

IUSS Bulletin

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112



International Union of Soil Sciences (IUSS)

The IUSS Bulletin is the official Newsletter of the International Union of Soil Sciences. It is freely distributed through the IUSS website. All contributions are welcome and should be send to the editor.

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IUSS Council Meeting Agenda Topics

Draft

1. Minutes of the last meeting in Philadelphia 2006 (previously printed in the Bulletin)
2. Bureau actions July 2006 to July 2008
3. Report of the President (including Report of the Executive Committee Meeting)
4. Report of the Secretary General (including ICSU, IYPE, Outreach, Bulletin (switch to solely electronic format)...))
5. Report of the Deputy Secretary General (including Bulletin, Website, Alerts,.....)
6. Report and Budget from Chair of Standing Committee on Budget and Finance – Robin Harris
7. Report and presentation of the audited accounts by the Treasurer – Jim Gauld
8. Report from the Chair of Structure and Statutes – John Kimble to include: proposals from ASSSI to increase frequency of WCSS from a four year cycle to a two year cycle; proposals from ASSSI to separate the Presidency from the host of WCSS; proposal from ASSSI to change the cycle of post holders from four to two years.
9. Reports from the Divisions
10. Election Process 2007-8. Results and comments on the process in 2007-8, including considerations of changes for the future – John Kimble (Chair of Standing Committee on Statutes and Structure) and Stephen Nortcliff.
11. Thoughts on how to optimise the contributions to IUSS of the Honorary Members – D.R. Nielsen
12. Discussions concerning the programme for 19th WCSS Brisbane 2010. (To include Commission Officers and other participants in the meeting)
13. Election of Honorary Members
14. Nominations and confirmation of Chairs of Standing Committees from 2010
 - a. Awards – Gerard Heuvelink, Netherlands
 - b. Structure and Statutes – Jean Chapelle, Belgium
 - c. Budget and Finance – Stephen Nortcliff, UK
15. Procedures proposed for the appointment of the Secretary General and Deputy Secretary General from 2010 – R.S. Swift and D. Sparks
16. World Soil Day – Progress Report
17. Review of existing Working Groups. (Report from Executive Committee)
18. Proposals for new Working Groups (Report from Executive Committee)
 - Global Soil Change – Proposed by Division One
 - Paddy Soils – proposed by KSSSF
 - Rare Soils – proposed by P Drohan and Division Four
 - Proximal Soil Sensing – Proposed by Pedometrics Commissions 1.5 (Pedometrics) and 2.1 (Soil Physics)
19. Preliminary Plans for the 20th World Congress, Seoul, Korea, 2014 – representatives of KSSSF.
20. Endorsement of the nominations from KSSSF of the nominations for President Elect – Dr. Jae E. Yang. Vice-President Elect – to be confirmed

Stephen Nortcliff,
Secretary General

April 2008, Reading

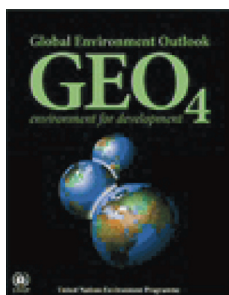
IUSS Alerts

November 2007 – April 2008

Information for and from the global soil science community

IUSS Alerts are e-mailed to more than 12,000 people in over 100 countries. If you have information to share please send it to alfred.hartemink@wur.nl Below are the still relevant contributions that appeared in the IUSS Alerts between November 2007 and April 2008.

Global Environmental Outlook 4



The Global Environmental Outlook 4 is now published; earlier outlooks were published in 1997 (GEO1), 2000 (GEO2) and in 2002 (GEO3). The Global Environment Outlook (GEO) project is the implementation of UNEP's mandate to keep the global environment

under review. Initiated at the request of the UNEP Governing Council in 1995, GEO is both a process and a series of reports, analyzing environmental change, causes, impacts, and policy responses. It provides information for decision-making, supports early warning and builds capacity at the global and sub-global levels. GEO is also a communication process that aims at raising awareness on environmental issues and providing options for action. Full report can be downloaded (free) here: www.unep.org/geo/geo4/media/ The GEO Data Portal is the authoritative source for data sets used by UNEP and its partners in the Global Environment Outlook (GEO) report. Its online database holds more than 450 different variables, as national, subregional, regional and global statistics or as geospatial data sets, covering themes like Freshwater, Population, Forests, Emissions, Climate, Disasters, Health and GDP.

See <http://geodata.grid.unep.ch/>

Loess map of Europe

The INQUA Loess Map of Europe has been completed and published. The International Union for

Quaternary Research INQUA has long functioned via the activities of Commissions- specialised research groups. The Loess Commission came into being in the 1960s, guided by Julius Fink of the University of Vienna. The major aim of the Loess Commission was to unite loess study across Europe, with some focus on stratigraphy and palaeoclimatic investigations. A major part of the Loess Commission programme was to be the preparation of a Loess Map of Europe. The map operation was largely directed by Gunter Haase of the Academy of Sciences in Leipzig, and he faced some remarkable problems. A large number of investigators contributed to the Map and they are all listed in the Haase et al. paper- it was a remarkable co-operative effort. The final push has come from the UFZ Centre for Environmental Research Leipzig-Halle in Leipzig (contact via dagmar.haase@ufz.de).

See also: Haase, D., et al. 2007. Loess in Europe - its spatial distribution based on a European Loess Map, scale 1: 2,500,000. *Quaternary Science Reviews* 26, 1301-1312. The INQUA Loess Map of Europe will be featured in *Loess Letter* 59, to be published in April 2008.

To order a copy please contact Ian.Smalley@ntu.ac.uk

New for 2008 - Ecohydrology



An international journal publishing original scientific and review papers that aim to improve understanding of processes at the interface between ecology and hydrology and associated applications related to environmental management. Don't miss out! Be the first to read

the exciting new content and sign up for RSS Feeds to receive FREE Table of Content Alerts and EarlyView Articles straight to your desktop as soon as they publish online.

Visit the journal homepage to set up your alerts or alternatively to submit a paper to this international publication www.interscience.wiley.com/eco

International Year of Planet Earth

The International Year of Planet Earth (IYPE), proclaimed by the General Assembly of the United Nations for 2008, has found significant footing on international and national levels. IUSS and ISRIC are two of the 12 Founding Partners of the IYPE. By today, 50 countries and Regions established a National IYPE Committee. One of the 10 IYPE themes is on Soils for which a dedicated 16-page brochure was compiled, now available in English, French and Portuguese. Soil scientific communities and its related industries are invited to participate in 'The Greatest Geo-Show on Earth'. For more information, please check: www.yearofplanetearth.org

New IPCC and UNDP reports



Here is a good read or two. The IPCC has just published a synthesis report. This Synthesis Report is based on the assessment carried out by the three Working Groups of the Intergovernmental Panel on Climate Change. It provides an integrated view of climate change as the final part of the IPCC's Fourth Assessment Report (AR4) – go to <http://www.ipcc.ch/ipccreports/ar4-syr.htm> for the website to download the synthesis report.



UNDP published its Human Development Report 2007-2008, with title "Fighting climate change: Human solidarity in a divided world." The conclusion: Climate change is the greatest challenge facing humanity at the start of the 21st Century. Failure to meet that challenge raises the spectre of unprecedented reversals in human development. For the full report (and more nuance). Go to <http://hdr.undp.org/en/reports/global/hdr2007-2008/>

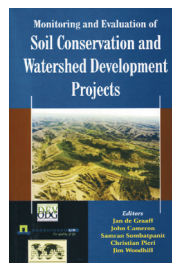
Soils brochure in French, Romanian, Japanese and Portuguese



Year 2008 will be the International Year of Planet Earth, with many outreach projects stressing the importance of the earthsciences for human societies. A brochure on the soils was produced in English in 2006. The brochure is intended to explain to the general public and is now also available in French (*Le sol, épiderme vivant de la Terre*), both in electronic version (www.iuss.org); for printed

copies send your requests to roland.poss@ird.fr
The brochure is also available in several other languages.

New Book



Monitoring and Evaluation of Soil Conservation and Watershed Development Projects, edited by: Jan de Graaff, John Cameron, S. Sombatpanit, C. Pieri and J. Woodhill. The focus is on the information systems needed to understand the developmental impact of soil conservation and watershed interventions. Such interventions inevitably start from physical sciences and equally inevitably end up in the social sciences. The book offers accounts of socio-environmental processes in a wide range of contexts. Science Publishers. Hardcover (2007) £38.90. ISBN-13: 9781578083497

Ten simple rules for scientists

Written by PLoS Computational Biology Editor-in-Chief Philip E. Bourne, sometimes with collaborators, the "Ten Simple Rules" provide a quick, concentrated guide for mastering some of the professional challenges research scientists face in their careers. Download the Ten Simple Rules Collection: http://collections.plos.org/ploscompbiol/TenSimpleRulesCollection_Small.pdf



Ten Simple Rules for Doing Your Best Research, According to Hamming
Ten Simple Rules for a Good Poster Presentation
Ten Simple Rules for Making Good Oral Presentations

Ten Simple Rules for a Successful Collaboration
Ten Simple Rules for Selecting a Postdoctoral Position
Ten Simple Rules for Reviewers
Ten Simple Rules for Getting Grants
Ten Simple Rules for Getting Published

WOCAT in Google Earth

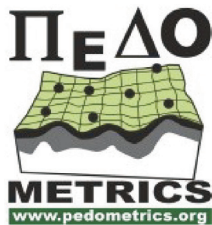


All case studies from the WOCAT database can now be viewed in [Google Earth](http://www.google.com/earth/). A WOCAT logo is displayed for countries with case studies described; smaller "clickable" WOCAT icons indicating the location of individual case studies will appear when

zooming in closer. World Overview of Conservation Approaches and Technologies (WOCAT) is a project coordinated by the University of Bern, ISRIC and FAO in collaboration with many institutions world-wide. WOCAT aims to promote sustainable land management into land use systems world-wide by offering a tool for standardized documentation and evaluation of SLM technologies and approaches. WOCAT has so far collected comprehensive information on over 180 technologies and 110 approaches from ± 40 countries.

For more information contact: wocat@giub.unibe.ch or Godert.vanlynden@wur.nl

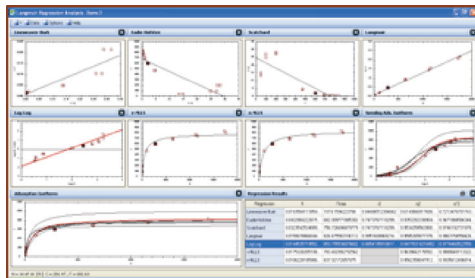
New issue of Pedometron



A new issue (number 23) is available from the www.pedometrics.org and www.iuss.org

In this issue there are reports on Pedometrics 2007, Markov Chain random fields, geostatistical bibliometrics, pyrometrie, profiles, Alex's preferred papers and a new Pedomathemagica and quiz to keep your brain cells working. The Newsletter is prepared by the IUSS officers Dr Budiman Minasny and Dr Murray Lark. As always with Pedometron: Happy reading!

Free Software



LMMpro is a new software program for regression analysis of the Langmuir Equation and the Michaelis-Menten Equation. It comes with three embedded data sets that are sufficient for most teaching objectives about regression techniques. The embedded data sets help you teach about the impact of data errors, the impact of regression choice, and the impact of slight theory errors. You can also show your students the impact of using few data versus lots of data by selecting which data points to use in the regressions. The program uses 7 regression techniques, 5 linear and 2 non-linear, and it is easy

to see how they differ from each other and compliment each other. It is a FREE download: <http://alfisol.com/IFS/IFS-003/LMMpro-Downloads.php>

From the Secretary General

Inter Congress Council Meeting

June 30 to July 4 2008

The Inter-Congress Meeting will take place in Brisbane, Australia from June 30 to July 4 2008. It is running partly in collaboration with a scientific meeting of the Queensland Branch of ASSI. Full details together with registration forms will be available shortly. I shall be pleased to receive items for discussion at the Business Meeting of Council no later than February 22nd 2008.

Honorary Member Nominations

I have received a number of nominations for Honorary Membership of IUSS. The final deadline for receipt of nominations is February 22nd 2008. I need a short statement (maximum 750 word) about the candidate and their contribution to Soil Science and/or the work of the IUSS and its predecessor ISSS.

Keeping in touch

One of the major problems facing the Secretary General is keeping up to date information on the Officers of the National Soil Science Societies. Many Societies change their officers annually, and if I am to keep Member Societies informed I need details of current Office Holders, their postal addresses and current email addresses. Please let me have details of your current Soil Science Society Officers.

Election of IUSS Division and Commission Officers

During December I circulated to National Societies the list of candidates for the elections of IUSS Division and Commission Officers, together with short biographies. The election period runs from January 1, 2008 to March 1, 2008. Each IUSS member is entitled to vote in their National ballot which is to be organised by the National Soil Science Society or National Academy of Science. Each of you should be invited to participate in a ballot either by submitting a ballot paper or by participating in an electronic ballot. If you are not invited to vote please contact your National Soil Science Society and copy the message to me.

Stephen Nortcliff, Secretary General, IUSS
iuss@rdg.ac.uk

2008 – International Year of Planet Earth



On 12 and 13 February 2008, the International Year of Planet Earth will be officially launched at UNESCO's headquarters in Paris. This event will be co-organized by the IYPE Corporation and the National Committee of the IYPE in France, together with IUGS and UNESCO. UNESCO's Director General Koichiro Matsuura will host the Event and several Heads of State have been invited. The soils brochure (*Soil - Earth's living skin*) is now available in English, French, Portuguese, Romanian, and Japanese see www.iuss.org There many activities in which the IUSS and soil scientists participate, two examples:



More than 10,000 scientists, professionals, and students will gather in Houston on 5-9 October 2008 in a meeting is sponsored by the Geological Society of America, and Soil Science Society of America, and some other societies. The intention of this first-ever joint meeting is to highlight and stimulate discussions in areas of common interest. It is held under the theme "Celebrating the International Year of Planet Earth".

More information: www.acsmeetings.org/about/news/releases/2008/0115/001/

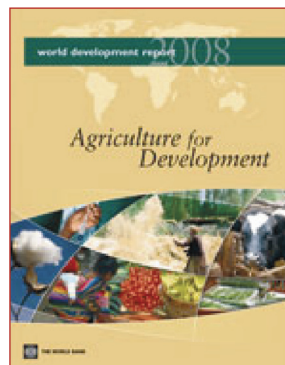


The New Zealand Society of Soil Science & Australian Society of Soil Science will hold a meeting from 1-5 December 2008 in conjunction with the International Year of Planet Earth 2008.

Theme of the meeting is "Soil – the living skin of planet earth" and it will be held in Palmerston North, New Zealand.

More information: <http://conferences.massey.ac.nz/Soils2008/index.htm>

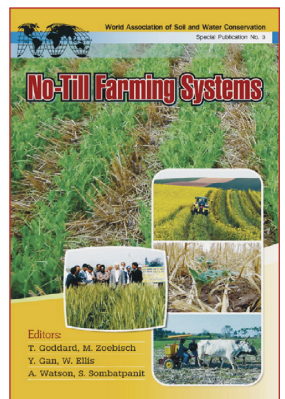
World Development Report 2008



The World Bank published its World Development report 2008. The report calls for greater investment in agriculture in developing countries and warns that the sector must be placed at the centre of the development agenda if the goals of halving extreme poverty and hunger by 2015 are to be realized.

There is a lot on soil fertility and soil conservation in this report and here are some quotes that most soil scientists will enjoy: "Science and technological innovation are critical for the agriculture-for-development agenda to succeed.." and the need to increase funding for agricultural R&D throughout the developing world cannot be overstated." If you want to read more (there are 386 pages) visit the World Bank website.

New book on No Till



No-Till Farming Systems, Special Publication No. 3 of the World Association of Soil and Water Conservation.

<http://waswc.soil.gd.cn>
www.waswc.org edited by: T. Goddard, M. Zebisch, Y. Gan, W. Ellis, A. Watson and S. Sombatpanit. Thirty-four contributions from renowned

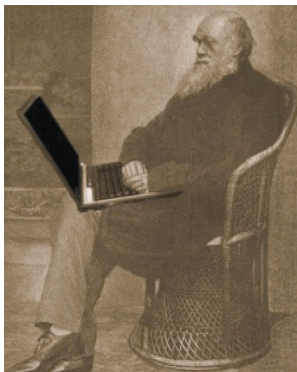
experts and practitioners around the world provide a comprehensive review of the rapid growth of no-till, the barriers that have been overcome and the challenges that still lie ahead. Chapters cover current research and new directions as well as policy needs, adoption and extension. Five other new books on the topic are also reviewed.

ISBN: 978-974-8391-60-1. No. of pages: 544.

Depending on the destination, price ranges from US\$15-20, including delivery.

For details contact Samran Sombatpanit sombatpanit@yahoo.com

Is that fun.....and for free



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The complete Darwin collection online:

<http://darwin-online.org.uk>

Who was the first scientist?

<http://network.nature.com/forums/sciencewriters/609?>

Online listening to *The Economist*?

<http://network.nature.com/forums/sciencewriters/609>

Climate Change Podcasts

<http://www.nature.com/climate/podcast.html>

The European Soil Database in Google Earth



The European Soil Portal provides access to the Google Earth Files (KMZ extension) of the European Soil Database. All 73 Google Earth files related to the European

Soil Database can be downloaded. KML (zipped KMZ files) is a file format used to display geographic data in such as Google Earth and Google Maps. In order to use the Google Earth Files, download **Google Earth**. For more information contact **Panos Panagos** at panos.panagos@jrc.it

(Advertisement – product focus)

Eijkelkamp wet sieving apparatus

The wet sieving apparatus from Eijkelkamp Agrisearch Equipment is used to determine the aggregate stability of soil. Eight sieves are filled with a



certain amount of soil aggregates. They are placed in a can filled with water, which will move up and downward for a fixed time. Unstable aggregates will fall apart and pass through the sieve and are collected in the water-filled can underneath the sieve.

Benefits:

- Determines susceptibility for erosion
- Works based on simple disturbed samples
- Sieve out the grains from 1.00 to 2.00 mm
- Grains falling apart are measured
- Pre-programmed grain-wash time

More information click www.eijkelkamp.com

No-till on CD ROM



This CD was planned as a collection of supplementary reference materials, to serve as a companion to the printed book *No-Till Farming Systems* (2008). This CD is entitled the 25th Anniversary Souvenir Edition of the

World Association of Soil and Water Conservation (WASWC – established 1983) and it is a contribution to the International Year of Planet Earth. There are 17 sections, comprising 1,008 files in 106 folders, mostly in PDF, PPT, Word, describing no-till and other related SWC works from many national and international organizations. An application form is also provided for those who wish to join WASWC. The CD, if purchased separately, costs US\$5/copy, with delivery to any post address worldwide. You are welcome to reproduce and use all materials in any form, without restriction. To get your copy please contact Samran Sombatpanit at sombatpanit@yahoo.com

Strengthening the World's Long-Term Soil Research Base

By Daniel deB. Richter & Sharon A. Billings

on behalf of 25 participants at the 2007 Global Soil Change Workshop, Duke University, Durham, NC 27708 USA (drichter@duke.edu), University of Kansas, Lawrence, KS 66047 (sharonb@ku.edu)

Imagine the science of climatology, if long-running weather stations were uncoordinated and operated independently with little cross-site comparison. Such is the present state of the long-term soils research base. The world's long-term soil experiments are not well organized or even inventoried, and these studies are unknown to most scientists and to most of humanity. In the coming decades, knowledge gained from long-term soil experiments (LTSEs) will become increasingly important to sustainably produce high-quality food, water, and fiber, and pre-

requisite to the science of environmental change (Figure 1). The transformation of pedology by anthro-pedogenesis (Bidwell and Hole 1965, Yaalon and Yaron 1966, Richter 2007) places LTSEs in new light, and make it obvious that they need review, coordination, and expansion.

A number of society's most important scientific questions involve the future of Earth's soils, and the world's long-term soils research will be important to resolving these questions as well. Three most pressing questions are:

- Can soils more than double food production in a few decades, all while minimizing adverse effects on the wider environment?
- How can land management improve soil's processing of nutrients, organic matter, wastes, toxics, and water?



Figure 1. One of the oldest LTSEs, known as Park Grass at Rothamsted in southern England, UK. Two researchers, Drs. Jo Smith and Nico Van Breemen, examine the vegetation and detritus of a plot receiving elevated nitrogen amendments since 1856. The study and the archived samples derived from it span nearly the entire Industrial Age, and have resulted in countless scientific papers, on a wide variety of topics including agriculture, ecology, statistics, and the environment.

• *How is the Earth's soil interacting with the global carbon cycle and climate change?*

Answers to these questions will depend on how soils function and change in the coming few decades, all in response to increasing human forcing. Investigators employ a number of approaches to address these questions, including short-term and laboratory studies, and modeling. However, because soil change results from high-order interactions involving multiple concurrent processes, answers to these questions will also depend on direct observations from LTSEs.

Long-term soil experiments are leading indicators of sustainability, and their results can provide early warning capabilities in detecting threats to future crop production (Barnett et al. 1995). Across Asia, for example, long-term rice experiments are currently testing the sustainability of intensively managed rice systems that supply protein and carbohydrate for well over two billion persons. Rice-yield declines observed over relatively long time frames in several of these experiments have been related to unexpected decreases in soil nitrogen availability, degradation of irrigation water quality, and to recent increases in night-time temperatures (Olk et al. 2007; Tirol-Padre and Ladha 2006). A second example is the North American forestry trials, known as the Long-Term Soil Productivity (LTSP) trials, in which dozens of experiments evaluate the sustainability of forest-soil productivity and its relation to timber harvest, soil compaction, and organic-matter management (Powers et al. 2006). Given the several decades required for forests to grow and mature, studies linking forest productivity to soil management or how elevated CO₂ will alter forest trees and soils (Figure 2) is emblematic of the need for LTSEs.

Of grave concern, however, is the remarkably poor funding and infrastructure that supports most LTSEs worldwide (Richter et al. 2007). Many LTSEs function without stable institutional support, and continue to be productive due primarily to the persistence of individual researchers. As a result, these important studies are vulnerable to neglect and abandonment. The discontinuation of the low-input Yurimaguas experiments in Peru (Smyth and Cassel 1995) and the recent loss of the KwaZulu–Natal acidity trials in South Africa (Farina et al. 2000) both occurred despite the importance of their research outputs to addressing the three questions listed above.

A global network of long-term soils research was recently launched with an advanced-format website

(<http://ltse.env.duke.edu>). The website currently networks more than 200 studies, and specifically promotes cross-site research. For example, questions about C sequestration, N-use efficiency, P leaching, acidification, atmospheric deposition, trace-element cycling, crop productivity, soil ecology, organic waste management, toxics chemistry, and water quality, all require an understanding of how soils change over time scales of decades. To plan these cross-site studies, whether for review papers, modeling exercises, lab-benchtop studies, or field research, website users can simply export the LTSE inventory data to a spreadsheet, sort the information to obtain what is most pertinent to the user's interests, and generate a potential list of LTSEs and scientific contacts. This advanced website tool originated in a graduate class in soils and ecol-

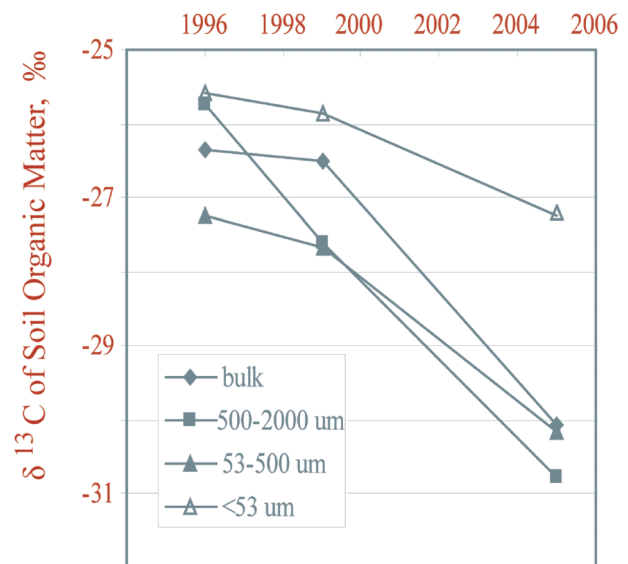


Figure 2. Soil organic matter formation can be examined over a decade at the Duke University Research Forest's long-running elevated CO₂ experiment, in which CO₂ that fumigates trees (initiated in 1996) is depleted with respect to ¹³C. Soil organic matter in surficial 30-cm of the Alfisol incorporates organic detrital carbon from the young pine forest into physical fractions at markedly different rates, with coarse fractions the most rapid and fine fraction the most sluggish. Bulk soils accrued C at 109 g C m⁻² year⁻¹, while independent estimates of SOC accrual in each carbon fraction were 48 in the 500 to 2000-um size fraction, 38 in the 53 to 500-um fraction, and 22 g C m⁻² year⁻¹ in the <53-um fraction (summing to 108 g SOC m⁻² year⁻¹). Such direct observations can only be gotten from a LTSE (Billings, submitted).

ogy among students from Duke and North Carolina State Universities and the University of North Carolina, and it encourages scientists and students to work more closely together and in ways unknown even in the recent past.

The 6 December 2007 issue of *Nature* magazine featured papers that emphasized the importance of long-running measurements of the Earth's environment. The accompanying editorial proclaimed, "Data sets encapsulating the behavior of the Earth system are one of the greatest technological achievements

of our age – and one of the most deserving of future investment." Long-range planning needs to strengthen and expand scientific commitment to the world's long-term soils research base. Coordination of long-running records of Earth's climate, atmospheric pollution, the hydrosphere, wildlife populations, and even tectonic activity has been possible - it is now time to extend this foresighted practice to Earth's soil.

For more information please login and participate at the LTSE website: <http://ltse.env.duke.edu>

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Arsenic in irrigated paddy soils

By Hugh Brammer

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Natural arsenic pollution of drinking water has been reported from over 70 countries world-wide, affecting an estimated 150 million people (Ravenscroft et al., 2008). About 50 million of these people live in Bangladesh, 30 million in India and 33 million in six other countries of south and south-east Asia. It has recently been recognised that arsenic-contaminated groundwater used for irrigation in these countries poses a serious health hazard to people eating food from the crops irrigated, and that arsenic accumulating in irrigated soils poses a serious threat to sustainable agriculture in affected areas (Heikens, 2006). Rice, the staple food in many of these countries, is the principal crop affected. Little is yet known about the extent and severity of this threat to food production, human health and livelihoods, and assessment surveys are urgently needed.

Source of pollution

Arsenic (As) pollution of groundwater is associated with four geochemical mechanisms: reductive dissolution; alkali desorption; sulphide oxidation; and geothermal activity. Reductive dissolution is the most important mode in south and south-east Asia. It occurs where As adsorbed on iron oxyhydroxides in sediments is liberated into groundwater when microbial activity in associated organic matter (e.g., in buried peat layers) reduces the iron to the ferrous form. The As is mainly contained in relatively-unweathered Holocene sediments derived from the Himalayas and related young mountain chains. These sediments are not As-rich, but the element is toxic at very low concentrations. So far as is known, Pleistocene and older sediments in south and south-east Asia are not affected except where sulphidic ores (including coal in China) and geothermal activity occur.

Variability


In Bangladesh, the country where the most detailed surveys and research studies have been made to-date, pollution affects aquifers between ca 20–120m deep in Holocene sediments, mainly in a belt across the south-centre of the country. However, within this area, As concentrations vary greatly from place to place. Overall, about 25 per-

cent of domestic wells exceed the national standard of 50ppb As and about 50 percent exceed the WHO standard of 10ppb. However, the proportion of wells within villages that exceed the national standard can range between >90% and <10%. A study of 456 irrigation tubewells in five widely-separated upazilas (subdistricts) showed that more than one-half produced water with >100 ppb As and 62 produced water with >200 ppb.

Soil loading

Rice is particularly susceptible to As contamination because of the large amount of water used to irrigate this crop – commonly 1000 mm or more per crop season – and the anaerobic conditions present in flooded paddy fields. Under anaerobic conditions, As is present as arsenate, the form that is most readily available to plants. In dryland soils, As is readily immobilised by ferric hydroxides. In Bangladesh, As-levels in unirrigated floodplain soils appear to be <10 mg/kg. A survey of 456 irrigation wells showed topsoil As-levels >10 mg/kg at 48% of the sites studied; another country-wide study showed that 21% of samples had levels >20 mg/kg, with a highest level of 81 mg/kg.

Application of 1,000 mm of water containing 100 ppb As adds 1 kg/ha As to the soil per season. Little is lost by leaching, volatilisation and removal in crops. Therefore, most of the added As remains in the topsoil. Many soil factors influence As availability to plants, including redox potential, pH and the contents of clay, organic matter, iron, manganese, phosphorus and calcium-carbonate. Even on seemingly flat floodplains, there can be significant differences in soil texture, organic matter content and duration of seasonal flooding between adjoining ridge and basin sites only a few tens or hundred of metres apart. Some of these properties and constituents also vary significantly within the year in floodplain soils that alternate seasonally between flooded and aerated conditions, and in irrigated upland sites used for paddy cultivation. Thus there can be considerable differences in soil properties that affect As accumulation and availability both between tubewell command areas and within them. Diurnal and seasonal variations in microbiological activity within paddy fields (particularly by algae) may also influence As accumulation and availability.



Not all the As delivered by tubewells actually reaches the fields irrigated. In As-affected areas of Bangladesh, groundwater is to varying degrees rich in iron. That iron is oxidised when the water is exposed to the air and is then precipitated as iron-hydroxides which adsorb As. At the only two sites for which information is available (both in Bangladesh), As concentrations in water at one site decreased from 136 ppb at the well-head to 68 ppb at the end of the 100m distribution channel; at the other, they fell from 397 to 314 ppb in a 152m irrigation channel. At the first site, which had been irrigated for about 15 years, topsoil As concentrations decreased from 61 mg/kg in the field nearest the well-head to 11 mg/kg in a field at the far side of the 4 ha command area. At the other site, irrigated for 20 years, topsoil As concentrations in one field decreased from 23.0 mg/kg near the water inlet to 11.3 mg/kg at the far side of the field. With continuing irrigation, these differences within command areas and within fields are likely to increase, such that areas near well-heads and field inlets will become severely contaminated before other areas. These differences within command areas need to be taken into account in soil and crop sampling.

Oxidation-reduction

In dryland soils, such as those in which crops such as wheat, maize and most vegetables are grown, As is quickly adsorbed by ferric iron and becomes largely unavailable to most plants. In wetland soils – including the flooded soils in which transplanted rice is grown – As in the arsenate form is readily available to plant roots. In seasonally-flooded soils in monsoon climates, floodplain soils change between the oxidised state in the dry season and the reduced state when submerged in the wet season. Similar changes occur in soils that are flood-irrigated: topsoils are reduced during periods when they are kept flooded and become oxidised when they dry out for crop harvesting and between crop seasons. Thus, As may be present in different forms in the same soil at different times of the year. For rice, the situation is further complicated by the ability of the plant to carry oxygen down its stem and discharge it through its roots forming an oxidised coating ('iron plaque') on the roots.

Uptake by rice

Arsenic taken up from soils by rice accumulates in different proportions in different plant parts in the order roots >stem >leaf >grain. For example, in a

pot trial in Bangladesh, 2.4 mg/kg As was measured in rice roots, 0.73 mg/kg in stems and leaves, and 0.14 mg/kg in grain. However, considerable differences in uptake exist between rice varieties and between the kinds of rice grown in different countries. Rice grain contents ranged between 0.058 and 1.835 mg/kg As in 13 different rice varieties tested in Bangladesh, 0.2–0.46 mg/kg in the USA and 0.063–0.2 mg/kg in Taiwan. The As in US varieties is predominantly in a relatively harmless organic form (dimethylarsinic acid), whereas most of that in Bangladeshi rice varieties is in the inorganic form which is most toxic to humans. These differences between rice types and cultivars need to be taken into account in all studies where rice yields and amounts eaten are measured or compared. Some dryland crops also take up significant amounts of As, and accumulate it in different plant parts: e.g., much more in the skin than in the body of potatoes. However, dryland crops generally provide a small proportion of the total diet in rice-growing parts of south and south-east Asia. Rice is the crop of greatest concern in the threat which As in irrigation water poses to agricultural production, human health and economic livelihoods in those countries.

Toxicity

There is no single level of soil As that is toxic to plants. Different plant species tolerate different amounts of As in soils. Some (known as hyperaccumulators) can tolerate very high levels of soil As. Even different rice cultivars differ in As tolerance. On soils contaminated by arsenical pesticides in the USA, yield reductions ranged from virtually none in one Chinese cultivar to 80–90% in four of ten US cultivars tested. In the only relevant field study so far reported in Bangladesh, yields of a single rice variety grown under flooded conditions decreased from 8.9 to 3 tons/ha with soil-As levels increasing from 26.3 to 57.5 mg/kg. Yields of rice grown on raised beds at the same site decreased from 8.24 to 5.21 t/ha at soil-As levels of 26.3 and 57.5 mg/kg respectively. Thus, differences in varietal tolerance and in soil management need to be kept in view in comparing results from different sites and countries.

Symptoms of As toxicity in rice include delayed seedling emergence, reduced plant growth, yellowing and wilting of leaves, brown necrotic spots on older leaves and reduced grain yields. A disease known as 'straighthead' (because of upright, empty panicles at maturity) or 'parrot beak' (because of



misshaped grains) is considered to be an indicator of As toxicity in the USA and Australia. Straighthead disease was reported for the first time in Bangladesh in 2006.

Human intake


Crop yield is not the only relevant criterion to use in considering plant toxicity. The As content of rice grain also needs to be considered because of the large daily amounts of rice eaten by people in many parts of south and south-east Asia (commonly assumed to be 450g/day for a 60kg adult in Bangladesh). The As content of rice straw also needs to be considered where this is fed to livestock producing meat or milk for human consumption.

When arsenic in rice grains is 0.2mg/kg, adults consuming 450g of rice and 4 litres of water per day at the 10 ppb WHO water standard consume 130µg of arsenic per day, which is the FAO and WHO provisional tolerable dietary intake standard for a 60g adult; (persons consuming 4 litres of water at 50ppb national standards already exceed that level before eating any rice). In effect, there is no safe level of arsenic intake from food or water. There is a linear dose-response relationship between arsenic intake and health hazards down to very low levels of As intake. Therefore, efforts need to be made to minimise As intake from all sources as soon as possible.

Arsenic causes serious skin lesions, is a potent carcinogen and can cause deaths from a wide range of other serious diseases. Symptoms typically do not appear for 2–10 years from the start of chronic exposure, and they may also appear long after exposure ceases. They are irreversible.

Research needs

Much more information is needed on the extent of As-contaminated soils and on As-soil-plant relationships. More appropriate laboratory methods for determining As availability in paddy soils are needed. Soil and crop sampling need to take more account of regional differences in environmental conditions and the complex patterns of soil As contamination between and within tubewell command areas. Although pot trials can provide useful information on soil and plant processes, many more field trials are needed: it is virtually impossible to simulate the physical, chemical and biological environment of a paddy soil in a pot experiment. Considerable strengthening of soil survey, soil laboratory, agricultural research and possibly agricultural engineering institutions will probably be needed in countries with a serious soil-As problem. No adequately-tested mitigation methods suitable for small-scale rice farmers are available. Possibilities that need testing in differ-



ent environments include: providing an alternative safe irrigation supply; aerating water before delivery to fields; substituting dryland crops; growing rice as a dryland crop on raised beds; using hyper-accumulator plants to remove arsenic; and removing contaminated topsoil.

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How Good is GLASOD?

By **B.G.J.S. Sonneveld and D.L. Dent**

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The Global Assessment of Soil Degradation (GLASOD), commissioned 20 years ago by the UN Environment Program (Oldeman et al., 1991), collated expert judgments of many soil scientists to produce a world map of human-induced soil degradation. It has been an important source for national and international environmental policy decisions but has been criticized on the grounds that its qualitative judgments were never tested for their consistency, the map units were too rough for national policy purposes, while the assumed relationship between land degradation and policy-pertinent criteria

like crop production was unverified. The GLASOD authors were the first to point out its limitations; criticism should be directed at its inappropriate use - which underlines the need for a more rigorous and detailed assessment. Renewed alarm about land degradation from international organizations like FAO and UNEP clearly warrants a new global inventory; a review of the literature shows that irrespective of the approach, some degree of expert judgment will be called for so it is worth drawing lessons from the GLASOD exercise.

In this study, we scrutinise the GLASOD assessments for the African continent for reasons of data availability and policy-relevance; the social and economic impact of land degradation seems to be most severe in Africa. First, we test the GLASOD assessments for their consistency by comparing expert

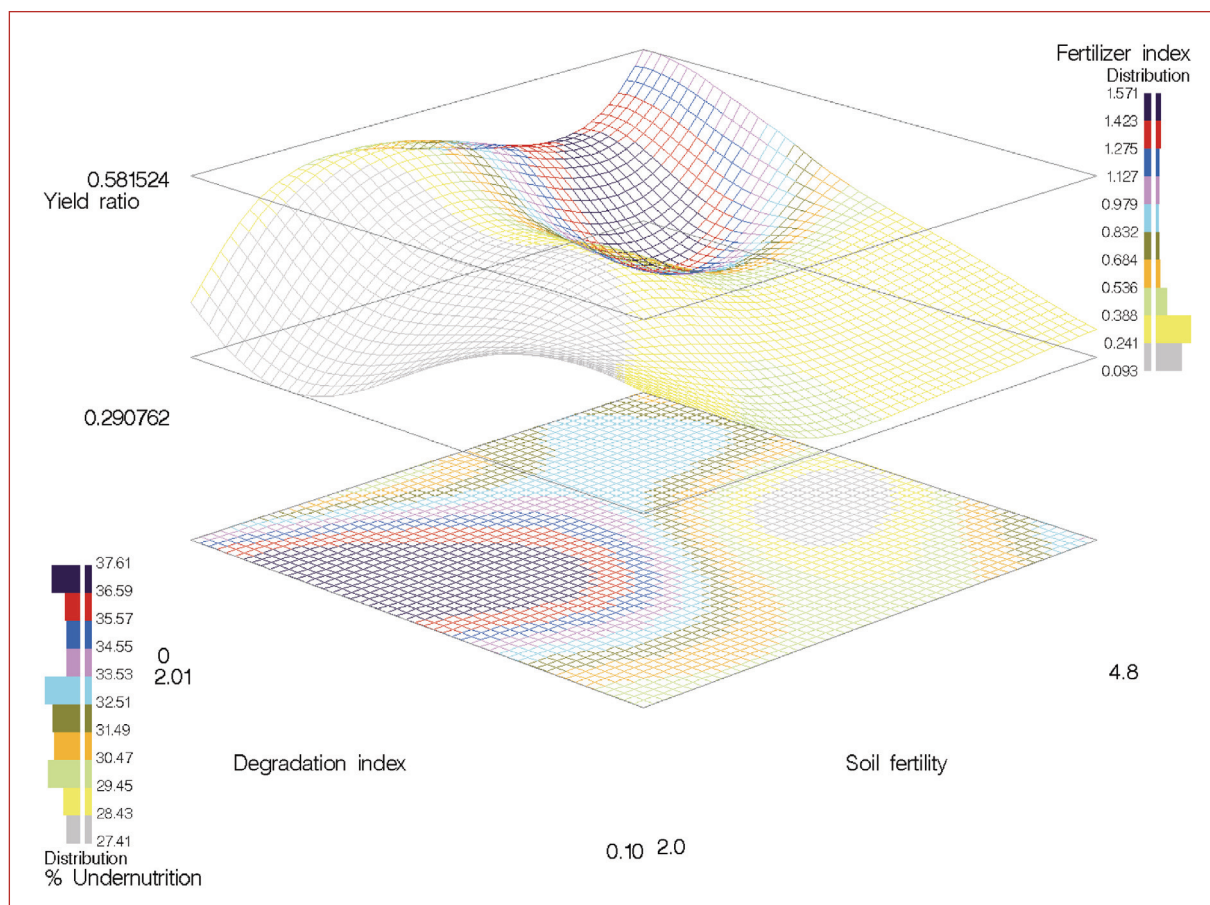



Figure 1 Yield ratio (y-axis) against soil degradation (SE-NW x-axis) and soil suitability (SW-NE x-axis) with covariates fertilizer use and prevalence of undernutrition represented in surface and ground plane, respectively. Bar charts represent frequency distribution of the estimated covariates.



judgments on the status of soil degradation for similar combinations of land and land use. Secondly, we evaluate the reproducibility of expert judgments by estimating an ordered logit model that relates degradation classes to easily-available information on explanatory variables, so as to make land degradation assessments at unvisited sites. Thirdly, we analyze the impact of the land degradation on food production in a cross-sectional analysis relating GLASOD assessments to crop production data at sub-national level. To account for climatic variability we express productivity as a ratio of actual to potential yield, while soil fertility appears explicitly. Furthermore, we analyze the association of the degradation-productivity relationship with prevalence of malnutrition and fertilizer usage.

So, how good is GLASOD? We find that the experts were not very consistent in assigning soil degradation classes to similar sites, possibly because they had different concepts of the degrees of degradation - these differences are likely to be more pronounced when experts come from different countries and have dissimilar experience of land degradation. Because of this lack of consistency, it is difficult to reproduce expert judgments with a parametric model approach. The findings confirm the results in other studies where deviating trends of expert assessments make it necessary to use country dummies in the qualitative response models to correct for interpretation differences among the international forum of experts.

The findings on the relationship between yields and land degradation were counter-intuitive: yields increase for higher levels of land degradation. Apparently, more intensive cultivation without appropriate soil protection measures causes higher degradation levels but does not necessarily reduce productivity. Moreover, yields on more productive but severely degraded soils are largely maintained by application of fertilizer. Better soils also seem to resist the impact of the lower levels of degradation without the need for fertilizers, yet, yields deteriorate rapidly for the more degraded areas with poorer soils. The high prevalence of malnutrition in areas with declining yields on the poor and highly degraded soils is alarming indeed.

We conclude that the GLASOD expert assessments are not very reliable. However, our verdict should not be too harsh. With slender resources, and in a very short time, a global assessment was completed that clearly depicted, for the first time, the extent and degree of land degradation. Its limitations were

made clear by the authors and, in spite of these limitations, GLASOD underpinned environmental policy discussions - it has been the only information available. Improved methods of assessment of land degradation are now needed to provide decision makers with the appropriate information for the development of sound environmental policies and it is likely that any new global assessment will have to resort, in some degree, to expert judgments - so the lessons learned from this GLASOD analysis will be valuable.

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Need for National Soil Policies for Developing Countries

- some facts

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As a soil scientist working for more than 25 years, I am very much concerned with soil protection and conservation. In this process, I started collecting information related to national soil policies of different countries. To my surprise I could not get a well defined national soil policy for any one of the developing country?

A developing country can be defined as, that country which has a relatively low standard of living, an undeveloped industrial base, and a moderate to low Human Development Index (HDI) score and per capita income, but is in a phase of economic development. Usually all countries which are neither a developed country nor a failed state are classified as developing countries (http://en.wikipedia.org/wiki/Developing_country).

The United Nations Environmental Programme held two meetings of the consultants in 1980 and 1981 developed a document on 'world soil policy' which was approved and endorsed by the governing council of the UNEP for implementation. Later on the FAO, in November 1981 launched a programme on 'world soils charter'.

While delivering a key note address at the plenary session on 'world soil policy' at 12th International Congress of Soil Science at New Delhi during 8-16 February, 1982 Dr.J.S.Kanwar, the then president, ISSS, said that "we should have a national soil policy to bring deteriorated soils back to normal production and to prevent any soil degradation and to save, improve and utilize our soils to their highest potential". Since then nothing has been done in most of the developing countries.


In October, 2000 the 2nd IUCN World Conservation Congress (WCC) at Amman, Jordan, passed the soil resolution, calling on the IUCNELP to prepare guide-

lines for national legislation and policy to assist states to manage their specific soil degradation problems and to investigate the format for an international instrument for the sustainable use of soils. Later, at the 16th WCSS in Montpellier in August 1998, which was attended by me, the IUSS established a working group on International Actions for the Sustainable Use of Soils (IASUS). The IASUS efforts resulted in the publication of 'Soils on the Global Agenda'. This working group suggested for the establishment of an Intergovernmental Panel on Soils, a proposal already taken up by the UNEP. At the 17th WCSS in Bangkok in 2002, IUSS adopted a 'World Soils Agenda'. Several documents, conventions and agreements with particular reference to soils exist at the international level.

To quote a few:

- Frame Work Convention on Climate Change - FCCC
- Convention on Biological Diversity - CBD
- Convention to Combat Desertification - CCD
- Global Environment Outlook - GEO₄
- International Assessment of Agricultural Science and Technology Development - IAASTD
- Intergovernmental Panel on Climate Change - IPCC
- Millennium Ecosystem Assessment - MA etc.
- The world Commission on Environment and Development - WCED
- UN Conference on Environment and Development - UNCED
- Convention on the Conservation of Biological Diversity - CCBD
- Commission on Global Governance - CGG
- Rio Declaration on Environment and Development - UN
- Agenda 21 - UN

The FAO, WRI provides country assessment on quantity of arable land and other indicators for national and global assessments. The FAO/UNESCO soil Map of the World, which is now digitally available provides for the first time a digital data base of global soil resources. FAO's Land and Water Devel-



opment Division have produced numerous benchmark publications. It remains the custodian of thousands of soil maps and major source of soil information world wide.

European commission developed a 'Thematic strategy on soil protection'. Developing countries does not have a comprehensive soil protection system like the EU, to tackle the various aspects of soil management.

The Rural Development Institute, USA have conducted field research and advised on land reform issues in 37 countries in Asia, Latin America, Eastern Europe, Africa and the Middle East. Some of the developing countries including India have National land use policies which are quite different from soil protection policies of developed world.

In India the National Land Use and Conservation Board is the highest policy planning and coordinating Agency for all issues concerning the health and scientific management of country's land resources. The basic objectives of the Board are to formulate and implement the National Land Use Policy, to prepare perspective plan for country's land resources, make overall review of the progress of implementation of on-going schemes and programs relating to the land resources, sponsor studies, organize seminars, workshops etc. and also to launch awareness campaign for conservation of land resources in the country. The policy direction and guidelines are being issued from time to time to check the diversion of good agricultural land to non-agricultural uses, preparation of State level perspective plans for land resources conservation and implementing the National Land Use Policy outline etc.

A comprehensive national soil policy should include: climate change, Biodiversity, GM crops, Biogeochemical cycles, carbon credit, land use and land cover change, urbanization, industrialization, river linking, geogenic pollutants, ecosystems, agriculture, forests, animals, gender issues, land rights, application of interdisciplinary knowledge, prevention and management policies, soil threshold values for pollutants, standards for soil quality, military activity and other human induced activities and economics etc. National soil policies can be a part of environmental protection laws of the countries. Most of the developing countries have the laws related to air and water pollution control and protection of biodiversity but not on soil protection directly. There are no comprehensive laws to protect the soils in developing countries due to urbanization and industrialization etc. An estimated 45%

of the world's population still makes their living primarily from Agriculture, depending directly on the land for their income, status, and security. Hence there is a need to develop national soil policies by these countries.

Most of the National Soil Science Societies in developing countries plays a limited role currently, with little engagement with the key professional and social issues that confront the soil sciences. There is a need for all National Soil Science Societies in developing countries can be reformed to learning and partnership based innovation systems approach enabling professional excellence, field level technology utilization, along with substantial policy and donor support.

Finally I take this opportunity to appeal, all the national soil science societies, scientists, policy makers and administrators in the developing countries to prepare a comprehensive soil protection policy of their own to suit their needs with the help of IUSS and this can be incorporated into respective environmental laws of the country for easy implementation.



The 2007 Kerner von Marilaun Declaration on Soils

The fourth report of the Intergovernmental Panel on Climate Change¹ makes it clear that global temperatures are on the rise due to human activities. The role of soils in global climate change merits immediate attention due to its paramount importance for human sustenance.

Soils perform a multitude of key environmental, economic, social, and cultural functions. These functions include production of food and other biomass products; provision of resources; and the storage, filtering, and transformation of materials (such as water) that are vital for life. Soils are a physical and cultural environment for humankind, a natural habitat, and they sustain the largest gene pool in the biosphere. Pressures on soils are increasing dramatically. Soils need to become central to global change discussions in order to advise policy makers in their understanding of the potentials, limits, and vulnerabilities of soils. In particular, strategies for sustainable management of soils in a rapidly changing world require a better understanding of soil-human interactions.

We are in the midst of a dramatic acceleration of agricultural change as the world strives to meet the food and energy needs of a growing population within the framework of resource limitations and the desire to reduce greenhouse gas emissions. In its scope and size the challenge is comparable to the transformation of agriculture which took place as part of the Industrial Revolution of the nineteenth century and its extension by the introduction of synthetic fertilizer and pesticides during the twentieth century.

The recent global environmental outlook by the United Nations Environment Programme² understates the vulnerability of soils when stating that land degradation is more reversible than other processes of global change - such as sea-level rise and species extinction. Soils are a non-renewable resource, with soil building times between 10.000s and 100.000s of years. Degradation is exacerbating the natural limitations of soils, in particular by affecting a wide

range of processes that maintain soils.

Human impacts on soils are complex and site specific; resulting in pressures on biodiversity, water availability and quality, and the atmosphere. Our rapidly increasing needs for food and energy place growing and conflicting demands on soil. Development issues, food security, nature conservation, our dependence on fossil fuels, social inequality, and armed conflict, all have a bearing on soils.

Well informed, effective public policy requires integrated knowledge of soils, water, air, and biota. It requires that we understand the role of soils as mediators in global water and element fluxes and the linkages between site specific and global processes. Human-soil interactions must be a center of concern if we are to meet the challenge of providing future generations with productive soils.

Workshop participants: Barbara Amon, Thomas Amon, Andreas Baumgarten, Winfried E.H. Blum, Klaus Butterbach-Bahl, Gregory Cushman, Michael Englisch, Markus Fiebig, Emmanuel Frossard, Martin Gerzabek, Gerhard Glatzel, Helmut Haberl, Franz Heinzlmaier, Sigbert Huber, Ellen Kandeler, Klaus Katzensteiner, Hans-Peter Kaul, Fridolin Krausmann, Helga Kromp-Kolb, Ernst Langthaler, Gregg Marland, Andreas Müller, Nebojsa Nakicenovic, Marion Ramusch, Kate B. Showers, Heide Spiegel, Verena Winiwarter, Wilfried Winiwarter, Sophie Zechmeister-Boltenstern.

For more information, please contact the workshop organizers:

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¹ IPCC AR 4, Synthesis Report: Climate Change 2007. Release: November 17, 2007

² Global Environment Outlook GEO 4, Environment for Development, ed. United Nations Environment Programme, 2007.

Five Questions to a Soil Scientist

Five Questions to Roland Poss



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1. When did you decide to study soil science?

I decided to study soil science when I was 20. I had an inclination for outdoor activities that had led me to study Agronomy when I was 18. In my first year in the Institut National Agronomique (Agro ParisTech today) I was fascinated by the soil science class of Jean Boulaine, an outstanding professor and keen historian of French soil science and agronomy. Unlike other professors, Jean Boulaine had organized his class around the projection of slides, which was most unusual at the time. This made soil science very lively and attractive. As a consequence I majored in Tropical Soil Science the next year.

2. Who has been your most influential teacher?

I cannot spot any particularly influential teacher. We had classes with many scientists specialised in Tropical Soil Science, most of them from ORSTOM (IRD today). Georges Aubert (an Honorary member of IUSS) gave an interminable class on pedogenesis that was the basis of our training, but I was not fascinated as I was already more interested in soil changes under present cultivation practices than in past changes. Georges Pédro (today Perpetual Secretary of the French Academy of Agriculture) impressed me by a very interesting and remarkably structured class on soil mineralogy. I became his best student ever, kept an interest in soil mineralogy, but did not work in this field afterwards.

3. What do you find most exciting about soil science?

Well, let's try to answer this one! If I look back at my career, I reckon that the two driving forces were a commitment towards the agricultural development of the tropical countries where I worked (Côte d'Ivoire, Togo and Thailand) and the passion to unravel the processes at work in cultivated soils. Finally, what kept me going throughout the years was the idea that a better understanding of the functioning of the Tropical soils would make possible to manage them better and, hopefully, contribute to improve the well-being of the farmers of tropical regions in the long run. I realize today that I have largely underestimated the importance of the socio-economic parameters (both local and global) in rural development.

4. How would you stimulate teenagers and young graduates to study soil science?

In renewing the way soil science is taught. I am convinced that today students need to master different fields to adjust to the changes they will have to undergo in their career. Thus I reckon that soil science must be deliberately placed at the junction between different fields (chemistry, physics, microbiology...) and that the student must be able to master enough of the different fields to address the many issues soil sciences is confronted with. One way to partially achieve this necessary link between fields and to trigger interest amongst students is to make them work on real situations.

5. How do you see the future of soil science?

Unfortunately, I cannot predict the future! However, I do see a growing interest in soil science in the wake of the emerging environmental concerns. I believe that the Millennium Ecosystem Assessment has provided soil science with a very attractive framework. Today we can speak about soils by the many services they provide to the ecosystems and human societies. This renewed way of looking at soils makes anybody interested in our field. I believe that the days where we had strong soil science departments are gone forever. However, I reckon that the need for soil scientists in groups working on terrestrial ecosystems has never been so strong. I expect that in the future soil science will be split between many small units and that one of the issues will be to find the way to keep these many small units in touch.

Five Questions to Hans-Peter Blume



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1. When did you decide to study soil science?

After preparing my diploma work during my study of Agricultural Sciences at Kiel University about Clay migration as profile forming process in summer 1957 my teacher in Soil Science, later Professor Ernst Schlichting (1923-1988) ask me to continue my studies of clay migration as his PhD student, what I have done between 1958 and 1961.

2. Who has been your most influential teacher?

My first and most influential teacher was Ernst Schlichting. I was his first PhD student in Soil Science. During the summer 1960 I could accompany him to study Tundra and Subarctic Soils in Northern Sweden for two months, which was an intensive learning by doing together with him. During the sixties I was his assistant in Hohenheim, but intensive scientific discussions followed later on until his death.

3. What do you find most exciting about soil science?

Most exciting for me is the study of soil profiles in the field, especially those with unknown history. During the seventies I could study fascinating soils from bricks and mortar as well as of and beside sanitary land fills in Berlin. The latter ones showed me e.g. that well drained soils with strong reduced conditions do exist (as Reductic Technosols). Later on I had the possibility to study very different soil units of hot and cold deserts, and found many similarities between them, e.g. polygons of sand filled cracks of clay soils as well as sandy ones.

4. How would you stimulate teenagers and young graduates to study soil science?

I am retired now, but I show young school teachers some of our in Germany existing pathways of soil profiles so that they will show these fascinating bodies of nature to their students. I show teenagers my stamp collection of Soil Science – Land Use – Soil Protection in addition.

5. How do you see the future of soil science?

Soil Science is a young but powerful discipline. Soil mapping of rural areas was done in many countries. But similar studies in Urban and Industrial Agglomerations are just at the beginning. Our knowledge about many fundamental processes of soil formation like podzolization, carbonatisation, silification or redoximorphism are incomplete until now, have to be done with more intensity. It seems to me that it is much more easy, to get money for analyzing soil pollution in many countries, than to solve fundamental questions of a better understanding of soil formation.


Five Questions to Hossein Khadem



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1. When did you decide to study soil science?

In 1984, during the final year of my undergraduate degree in Agricultural Sciences at the Isfahan University of Technology (Iran), I had to choose about 20 credit units from one of the four major subjects including Agronomy and Plant Breeding, Horticultural Science, Soil Science and Plant Protection. I decided to take soil science courses which developed



my interest in this subject and further encouraged me to continue my education in Soil Science later at both M.Sc. and Ph.D levels.

2. Who has been your most influential teacher?

It is, in fact, very difficult to answer this question because many distinguished teachers influenced my academic career. Among them are Dr. M. Kalbasi and Dr. A. Jalalian from the Department of Soil Science at the Isfahan University of Technology (Iran), Dr. A.R. Mermut from the Department of Soil Science, University of Saskatchewan, Saskatoon, Canada and Dr. R.H. Krouse from the Department of Physics and Astronomy, University of Calgary, Calgary, Canada, who undoubtedly had a great contribution to my understanding of science, in general, and that of soils, in particular. I can never forget the first session of the course "Introduction to Soil Science" I had with Dr. Kalbasi when he started defining "Pedology" and "Edaphology" and elaborating their significance. Later on, I learned a lot about Soil Chemistry from him. Dr. Jalalian was my M.Sc thesis supervisor who taught me that the soil and landscapes themselves were the best teachers for Soil Scientists. What I learned from Dr. Mermut, my Ph.D. supervisor, is that dedication and hard working are the keys for success in research. Dr. Krouse, a physicist, taught me how basic sciences, such as physics, could be used to answer some of the major questions in applied sciences like Pedology.

3. What do you find most exciting about soil science?

To me, soil variability in space and time is the fundamental reason why soil science as a scientific discipline exists. Variability in soil properties results from changes in soil forming factors and also the modifications (mostly adverse) made by anthropogenic activities. If soils were of the same kind and origin from small to large scales, we would not have spent so much time and effort on soil related research. Scale dependency of soil variability is especially exciting. When you look at the soil particles under a transmission or scanning electron microscope with a magnification of more than 100000 times, you still observe a world of diversity and variability as you are outside in the field watching with your naked eyes the beauty of diversity in soils, landscapes, vegetations and so on.

4. How would you stimulate teenagers and young graduates to study soil science?

It is extremely difficult these days to convince the new generation to choose soil science as a disci-

pline for study and work, particularly in the developing countries where easy-to-do kinds of jobs are more attractive in terms of income they provide. In such conditions, it is essential to communicate the fascination and importance of soils to school students and also to school teachers. In my opinion, teenagers and young graduates should be taken out to the real world where they can see the interaction between soils and living phenomena. They need to see how and why soils are different so that they can have a better understanding of why different soils should be managed differently. The importance of soil from different aspects has to be well advertised.

5. How do you see the future of soil science?

Soil Science will continue to play an important role as a scientific discipline as long as the soil and the human populations that depend on the soil endure. Apart from the traditional task of Soil Scientists in sustainable agriculture, they have much to offer in understanding how soils influence, drive and control other important processes linked to soil contamination and atmospheric pollution. Global warming and environmental pollutions appear to be today's top international issues. Even if we are very optimistic, the world population would still increase but with a much lower rate. The anthropogenic activities would continue disturbing and degrading the ecosystem. So, just like the last few decades, environment related problems would still remain as top priorities on the agenda of scientists, particularly Soil Scientists, to explore methods to remediate the contaminated soils and to reclaim the degraded lands. As we collect more and more information about our soils, the need to link our information with other applied sciences would more necessitate the diversity in our tasks. We definitely need to do more team work and conduct multidisciplinary research in future with the cooperation of scientists such as Ecologists, Biologists, Geologists, Chemists and Engineers.

Getting involved in examining soils (or soil-like materials) from other planets in future also seems to be within the reach of Soil Scientists of the new millennium. Let's see what the next generations of Soil Scientists would do with the soils which cover the planet earth as well as the top mantle of perhaps other planets! Soil Scientists would perhaps find new issues to handle in future. Nevertheless, they would never seem to lose their current linkage with food, feed and fiber production.

Five questions to Pandi Zdruli



Age: 50
Position: Senior Research Scientist
Address: International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), Mediterranean Agronomic Institute of Bari, Land and Water Department, Via Ceglie 9, 70010 Valenzano (BA) Italy
E-mail: pandi@iamb.it

1. When did you decide to study soil science?

I grew up in a society where the Government decided where to study, work, and live. As a city boy I had other dreams rather than studying agriculture, but they sent me at the Faculty of Agronomy of the Agricultural University of Tirana, in Albania. Despite some initial malcontent I found this Faculty exiting and challenging, especially Pedology. My direct contact with the soil though was after graduation when I served for six years as agronomist in an agricultural cooperative near Tirana. All what I knew from the books was now real and I still remember very well what it means to find the right moment to plough a Vertisol. I truly decided to dedicate myself to soils in 1988 when I started working at the Soil Science Institute of Tirana and especially after I won in 1992 the Fulbright fellowship competition to continue research and study on soils at the USDA Natural Resources Conservation Service (NRCS) in Washington DC for just about five years. I could say now that I'm very grateful for this choice.

2. Who has been your most influential teacher?

Undoubtedly Dr. Hari Eswaran, National Leader at the USDA NRCS World Soil Resources in Washington DC, USA. His wise advice, dedication, scrutiny, and friendship taught me a "different way of doing business", and yet I find at his papers plenty of ideas and topics to be explored.

3. What do you find most exciting about soil science?

We all know that the soil is a very complex system. To study it thus one should have a complete scien-

tific background. So this is exiting. Why we yet have several disagreements for instance to accept an international soil classification system (despite the excellent work done by the WRB group). Perhaps because we still don't know everything about the soils. I remember once Hari saying after spending hours in a soil profile: "If soils could talk no one could predict how they would insult soil scientists". And Dr. Richard Arnold used to say, "soils are never wrong", hence we should find out why and how they are out there and I'm convinced this could not be done only with remote sensing and GIS.

4. How would you stimulate teenagers and young graduates to study soil science?

I was once invited to give a talk on soils at the elementary school of my son. It was interesting to respond to their questions and I noticed how hard is for us to speak their language. I'm sure with adults is much difficult. So we must make our science "easier" but not "simpler". The Soil Atlas of Europe prepared by the European Soil Bureau Network (ESBN) has a section "The soil in your garden". The purpose is to bring this resource closer to those that take it for granted. We must find similar examples to stimulate interest in soils for the larger public and not only for students. The opening of the Smithsonian Soils Exhibit in Washington DC in July 2008 is something to be applauded. People should understand that is as truer as you could get sick from polluted water and air as well as from polluted soils.

5. How do you see the future of soil science?

A decade ago a soil scientist from New Zealand circulated an essay entitled "Is Pedology dead and buried?" I don't think the situation now is much better today. I was leading at our Institute a soil survey team until 2001 but none of my four young colleagues (one was a girl) is with us since then. After having spent five years surveying hundreds of soil profiles in Puglia, Italy and even having their first international experience in soil survey, when the project came to end they had to leave. None of them is doing anything with soils ever since. Let me ask also how many of us have suggested to our children a carrier in soil science?

I don't think this is neither sustainable nor fair to soil science and to the people who devote to it. To survive thus we need to "broaden horizons" beyond the soil profile. We need to embark in an eco-system approach and to demonstrate that soils are equally important to water, air, geology, biodiversity,

socio-economics of soil management, and not to use for instance water as an excuse for doing soil research. We need to talk not only to ourselves (as we often do!) but also to other scientists and especially to policy and decision makers. Otherwise we could continue to experience disappointing news such as the latest from the EU Council meeting in December 2007 where no political agreement was reached on the draft directive for the EU Thematic Strategy for Soil Protection, a setback especially for the ESNB and for the hard work that had invested on it.

Five questions to Tibor Toth



Age: 52 years

Position: Scientific advisor

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Street address: Budapest II. Herman O. ut 15.

E-mail: tibor@rissac.hu

1. When did you decide to study soil science?

As a graduate of chemistry I started to work in the Soil Chemical Laboratory of the Research Institute of Debrecen Agricultural University in Karcag. Faced with the strange methods and parameters used there, I was curious to understand more than what was taught by the professors of colloid chemistry at the university. The self-study was followed by a regular education, the only way of formal soil science curriculum in Hungary. We still have that corresponding soil science course and there are already four hundred soil science M Sc degree holders in the country.

2. Who has been your most influential teacher?

There were several excellent scientists who helped me some way during my 27 years that I spent in soil science. The first time when I collaborated with a world-class scientist, Theo Bruggenwert, I immedi-

ately realized the strength of the motivation provided by curious students. There is still a list of unsolved problems discussed with Theo and his students that I remember after twenty-two years.

3. What do you find most exciting about soil science?

There are two things that I find very exciting. Soil science is related to so many issues, that it is difficult to imagine anything independent from soils. For example in our institute we collaborate not only with agronomists, botanists, geologists, but also with physicians, ethnologists, economists some times. Soils are variable in space and time. There are very interesting cause and effect relations behind the variation. Furthermore the variation is reflected by vegetation, and this way creates the fundamentals of terrestrial biodiversity.

4. How would you stimulate teenagers and young graduates to study soil science?

As researcher I do not have frequent contact with young graduates. For stimulating these youngsters participation in a motivating project with unconventional techniques and interdisciplinary collaboration may be the best. When soil science is shown from multiple angles it is a very attractive discipline.

5. How do you see the future of soil science?

Soil science has a very great future. It has a very strong century behind and has convinced the society that it is useful and contributes to the well being of the citizens. Soil science is open, receives students from large number of disciplines and provides results to many scientists. Increasing number of decisions requires soil research.



The favourite soil science books

Sergey V. Goryachkin (Russia)

Soil science is the large branch of knowledge attracting the specialist with very different mentalities and preferences. Soil biologists can be closer to the biology and soil chemist can be biased towards chemistry. That is why the favorite book of a soil scientist depends on the branch of our science he works in. I am a soil geographer and specialist in soils of cold climates. It determines my preference in scientific reading.

My first choice is the book of V.M.Fridland (Fridland V.M. 1976. Pattern of the soil cover. Israel Program for Scientific Translations, Jerusalem, 291 p.) and its continuation and adaptation to English-speaking scientific community (Hole F.D., Campbell J.B. 1985. Soil landscape analysis. Rowman & Allanheld Publishers, 216 p.). These two books are not very popular now, in the era of pedometrics, however, they have been revolutionary in 1970s as the system approach to investigate soil covers not just as a collection of soil profiles or even soil catenas but as a three-dimensional systems with different components and linkages. They allowed to elaborate new soil maps where were shown 1) soils as soil cover components, 2) soil percentage in every map polygon, 3) linkages between soils and 4) the genetic morphology of a pattern. Even now the most of soil maps and GIS databases has only two characteristics of four ones suggested by the authors of these books.

My second choice is the "Encyclopaedia of polar soils" – the book of the real giant in cold soils study J.C.F.Tedrow (Tedrow J.C.F. Soils of the polar landscapes. Rutgers Univ. press. 1977. 664 pp.). This book embraces Polar Regions of both hemispheres – Arctic and Antarctic. J.C.F.Tedrow included all the knowledge on polar soils the science had at the end of 1970s. He cited many German, French, Russian and Scandinavian books and papers. He explained all the sides and specificities of pedogenesis in high latitudes – cryogenic churning, the formation of patterned ground and other features caused by permafrost. There have been published a lot of new data, papers and books on polar soilscapes since that time but the most comprehensive monograph is still the one of J.C.F.Tedrow.

My third choice is two volumes of M.A. Glazovskaya's Soils of the World (Glazovskaya M.A. 1983. Soils of


the world: Vol. 1. Soil families and soil types. 214p. Glazovskaya M.A. 1984. Soils of the world: Vol. 2. Soil Geography 411 p. New Delhi, Amerind.) They were published in Russian in 1972, before Soil Taxonomy and FAO-UNESCO Soil Map. So, this book was one of the first overlooks of the global pedosphere. The first volume concerns different soils of the world. The approach of their systematization was absolutely novel at that time. It combines both substantial and genetic approaches basing on such characteristics as pH, Eh, CEC and its saturation as well as genetic horizons. The second volume is the systematic information on soil distribution on different continents and some general approaches to soil geography. They are a combination of bioclimatic zonality and geogenic regionalization. This monograph is still one of the best analyses of the world's soils and pedosphere.

- Fridland V.M. 1976. Pattern of the soil cover. Israel Program for Scientific Translations, Jerusalem, 291 p.
- Hole F.D., Campbell J.B. 1985. Soil landscape analysis. Rowman & Allanheld Publishers, 216 p.
- Tedrow J.C.F. Soils of the polar landscapes. Rutgers Univ. press. 1977. 664 pp.
- Glazovskaya M.A. 1983. Soils of the world: Vol. 1. Soil families and soil types. New Delhi, Amerind. 214 p.
- Glazovskaya M.A. 1984. Soils of the world: Vol. 2. Soil Geography. New Delhi, Amerind, 411 p.

Mary Idowu (Nigeria)

One of my favorite soil science books is the Principle of Soil Chemistry by Tan, K. H. of the Department of Crop and Soil Sciences, the University of Georgia, Athens. It was an expanded edition, published in 1998. The book was a very useful Ph. D research and teaching material for me. It clearly explains the basic chemical and thermodynamic principles, soil air and water, the soil gas and liquid phases, and cation exchange theories. The importance of soil organic acids and their chelation reactions are discussed more explicitly.

The focus of my Ph.D. was on Soil Fertility and Plant Nutrition, with special interest in sodium and potassium as nutrients for tomato production. Mineral Nutrition of Higher Plant by Marschner, H, revised



edition that was published in 1998 was a very important book to me. This book is a great collection of knowledge needed in mineral nutrition of plants. The information that is often scattered throughout the literature is brought together as a single comprehensive text book. The book contains numerous tables, structures with a lot of references on soil nutrient availability and transportation, compartmentation and functions in the plant. It deals with macro and micronutrient elements, and those that are at the verge of being considered essential to plants. I appreciate the efforts of friends who made the dream of the Author a reality.

Fertilizer Use and Management Practices for Crops in Nigeria by the Federal Ministry of Agriculture and Rural Development, edited by pioneer soil scientists Aduayi, E. A., Chude, V. O., Adebusuyi, B. A. and Olayiwola, S. O., published in 2002 is another favorite book for me. The book covers large area of agricultural land, classified Nigerian soils and indicated management strategies for effective fertilizer use. Soil classification was based on USDA and/or FAO/UNESCO. The book is unique because it contains information on the plant nutrient levels and socio-economic factors influencing fertilizer usage in Nigerian. It also incorporates information on fertilizer requirements of diverse arable crop in Nigeria. The book is useful for both soil scientists and agronomists.



Course

Functions of microbial communities in soils: impact of anthropisation and sustainable use

We are pleased to inform you that a new edition of the French–German Summer school entitled “ functions of microbial communities in soils: impact of anthropisation and sustainable used” and supported by the French–German University, the Lorraine doctoral school(CRED), the UE network EVOLtree will be held from September 8th to September 19th in Nancy (France). The aim is the presentation and discussion of the newly acquired knowledge on the ecology (dynamics and functions) of microbial communities in soils of different use and contamination (forest, agricultural, urban and strongly anthropic e.g. post industrial soils).

Location:

LIMOS, Nancy Université-CNRS, UMR 7137, Faculté des Sciences, BP 239, Boulevard des Aiguillettes, 54 506 Vandoeuvre-les-Nancy, France.

Organisation committee:

- Dr. J. Berthelin, Nancy University-CNRS, LIMOS, Nancy, France
- Dr. C. Leyval, Nancy University-CNRS, LIMOS, Nancy, France
- Dr. T. Beguiristain, Nancy University-CNRS, LIMOS, Nancy, France
- Dr K. Pritsch, Soil Ecology, Helmholtzzentrum München, Neuherberg, Germany
- Dr M. Schloter, Soil Ecology, Helmholtzzentrum München, Neuherberg, Germany
- Prof. Dr. J.C. Munch, Tech. Univ. Munich & Helmholtzzentrum München, Neuherberg, Germany

The sessions are led by a team of German and French lecturers and will be of interactive nature. PhD students, postdocs and scientists who are en-

tering the field or want to deepen their knowledge of the subject are invited to apply for participation. The summer school registration fees are free. Accommodation can be provided at reasonable price levels. For programme, detailed information and registration (deadline for application: May 31st), please contact Thierry Beguiristain (thierry.beguiristain@limos.uhp-nancy.fr). List of selected participants will be available by June 10th.

Don Nielsen received the Don And Betty Kirkham Medal



Don Nielsen receiving the Medal from Mary-Beth Kirkham

The Don and Betty Kirkham Medal, presented every eight years at alternate Kirkham Conferences, commemorates the unexcelled career achievements of those most extraordinary individuals throughout the world who uniquely contributed to soil physics because of their inspirational teaching, research and professional activities. Nominees for the medal must be living and retired from employment. The recognition consists of a certificate, a gold medal and an honorarium of \$1,000. It was awarded to Prof. Don Nielsen at the 2008 Kirkham conference.





Obituaries

Georges Aubert

1913 - 2006

Georges Aubert died on 6th September 2006 after a long career devoted entirely to the study of soils. Following his studies at Agro and a period of military service he chose a career as a researcher in Agronomy at IRA (the predecessor to INRA). Together with Stéphane Henin he became involved in the soils laboratory which Albert Demolon had recently established at Versailles. Within the Laboratory he was given responsibility for the Pedology section, the aim of which was to provide a scientific basis to the study of soils which up to that time was not specifically focused and was regarded as a branch of agrochemistry.

This was the beginning of a long career in research and teaching where he combined his strong scientific background and his particular enthusiastic personal approach to his subject. From his early days at Versailles, Aubert approached his task with characteristic enthusiasm and diligence. Often undertaking his field excursions and observations of the land by bicycle, he completed the very general surveys begun by Agafonoff (1936), Erhard (1935) and Oudin (1936). These surveys provided the opportunity to observe soils in the field as they occurred. From his base in Versailles he naturally travelled extensively in the Paris Basin focusing on the silts found on the loess plateaux, giving special attention to this type of soil, *sol lessivé*, which was not envisaged in Dokuchaev's classification. This work was later completed by Marcel Jarmagne in 1973.

His favourite area from this period was the West of France (Brittany, Anjou and Normandy), and this perhaps explains why the first pedological map of France at 1:1M, published in 1952 was that for the North West in which so much of his work had been centred. During the World Congress of Soil Science held in Paris in 1956, he prepared the field excursion to this part of France.

At the same time as pursuing his work in France he was concerned with the overseas territories of France. In 1937 he was made responsible, in Algeria, for the production of the first map of 'The soils of the irrigated edge of the Plains of Relizane' which

was complete in 1959 by Jean Boulaine. It was during this time that he became aware of saline soils and the processes of salinisation in relation to irrigation in dry regions. He became an active participant in the pedology of Mediterranean soils, this continuing throughout his life through ORSTOM and UNESCO. With encouragement from the Academy of Sciences, Aubert became a driving force in the Academy of Overseas Sciences and began to focus on a wider range of soils from the colonies. This work was synthesised in a bibliographic summary on the Soils of Overseas France published in 1941. It is not surprising therefore that he was actively involved in the establishment of the Pedology Section of the Office of Colonial Research (becoming later ORSTOM, then IRD), and he was at the core of this section for the next 40 years.

This was a fascinating time for pedologists because relatively little was known about the soils of tropical regions. Aubert began his work by identifying the main types of soil and with other pedologists developed a mapping system which could be readily applied to the French Overseas Territories.

In addition to this contribution to Soil Science, it should also be recognised Aubert's enormous contribution in establishing the teaching of Pedology in the Universities and the *Ecoles supérieures agronomiques* (with the exception of Nancy where Pedology was taught in the School of Water and Forests). This programme was very comprehensive and included a period of field-based study in one of the French Overseas Territories. This training programme provided many soil scientists for ORSTOM, CIRAD, INRA, CNRS, etc. Aubert's enthusiasm for soils and soil science was a key element in attracting young scientists to the subject.

Based on his extensive knowledge of soils from many parts of the world, he proposed a new approach to the general classification of soils which he called 'morphogenetic', linking genetic evolution, from knowledge of processes, with morphological characteristics of soil profiles. A first draft was presented together with Philippe Duchaufour at the 1956 WCSS, the final version being completed in 1963. This was the foundation for the French Classification, itself the forerunner of the Soil Study and

Pedology Map service of France of which he was the President of the Scientific Committee with Marcel Jamagne as Director.

This illustrates the enormous contribution Georges Aubert has made to Soil Science and the study of soils. He was elected to the Academy of Agriculture in 1954 and was President in 1970. From 1965 he was a member of the Overseas Academy of Sciences and was President in 1985. He was very active in UNESCO and ISSS, where he was Chair of Commission V (Genesis of Soils) between 1960 and 1964, and was subsequently elected a Honorary Member of ISSS.

The death of Georges Aubert is a major loss to Soil Science, but he leaves behind him a record of his knowledge and understanding of the subject, both through the published information and through the many present-day soil scientists who benefited directly from his teaching or the framework for soil science teaching he established.

Stephen Nortcliff

(from the obituary written in French by Georges Pédro)

Dom Luis Bramão

1909 - 2007



Dom Luis Bramão, former chief of FAO's World Soil Resources Office, passed away at Estoril (Portugal) on 8 November 2007. He was born in Lisbon on 31 May 1909.

He graduated from the School of Agriculture of the University of Lisbon in 1933. He obtained an MSc in agricultural engineering in 1935 with special reference to soil survey and land use suitability. In 1935-36 he served as Chief soil section of the Portuguese National Board of Irrigation and Drainage. In 1936-39 he took advanced training at Cornell University in the USA, under a scholarship of the Portuguese Government. In 1939 he was appointed Chief of the Division of Soils of the Agricultural Research Organization of Portugal. In cooperation with the Plant Industry Station at Beltsville, USA and the University of Lisbon he undertook thesis research on clay mineralogy and soil classification. In 1951-52, on leave from the Government of Portugal and in association with the Rockefeller foundation Dr. Bramão provided scientific assistance to the government of Brazil on soil issues in the Amazon and the State of Sao Paulo. This mission was extended in the framework of FAO's programme for technical assistance in charge of research, teaching and the initiation of a soil map of Brazil.



In 1955 he joined FAO headquarters in Rome where he was charged with the organization's soil survey programmes. From the beginning he suggested that FAO's soil survey network also be mobilized to undertake an inventory of soil resources at continental scale. Consultations which took place on the occasion of the sixth congress of the International Society of Soil Science (ISSS) in Paris in 1956 revealed an overall interest for regional soil inventories. As a result soil maps of great regions were presented at the seventh congress of the ISSS, held in 1960 at Madison, WI, USA. On this basis and in response to a recommendation of the Congress FAO and Unesco, in association with the ISSS, agreed to prepare a Soil Map of the World. In 1961 the coordination of the project was entrusted to FAO's World Soil Resources Office, of which Dr. Bramão, was the begetter and coordinator. The work of the World Soil Resources Office, guided by an international advisory panel, comprising the collection and correlation of survey material, field reconnaissances, worldwide cooperation under Dr. Bramão's direction lead to the presentation of a first draft of the Map and of the international legend at the ninth congress of the ISSS at Adelaide in 1968.

Dr. Bramão returned to Portugal in 1969. Upon his return he served as a Director of Research at the Portuguese Agricultural Research Organization.

In 1971-72 he was a member of the Portuguese delegation to the FAO Council and Conference. From 1972 till 1975 he was Professor of the International Course Fertilidad de Suelos e Nutricion Vegetal at the Universidad Complutense in Madrid. In 1977 he assumed the position of governor of IFAD. He was a Guildersleeve guest professor at Barnard College., Columbia University, New York. He participated in the studies of the Pontifical Academy of Science on organic matter and soil fertility.

He became a knowledgeable student of Portuguese genealogy and was the founder and first president of the Portuguese association of historical houses which worked with international counterparts in the Netherlands, France and England.

Dr. Bramão was a life member of the ISSS and was the liaison between FAO and the ISSS at the time that it obtained a consultative status with the specialized UN agency. He will be remembered as a fervent promoter of international cooperation for the global inventory of soil resource. To Mrs. C. Bramão the IUSS expresses its condolences and deep sympathy.

R. Dudal


Biauw Tjwan Kang

1932 - 2008



Biauw Tjwan Kang, 76, a resident of Haverhill (USA) for the past 10 years, passed away Saturday, February 2, 2008, at Massachusetts General Hospital, Boston. Born and raised in Indonesia, he graduated from Bogor Agricultural University (IPB) Indonesia, in 1958 and completed his PhD in Agronomy from Purdue University in 1962. He was Principal Soil Scientist and Agroforester at the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria for over twenty years. In addition, he was a visiting scientist at the University of Florida, University of Reading, University of Georgia, and University of Hawaii.





Dr. Kang pioneered the scientific development of the alley cropping/farming system as an alternative to the slash-and-burn land rotation farming system, and established the first agroforestry arboreta in tropical Africa. He authored or coauthored over 170 publications including refereed articles, books, and book chapters in soil science and agroforestry. Dr. Kang supervised many graduate research scholars from developing and developed countries. Throughout his professional career he lectured extensively worldwide at universities and agricultural research institutions.

He received the prestigious 1990 Swedish Innovations for Development Association Honourable Mention Award for successfully implementing alley cropping in Nigeria, Philippines, and Indonesia with the following citation: "Dr. Kang's system makes permanent, sustainable cultivation of the soil possible, even with increased population density." He was the recipient of the 1995 International Soil Science Award from the American Soil Science Society. While the scientific recognitions were professionally gratifying, Dr. Kang personally cherished the chieftaincy title of Babaleye Agbe received from Alabata village in Nigeria for his contributions to its agricultural development.

He was a member of numerous professional societies including the American Society of Agronomy, Soil Society of America and the International Society of Soil Science. He served as reviewing editor for many scientific journals.

Following his retirement, Dr. Kang continued his passion for scientific research for several years, but in recent years began focusing his creativity and diligence on wood carving as a personal hobby.

He is survived by his wife of nearly 50 years, Jeanette Kang, four children, Antonia Saddington, Sandra Kang, Norbert Kang, and Juanita Kang, three sons-in-law, Hugh Saddington, K. Ramesh, and Cheuw Lee Yeo, a daughter-in-law, Louisa Kang, two grandsons, Alex and Marcus, and six granddaughters Kartini, Frannie, Louisa, Theresa, Antonia, and Anna.

Reports of Meetings

Seminar on Tropical Soils under Direct Seeding, Mulch Based Cropping Systems

The seminar in Antananarivo (Madagascar) was a strong presentation of ways to improve soil management in the tropics but showed also the reality of serious problems of recent land use. This very successful meeting was organized by Christian Feller from Institut de Recherche pour le Développement (IRD), Madagascar and vice chair of IUSS commission 4.5 – History, Philosophy, and Sociology of Soil Science, and Lilia Rabeharisoa from the Laboratoire des Radio-Isotopes (LRI), Madagascar. The idea of the conference was to show the multiple benefits of cropping systems with mulch, so increase of soil carbon content, and by this contribution of soils to carbon sequestration, reduction of erosion, to avoid soil water loss by evaporation and increase water infiltration capacity of soils. This benefit will be achieved by increased soil biological activity of a mulch based cropping system.

Due to the global need to reduce atmospheric carbon dioxide content, and encouraged by a very complete but comprehensive introduction on Organic Residues Management and Tropical Soils Function-


ing by Rattan Lal, Ohio State University, the seminar started with the contributions of soils for carbon sequestration. It was encouraging that tropical soils have a large potential, and Africa and the other tropical countries as shown by presentations from Brazil and Laos started to discover their potential for carbon sequestration.

Essential topics were mulch based cropping systems versus conventional tillage which were presented in context of carbon storage and N₂O emissions. The role of meso - and macro - fauna particular in upland rice fields, nitrogen dynamic and phosphorus balance and the role of mycorrhizal soil infection were covered by several presentations. Effects of interval of shifting cultivation, of different soil management techniques for increasing infiltration of water, characteristic of run off water, erosion types and leaching of nutrients by increase of infiltration were identified.

The 2 days excursion of the seminar was a visit to the region of Antsirabe in the inner highlands of Madagascar. Field trials about direct seeding and mulch covers by different crops were viewed. The large experimental farm with its manifold trials and research targets was operated by the ngo Tafa. For soil science it is very encouraging that not govern-



Participants of the International Seminar on Tropical Soils under Direct Seeding, Mulch Based Cropping Systems, excursion to Antsirabe, discussing motivation of farmers



mental organisations like Tafa are engaged also in soil survey and development of proper soil management techniques. Soil research was near to practical demands. The excursion did give good examples how to interest farmers in good soil management and fertilizer use by combining soil needs with economic ones. On the other hand the hilly inside of Madagascar has to struggle with strong problems of erosion and maintenance of fields. Perhaps a large problem of the future will be the small size of fields which restricts mechanisation and by this the increase of farmer's family income in a hilly area with strong slopes. One can expect that many sites will be abandoned and the soil will pass away. The seminar was visited by 82 participants from 13 countries. There had been 43 oral and 20 poster presentations. The seminar was held in the Panorama hotel of Antananarivo with its good conference facilities. Important marks were that there had been intensive discussions after each presentation. Christian Feller and his co-workers took marvellous care for the participants so we did feel well shepherded. This was a good environment to get contacts and exchange ideas. The participants thank the organizers, the many people and staff, institutions, governmental and non governmental agencies who were engaged, and supported the 'seminar tropical soils under direct seeding, mulch based cropping systems' in Antananarivo, Madagascar, particular many thanks to Christian Feller and Lilia Rabeharisoa.

Wolfgang Burghardt

Chair of IUSS Division 3 - Soil Use and Management
University of Duisburg-Essen

4th International Conference on Urban Soils - Soils of Urban, Industrial, Traffic, Mining and Military Areas (US/SUITMA)

After the conferences in Essen, Germany, 2000, in Nancy, France, 2003, and in Cairo, Egypt, 2005 the 4th conference of the Working Group Urban Soils (US/SUITMA) of the International Union of Soil Science was performed by the Institute of Soil Science of the Chinese Academy of Science (CAS) in Nanjing, China. From the 1st to the 4th one US/SUITMA conferences experienced a shift of their main topics. In the beginning pollution and classification of urban

soils were the main topics. It was the fear of hazardous compounds and the big question can be the deposits and technological materials designated as soils. Nowadays the effect of diverse types of urban land use on soil characteristics, the new properties soils gained from them, functions, and methods of assessment of soil functions, from particular urban properties and for urban services have become top themes. Soils offer numerous services so for example of pollutant uptake. This makes clear that the viewpoints for soil pollution changed. Large part of the conference was devoted to particular physical and chemical impacts but also services from physical and chemical soil properties. The modern objectives of soil science such as environmental effects, mycological and habitat properties, and carbon sequestration of urban soils, occurrence and properties of black carbon were presented for cities. The state of inclusion of Technosols into the WRB Taxonomy, and by this the acceptance of soils from technological materials was discussed. Such Technosols occur in most cases unplanned. But it was shown that it make sense to construct soils from different materials. Particular in Asia there is a strong expansion of urban areas. Which soils are lost, their quality parameter, their fertility, the pattern of new soils and the loss of relationship of soils to natural landscape patterns, shape of the pattern, boundaries of soils and non-soil elements, the increasing pedo-diversity were demonstrated by several contributions. Several sets of methods were presented for that purpose. Other interesting themes were identifying and characterizing diffuse pollution, and prognosis of urban soil quality based on soil material composition.

Urbanization results in part in soil extinction, but also in new soil functions and demands for soil functions. Therefore assessment studies about the availability of soil functions to cover the needs of diverse types of soil uses were presented. They show that in urban areas numerous functions can be fulfilled. Important for the discussion about loss of bio-diversity will be that urban soils and particular Technosols can contribute very valuable habitats. Important by its huge amount, but only highlighted by one presentation is the wide spread soil mining by excavation for diverse constructions. It changes landscapes totally. Strong effects on urban soils and on generating new urban soils have the strong migration of rural population into urban areas as it is happening in Africa and Asia. A serious problem also for soil science in general is the

unprotected and not controlled storage and distribution of polluted waste as it happened recently in Abidjan.

In spite of the upcoming interest in urban landscape and land use processes there was still a strong focus by many presentations on soil pollution status and distribution, origin from streets, mines, smelters, war mines, explosive materials, gas pipe lines, oil winning areas, coke plants, and methods of remediation.

That there are other benefits from soils as such as food, timber, fibre supply and water winning showed the example of urban soil art: the movie on vegetation succession on rubble. The conference was visited by about 89 Chinese and 60 colleagues from 18 other countries. There were 43 oral and 85 poster presentations. Larger visitor groups were from Russia, Germany, South Korea, France and Czech Republic. Africa was represented by three countries which is very encouraging for the future work in urban areas, in Africa beside Asian countries. The conference was excellent organized by Gan-Lin Zhang and Yu-Guo Zhao, and their co-workers in the Institute of Soil Science of CAS. It started with early announcement of the program together with all travel and lodging, and location details. The rich and all time of the stay covering social and scientific programs were very

compactly and smoothly connected. Detailed descriptions on how to get from Shanghai and Nanjing Airport to the conference hall and to the hotels were available. The conference fees (250 US\$ inclusive meals), hotel, tour and other costs were kept low so that many colleagues had a chance to participate in the US/SUITMA conference and also to take part in the conference tours. We had noticed this very thankfully and hope other conferences will follow the example of low cost arrangements of our Chinese colleagues. This way of conference performance did bring many of us closer together and established a SUITMA family feeling.

The two-days pre-conference tour to Nanjing city and Tongling(Copper Hill) city demonstrated the effect of different and frequent urban land use types such as residential areas green, urban vegetable farms, and park on young rubble deposits. Soil characteristics, soil properties, morphogenesis of soils and soil functions were discussed. The attraction in Tongling had been the colourful large copper mining spoil deposits. Unfortunately there was only limited access at the week end. The post-conference tour was to Suzhou City and Shanghai, focused on paddy soils in the Yangze Delta and water treatment as well as sludge disposal in the metropolitan Shanghai.

The 4th US/SUITMA conference in Nanjing pre-



Pre-conference tour: the ground water is everywhere near the surface in Nanjing city. Demonstrating the properties of a Gleysol profile of an urban vegetable farm, photo by Gan-lin Zhang.

sented a strong urban soil research group of our colleagues of the Institute of Soil Science of CAS. There are also numerous other strong urban soil research group in China. This is for us all a good signal that urban soil science can and will play its role for improvement and sustainability of urban life. We have to say thanks to Zitong Gong, who opened the way for urban soil science in China, Gan-Lin Zhang and Yu-Guo Zhao who filled it with life, and all the others who followed them and did give their support to the conference. We have also to thank the Institute of Soil Science of CAS in Nanjing, for the excellent facilities for the performance of the conference we got, and particularly all the co-workers of the institute whose engagement we enjoyed thankfully.

In Nanjing the US/SUITMA working group election was also conducted. Wolfgang Burghardt, Germany, who established the IUSS working group US/SUITMA on the 16th World Congress of Soil Science in 1998 in Montpellier, France, finished his nearly 10 years of engagement as chair. The previous vice Jean Louis Morel of Laboratoire Sols et Environnement, Institut National Polytechnique de Lorraine, ENSAIA, INRA, Nancy, France was elected new chairs. Gan-Lin Zhang, Dep. of Soil Resources and Remote Sensing of the Institute of Soil Science of CAS was elected as vice chair. The 5th conference

of the Working Group US/SUITMA is planned in 2009 in New York. Richard K. Shaw from the NYC Soil Survey, USDA-NRCS, Staten Island, New York did give his welcome to this big event in 2009, and introduction. Hopefully we can meet many old and new fiends of the SUITMA at this big event in New York.

Wolfgang Burghardt


Chair of IUSS Division 3
-Soil Use and Management,
University of Duisburg-Essen, Germany

High-Resolution Digital Soil Sensing and Mapping

From February 5 to 8, 90 delegates from across Australia and around the world attended the 1st Global Workshop on High-Resolution Digital Soil Sensing and Mapping at the University of Sydney. Delegates had a wide range of expertise in fields including soil science, precision agriculture, statistics and spectroscopy. Seventeen countries were represented. The workshop opened with short addresses by CSIRO Land and Water chief Neil McKenzie and the University of Sydney's Professor of Soil Science (and workshop chair) Alex McBratney. These were



It makes sense.



followed by the first keynote presentation, presented by Jaap de Gruijter (Wageningen University and Alterra), on sampling for high-resolution soil mapping. There were another three keynote presentations throughout the rest of the workshop, and they were presented by Viacheslav Adamchuk (Univ. Nebraska; on on-the-go soil sensor systems), Bosse Stenberg (Swedish Univ. Ag. Sciences; on diffuse reflectance spectroscopy) and Noel Cressie (The Ohio State Univ.; on statistics for very large datasets).

A key feature of the workshop was the discussion time at the end of each session. This was usually used to provide a summary of the talks that had been presented and for an opportunity to ask questions of the presenters, in addition to discussing points that had arisen during the session itself.

The workshop field trip to the University's Lansdowne Farm at Cobbity on the outskirts of Sydney was an opportunity to see first-hand some of the sensors and systems that had been presented during the talks. Damien Field from the University of Sydney informed delegates about the kind of soil underlying Lansdowne Farm and there were demonstrations of a number of sensors including a Veris 3100 platform, various EM instruments from Geonics and a ground-penetrating radar unit from Alpha Geosciences. Delegates could try some of the sensors out for themselves.

The conference dinner was held at the Waterfront Restaurant at The Rocks in Sydney. Delegates enjoyed the meal while being serenaded by musicians playing the harp and acoustic guitar (a few unnamed delegates were particularly transfixed by the music).

The final session of the workshop was a chance to wrap up the proceedings and to recap what had been discussed and presented throughout the week. The rapporteur for each session presented a summary of the talks given and points discussed in his or her session, and there was time for open discussion as well.

It is safe to say that, as is often said, a good time was had by all during the workshop (and probably too much of a good time had by some). The presentations were very informative and the discussions were especially stimulating and constructive. The field day was rewarding too. We wait for the announcement of the next HRDSSM workshop, which will no doubt be held in some cosy spot in the world.

Soil in the modern information society

First Joint Conference of Slovak Soil Science Society (Societas pedologica slovacica) and Czech Soil Science Society titled „Soil in Modern Information Society“ took place on August 20 – 23, at Roznov pod Radhostem in Czech Republic. The conference was organized under the auspices of Minister of Land Management and Minister of Environment of both countries. The conference was attended by more than 164 specialists from Czech Republic, Slovakia and other neighboring countries. A special importance had presence of prof. Dr. Winfried E.H. Blum, dr.h.c. from Austria, president of ECSSS as well as the participation of representatives of ministries and universities and five presidents of neighboring national soil science societies.

The conference participants presented 40 selected oral presentation and 90 posters. The main scientific topics were following:

Soil information system in relation to soil classification, evaluation, modeling and pedometrics

Soil resources, soil functions and (non)sustainable development

Human impact on soil quality and soil monitoring.

Organizers of this conference have decided to express a great appreciation to those Slovak and Czech soil scientists who participated in general soil surveys of agricultural and forest soils in 1960ies and in the subsequent land evaluation in former Czechoslovakia. These activities have been created the base for recent Soil Information System in Slovakia and Czech Republic and their results have been utilized until today. In addition, several foreign leading personalities were awarded for their contribution to collaboration development between their national soil science societies and SPS or CPS.

One of the aims of the conference was to acquaint the international soil science community about the great scientific potential of Slovak and Czech soil science and about their capabilities contribute to soil science development in conditions of recent development of international scientific co-operation.

The scientific discussions at the Conference showed up an urgent need to work out further approaches and recommendations for soil conservation. Soil as non-renewable natural resource is under a growing pressure of degradation factors causing damages with a lot of environmental consequences not only for nature but for the human health and economy as well. For this reason there is very positive re-



The conference board, from left: prof. Dr. Josef Kozak, Dr.h.c., prof. Dr. Jiri Kulhavy, Dr. Jaroslava Sobocka, Prof. Dr. Winfried Blum, Dr.h.c.

sponse of soil science community to process of preparation of the EU directive for soil protection (Communication of the Commission "Towards a Thematic Strategy on Soil Protection" (COM(2002)179)).

Dr. Jaroslava Sobocka
President of Slovak Soil Science Society

Palaeosols, Geomorphic Evolution of Landscape and Paleoclimate Change

From the 10th to the 14th of January 2008, the International Conference & Field Workshop on Paleopedology: "Paleosols, Geomorphic Evolution of landscape and Paleoclimate Change", organized by Hema Achyuthan (Department of Geology, Anna University), took place in Chennai (Madras), India.

The meeting was inaugurated by Prof. L. Elango (Department of Geology) and Dr. K. Jayaraman, dean of the Anna University, who addressed the welcome to the participants, followed by the opening speech of the President of the Paleopedology Commission, Dr. E.A.C. Costantini, the release of the Abstract Volume by Prof. A. Bronger (University of Kiel) and the ceremonial Vote to Thanks handled by Hema Achyuthan. The hosts greeted the colleagues coming from abroad, who had given the many Indian

young participant an important opportunity of enhancing the quality of their research through an international comparison and exchange of opinions. The President of the Paleopedology Commission, after having introduced the Paleopedology group as a Commission inside the International Union of Soil Sciences and subcommission of the International Union for Quaternary Research stressed, among other, the importance of involving the emerging countries in the activities of the two Scientific Societies, also by supporting the meetings and conferences organized in those countries.

The introductory key lecture was carried out by Prof. Arnt Bronger, about vetusols and relict soils of south India. About forty oral presentations coupled with a dozen of posters were presented during the whole meeting, the major part of them by young scientists. The contributions included a variety of scientific topics, spanning from the study of paleosols in the framework of geomorphological evolution, stratigraphy and sedimentology, soil genesis, paleoclimate reconstruction and climatic change, geochronology, geochemical and isotopic signature, carbon and microbial dynamics in the earth ecosystem, soil sustainability, land use and human impact, etc. As a consequence, also methodological approaches were interestingly assorted and sometimes very innovative, especially in a number of multidisciplinary works.

In the first scientific session, chaired by Edoardo Costantini, the following papers were presented: "A stratigraphical and genetical revision of classic Apennine fringe palaeosols" by Stefano Carnicelli, "Late Pleistocene environmental change in a northern sector of the peninsula de Yucatán, Mexico, based on sedimentological and paleopedological proxies" by Elizabeth Solleiro-Rebolledo, "Micromorphological, LA-ICP-MS and radionuclide analyses of two soil transects in Sardinia, Italy: genetic, morphodynamic and chronological implications" by Fabio Scarciglia, and "Paleosols as tools for the detailed reconstruction of alluvial fan architectures" by Rossano Ciampalini.

Irina Kovda led the second session, during which Stefano Carnicelli spoke about "A pedostratigraphic marker for the Main Ethiopian Rift (MER)", Simone Priori presented "Pedostratigraphic and geomorphological evidences of Quaternary tectonic activity in a coastal terraces flight of south-west Sicily (Italy)", Brigitte Urban dealt with the "Characterisation of Fluvisols and sedimentation processes in the Elbe River flood plain, northern Germany, during the Late Holocene". M.A Bronnikova presented the paper "Late Holocene climate-related change of fluvial activity and floodplain pedogenesis in the upper Dnieper basin (Russian plain)", Pankaj Srivastava showed "Micromorphology and clay mineralogy of Late Quaternary loess-paleosols of Kangra intermontane basin, NW Himalayas: Paleoclimatic implications", Chun Chang Huang "Holocene loess-palaeosol derived from the overbank flood deposit of the Yellow River, China".

Arnt Bronger was the chairman of the second-day scientific session, initiated by a lecture on "Tephric

paleosols on an eroding active plate margin: Waipaoa catchment, East Coast North Island, New Zealand" by Alan Palmer. M.R.G. Sayyed discussed about "Rare earth element geochemistry of the interbasaltic bole beds (paleosols) from Deccan flood basalts", followed by Irina Kovda, speaking about "Modern and paleoverisols for the environmental paleoreconstructions: opportunities and record potential". "Geochemical characters of surface and core sediments from Tejocotal reservoir, Hidalgo state, Mexico: a study on environmental and climatic factors" was presented by M.P. Jonathan, whereas "Coastal sand bars and mud dykes of Orissa and north Andhra: ongoing observations" was dealt with by Deepak Bhattacharya.

Brigitte Urban and Elizabeth Solleiro-Rebolledo held the following session, during which Veena U. Joshi spoke about "Textural, mineralogical and grain surface features of the alluvial sediments from a riverine badland along the Pravara basin, Maharashtra, India", T. Subramani about "Interpretation of rock weathering from geochemistry of soils in Chithar river basin, southern India".

Fabio Scarciglia was the convener of the afternoon session: P.D. Roy presented "Late Quaternary paleoclimate of the Sonora desert, north-west Mexico: a study based on geochemistry of lacustrine sediments from Laguna Seca de San Felipe", Amzad Husain Laskar showed " ^{14}C and $\delta^{13}\text{C}$ depth profile for a forest soil from Chhattisgarh, central India", Brigitte Urban discussed about "Geochronological work on coastal sediments in India", M.G. Yadava dealt with "Grey level measurements in a stalagmite: a proxy for past solar variability", G. Subrahmanyam spoke about "Diversity and activity of microbial commu-



nity in the paleosols of Mahi river basin, western India by polyphasic approach”.

The third day was opened by D. Pal with a lecture on “Significance of soils and their mineral formation in geomorphic evolutions and paleopedology”. Alan Palmer was the convener of the following session, which included the presentation “Paleoclimatic implications of the red dune sands (Teris) of southern Tamil Nadu, India” by Joseph Sabu, “Chemistry and pedology process of calcrete development in Vertisols of Coimbatore area” by Navin Shankar, “Rain-fall erosivity in the Kandhamal plateau of Orissa: a theoretical effort for real time administrative assessments” by Deepak Bhattacharya, “Point bar complexes of Chhoti Ganadak river and its implications on palaeoclimate” by D.S. Singh, “Late Quaternary fine deposits of Jammu (J & K State), India – Sediment characteristics, weathering and palaeoclimate” by Vinod Kumar.

The chairperson of the last session was Stefano Carnicelli. The following contributions were presented: “Micromorphological features of shrink-swell soils of India. Part I: Clay pedofetures” dealt with by P. Raja, and “Micromorphological features of shrink-swell soils of India. Part II: Plasmic fabric and carbonates” by U.K. Maurya. Ludmila Pesochina spoke about “The late Holocene soil and climate changes recorded in paleosols of the archaeological monuments in the steppe zone of the Russian plain”, whereas Fabio Scarciglia discussed about “A chronosequence of Quaternary soils on a flight of coastal river terraces in Calabria (South Italy) in the framework of paleoclimatic change and geomorphological evolution”, and finally Hema Achyuthan illustrated results about “Pedosequence of hardpan calcrete formation: a stratigraphic marker horizon”.

The indoor third day was devoted to the business meeting, whose minutes are reported below. In addition, during the last two days of the workshop, delegates joined field excursions along coastal and inland areas of south India. The main topics observed and discussed in the field were pediments, alluvial and coastal plains, tectonics and seismicity, exhumed spheroidal boulders and weathering profiles exhibiting typical subspherical, onion-like patterns of alteration on crystalline rocks, tsunamis-affected coastal sites, tropical laterite soil profiles and ferricretes, Holocene fluvial depositional environments and pedogenesis.

The intense scientific programme was nicely punctuated by friendly social and cultural events.

Minutes of the Business Meeting of the Paleopedology Commission


The group of people dealing with Paleopedology have the status of a Commission in IUSS, within Division 1 (Soil in Space and Time), and in INQUA, within TERPRO commission (Terrestrial Processes). The activities of the group include coordination, as the promotion of international projects, the support of interdisciplinary events, and dissemination, as proceedings of the meeting, newsletters, mailing list and web site (<http://groups.google.com/group/Paleopedology>).

During the business meeting in Chennai, the President of the commission, Edoardo A.C. Costantini discussed about the next appointments. He proposed the journals for the proceedings of the meeting, “Geomorphology” and “Indian Journal of Geology”. The guest editors for these proceedings will be Alan Palmer for “Geomorphology” and Brigitte Urban for “Indian Journal of Geology”.

The president showed the last meetings proceedings about paleopedology. In fall 2008, a special number of “Journal of Plant Nutrition and Soil Science”, will collect the papers presented by the commission members during the WCSS 2006 in Philadelphia. In the last year, a volume of “Catena” (vol.71) and a volume of “Revista Mexicana de Ciencias Geológicas” (vol.24) collected the papers presented during the Paleopedology International Conference in Mexico City, 2005.

The president also presented the next meetings where the members of the Paleopedology group are going to present their works. The first ones will be the EGU (European Geoscience Union) General Assembly in Vienna, from 13rd to 18th April 2008, and Eurosoil 2008, from 25th to 29th August, another time in Vienna.

During the EGU, four sessions will be dedicated to Paleopedology: “Soils and pedosediments as environmental archives of the last 130,000 years” (SSS11), “Evolution and properties of stratified soils” (SSS12), “Regolith and soil micromorphology, mineralogy and geochemistry” (SSS16) and “Past land surfaces: basic concepts, paradigm development and new methods in paleopedology” (SSS17). During Eurosoil 2008, other four sessions of paleopedology will be presented: “Soils and climate change” (S2), “Memory function of recent and paleosols” (S25), “Time scales of pedogenic processes for predicting soil changes in time” (S29) and “Micromorphological and mineralogical evidences of soil environmental change” (S30). In September



2008, some members of the commission will participate to the 13th International Conference on Soil Micromorphology, Chengdu, China.

In 2009, the Commission is organizing a meeting in Mexico and in 2010 is going to participate at the World Congress of Soil Science (WCSS) in Brisbane (Australia), 1st - 6th August. The proposed themes for the WCSS 2010 sessions are: "Impact of aeolian sediments on pedogenic processes and soil morphology", "Genesis and functions of soils and paleosols in karst environments" and "Timescales of soil formation pedogenic processes". During WCSS 2010, the new officers of the Commission will be elected, the people proposed by the Commission are Daniela Sauer and Sergej Sedov.

Another important issue of the business meeting was the setting up of an international project dealing with Paleopedology. A group of members of paleopedologists has made a proposal for an international project titled "Paleosol record of environmental changes for predicting soil sensitivity to climate change (Pacsof)". Pacsof is a proposed project aimed at supporting the use of the knowledge achieved by a group of paleopedologists, about the consequences of past climatic changes on paleosols, to foresee possible consequence of present and future climatic changes in present soils. The tools are the sharing of knowledge in workshops, meetings and field trips, and the education. The last will comprise the dissemination of materials, mainly through the web, and the realization of field and laboratory courses. The financial supports that will be possibly obtained by International bodies will be used to support member's participation to the initiatives and give grants to young researchers and students who will present their work to the workshops and attend the field and lab courses. An application was submitted to INQUA.

Fabio Scarciaglia

Simone Priori

Edoardo A.C. Costantini

Changing Soils in a Changing World: the Soils of Tomorrow

From the 25th to 30th of June 2007 it took place in the city of Palermo (Italy) the Fifth International Congress of the European Society for Soil Conservation, under the global subtitle of "Changing Soils in a Changing World: the Soils of Tomorrow".

The soil must be considered as cornerstone of the man future development and of the sustainability of the world ecosystems. The need of increase food production to sustain an always growing population, the overexploitation of natural resources to increase economical benefits, the exponential urban and industrial development, etc have produced in the last decades a clear response of nature that has been translated in floods, landslides, contamination, deforestation exhaustion of soils, climate change and the advance of desertification. Because of that, its preservation, restoration and adequate management become in a pressing necessity. In this framework has been developed the aim of this 5th ESSC International Congress.

Under these main premises, the Congress drew more than 400 participants from 52 countries, representing national and international societies of soil science, research agencies, universities, government bodies, higher education, science, public non-governmental organizations, and business. A very important aspect to highlight was the great participation in the Congress of young researchers and students that reflects the increasing concern that environmental conservation and protection, in particular soil related aspects, has actually in the society. This fact allows having encouraging perspectives for the future on soil conservation.

The Congress started in day 25th of June with a brilliant open ceremony in the main hall of the University of Palermo, hosted by the Chairman of the Organizing Committee Carmelo Dazzi accompanied by the welcome speech of the Under-Secretary of the Italian Minister of Environment Mr. Bruno Dettori. Some words of representatives of the Regional Government, City Council and University preceded the beginning of the scientific part of the Congress that was opened with words of the President of the ESSC, Jose L. Rubio, focusing on the concept of soil conservation, and its evolution. To finalize the ceremony, Dr. Ahmet Mermut, Chair of the Division 1 of the International Union of Soil Sciences gave a *Lectio Magistralis* pointing out the importance of soils in the context of human development and interconnected as a whole with the earth surface systems.

It has to be remarked, the 5 grants to attend the Congress, that for first time the ESSC provided to 5 young researchers (less than 35 years old) that work in European countries. This initiative could be maintained for future ESSC Congresses.

The scientific sessions, which spent days 27 to 29 of July, were divided in eight parallel sessions, (i) Soils



The participants to the scientific excursion to Sparacia farm and Temple Valley of Agrigento

and Society, (ii) Soil Erosion, (iii) Soil Organic Matter, (iv) Soil Degradation and Desertification, (v) Soil Pollution and Contamination, (vi) Soil Conservation and Soil Quality, (vii) Policies for Environmental Conservation in a Global Society, and (viii) New Approaches and Technologies for Soil Assessment, which covered 58 related topics. During these days, in the framework of the different topics, a total of 112 oral presentations, more than 330 posters, and 8 invited lectures were presented. From all these scientific contributions the most tackled matters were focused on soil restoration and remediation, water and wind erosion, soil pollution assessment, decline in soil fertility and soil characterization and mapping. The new methodologies and approaches to soil evaluation had an important role in the Congress, from the applicability of neural networks for desertification assessment and modelling or for soil evaluation, to the use sophisticated techniques such as VIS-NIR-SWIR reflectance spectroscopy, land information systems, new GIS-based techniques, bio-techniques, etc, which reveals the continuous effort in advance and improvement in the fields of soil assessment and conservation.

The importance of human induced degradation and processes on soil was also reflected by numerous presentations, among them the contribution of N.E. Smeck of the Ohio State University on the new modification in the USDA Soil taxonomy to facilitate the inclusion of aspects related to human activities in soil properties and classification. In relation to that, is necessary to mention the interest observed in the presentation and applicability of the new World Reference Base for Soil Resources 2006.

A 8 best poster trophy, one per congress session, were awarded by the organizing committee of the Congress. The best posters were selected by the vote of the congress participants at the end of each day sessions.

In Wednesday 27th of July, was held the ESSC General Assembly of the ESSC members in which the new council of the Society, together with the representatives of the different countries, was elected and approved. During the session was presented by prof. T. Karyotis the city of Athens as the possible location of the next ESSC Congress of 2011, which was approved unanimously. It has to be pointed out the preparation and approval by the general Assembly of an ESSC statement in support of the EU Soil Framework Directive, to be sent to the EU Commission. It has to be considered that it is the first document from the Commission that tries to deal comprehensively with soil protection. With its approval and application it would be reached the political commitment to consider soil and its protection and preservation to the same extent as other environmental media such as water or air, and to promote its sustainability.

After a long journey, riddled with difficulties, it is unquestionable the necessity of joining efforts to reach the final approval and application by the European Commission of the EU Soil Framework Directive. In this sense, the ESSC has played a relevant role as international scientific society and through its members that have actively participated in the preparation of this Directive and now should give support and suggestions to made it more feasible and real.

The next day, Friday 28th, the new council elected executive committee for the next mandatory period.

At the end of the Congress two post-congress excursions (Sparacia farm and Temple Valley in Agrigento, and Belice area and Selinunte Archaeological Park) during which were observed, together with very attractive archaeological sites, interesting examples of soil conservation research, and also examples of zones with problems of soil consumption and inadequate land management. One extra-con-

gress excursions was planned to visit the interesting area of the Etna volcano during 1-2 of July.

The core idea reflected in the Congress was the need to assume soil protection as the basis for the sustainability of the ecosystems and human society, through the knowledge of its functions and capabilities on food production, maintenance of human structures and sustaining the survival of world ecosystems. Soil conservation has become an indispensable strategy in socio-economic development. During the closing ceremony of the congress the following resolution was unanimously approved by all the participants.

Resolutions of the 5th International Congress of the ESSC

The 5th International Congress of the ESSC - European Society for Soil Conservation on "Changing Soils in a Changing World: the Soils of Tomorrow", involving about 400 participants from 52 Countries, representing national and international societies of soil science, research agencies, universities, government bodies, higher education, science, public non-governmental organizations, and business,

hearing

the results of the several invited lectures, of the 112 oral presentations and of the more than 330 posters presented from the thematic sessions,

identified

- that the level of degradation of the natural resources and particularly the soils as related to the pressure of man, year after year is becoming more and more evident in many areas of the world;
- that the level of soil pollution, degradation and desertification is continuously increasing particularly in the countries with a high level of development;
- that the processes of soil degradation and desertification are affecting also the countries of low economic development and harsh climatic conditions;
- that the pro-capite amount of good healthy soil is continuously decreasing all over the world;
- that the most common words used by all the participants are: soil erosion (including wind and water erosion), soil compaction and destructuration, desertification, salinization, heavy metal contamination and soil pollution, reduction of soil fertility and organic matter content, soil sealing and soil consumption;

considering

- the importance of the multi-functionality of soils and the impact of these on human health and welfare all over the world;
- the communication from the European Commission "Towards a Thematic Strategy for Soil Protection";
- the European Council's conclusion on integrated soil protection;

request

- that decision makers, land managers and administrators:
- ensure application of sound environmental management technologies for soil care, soil conservation and soil improvement so as to ensure the environmental health for present and future generations;
- recognize the importance of high quality soils for agriculture and the environment and to protect this valuable resources from degradation and consumption;
- apply soil information and scientific knowledge more effectively in order to protect and safeguard the ecological and life support capacity of soils;
- develop a robust and sound Soil Framework Directive;

stress

- the importance of these natural resources in maintaining and safeguarding the environment equilibria for human health and well-being.

and recommend all the Governments and Institutions

- to develop environmental policies aimed to favour the behaviour of the soils as a sink of organic carbon to contrast the greenhouse effect;
- to pay particular attention to maintain and re-establish the peculiar function of the soils to produce goods and services of quality and quantity;
- to pay particular attention to maintain and to re-establish the pedodiversity that influences all living systems and the quality of life.

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Austrian school children to celebrate World Soil Day 2007

On December 5, 2007 I was invited to celebrate World Soil Day at Klosterneuberg, the site of a beautiful monastery on the Danube a few kilometres upstream of Vienna. The day was co-ordinated by the regional government of Lower Austria with strong leadership from Josef Plank the Minister for Agriculture and Environment for Lower Austria.

The day was divided into two parts; the morning focusing on children and the afternoon on adults and some of the older children. With a complex arrangement of shuttle buses 180 pupils from elementary schools (6 to 10yrs old) and 530 pupils (11 to 16 years) from a range of local schools including agricultural vocational schools, participated enthusiastically in the morning sessions. The day began with music and singing led by Paul Sieberer and the World Team (including the Lower Austria 'Soil Song'; followed by 60 minutes of soil related activities around the hall; students across the age ranges presented the soil projects they had done in school; students painted with soil, exploring the exceptionally wide range of colours the soil materials provide; students felt soil as they walked across soils from different environments in their bare feet. There was an exceptionally wide range of activities to generate interest across the age range, and the enthusiasm was fantastic.


Following a brief introduction about World Soil Day from Winfried Blum, I presented a global perspective on soil problems and soil protection. This was not a simple lecture, but rather as I dealt with the problems and solutions by continents we were entertained by music and dancing from different parts

of the world; a young didgeridoo player for Australia; dancing from Asia; drum playing from Africa; tango dancing from South America and the Soil Song from Europe. After dealing with each of the broad continental areas I was asked a series of questions by the young children. This type of presentation was a first for me, and proved to be most enjoyable and stimulating. It provided an unusual way of introducing the audience to the global diversity of soils and soil problems and the possible solutions to these problems.

The final part of the morning saw the presentation by Josef Plank to district representative of Lower Austria posters and postcards showing 'their soil'. This is part of the Lower Austria initiative to raise awareness of soils and their importance in many aspects of our lives. For each community a locally important soil is identified and described. The community adopt this soil, providing information in local administrative offices and in some cases soil pits with annotated boards providing information about the soil. In addition to the large posters showing the soils the programme provides each community with a supply of postcards showing 'their soil'. Many communities in Lower Austria are already involved in this scheme and show great pride in their soil and more are planning to get involved.

In the afternoon when most of the children had returned to normal classes there was a somewhat more formal conference with short presentation on the impact of climate change on soil fertility and soil behaviour with contributions from a range of speakers including Winfried Blum (Austria), Enzo Lombi (Denmark); Domy C. Adriano (USA), Andreas Baumgarten (Austria) and Stephen Nortcliff (IUSS). There





followed a lively discussion with the older school children and representatives from the land user community and other scientists.

For a small group of us the day finished with a fascinating tour of the monastery and church of Klosterneuberg followed by supper and a chance to enjoy some of the excellent wines produced by the monastery. The whole day was a most enjoyable way to celebrate World Soil Day 2007.

Stephen Nortcliff
Secretary General



Upcoming Meetings

For details on the Upcoming Meetings see: www.iuss.org

2008

- Argentine Congress of Soil Science
13-18 May **Argentina**
- 15th ISCO conference
18-23 May **Hungary**
- On- & off-site environ. impacts of runoff
and erosion
30 June-4 July **Portugal**
- 9th In conference on precision agriculture
20-23 July **USA**
- 1st International Conference on Hydropedology
28-31 July **USA**
- 33rd International geological congress
5-14 Aug **Norway**
- EUROSOL Congress
23-31 Aug **Austria**
- 13th Int Conference on soil micromorphology
11-16 Sept **China**
- Acid sulphate soil conference & acid rock
drainage symposium
16-20 Sept **China**
- 5th International conference on land degradation
18-22 Sept **Italy**
- Problems of soils classification and diagnostics
25-28 Sept **Ukraine**
- 3rd global workshop on digital soil mapping
30 Sept-3 Oct **USA**
- ASA-CSSA-SSSA International annual meeting
5-9 Oct **USA**
- International congress of irrigation and drainage
13-19 Oct **Pakistan**
- Soil fertility, land management
and agrocilimatology
29 Oct-1 Nov **Turkey**
- International conference on soil classification
9-17 Nov **Chile**
- Interaction of soil minerals with organic
components
24-29 Nov **Chile**
- Sediment dynamics in changing environments
1-5 Dec **New Zealand**

2009

- Integrated Assess. of Agriculture and Sust. Dev.
10-12 Mar **Netherlands**
- 14th International Clay Conference
12-20 June **Italy**
- Meeting on Soils with Mediterranean
Type of Climate
22-26 June **Lebanon**
- 16th Nitrogen Workshop
28 June-1 July **Italy**
- 11th International Symposium on Soil
and Plant Analysis
21-25 July **USA**
- Salinization conference
20-23 Sept **Hungary**
- Biohydrology 2009: Biology and soil
hydrology interactions
21-24 Sept **Slovakia**
- ASA-CSSA-SSSA International annual meeting
1-5 Nov **USA**

2010

- 19th World Congress of Soil Science, Brisbane
1-6 Aug **Australia**
- ASA-CSSA-SSSA International annual meeting
31 Oct-4 Nov **USA**

2014

- 20th World Congress of Soil Science, Seoul,
South Korea



New Publications¹

The Ecology of Papua (covering the Indonesian provinces of Papua and West Irian Jaya)

The Ecology of Indonesia Series, volume VI. A.J. Marshall and B.M. Beehler. In two parts. Periplus Editions, Singapore, 2007, 1467 p. ISBN 978-0-7946-0393-9 (part 1); 978-0-7946-0483-7 (part 2). Hardcover.

Papua (western - or Indonesian - New Guinea) is the largest island in Indonesia with the smallest population compared to the other islands of Indonesia. Papua has lasted into the 21st century as largely a blank space on the map, and we will do well to treasure it for that. Here for the last time in history, as human modernity closes irreversibly over the planet, we may take comfort that there still exists a land “beyond the frontier” such as Papua. New Guinea, including Papua, is a challenge and a paradise for anthropologists and biogeographers. Its complex mountainous terrain has divided its human populations into the most diverse array of cultures and languages of any comparable area in the world. Long before people arrived, the islands equatorial location and geology combined to make it one of the several most biologically rich regions of Earth, both on the land and in the coral reefs of its marine coast. However, biodiversity in Papua is facing very serious problems, such as biodiversity loss and ecological degradation. The threats include logging-induced deforestation, forest conversion into agricultural plantation (especially oil palm), small-holder agricultural conversion, the introduction and potential spread of non-native alien species, and water pollution from oil and mining exploration. The book brings together 76 authors to catalog for the first time the many facets of Papua’s environment. Section 1 of the first part presents an introduction to Papua. The physical environment is treated in section 2. The flora is discussed in section 3, the fauna in section 4. The second part of this book has four sections. The natural ecosystems are presented in

section 5; the human-ecosystem interactions in section 6. Section 7 pays attention to the conservation of Papuan natural resources. Eleven appendices are contained in section 8. The volumes are well illustrated with (color)photographs, tables and figures. The papers have extensive lists of references. Designed for students and researchers, it is a richly detailed text, dense with biogeographical data, historical reference, and fresh insight on this complicated and marvellous region. The authors hope that the book will serve to raise awareness of Papua on a global as well as local scale, and to catalyse effective conservation of its most precious natural assets.

Price: Each volume costs USD 34.96 if ordered by email, plus packing and postage to some countries.

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For countries elsewhere, please consult:

www.periplus.com

Encyclopedia of Soil Science Encyclopedia of Earth Sciences Series.

W. Chesworth, editor. Springer, 2008, xxvi + 902 p. ISBN 978-1-4020-3994-2. Hardcover.

Electronic publication: ISBN 978-1-4020-3995-9;

Print and electronic bundle: ISBN 978-1-4020-5127-2.

Over 120 contributors have collaborated with the volume editor and an advisory board of 9 soil scientists to compose this new encyclopedia, which could be regarded as the second edition of the one compiled by R.W. Fairbridge and Ch.W. Finkl and published in 1979 – the one I still use. The series contains already 10 encyclopedias while 6 others are forthcoming. It is a pleasure to glance through the subject index and get lost in reading the various entries with related entries mentioned in the practical list of cross-references. The encyclopedia brings together in an alphabetic order approxi-

¹ The New Publication section is prepared by Hans van Baren (hans.vanbaren@wur.nl). Should you have a publication that you would like to have included in the next IUSS Bulletin, ask your publisher to send a review copy to: ISRIC-IUSS, PO Box 353, 6700 AJ Wageningen, The Netherlands.

mately 190 longer articles (some of them are 10 pages or even longer), together with some 430 definitions of common terms used in soil science, as a glossary. The book emphasizes the study of soils as an integrated part of the earth sciences, and it does this without ignoring the agricultural, environmental and technological aspects of the subject. Throughout the text, the World Reference Base for soil resources (WRB) terms are used, but correlations to Soil Taxonomy occur also. Such content will help soil and other scientists to speak the same language – a need in the 21st century. The work involved in putting together an encyclopedia of this size is huge and takes a long time, this has resulted in the fact that there are not many references to publications of the present century. The book, which is presented as ‘a compendium of knowledge’, is profusely illustrated with many (colour)photographs, figures and tables. The price is probably too high for an individual scientist, but the university library should certainly obtain a copy!

Price: USD 499.00; EUR 399.00, GBP 317.00; plus taxes where applicable, for the book. F or electronic copies see the website.

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Ingénierie des Eaux et du Sol. Processus et aménagements

M. Soutter, A. Mermoud et A. Musy. Presses Polytechniques et Universitaires Romandes, 2007, 312 p. ISBN 978-2-88074-724-4. Broché.

Cet ouvrage traite des méthodes et techniques des sciences de l'ingénieur dont les objectifs sont la maîtrise des eaux et leur gestion, dans un cadre global de préservation des ressources naturelles. Les notions abordées couvrent les nombreux aspects de la gestion des eaux en relation avec la production alimentaire (irrigation et drainage) et la conservation des milieux naturels. Le concept de maîtrise des eaux renvoie en effet à la fonction de protection qu'exercent les ouvrages et aménagements, en particulier à l'égard de la ressource que constitue le sol. Les divers domaines de l'agrohy-

drologie sont associés et intégrés dans une perspective d'ingénierie environnementale qui met en évidence les liens étroits unissant ces ressources naturelles vitales que sont l'eau et le sol. Articulé en deux parties consacrées d'une part à la description des processus fondamentaux et d'autre part à celle des techniques d'aménagement, cet ouvrage original et pédagogique propose une vision complète, équilibrée et détaillée de plusieurs disciplines, en un ensemble cohérent et rigoureux. Il répond ainsi aussi bien aux besoins de formation des étudiants, qu'à celui de référence pour le praticien.

Prix: Suisse: CHF 79.30; France: EUR 57.90; export: EUR 54.90. Commandes à: PPUR, CP 119, EPFL – Centre Midi, CH-1015 Lausanne, Suisse. Email: ppur@epfl.ch - Internet: www.ppur.org

A Pro-poor Policy Agenda for Sustainable Agricultural Development in the Hindu Kush-Himalayan Region

Talking Point 2/07. ICIMOD, Kathmandu, 2007, 21 p. ISBN 978-92-9115-044-1. Softcover.

The vast majority of people in the Hindu Kush-Himalayan (HKH) region lives in rural areas and depends primarily on agriculture for their survival and wellbeing. Mountain farmers have gained little from agricultural development during the Green Revolution. In an analysis to address this issue, it is shown that agricultural policies and strategies in most countries of the region target agriculture for the plains, particularly for field crops. By ignoring mountain-specific biophysical and socioeconomic factors and diversification most countries in the region are also pursuing the same agricultural policies and strategies in mountains as used in the plains. This has resulted in accelerated deforestation, soil erosion and environmental degradation, creating a vicious circle of poverty, degradation, and deprivation. Drawing evidence from different parts of the region and other similar regions, this paper concludes that agricultural development and resource conservation goals can be achieved simultaneously by removing existing policy biases and imperfections, and reorienting institutions towards mountain agriculture. This would require a fundamental change in policies, institutions, strategies, and programmes. This paper develops a framework for such a change in paradigm shift and discusses the concepts.

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Ecological Basis of Agroforestry

D.R. Batish, R.K. Kohli, H.P. Singh and S. Jose, editors. CRC Press, 2007, 400 p.
ISBN 978-1-4200-4327-3. Catalogue no. 43277.

Faced with the growing problems of climate change, ecosystem degradation, declining agricultural productivity and uncertain food security, agricultural scientists look for potential relief in an ancient practice. Agroforestry, if properly designed, can mitigate greenhouse effects, maintain ecosystem health and biodiversity provide food security, and reduce poverty. However, poorly implemented agroforestry can not exacerbate existing problems, but also contribute to the overall negative effects of our depleted and failing ecosystems. A thorough understanding of the ecological processes that govern these complex systems is therefore crucial. This book provides an understanding of the ecological relationships among forests, soils, root systems and water systems. It evaluates the socioeconomic impact of agroforestry, and covers the practice of ecologically sustainable agroforestry in tropical and temperate regions. The book starts (7 papers) with a study of tree-crop interaction, including above and below ground interactions, alley cropping, tri-trophic interactions, ecologically based pest management and the potential of chemically mediated plant interactions. The second section (6 papers) investigates root-mediated below ground interactions and their role in enhancing productivity, soil fertility and sustainability. It includes a study on litter dynamics and factors affecting nutrient release. Section three (2 papers) demonstrates the use of computer-based designs to ensure profitability, while the last section (4 papers) addresses the socio-economic aspects of agroforestry.

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Climate Change and Terrestrial Carbon Sequestration in Central Asia

R. Lal, M. Suleimenov, B.A. Stewart, D.O. Hanson and P. Doraiswamy. CRC Press, 2007, 512 p. ISBN 978-0415422352. Catalogue no. SW2353.

Bringing together current knowledge of terrestrial C sequestration in Central Asia, this book covers biophysical environments, water resources, sustainable agriculture, soil degradation, the effects of irrigation schemes on secondary salinization, soil management and its relationship to carbon dynamics; the relationship between forest management and carbon dynamics, economic analyses of land use practices, issues in using GIS, remote sensing, and carbon budgeting and scaling. It will be of interest to a wide variety of environmental scientists, economists and those interested in policy issues for the sustainable management of natural resources.

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Soil Sampling and Methods of Analysis, second edition

M.R. Carter and E.G. Gregorich. CRC Press, 2007, 1264 p. ISBN 978-0849335860. Catalogue no. 3586.

Thoroughly updated and revised, this second edition of Soil Sampling and Methods of Analysis presents several new chapters in the areas of biological and physical analysis and soil sampling. Reflecting the burgeoning interest in soil ecology, new contributions describe the growing number and assortment of new microbiological techniques, describe in-depth methods, and demonstrate new tools that characterize the dynamics and chemistry of soil organic matter and soil testing for plant nutrients. A new section devoted to soil water reviews up-to-date field- and laboratory-based methods for saturated and unsaturated soil hydraulic properties. Retaining the easy-to-follow, "cookbook" style of the original, this second edition

provides a compilation of soil analytical techniques that are fast, straightforward, and relatively easy-to-use. This practical manual and resource handbook that describes a wide array of methods, both conventional and cutting-edge, for analyzing the chemical, biological, biochemical, and physical properties of many different soil types. Including several "primer" chapters that cover the overall principles and concepts behind the latest techniques, the book presents sufficient detail on the materials and procedures to characterize the potential and limitation of each method. It covers recent improvements in methodology, outlines current methods, and characterizes the best methods available for selecting the appropriate analysis technique.

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Monitoring and Evaluation of Soil Conservation and Watershed Development Projects

J. de Graaff, J. Cameron, S. Sombatpanit, Ch. Pieri and J. Woodhill, editors. With assistance from A. de Bruin. Science Publishers, Enfield, Jersey, 2007, 529 p. ISBN 978-1-57808-349-7. Softcover.

Much concern is being expressed about the state of the world's soil and the availability of water. Interventions to conserve soil and develop watersheds are being undertaken globally by a wide variety of agencies, but we need to have instruments to assess the access of these interventions. This means identifying the variables that the interventions are aiming to affect, indicators of those variables, and the people who are the intended beneficiaries. It is therefore important that effective monitoring and evaluation (M&E) techniques are identified to ascertain that these interventions contribute to halting further environmental degradation, but also to determine their wide socio-economic impact and to learn from these experiences. This book offers evidence that better practices in M&E systems, with differing procedures and tools, have already been developed and applies in many countries around the

world. The writing of this book was initiated by the World Association of Soil and Water Conservation (WASWC) in 2002, after much smaller publications on two essential soil conservation topics: Extension and Incentives in 1997 and 1999 respectively. The purpose of the present book is to help all stakeholders, either directly or indirectly, to plan and execute soil conservation and watershed development projects/programmes more effectively. It focuses on both physical and socio-economic factors and indicators. The presents an overview of how M&E systems are being applied in various types of soil conservation and water management development projects and can serve as a reference book for all those involved in designing systems. The book contains 25 papers, grouped into four parts. Part 1 (5 papers) discusses principles of M&E in soil conservation and water development projects. Part 2 (7 papers) presents contributions about M&E in practice. Part 3 (6 papers) gives information about Physical parameters in M&E, while part 4 (7 papers) has contributions about the social, economic and institutional aspects. The book has an interesting epilogue, in which the editors have identified five main challenges in the subject matter discussed in this book. The first appendix gives a listing and information about training courses in this subject. The second appendix gives an overview of some of the manuals and guidelines about monitoring and evaluation.

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by contacting Mr. Vijay Primlani at: orders-ibh.com

Hydroecology and Ecohydrology. Past, Present and Future

P.J. Wood, D.M. Hannah and J.P. Sadler, editors.
John Wiley & Sons, Chichester, 2007, xxiv + 436 p.
ISBN 978-0-470-01017-4. Hardcover.

Water-dependent habitats are extremely diverse in terms of their nature (e.g., drylands, wetlands, streams/rivers and ponds/lakes), geography (poles to equator, low to high latitude) and many support communities and species of high conservation value, some of which are under threat from extinction. As pressure

is increasing on water-dependent habitats due to global change and ever-growing anthropogenic impacts, it is clear that balancing the water needs of people against those of ecosystems (terrestrial and aquatic) is, and will increasingly become, a premier environmental issue. This crucial, often precarious 'balancing act' involves some highly complex issues and, thus, it has compelled recent workers to identify the need, not only for new integrative science (between traditional fields of hydrology-ecology) and analytical approaches, but for truly interdisciplinary research. In this context, it has been argued that the 'new' discipline(s) of hydroecology/ecohydrology has the potential not only to unlock elements of this complexity, but also to provide a foundation for the sustainable management of water resources. The terms ecohydrology and hydroecology have been used increasingly in the international scientific literature over the last decade, but although there is a growing volume of research output at the interface between hydrological and biological sciences, the terms hydroecology and ecohydrology and the scientific remit of the field remain remarkably poorly defined. This book aims to address this research gap and capture the vitality of this current scientific hot-topic in a cutting-edge research text that: (i) reviews the evolution of the discipline (past); (ii) provides detailed coverage of the present state of the art, and (iii) looks to the horizon for the ecohydrology/hydroecology of the future. The chapters in this book present significant new results and methodological developments and identifying future research needs. The book has three sections. Part 1 considers fundamental ecohydrological/hydroecological process understanding and how floral and faunal communities and ecosystem functions (e.g. nutrient cycling) are influenced and respond to water and its availability. Part 2 draws together methodological approaches and critiques of how ecohydrological/hydroecological patterns and processes can (may) be monitored/modelled to maintain and protect the natural environment, and be managed to ensure the continued supply of water for human uses. Part 3 comprises detailed case studies of research studies undertaken on different floral and faunal groups in different environments across the globe. The final chapter identifies some challenges and future prospects for hydroecology/ecohydrology. All of the 22 chapters have an introduction, discussion and conclusions, and many references.

There is an important role to play by soil scientists in this quickly developing new field, in which the integration with our science is of importance.

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Geostatistics for Environmental Scientists

Second edition. R. Webster and M.A. Oliver. John Wiley & Sons, 2007, xii + 315 p. ISBN 978-0-470-02858-2. Hardcover.

Geostatistics is essential for environmental scientists. Weather and climate vary from place to place, soil varies at every scale at which it is examined, and even man-made attributes – such as the distribution of pollution – vary. The techniques used in geostatistics are ideally suited to the needs of environmental scientists, who use them to make the best of sparse data for prediction, and to plan future surveys when resources are limited. Geostatistical technology has advanced much in the last few years and many of these developments are being incorporated into the practitioner's repertoire. This second edition describes these techniques for environmental scientists. Topics such as stochastic simulation, sampling, data screening, spatial covariances, the variogram and its modeling, and spatial prediction by kriging are described in rich detail. At each stage the underlying theory is fully explained, and the rationale behind the choices given, allowing the reader to appreciate the assumptions and constraints involved. Price: USD 135.00

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Biophysico-Chemical Processes of Heavy Metals and Metalloids in Soil Environments

A. Violante, P.M. Huang and G. M. Gadd, editors. John Wiley & Sons, Chichester, 2008, 658 p. ISBN: 978-0-471-73778-0. Hardcover.

Written by a multidisciplinary group of soil and environmental scientists, this book provides the scientific

community with a critical qualitative and quantitative review of the fundamentals of the processes of pollutants in soil environments. The book covers pollutants' speciation, mobility, bioavailability and toxicity, and impacts on development of innovative restoration strategies. In addition, the development of innovative remediation strategies for polluted soils is covered.

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No-Till Farming Systems

World Association of Soil and Water Conservation, Special Publication No. 3. T. Goddard, M. Zoebisch, Y. Gan, W. Ellis, A. Watson and S. Sombatpanit, editors. WASWC, Bangkok, 2008, xxv + 540 p. ISBN 978-974-8391-60-1. Softcover.

This third publication of the WASWC forms an important contribution to the knowledge and use of no-till farming. It should be seen as a compendium on this management technique, which is gaining in importance around the world. It is estimated that on about 100 million hectares no-tillage is being practiced, mostly in North America, Latin America (mostly Brazil and Argentina) and Australia. It is not common in Europe, Asia and Africa. The book has 5 parts and 6 appendices. Part 1, Opening, has two papers. Lester Brown sketches the history and the growing importance of the development of the no-till practice. A progress report on no-tillage and conservation agriculture shows the development over time and in several regions of the world, especially South America. Part 2, No Tillage and Soil Fertility, has 5 papers; part 3, Impact, Adoption, Policy and Future Prospects, has 10 papers; and part 4, Research, Development and Implementation, has 15 papers. The closing part 5 has a paper entitled "Critical Steps to No-Till Adoption", and the conclusions, written by the editors. There are 5 books presented in the appendix, plus an introduction of the Earth' Hope Project about the developments in China's Loess Plateau and its lessons for other regions of the world. An enclosed DVD contains a lot of useful information, e.g. the WASWC Newsletter from 2001 till March 2007 and other publications of the WASWC, some journal issues related to no-till management and an article about the history of crop production with and without tillage. The publication has many illustra-

tive photographs, a large part in colour. The World Association of Soil and Water Conservation and the editors of this book must be congratulated with the appearance of this third, and most important, publication! Because of the financial support and sponsoring by many companies, institutions and societies, the price is remarkably low. It is therefore within the reach of many scientists, also in developing countries, where the need to use the information in this book is great. This book deserves to be read and used widely!

Price: between USD 18.00 and 20.00

Orders to: to cut down on costs, there are regional and national distributors. Please consult the websites of the WASWC (<http://waswc.soil.gd.cn>; or www.waswc.org) or contact Dr. Samran Sombatpanit at WASWC Thailand Office, 67/141 Amonphant 9, Soi Sena 1, Bangkok 10230, Thailand

Phone: +66-25703854

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Email: sombatpanit@yahoo.com for more details.

Reducing Carbon Emissions through Community-managed Forests in the Himalaya

K. Banskota, B. Singh Karky and M. Skutsch, editors. ICIMOD, Kathmandu, 2007, 85 p. ISBN 978-92-9116-058-8. Softcover.

Mountain systems are seen globally as the prime sufferers from climate change. Enhancing resilience and promoting adaptation in mountain areas have thus become among the most important priorities of this decade. The present study describes an example of how mountain areas and mountain people can contribute effectively to mitigation through carbon sequestration, although compensation for their services has yet to be realised. Climate change has become an overriding issue and its impacts are recognised to be felt globally. The fragile ecosystem of the Himalayas is exceptionally susceptible to even minute variations in climatic conditions and is likely to experience many such impacts over the coming decades. Studies suggest that mountain people in general and poor people in particular are more vulnerable to the impacts of climatic change than communities in the plains. The research discussed here looks at emerging issues of climate change and how communities' forests can help mitigate concentrations of atmospheric carbon dioxide. The book reports on work carried out by the research project: 'Kyoto: Think Global Act Local', which

aims to bring local sustainable forest management projects under the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The book draws on work carried out at three sites in India and Nepal. The project gathered data to show that community-managed forests can play important roles in mitigating the adverse impacts of climate change by sequestering CO₂ from the atmosphere. The levels of CO₂ sequestered annually were quantified using the IPCC guidelines. Field studies show how communities can carry out measurements needed to calculate carbon sequestration, the basis for calculating the impact of avoiding deforestation. Including 'avoided deforestation' in climate change policy will not only help the global climate, it will provide a way for millions of poor people in developing countries to benefit directly, and will help stop the destruction of forests and encourage further conservation. The publication, with 7 chapters, has many tables and figures.

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Carbon Sequestration in Tropical Grassland Ecosystems

L. 't Mannetje, M.C. Amézquita, P. Buurman and M.A. Ibrahim, editors. Wageningen Academic Publishers, 2008, 221 p. ISBN 978-90-8686-026-5.

Hardcover.

The increasing scientific consensus on global warming, together with the precautionary principle and the fear of non-linear climate transitions is leading to increasing action to mitigate global warming. To help mitigate global warming, carbon storage by forests is often mentioned as the only or the best way to reduce the CO₂ concentration in the atmosphere. This book presents evidence that tropical grasslands, which cover 50% of the earth's surface, are as important as forests for the sequestration of carbon. Results are reported of a large five year on-farm research project carried out in Latin America (Colombia, Costa Rica). Soil and vegetation carbon stocks of long-established pasture, fodder bank and silvopastoral systems on commercial farms were compared with those of adjacent forest and degraded land. The objective was to identify production systems that both increase livestock productivity and farm income and, at the same time, contribute to a reduction of

carbon accumulation in the atmosphere. The project was carried out in four ecosystems: the Andean hillsides of the semi-evergreen forest in Colombia; the Colombian humid Amazonian tropical forest ecosystem; the sub-humid tropical forest ecosystem on the Pacific Coast of Costa Rica; and the humid tropical forest ecosystem on the Atlantic Coast of Costa Rica. The book is recommended reading for research and teaching scientists and policy makers with an interest to mitigating global warming.

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Sustainable food production and ethics

W. Zollitsch, Ch. Winkler, S. Waiblinger and A. Haslberger, editors. Wageningen Academic Publishers, 2007, 550 p. ISBN 978-90-8686-046-3.
Softcover.

Sustainability has become an issue widely debated in many countries. Given the central role of food supply and the emotional relationship that modern mankind still has to its food, sustainability is seen as a value which has to be maintained throughout food supply chains. The complexity of modern food systems invokes a variety of ethical implications which emerge from contrasts between ideals, perceptions and the conditions of technical processes within food systems, and the concerns connected to this. This book covers a broad range of aspects within the general issue of sustainable food production and ethics. Linking different academic disciplines, topics range from reflections about the roots of sustainability and the development of concepts and approaches to globalisation and resilience of food systems as well as specific ethical aspects of organic farming and animal welfare. Modern technologies which are intensely advocated by certain stakeholder groups and their societal challenges are addressed, as are many other specific cases of food production and processing, consumer perception and marketing.

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Soil Desertification in River Deltas Part II. The Syrdarya River

V.M. Starodubtsev and L.R. Petrenko. MAUP Publishers, Kiev, 2007, 90 p. ISBN 978-966-608-839-3. Softcover.

This monograph discusses the processes of hydromorphic soil desertification in the river deltas under the impact of hydropower and water management construction, for which the Syrdarya River is taken as an example. The consequences of these processes result in the reduction of soil fertility, development of salinity and wind erosion as well as in the degradation of the deltaic landscapes. Desertification is accompanied with the aggravation of social problems, health problems, and migration of the population.

The publication is written for researchers, teachers and students, and other individuals interested in the discussed topics. Part I has been announced in a previous Bulletin.

Orders to: starodubtsev@voliacable.com

Trace elements in animal production systems

P. Schlegel, S. Durosoy and A.W. Jongbloed, editors. Wageningen Academic Publishers, 2008, 352 p. ISBN 978-90-8686-061-6. Hardcover.

This book deals with trace elements, such as cobalt, copper, iron, manganese, selenium and zinc, which are essential to modern animal nutrition, but are increasingly detrimental to soil and water quality in today's globalized production. The goal in finding a sustainable balance between trace element use in animal nutrition and its impact on the environment is addressed by focussing on the following questions: What is the trace element flow on farm, regional or national scale and which

tools are available to influence the flow? What are today's and future soil and water quality in relation to trace minerals? What are the trace mineral loading limits in soil and water from a health and legal standpoint? Which technologies exist to modify slurry trace element contents? What is today's knowledge on quantitative and qualitative trace element requirements and recommended supplementation for ruminants, swine, poultry, fish and crustaceans? What is trace element bioavailability and how can it be determined? To which extent are trace minerals related to immune response? What are the future issues to be addressed in trace element nutrition? This book contains the peer-reviewed papers of the first International Symposium on Trace Elements in Animal Production Systems. It is a valuable resource for researchers and professionals in the life sciences of animal nutrition, soil and water quality, for actors in the feed industry and policy making.

Price: EUR 78.00; USD 117.00

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First International Meeting on Microbial Phosphate Solubilization

Developments in Plant and Soil Sciences, volume 102. E. Valazques and C. Rodrigues-Barrueco, editors. Springer, x + 362 p. ISBN 978-1-4019-1. Hardcover.

Last decade has seen a significantly increased knowledge about phosphate solubilizing microorganisms. Sixty specialists from thirteen countries met in Salamanca to discuss the problems of the high P-unavailability as a soil nutrient for crops, and the hazards of an increasing phosphate input to aquatic habitats from industrial and mining activities, sewage disposal, detergents, and other sources. Updated solutions to enhance P-uptake by plants, bioremediation potential in the rehabilitation of ecosystems, taxonomic characterization interactions with mycorrhizae, the physiological and molecular basis of PSM, and possibilities of

genetic modifications of rhizospheric microorganisms were among the contributions presented. Challenges in commercializing a phosphate solubilizing microorganism were also outlined by a relevant biotech company. The book will fill a gap in agricultural libraries and it is a wish of the editors to attract the attention of agronomists, environmentalist, technocrats and administrators holding responsibilities in the field of soil conservation and sustainable agricultural production.

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Eco- and Ground Bio-engineering: the Use of Vegetation to Improve Soil Stability

Proceedings of the First International Conference on Eco-engineering, September 2004. Developments in Plant and Soil Sciences, volume 103. A. Stokes, I. Spanos, J.E. Norris and E. Cammeraat, editors. Springer, 2007, ix + 438 p. ISBN 978-1-4020-5592-8. Hardcover.

In an era where climate change, natural catastrophes and land degradation are major issues, the conservation of soil and vegetation in mountainous or sloping regions has become an international priority. How to avoid substrate mass movement through landslides and erosion using sustainable and ecologically sound techniques is rapidly becoming a scientific domain where knowledge from many different fields is required. These proceedings bring together papers from geotechnical and civil engineers, biologists, ecologists and foresters, who discuss current problems in slope stability research, and how to address those problems using ground bio- and eco-engineering techniques. Ground bio-engineering methods integrate civil engineering techniques with natural materials to obtain fast, effective and economic methods of protecting, restoring and maintaining the environment whereas eco-engineering has been defined as a long-term ecological strategy to manage a site with regard to natural or man-made hazards. Studies on slope in-

stability, erosion, soil hydrology, mountain ecology, land use and restoration and how to mitigate these problems using vegetation are presented by both scientists and practitioners. Papers encompass many aspects of this multidisciplinary subject, including the mechanisms and modelling of root reinforcement and the development of decision support systems, areas where significant advances have been made in recent years.

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Micronutrient Deficiencies in Global Crop Production

B.J. Alloway, editor. Springer, 2008, xxvi + 354 p. ISBN 978-1-4020-6859-1. Hardcover.

A deficiency of one or more of the eight plant micronutrients (boron, chlorine, copper, iron, manganese, molybdenum, nickel and zinc) will adversely affect both the yield and quality of crops. Micronutrient deficiencies in crops occur in many parts of the world, at various scales (from one to millions of hectares), but differences in soil conditions, climate, crop genotypes and management, result in marked variations in their occurrence. The causes, effects and alleviation of micronutrient deficiencies in crops in: Australia, India, China, Turkey, the Near East, Africa, Europe, South America and the United States of America, are covered, and these are representative of most of the different conditions under which crops are grown anywhere in the world. Links between low contents of iodine, iron and zinc (human micronutrients) in staple grains and the incidence of human health problems are discussed, together with the ways in which the micronutrient content of food crops can be increased and their bioavailability to humans improved. Detailed treatment of topics, such as: soil types associated with deficiencies, soil testing and plant analysis, field experiments, innovative treatments, micronutrients in the subsoil, nutrient interactions, effects of changing cropping systems, micronutrient budgets and hidden deficiencies in various chapters

provides depth to the broad coverage of the book. This book provides a valuable guide to the requirements of crops for plant micronutrients and the causes, occurrence and treatment of deficiencies. It is essential reading for many agronomy, plant nutrition and agricultural extension professionals.

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Soil Essentials. Managing Your Farm's Primary Asset

R. Hall. Landlinks Press, 2008, 192 p. ISBN 978-0643090521. Softcover.

This book is a practical reference for farmers and land managers covering soil issues commonly encountered at the farm level in different regions of Australia. Written in a straightforward style, it explains the principles of soil management and the interpretation of soil tests, and how to use this information to address long-term soil and enterprise viability. This publication demonstrates how minerals, trace elements, organic matter, soil organisms and fertilisers affect soil, plant and animal health. It shows how to recognise soil decline, and how to repair soils affected by nutrient imbalances, depleted soil microbiology, soil erosion, compaction, structural decline, soil sodicity and salinity. The major problem-soils – sodic soils, light sandy soils, heavy clay soils and acid sulphate soils – are all examined. With this information, Australian farmers and land managers will be able to consider the costs and financial benefits of good soil management.

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Biology of the Nitrogen Cycle

H. Bothe, S. Ferguson and W.E. Newton, editors.

Elsevier, 2006, 452p. ISBN 978-0-444-52857-5.

Hardcover.

All organisms require nitrogen to live and grow. The movement of nitrogen between the atmosphere, biosphere, and geosphere in different forms is described by the nitrogen cycle. This book is an activity of the COST 856 Action on Denitrification. It covers all aspects of the N-cycle: chemistry, biology (enzymology, molecular biology), physics, applied aspects (greenhouse effect, N-pollution problems, practices in farming, in waste-water treatment, and more). In this book, leading editors offer the latest research available on denitrification (reduction of nitrates or nitrites commonly by bacteria- as in soil). This book is written for graduate/postdoc scientists, doctoral students in the field of denitrification and the ecological balance in nitrogen and the environment.

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Community Forest Management (CFM) Database

Centre for International Forestry Research (CIFOR) launches community forest management (CFM) database. Available in Spanish, the database provides 428 records of books, articles, laws and other documents that address a range of community forest management (CFM) experiences, concepts and outcomes. CIFOR believes the tool will help foresters conduct or support CFM as well as provide very useful information for people dealing with forestry is-



sues. The database is a major component in a book to be published later this year that brings together a large volume of current CFM knowledge. Some CFM experiences in Latin America are decades old and have generated many lessons. However, little effort has been made to gather and categorize these experiences in a way that allows critical reflection about its positive and negative aspects. The book will fill an important gap in forestry knowledge that has hindered CFM's development in neighbouring countries. Most of the information available in the database refers to countries of the low tropics, such as Bolivia, Brazil, Peru, Ecuador, Guatemala and Costa Rica, excluding countries of the extreme South, the higher zones of the Andes, and the North of Mexico. The database was developed in Microsoft Access and Visual Basic, offering users the possibility of updating, adding or removing new records. Each database entry includes the publication or document's bibliographic details, abstract, conclusions, lessons learned and the publisher's contact details. The database can be searched using key words or according to sub-regions, tools, concepts, capacity building, species, products and land use. To produce the database, CIFOR collaborated with and received support from the Netherlands Development Organisation (SNV) and the Amazon Institute of People and the Environment (Imazon). Both institutions helped CIFOR to identify and gather publications and documents regarding the Brazilian Amazon and countries of the Andes-Amazônia sub-region.

The CFM database can be downloaded from the website: www.cifor.cgiar.org/publications/

At the website of the International Fertilizer Industry Association (IFA), Paris, a number of books, brochures and flyers can be downloaded free of charge, in PDF format.

Please see: www.fertilizer.org/ifa/topics for available titles.

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