not forget to send in your details of the following information:

(i) Reviews of recent conferences.
(ii) Recent grant awards.
(iii) The citation details and abstracts of completed Ph.D. and M.Sc. theses.
(iv) Newly enrolled Ph.D. research students, title of their research topic and names of research supervisors.
(v) Recent staff institutional movements/promotions.
(iv) A reference list of your 'new' international refereed scientific journal papers, which have been published recently (since and including the year 2000).
(v) At the ESSC Council at Průhonice (Czech Republic) in June 2009, it was agreed that the Newsletter will present a series of national reports on soil erosion and soil conservation activities in individual European countries. If you would like to volunteer a contribution, please contact any member of the Editorial team.

Send these details to either:

Professor Mike Fullen: m.fullen@wlv.ac.uk
or
Dr Colin Booth: c.booth@wlv.ac.uk
and they will include this information in the next issue.

PLEASE NOTE:
We publish four Newsletter issues per year. The deadlines are:
10 January; 1 April, 1 July and 1 October.

Some Closing Thoughts:

"Think truly, and thy thoughts
Shall the world's famine feed;
Speak truly, and each word of thine
Shall be a faithful seed;
Live truly, and thy life shall be
A great and noble creed."

(Horatio Bonar)

"No organization, no matter how adroit, can make money from a poisoned population and a dead planet" ; *(Rob Holdway, 2010)*

"Because you are inseparably linked to everything, you cannot afford to foul the planet's air and water. But at a deeper level, you cannot afford to live with a toxic mind, because every thought makes an impression on the whole field of intelligence. Living in balance and purity is the highest good for you and the Earth" *(Deepak Chopra, 1993)*

"Accuracy in building words and sentences is the highest form of architecture in civilization"
(Charles F. Haanel, 2008 Edition)

"Truly, it is in the darkness that one finds the light, so when we are in sorrow, then this light is nearest of all to us" *(Meister Eckhart)*

"The longer we dwell on our misfortunes, the greater is their power to harm us"
(Voltaire, 1694-1778)

"Unless a butterfly struggles to break free, it will never fly" *(John Gray, 1999)*

"See every difficulty as a challenge, a stepping stone, and never be defeated by anything or anyone" *(Eileen Caddy)*

"Fear knocked at the door, faith answered and no one was there" *(Irish proverb)*

AIMS OF THE SOCIETY

The ESSC is an interdisciplinary, non-political association, which is dedicated to investigating and realizing soil conservation in Europe. The ESSC pursues its aims in the scientific, educational and applied sectors by:

Supporting investigations on soil degradation, soil erosion and soil conservation in Europe,

Informing the public about major questions of soil conservation in Europe,

Collaborating with institutions and persons involved in practical conservation work in Europe.

The ESSC aims at co-ordinating the efforts of all parties involved in the above cited subjects: research institutions; teachers and students of geosciences, agriculture and ecology; farmers; agricultural planning and advisory boards; industries and government institutions.

ZWECK DER VEREINIGUNG

Die ESSC ist einer interdisziplinäre, nicht politische Vereinigung. Ihr Ziel ist die Erforschung und Durchführung des Schutzes der Böden in Europa. Die ESSC verfolgt dieses Ziel auf wissenschaftlichem, erzieherischen und angewandtem Gebiet:

durch Unterstützung der Forschung auf den Gebieten der Boden-Degradierung, der Bodenerosion und des Bodenschutzes in Europa,

durch Information der Öffenlichkeit über wichtige Fragen des Bodenschutzes in Europa,

durch Zusammenarbeit mit Institutionen und Personen, die an der Praxis des Bodenschutzes in Europa beteiligt sind.

Die ESSC will alle Personen und Institutionen zusammenführen, die sich für die genannten Ziele einsetzen: Forschungsinstitutionen, Lehrer und Studenten der Geowissenschaften, der Landwirtschaftswissenschaften und der Ökologie, Bauern, landwirtschaftliche Planungs- und Beratungsstellen, Industrieunternehmen und Einrichtungen der öffentlichen Hand.

BUTS DE L'ASSOCIATION

L'ESSC est une association interdisciplinaire et non politique. Le but de l'association est la recherche et les réalisations concernant la conservation du sol en Europe. L'ESSC poursuit cette finalité dans les domaines de la recherche scientifique, de l'éducation et de l'application:

en encourageant la recherche sur la dégradation, l'érosion et la conservation du sol en Europe,

en informant le public des problemes majeurs de la conservation du sol en Europe,

par la collaboration avec des institutions et des personnes impliquées dans la pratique de la conservation du sol en Europe.

L'ESSC souhaite favoriser la collaboration de toutes les personnes et institutions poursuivant les buts définis ci-dessus, en particulier: institutions de recherche, professeurs et étudiants en géosciences, des agriculteurs, des institutions de planification et des conseil agricole, de l'industrie, et des institutions gouvernementales.

OBJECTIVOS DE LA SOCIEDAD

La ESSC es una asociación interdisciplinar, no-politica, dedicada a la investigación y a la realización de acciones orientadas a la conservación del suelo en Europa. La ESSC persigue sus objectivos en los sectores cientificos, educacionales y aplicados, en al ámbito europeo:

promocionando la investigación sobre degradación, erosión y conservación de suelos,

informanto al público sobre los principales aspectos de conservación de suelos,

colaborando con instituciones y personas implicadas en la práctica de la conservación de suelos.

La ESSC aspira a coordinar los esfuerzos, en los temas arriba mencionados, de todas las partes implicadas: centros de investigación, profesores y estudiantes de geo-ciencias, agricultura, selvicultura y ecología, agricultores, servicios de extensión agraria, industrias e instituciones gubernamentales.

Visit the ESSC Website: http://www.essc.sk

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Please send this form to: ESSC Treasurer, Dr Wim Cornelis, Department of Soil Management and Soil Care, Coupure links 653, B-9000 Gent, BELGIUM.

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