

REPORT OF ACTIVITIES

2006



World Soil Information

ISRIC – World Soil Information is an independent foundation receiving funds from the Dutch Government. Our mandate is *to increase worldwide knowledge of the land, its soils in particular, and to support the sustainable use of land resources.*

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Inquiries

C/o The Director, ISRIC – World Soil Information

PO Box 353

6700 AJ Wageningen

The Netherlands

Telefax: +31-(0)317-471700

E-mail: soil.isric@wur.nl

Front cover: Soil monoliths representing all the major groups of the new *World Reference Base for Soil Resources*, published in 2006

Back cover: In 2006, our collection of thin sections was augmented by the well-documented collection from Wageningen University Dept Soil Science

Illustrated:

Left - Photomicrograph of a cultivated silt loam showing orange clay skins plastering old root channels

Right - Full size digital scan of a Planosol from Kenya showing the top of the claypan with iron nodules

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INTRODUCTION: FORTY YEARS ON

We marked on 9-10 March the 40th anniversary of our foundation with a symposium on *World soil issues and sustainable development: an agenda for action*. Speakers from four continents, and more than a hundred participants, generated thought-provoking discussion of global soil issues and why we do so little about them. One of the conclusions was that there is need for a *World Soils Council* to bring soil and land issues up the global policy agenda and provide a credible body to carry our knowledge and information to the point of decision. This proposal was backed by the Council of the International Union of Soil Sciences in Philadelphia in July; ISRIC – World Soil Information offered to provide a secretariat; and it is disappointing that the IUSS has yet to establish the Council within its own structure. However, to be effective, the Council needs to embrace a much wider field than soil science and soil scientists; the land is everybody's business and we are focusing our energies on building this broad base of support.

40 years on from our beginnings, what should be the role of a small institute facing up to global issues? Surely, it must be as a catalyst. Ideas don't take up a lot of room and, as a not-for-profit Foundation, we are happy implant them where they can make a difference. As World Data Centre for Soils, we manage publicly accessible global soils databases that are used by scientists all over the world - but not nearly enough! Therefore the emphasis of our applied research program is to put these data to work. We are using our own funding to lever much greater resources by partnership in major programs such as the GEF-UNEP-FAO program Land degradation in drylands (LADA) and international programs of IFAD and the EU, and we have, this year, entered a collaborative agreement with the Institute for Environment and Sustainability of the EU Joint Research Centre.

Listed below are some highlights of the year in our three fields of activity - education and public information under the World Soil Museum; soil standards, documentation and dissemination under the World Data Centre for Soils; and applied research:

World Soil Museum

2006 saw a steady stream of visitors to the Exhibition which is, for many people, the first entry point to the activities of the Institute. The exhibition caters for the diverse interests of the visitors. Restructuring over the last year now puts more emphasis on the functionality of soils and the importance of soils in global issues like climate change and food security than on pedology. However, a new section is devoted to examples of each Reference Soil Group of the new *World Reference Base for Soil Resources*.

The brochure *Soil – Earth's Living Skin*, written for the 2008 Year of Planet Earth, has been widely distributed and was presented to all participants of 18th World Congress of Soil Science in Philadelphia. There is a French language edition and translations in various other languages are in hand. On the subject of international years, 2006 was the International Year of Deserts and Desertification for which we contributed sections for the UN Environment Program's *Global Deserts Outlook* as well as leading the Land chapter of *Global Environmental Outlook GEO-4*, to be published in 2007.

World Data Centre for Soils

New, revised editions of *Guidelines for soil description* and the *World reference base for soil resources* are now published by FAO and the World Reference Base was the focus of a well-attended symposium at the 18th International Congress of Soil Science at Philadelphia.

Rejuvenation of the Library is well in hand, in cooperation with the Wageningen UR library. In our division of labour, we are relying on Wageningen UR library's holdings of standard texts and journals; the ISRIC library is focusing on regional/country documentation and *grey literature* that is often not readily available, even in-country. Following the digitization of our map collection last year, our collection of maps has been enlarged by incorporating parts of the previous holdings of the Dept of Soil Science, so there is more to do, and we are now moving on to the much greater task of making electronic copies of the regional and country documentation.

Applied research

This year, the Soil and Terrain Database for Central Africa (Congo, Rwanda and Burundi) was completed in cooperation with the University of Ghent and with support from FAO. Also, an innovative program of capacity-building for post-conflict land use planning in the Chittagong Hill Tracts of Bangladesh, supported by the European Union. Progress in the proof-of-concept for Green Water Credits in the Tana Basin, Kenya, has been rewarded by the award of a Large Grant by the International Fund for Agricultural Development for pilot operations to begin later in 2007.

In December 2006, a start was made to create a new digital soil map of the world - *GlobalSoilMap.net*, employing state-of-the-art and emerging technologies for soil mapping and predicting soil properties at fine resolution. For a long time, this has been the Holy Grail of soil information but the time is right for the quest. The need has never been greater: to meet the Millennium Goals in the face of burgeoning human population, climate change and apparently inexorable land degradation, especially in poor countries; to provide the soil and land information needed for functioning cities and their connecting infrastructure now that, for first time in history when most people live in cities; needed to make better land use and management decisions everywhere; to make better land use and management decisions everywhere, for instance to meet competing demands on the land from new directions such demand for bio-fuels, as well as to maintain essential environmental services. Now, the growing strength of digital soil mapping, remote sensing and computing power make it actually possible to provide the information. A workshop at Columbia University in New York brought together 30 leading scientists from across the world and a consortium was formed, led by ISRIC – World Soil Information, to seek funding for this global initiative from the Bill & Melinda Gates Foundation.

David Dent

FROM INTERNATIONAL MUSEUM OF SOIL STANDARDS TO WORLD SOIL INFORMATION

In 1952, Professor FA van Baren who had recently moved from Indonesia to the Royal Tropical Institute in Amsterdam, proposed to FAO that a reference collection of tropical soil samples should be created, beyond a small start which was already made by Professor J Mohr at the same institute. The proposal gained new impetus in 1961 when, upon a recommendation of the 7th International Congress of Soil Science, FAO and Unesco decided to prepare a Soil Map of the World and the 8th Congress, in 1964, recommended the foundation of an International Museum of Soil Standards.

Moral and financial support was received from FAO and, especially, from Unesco which adopted the project within its Division of Natural Sciences, led by Professor Victor Kovda. The Dutch Government offered to host the institute and provided financial support for a core staff of twelve – which continues today. In January 1966, the International Soil Museum was established with Professor van Baren as Director, an International Advisory Panel of renowned soil scientists, a Dutch Consultative Body, and a Board. The Museum was housed, first, in Utrecht University and moved to its present premises in Wageningen in 1977.

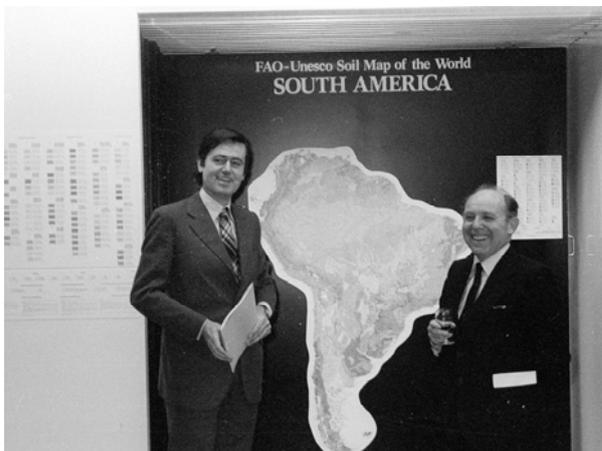
At the outset, the aim was to collect soil monoliths and reference samples worldwide, backing up the FAO-Unesco *Soil Map of the World*. It was realized that a representative collection of the mapped soils, with adequate descriptions and full analytical and environmental data, could have wide applications. Through a better knowledge of the soil, particularly in the developing countries, farm production could be increased and living conditions improved. It was also envisaged that the reference collection would stimulate research and education, especially for students and scientists visiting the International Soil Museum.

During the course of 40 years, the collection of soil monoliths, thin sections and reference soil samples has increased to almost 1000 soil profiles, most of which were fully analysed in our own laboratory to create a unique World Soil Reference Collection with the data on-line as the *ISIS database*. The collections are the basis for a permanent exhibition for education and information of students, scientists and the general public.

While the name of the institute has changed from International Soil Museum, to International Soil Reference and Information Centre, to ISRIC - World Soil Information, compilation and maintenance of fundamental, reliable global soil information has continued – with the initiative to replace the 1:5 million-scale *Soil Map of the World* by a global Soil and Terrain digital database (SOTER), a task still only half completed, and compilation of the WISE database of some ten thousand soil profiles from various sources. Much information has been spread through many published studies and inventories, both through our own publications and those of other organizations, especially FAO; some of these projects have been carried out in cooperation with the IUSS, with which ISRIC has maintained close ties. Nowadays, most of our data are publicly available on the website or through on-line services.

The use of the soil information has changed a lot. In the beginning, it was the foundation of soil classification, especially in the soil units of the FAO-Unesco *Soil Legend*, *Soil Taxonomy* and, most recently, the *World Reference Base for Soil Resources*. Now it is applied to a wide range of old and newly-perceived problems, such as land degradation, the influence of climate change on agricultural production and water resources, and the influence of land use change on climate. These changes in emphasis call for much more collaboration with other disciplines. At the same time, the original task remains: to make soil information common knowledge - in particular that this most important natural resource is hardly renewable on the human time scale and should be conserved, and its productive capacity maintained, as a treasure for humanity and to support all life.

Hans van Baren



Klaas-Jan Beek (left) and Rudi Dudal (right) with the FAO-Unesco Soil Map of the World at the official opening of new premises for the International Soil Museum, om 1979



Participants of the GlobalSoilMap.net meeting in New York, December 2006

WORLD SOIL MUSEUM: INFORMATION AND EDUCATION

Educational program

In 2006, some 35 groups of students, teachers and others visited the Exhibition. Most of them took advantage of an introductory lecture and a guided tour through the exhibition, several groups also undertook field excursions. Seven German universities are regular visitors, each spending one or two days with us. Other university groups came from Belgium, England, Iraq, and the USA. About one-third of our student visitors are from Wageningen; exercises in the museum are now part of three regular courses of Wageningen University. Almost 400 visitors from The Netherlands included university and college students from Amsterdam, Delft, Deventer, Utrecht, and Velp, and local high school students, as well as visits from PROBUS and members of the general public.

Lectures and Courses

As part of the 4th European Summer School on Soil Survey organized by JRC-IES at Ispra, Italy, Otto Spaargaren gave lectures on *Anthrosols and Technosols*, on *Northern European and Mediterranean soil types*, and on the newly issued *Guidelines for profile description*.

Alfred Hartemink organised courses on *Soil science and drainage* - for scientists from Iraq; and *Scientific publishing* - for PhD students and members of the CT de Wit Graduate school PE&RC; also a two-day excursion to Limburg for IHE-UNESCO, Delft. He gave keynote papers at conferences and research centres in China (Kunming), Kenya (Nairobi), Brazil (Rio de Janeiro), USA (Philadelphia), and Belgium (Gent). Alfred also annually teaches the course *Site and System Characterization* at the National University of Rwanda as part of a NUFFIC project and, along with David Dent, he supervises MSc and PhD students from Wageningen University.

David Dent gave the inaugural address: *Sustainable land and water management* at the GEF Assembly Forum in Cape Town August 29th, and *Global soil issues* at the ISRIC – World Soil Information Anniversary Seminar, March 9th.

Stephan Mantel's PhD project proposal: *Design of a decision support tool for lower-level user groups to satisfy information needs on land management practices and planning* was approved by the PE&RC research school of Wageningen UR. Field research in the CHARM project serves as a first case study.

Public Information

As an International Collaborating Institute of UNEP, ISRIC - World Soil Information is contributing to the *Global Environmental Outlook GEO-4*. David Dent is Coordinating Lead Author of the Land chapter to which Alfred Hartemink contributes the section on nutrient depletion, Godert van Lynden contributes to the section on land degradation, and Niels Batjes to biological cycles.

The UN General Assembly declared 2006 the International Year of Deserts and Desertification, under the auspices of which UNEP published the book: *Global Deserts Outlook*. David Dent contributed to chapters on Natural History and Evolution of the World's Deserts (with Paul Driessen), State and Trends of the World's Deserts, and Deserts and the Planet – linkages between deserts and non-deserts; Niels Batjes provided analytical and scientific input to Deserts and the Planet, with special attention for soil carbon sequestration.

ISRIC staff also contributed to the publication: *Soils on the global agenda*, by the IUSS working group International Actions for the Sustainable Use of Soils.

Projects in 2007

- *World of Soils*: Exhibition and educational material on the world-wide web; link to ISIS profile data and reference photo collections
- *Exhibition*: New thematic displays, including characterisation of the major groups of the World Reference Base for Soil Resources
- *International Year of Planet Earth*: advancement of the soils theme
- *World Soil Council*: Initiative to raise the profile of soils at national and international policy level
- *Rwanda Agroforestry and Soil Management, MSc* (NUFFIC project): partnership with Wageningen University
- *GLOBE (Global Learning and Observations to Benefit the Environment)*: development of soil research modules for secondary schools in the Netherlands
- *Publications*: policy briefs, *Booker Soil Manual*, *Global Environmental Outlook GEO-4*, WOCAT publication *Where the land is greener*

WORLD DATA CENTRE FOR SOILS

World Data Centres operate under the International Council for Science (ICSU). Data from ICSU programs and related data sets are scrutinised, maintained and made freely available.

Collections

The reformation of the library as a *World Soils Information Centre* was begun in cooperation with the Wageningen UR Library. The information centre will focus on regional and country documentation, including a wealth of *grey literature*. Our holdings of standard texts have been screened for usefulness to ISRIC and availability in other Wageningen libraries, so as to avoid duplication of effort and to create space for acquisitions.

Digitising of the ISRIC map collection as the backbone of the *European Digital Archive of Soil Maps* (EuDASM) was completed in cooperation with JRC-IES, Ispra. It is already available on-line and as DVDs: *Soil Maps of Africa*, *Soil Maps of Asia*, *Soil Maps of Latin America and the Caribbean Islands*. This is an ongoing program; there have been further important acquisitions including parts of the large map collection of the Department of Soil Science of Wageningen UR. Special additions are large wall maps including the *Soil Map of the United States* by Marbut (1931) and Stremme's *Soil Map of Europe* (1928). A start has also been made on the even greater task of scanning of associated reports, for on-line delivery.

The thin-section collection of the Department of Soil Science was also transferred to ISRIC. The sections are well-documented, having been used in many publications. This collection, along with our own World Soil Reference Collection and the Schmidt Lorenz collection is available for research in the micromorphology laboratory. Several lacquer peels and monoliths were acquired that illustrate some special soils around Wageningen others used in research projects in the Low Countries, Sierra Leone and Spain.

GeoLoketten

The [GeoLoketten or GeoPortal consortium](#) is developing an open infrastructure for documentation and exchange of earth sciences information, with a geographical focus on the Netherlands in the framework of the *Space for Geo-informatics (RGI)* program, co-funded by [BSIK](#). Otto Spaargaren and Niels Batjes participated in methodology development; ISRIC also contributes its international holdings to the *subsoil node* of Working Package 2 [2005-2006]. The corresponding meta-data and datasets can be accessed on-line through the [Groene Omgeving metadata portal](#).

World Reference Base for Soil Resources

2006 saw the publication of the second edition of the *World Reference Base for Soil Resources – A framework for international classification, correlation and communication*, the result of eight years of intensive cooperation between the working group WRB of the International Union of Soil Sciences, the Food and

Agricultural Organization of the United Nations, and ISRIC – World Soil Information. It was officially presented to the international soil science community during the 18th World Congress of Soil Science in Philadelphia, USA.

Internet

Our new website went live in early 2006 with fully overhauled structure and content. The content is updated regularly, the number of on-line available datasets and publications has been augmented, and attention has been paid to the attractiveness of the site by adding more pictures to illustrate the text. The digital ISRIC map collection, hosted by the EU Institute of Environment and Sustainability, can be reached through the ISRIC website.

Some 17 000 users have visited the new website since its launch and, based on user statistics for the period monitored, the projected number of visitors for the first year will be some 31 000, not including use of our on-line data hosted by other Centres, such as JRC-IES and the Global Change Master Directory.

Knowledge of information sources is a vital part of an effective question and answer service. A new Question-and-Answer Service was implemented to help our various user groups find information specific to their needs. Some 30 partners from from [CTA's ACP Question-And-Answer Services](#) (QAS) visited ISRIC (26 Oct. 2006) to learn about ISRIC's soil resources and Q&A services.

Several new data sets were added to our publicly available, on-line collection and the backlog of ISRIC publications is being scanned and linked to the website. The ISRIC Soil Information System (ISIS) has been translated to a web application; data have been transferred into a Microsoft SQL database and the application has reached the final testing phase; ISIS should be open to the outside world in 2007.

Projects in 2007

1. *Library renewal*
2. *Decentralised global digital archive of land resources data* – expansion of the European Digital Archive (EuDASM) in partnership with the European Soil Bureau, FAO and others; incorporation of viewing and analysis tool
3. *Reference photo collection* – documentation and digitisation
4. *ISIS database* – web application and link to *World of Soils*
5. *Common digital data management system*
6. *Soils Atlas of Africa*- joint program with EU Joint Research Centre
7. *Micromorphology collection* – Consolidation of ISRIC, Netherlands and other collections; on-line catalogue
8. *World Soil Reference Collection* – implementation of re-sampling program, contingent on confirmation of funding

Otto Spaargaren, Niels Batjes, Ingrid Haas

APPLIED RESEARCH

Land resources data are fundamental to any land-related assessment, not in their own right but in relation to their applications in relation to other data and knowledge. The Applied Research Program compiles our own and other data for a wide range of applications - land use policy and planning, assessment of food and water security, and predictive models for global climatic change. Some activities are of long standing, for instance work towards a global soil and terrain database to succeed the *Soil Map of the World*; 2006 saw completion of a sub-continental SOTER for Central Africa. Others are new, for instance the *green* and *blue* water initiative was started in 2005 to raise appreciation of the significance of soils, soil use and management to water resources: *green* water - water held by soils and available to plants; *blue* water – streams and groundwater that can be tapped for use elsewhere for irrigation, domestic and industrial supply, and environmental flows. In 2006, a proof-of-concept for *Green Water Credits* - payment for water management services performed by farmers – was financed by the Swiss Agency for Development and Cooperation and the International Fund for Agricultural Development in the Tana Basin, Kenya. Pilot operations starts in 2007.

Development and use of soil and terrain databases

Global Soil and Terrain Database (SOTER) is a joint program with FAO to develop a harmonised, global soil and terrain spatial database. Landform units, formerly hard to depict, can now be defined by quantitative attributes derived from the SRTM digital elevation model. The techniques have been applied in Cambodia and Central Africa, and the experience from these case studies will be incorporated in the revised *SOTER Procedures Manual* to be published in 2007.

A SOTER database of DR Congo at scale 1:2 M and of Rwanda and Burundi at scale 1:1 M was completed in collaboration with the University of Ghent, using data collected by various national and Belgian organizations. Landform units were delineated by interpretation of the SRTM 90m DEM. The project was co-funded by FAO and will be published by FAO in its Land and Water Digital Media Series early in 2007. At the same time, the dataset will also be available on our website.

Land resources conservation and degradation

Extrapolation of pastoral systems in the American Tropical Forest Ecosystem

This study for the Carbon Sequestration Project (CSEQ – a research network for the evaluation of carbon-fixing capacity of pasture, agro-pastoral and silvo-pastoral systems in the American tropical forest ecosystem) identified areas in Central and South America that are similar to the four CSEQ research stations - Andean hillsides, Colombia; humid tropical forest, Amazonia, Colombia; humid tropical forest, Atlantic Coast, Costa Rica; and sub-humid tropical forest, Pacific Coast, Costa Rica – with a view to extrapolating research results and recommendation domains. Similarity was based on climatic, topography and soil conditions. The length of

growing period was used to characterize the climate conditions of the research sites; a 90m-resolution digital elevation model was used to define elevation and slope conditions; soil characterization employed the Soil and Terrain Database of Latin America and the Caribbean. Results will be published in 2007 in a project book.

Available sub-continental data only allowed mapping at scale 1:5 M and take no account of social and economic circumstances.

Vincent van Engelen

World Overview of Conservation Approaches and Technologies

ISRIC continues to support the World Overview of Conservation Approaches and Technologies (WOCAT) program, Godert van Lynden being a member of the management group together with CDE – University of Bern, and FAO. November saw the launch, in Rome, of the book *Where the land is greener*, a selection of 42 case technologies and 28 approaches from all over the world. WOCAT is also formally involved in the GEF-UNEP-FAO *Land Degradation in Drylands* (LADA) program. The annual workshop and steering meeting of WOCAT in Cape Town, in October, saw a record of 50 participants from 28 countries, creating a lot of momentum and demonstrating encouraging activities going on at national or regional level (without financial support from WOCAT).

Zhanguo Bai assisted in WOCAT training in the Loess Plateau, China, in April within a large ADB-funded land conservation project; Godert van Lynden was resource person for a WOCAT training in Indonesia in September, initiated by the Ministry of Forestry; and Stephan Mantel has involved the Bangladesh national WOCAT team in the ongoing land use planning project in the Chittagong Hill Tracts (CHARM).

Soil and Water Protection

The Soil and Water Protection in Europe (SOWAP) project, supported by Syngenta and the EU, was completed in September 2006 after three years' duration. It implemented the principles of conservation agriculture (CA) - minimal soil disturbance, permanent soil cover and diverse crop rotations - in arable cropping systems in Northern and central Europe (Belgium, England and Hungary). SOWAP has shown that when CA is applied in the right place and at the right time, it can deliver several environmental benefits: by protecting the soil, primarily by reducing soil erosion, it can also improve water quality, provide a better habitat for farmland biodiversity, while ensuring profitable farming. In farmers' fields, run-off can be reduced by up to 40 per cent and soil erosion by up to 90 per cent; nutrient loss in sediment and water is similarly decreased; the habitat for earthworms and soil microorganisms is enhanced and over-wintering farmland birds favour CA fields; crop yields can be maintained and crop establishment costs can be reduced. Beyond the farm in the wider catchment, evidence suggests that CA can favour aquatic biodiversity but the link with improved chemical quality of water-bodies is not clear and the intensity of the agricultural system can change the relationship. Also, CA is not suitable for certain soil types, crops and weather, so the system has its weaknesses.

Godert van Lynden was responsible for SOWAP documentation and dissemination. CA practices were documented using WOCAT methodology. Various media were employed to disseminate the outputs: the project website (www.sowap.org) recorded 13 000 hits/month; the farming community was informed through electronic newsletters, workshops, open days and articles in the farming press; outreach to the general public made use of radio interviews, television programs and magazine articles. European policymakers were a key target; a booklet was produced, reviewing CA across Europe, in support of support policy measures to protect soil and water.

Questions remain about drivers and constraints to adoption of CA in Europe and what it can deliver in the long-term, particularly in the face of climate change. ISRIC is advocating a map of the current adoption of CA practices and a follow-up of SOWAP but it is clear that, unrelated to SOWAP outcomes, Syngenta will not continue its support at the same level.

Godert van Lynden

Green Water Credits

Green Water Credits (GWC) is a mechanism to pay land users for water management activities which are presently unrecognised and unrewarded. ISRIC – World Soil Information leads a proof-of-concept project, funded by the International Fund for Agricultural Development (IFAD) and the Swiss Agency for Development and Cooperation, in collaboration with the Stockholm Environment Institute, International Institute for Environment and Development, the Agricultural Economics Research Institute, and national partners Kenya. Activities during 2006 included:

- Selection of the Tana basin from amongst several basins in Africa for the proof-of-concept;
- Establishment of an international Grant Management Committee and a National Contact Group including the Ministry of Agriculture, Ministry of Water and Irrigation, the newly-established Water Resources Management Authority, major water users, and water managers;
- Contractual arrangements with KARI-National Agricultural Laboratories, Kenya Soil Survey, ETC East Africa, and University of Nairobi;
- The first *Green Water Credits Workshop* at KARI Headquarters, Nairobi, 11-12 October, with 55 representatives of farmers, public and private-sector agencies;
- Establishment of a series of Green Water Credits Reports with *Basin selection* (Droogers and others 2006) and *Lessons learned from payments for environmental services* (Grieg-Gran and others 2006);
- A presentation to staff and students of ZDF-Bonn and the Global Water Systems project (Dent and Kauffman 2006);
- Preparation and submission to IFAD of a Concept Note and Grant Design Document for Pilot Operations.

Sjef Kauffman

Soil organic carbon stocks and change at regional scales

Between 2002 and 2005, the project *Assessment of Soil Organic Carbon Stocks and Changes at National Scale* (GEFSOC*) developed a generic system to quantitatively model the potential of various land use/management and climate scenarios for sequestration of carbon at a regional scale. The system was developed by scientists from Brazil, India, Jordan, and Kenya working with groups in the United Kingdom, Austria, France, the Netherlands (ISRIC, represented by Niels Batjes), and the USA.

In 2006, GEFSOC scientists prepared posters (e.g. for the 18th WCSS in Philadelphia) and peer-reviewed papers to publicise the findings, in particular in a special volume in *Agriculture, Ecosystems and Environment*, to be published in 2007.

WISE-derived soil parameter estimates for the soil types of the world

Primary soil and terrain databases, compiled from existing data, often have gaps in the attribute data – especially for soil physical attributes that are rarely measured in the course of systematic soil surveys. Niels Batjes has further developed the standardized, taxonomy-based pedo-transfer procedure for filling such data gaps to prepare consistent *secondary* databases. The procedure considers 18 soil variables that are commonly required for environmental modelling. Measured soil data for preparing the pedo-transfer scheme were derived from a working version of the WISE database; some 100 new profiles were added to this set in 2006.

The taxo-transfer scheme was used to prepare a harmonized global data set of soil parameter estimates at a resolution of 5 by 5 arc-minutes, using profile data from WISE and soil geographic data from the FAO *Soil Map of the World*. The data set is available from the ISRIC website.

Niels Batjes

Global Assessment of Land Degradation and Improvement

Within the GEF-UNEP- FAO program *Land Degradation Assessment in Drylands* (LADA), Global Assessment of Land Degradation and Improvement (GLADA) is making a quantitative, global assessment of land degradation and improvement, reproducible by defined procedures which have been developed and proven in pilot studies in North China and Kenya.

Net primary productivity is an integrated measure of biological production; its deviance from the norm is a measure of land degradation - or improvement. It can be assessed by the normalised difference vegetation index (NDVI) derived from the reflected red and infrared wavebands measured by earth-observation satellites. Local norms may be established according to climate, soils, terrain, and land use; deviance may then be calculated locally and combined regionally and globally - to allow universal comparisons and to provide both local detail and the generalisations needed for national or international policy and action.

Mapping of *black spots* of land degradation by combining 25-year trends of net primary productivity and rain-use efficiency will guide field measurements by

* <http://www.nrel.colostate.edu/projects/gefsoc-uk/>

partner-country teams in the LADA program. These field measurements are essential to lend confidence to the remotely-sensed data and interpretations and to provide specific measurements of the losses and gains in land quality.

In 2006, GLADA Kenya pilot was completed, the report was approved by FAO and placed on the ISRIC web site. The approach will be applied first to the LADA partner countries (South Africa, Tunisia, Senegal, China, Argentina, Cuba) then globally.

Zhanguo Bai

Chittagong Hill Tracts land use planning

The Chittagong Hill Tracts improved natural Resources Management project (CHARM) (November 2005–January 2007) supports sustainable management of the natural resources with improved information for decision making and participation of target groups. Activities included: 1) facilitation of dialogue through workshops, 2) assessment of the state of the environment of the Chittagong Hill Tracts , 3) inventory of land management practices, 4) assessment of socio-economic conditions and information needs for improved natural resources management (NRM), 5) creation of an NRM information system which includes a soils and terrain database, and 6) pilot operation of participatory NRM planning.

Deforestation is a major cause of environmental degradation in the Chittagong Hill Tracts. Fortnightly, 8-km resolution NDVI measurements from the NASA Global Inventory Modelling and Mapping Studies (GIMMS) 1981-2003 and climate variables were used to analyze biomass trends; lost net primary productivity was estimated from NDVI analysis. Combined negative trends of biomass and rain-use efficiency were used to identify *black spots* of land degradation - which occupy 20 per cent of the CHT and which were validated by field observations. The remotely-sensed indicators of land degradation are only indicators of complex social, economic and biophysical situation.

CHARM outcomes were disseminated by: project fliers, articles in daily newspapers in Bangladesh, publication in *LEISA* magazine and the science section of the *IS* magazine of development cooperation (Ministry of Foreign Affairs), a presentation at an international workshop on steepland agriculture in Laos, the website www.charmbd.com, eleven CHARM technical reports, thematic technical databases and digital maps, and an information system for lower-level users.

Stephan Mantel and Zhanguo Bai

SAWIT- Land suitability for oil palm in Kalimantan

At the request of the Ministry of Agriculture, Nature and Food Quality, Directorate of International Affairs, and in partnership with Alterra, an assessment of land suitability for oil palm plantations in Kalimantan was carried out to support policy development, in particular to inform the debate on the sustainability of oil palm expansion and forestry issues.

Stephan Mantel

Projects in 2007

1. *SOTER Procedures Manual*, in particular further development of DEM landforms analysis and soils placement within landscapes in support of EU Framework 7 and GlobalSoilMap.net proposals;
2. *Chittagong Hill Tracts land management and planning (CHARM)* – Funded by the EU (completed in March 2007)
3. *Global assessment of land degradation and improvement (GLADA)* – Funded by GEF/UNEP/FAO:
 - a. SOTER databases of LADA partner countries (Argentina, China, Cuba, Senegal, South Africa, Tunisia)
 - b. Analysis of land degradation black spots in LADA partner countries
4. *Web-based GIS tools for data surfaces and interpretations*
5. *Green Water Credits: proof-of-concept* – Funded by IFAD and the Swiss Agency for Development and Cooperation.
6. *Desertification mitigation and remediation of land (DESIRE)* – In consortium with Alterra, funded by EU . Review of desertification information; drivers; mapping and assessment

Other activities

International Union of Soil Sciences and Dutch Society of Soil Science

At the 18th World Congress of Soil Science Alfred Hartemink was re-elected as Deputy Secretary General and webmaster of the International Union of Soil Sciences. He will serve from 2006 to 2010. During 2006, IUSS bulletins 108 and 109 were produced and the IUSS website was further expanded (during 2005 and 2006 the annual number of visitors was 100 000); *IUSS Alerts*, e-mailed monthly to over 12 000 people in 100 countries.

Stephan Mantel represents ISRIC – World Soil Information on the Board of the Dutch Society of Soil Science as Secretary-Treasurer.

Consultancies and Training

Vincent van Engelen conducted a concluding consultancy mission to Cambodia to assist the Land Management Project of GTZ with the compilation of a land resources database needed for the assessment of land for smallholder settlement.

Zhanguo Bai conducted a WOCAT training in China at the request of Central Project Management Office for PR China - GEF Partnership on Land Degradation in Dryland Ecosystems. Participants from the 6 provinces of NW China were trained to document the good practices of combating land degradation using WOCAT tools.

PUBLICATIONS

In September 2006, Alfred Hartemink was appointed Editor-in-Chief of *Geoderma*; he is also Co-editor of the series *Developments in Soil Science*. David Dent is an Associate Editor of *Soil Use and Management*.

Papers in primary journals

Batjes NH 2006. Soil carbon stocks of Jordan and projected changes upon improved management of croplands. *Geoderma* 132, 361-371

Hartemink AE 2006. Assessing soil fertility decline in the tropics using soil chemical data. *Advances in Agronomy* 89: 179-225

Weijers, JWH, Schouten S, Spaargaren OC and Sinnige Damsté JS 2006. Occurrence and distribution of tetraether membrane lipids in soils: implications for the use of the TEX₈₆ proxy and the BIT index. *Organic Geochemistry* 37, pp 1680-1693

Books

Hartemink AE 2006 *Invasion of Piper aduncum in the shifting cultivation systems of Papua New Guinea: Foreword* by David Pimentel. ISRIC - World Soil Information, Wageningen ISBN 90- 8106281- 6 xiv+234 p

Hartemink AE (Editor) 2006 *The future of soil science*. International Union of Soil Sciences, Wageningen ISBN 90-7155616- 6 x+165 p

IUSS Working Group WRB 2006 *World reference base for soil resources 2006: a framework for international correlation and communication*. World Soil Resources Report 103, FAO, Rome 128p

Jahn R, HP Blume, VB Asio and O Spaargaren 2006 *Guidelines for soil description, 4th edition*. FAO, Rome ISBN 92-5-105521-1 97p

Liniger HP and W Critchley (editors) 2007 *Where the land is greener – case studies and analysis of soil and water conservation initiatives worldwide*. WOCAT – World Overview of Conservation Approach and Technologies – CTA Wageningen ISBN 978-92-9081-339-2 xi + 364 p

Contributions to edited books

Ezcurra E, E Mellink, E Wehncke, C González, S Morrison, A Warren, DL Dent and P Driessen 2006 Natural History and evolution of the world's deserts. 1-26 (Chapter 1) in Ezcurra E (editor) *Global deserts outlook*. UNEP Nairobi

Hartemink AE 2006 Soil science, population growth and food production - some historical developments. In Batiao A and others (editors): *Advances in integrated soil fertility management in sub Saharan Africa: challenges and opportunities*. Springer, Berlin

Hartemink AE 2006 Soil erosion: perennial crop plantations. 1613-1617 in Lal R (editor) *Encyclopedia of Soil Science, 2nd edition*. Taylor and Francis, New York

Hartemink AE 2006 Soil fertility decline: definitions and assessment. 1618-1621 in Lal R (editor) *Encyclopedia of Soil Science, 2nd edition*. Taylor and Francis, New York

Hartemink AE and H de Bakker 2006 Classification, Netherlands. 265-268 in Lal R (editor) *Encyclopedia of Soil Science, 2nd edition*. Taylor and Francis, New York

Hartemink AE 2006 *Piper aduncum* fallows in the lowlands of Papua New Guinea. 186-190 in Carns M (editor) *Voices from the Forest - Integrating Indigenous Knowledge into Sustainable Upland Farming*. Johns Hopkins University Press, Baltimore MD

- Herrmann S, CF Hutchinson C Nellemann, K Nagatabi, A Warren, DL Dent and S Morrison 2006 Desert outlook and options for action. 111-136 (Chapter 6) in Ezcurra E (editor) *Global deserts outlook*. UNEP, Nairobi
- Navone S, E Abraham, M Bargiela, DL Dent and others 2006 State and trends of the world's deserts 73-88 (Chapter 4) in Ezcurra E (editor) *Global deserts outlook*. UNEP, Nairobi
- Safriel U, Ezcurra E, Tegen I, Schlesinger WH, Nellemann C, Batjes NH, Dent D and others 2006. Deserts and the planet - Linkages between deserts and non-deserts. 50-72 in: Ezcurra E (editor), *Global deserts outlook*. UNEP, Nairobi

Contributions to conference proceedings and other publications

- Bartholomeus HM, ME Schaepman, L Kooistra, A Stevens, WB Hoogmoed and O Spaargaren 2006 Quantitative retrieval of Soil Organic Carbon using laboratory spectroscopy and spectral indices. In: Kerle N and AK Skidmore(editors) *ISPRS 2006: ISPRS mid-term symposium 2006 remote sensing: from pixels to processes, 8-11 may 2006, Enschede*. ISPRS, Enschede
- Batjes NH, E Milne, M Easter, K Paustian, SA Williams SA, K Killian and others 2006 Assessment of soil organic carbon stocks and changes at national scale In: Heffer P, (editor) *IFA Agriculture Conference 27 February - 2 March 2006, Kunming China*, International Fertilizer Industry Association, Paris
http://www.fertilizer.org/ifa/publicat/PDF/2006_ag_kunming_batjes_poster.pdf
- Bationo A, AE Hartemink, O Lungo, M Naimi, P Okoth, EMA Smaling & L Thiombiano 2006 African soils: their productivity and profitability of fertilizer use. Background paper for the African Fertilizer Summit 9-13th June 2006, Abuja, Nigeria
- Bhattacharyya T, DK Pal, KS Gajbhiye, P Chandran, SK Ray, C Manda, NH Batjes and others 2006 Model evaluation to assess organic carbon stocks and changes in soils of the Indo-Gangetic Plains, India. 138-36 in *Frontiers of soil science: 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Dent DL and MA Singer 2006 Soil care and quality soil management. Division 4 Symposium in *Frontiers of soil science: 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Dent D and JH Kauffman 2006 Green Water Credits for rainwater management by farmers, *Global Water News* 4, 4-6 (www.gwsp.org)
- Easter M, K Paustian, K Killian, S Williams, T Feng, E Milne, R Al-Adamat, NH Batjes and others 2006. The GEFSOC Soil Carbon Modelling System - A tool for regional and country scale soil carbon inventories and land use assessments. 138-30 in *Frontiers of soil science: 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Hartemink AE 2006 Soil science publications - History and current trends. *Frontiers of soil science: 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Hartemink AE 2006 Long-term trends in soil fertility under agricultural plantations in the tropical regions. In *Frontiers of soil science: 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Hartemink AE 2006 Soil science in tropical and temperate regions - differences and similarities. *Frontiers of soil science: 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Hartemink AE and AB McBratney 2006 Teaching soil science, educating the numbers. Inter-divisional symposium in *Frontiers of soil science: 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Hartemink AE and F Nachtergaele 2006 Soil mapping for development. *Proceedings Second Global Workshop on Digital Soil Mapping*, Rio de Janeiro
- Hartemink AE, A Veldkamp and Z Bai 2006 Land cover change and soil fertility in tropical regions. *IFA Agricultural Conference, 27 Feb-2 March 2006, Kunming, China*. International Fertilizer Association, Paris

- Mantel S, M Mohiuddin, MK Alam, JR Olarieta, M Alam and FMA Khan 2006. Improving the *Jhum* system in Bangladesh. *Leisa* 22,4, 20-21
- Mantel S, Alam M, Khan FMK, Olarieta JR, 2006. Improving information access for innovation of the *Jhum* farming system in the Chittagong Hill Tracts of Bangladesh. *Proceedings 2nd International Conference on Sustainable Sloping Lands and Watershed Management 12-15 December 2006*, Luang Prabang, Lao PDR
- Milne E, Easter M, Paustian K, Al-Adamat R, Bhattacharyya T, Cerri CEP, Batjes NH, and others 2006a. The GEFSOC Modelling System, a process-based modelling approach for spatially explicit estimates of soil organic carbon stock change. 36-5 in *Frontiers of soil science: 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Milne E, Easter M, Paustian K, Killian K, Williams S, Al-Adamat R, Bhattacharyya T, NH Batjes and others 2006b. A system for estimating spatially-explicit soil organic carbon stocks and changes. Paper 49 in *Proceedings of The International Conference on Regional Carbon Budgets (August 16-18, 2006)*, Beijing
- Spaargaren O 2006 Guidelines for soil profile description. 8-1 – 8-8 in Michéli E and others (editors) *3rd European summer school on soil survey*. EUR 22193 EN Office for Official Publications of the European Communities, Luxembourg
- Spaargaren O 2006 Mineral soils influenced by human activity: Anthrosols (New reference group: Technosols). 16-1 – 16-5 in Michéli E and others (editors) *3rd Europeans summer school on soil survey*. EUR 22193 EN, Office for Official Publications of the European Communities, Luxembourg
- Spaargaren O 2006 Mineral soils conditioned by parent material: Andosols, Arenosols. 17-1 – 17-5 in Michéli E and others (editors) *3rd European summer school on soil survey*. EUR 22193 EN, Office for Official Publications of the European Communities, Luxembourg
- Spaargaren O 2006 Mineral soils conditioned by limited age: Cambisols. 21-1 – 21-3 in Michéli E and others (editors) *3rd European summer school on soil survey*. EUR 22193 EN, Office for Official Publications of the European Communities, Luxembourg
- Spaargaren O 2006 Mineral soils conditioned by permafrost: Cryosols. 28-1 – 28-4 in Michéli E and others (editors) *3rd European summer school on soil survey*. EUR 22193 EN, Office for Official Publications of the European Communities, Luxembourg
- Spaargaren O 2006 WRB – Wittingly Reaching Babel? In *Developments in the World Reference Base, Soil Taxonomy and other national soil classification systems, Frontiers of soil science, 18th World Congress of Soil Science, July 9-15 2006, Philadelphia*. IUSS, Philadelphia PA
- Spaargaren O 2006 Are Cryosols on the move? A reflection on the classification of permafrost-affected soils during the development of the World Reference Base for Soil Resources. In *Frontiers of soil science: 18th World Congress of Soil Science, July 9-19 2006, Philadelphia*. IUSS, Philadelphia, PA
- Spaargaren O, E Michéli and P Schad 2006 World Reference Base explained. In *Frontiers of soil science: 18th World Congress of Soil Science, 9-19 July 2006, Philadelphia*. IUSS, Philadelphia PA
- Spaargaren O, S Selvaradjou, L Montaranella and DL Dent 2006 An accessible digital archive of soil maps. In *Frontiers of soil science: 18th World Congress of Soil Science, 9-19 July, Philadelphia*. IUSS, Philadelphia PA

Book reviews

- Hartemink AE 2006 *Underground, how creatures of mud and dirt shape our world*, by Yvonne Baskin. Island Press, Washington. *Soil Science* 171, 564-567
- Hartemink AE 2006 *Soil Atlas of Europe*, by European Soil Bureau Network of the European Commission, 2005. Principal editors: Arwyn Jones, Luca Montanarella and Robert Jones. Office for Official Publications of the European Communities, Luxembourg. *J Environmental Quality* 35, 952-955
- Hartemink AE 2006 *The end of poverty - economic possibilities for our time*, by Jeffrey Sachs. Penguin Press, New York. *Geoderma* 135, 345-347

Hartemink AE 2006 Encyclopedia of Soils in the Environment, by Daniel Hillel. Elsevier, Academic Press, Amsterdam. *Geoderma* 132, 240-246

Reports*

Bai ZG and DL Dent 2006 *Global assessment of land degradation and improvement: pilot study in Kenya*. [ISRIC Report 2006/01](#), 35p

Bai ZG 2006 *Assessing land degradation in the Chittagong Hill Tracts, Bangladesh, using NASA GIMMS*. ISRIC Report 2006/6, 52p

Batjes NH 2006 *ISRIC-WISE derived soil properties on a 5 by 5 arc-minutes global grid (ver. 1.0)*. [ISRIC Report 2006/02](#), 47 p + data sets

Batjes NH and others 2006 SOTER-methods — Harmonization of Soil and Terrain Data for Studies of Carbon Stocks and Change. 11-16 in Milne E and others (editors) *Assessment of soil organic carbon stocks and change at national scale*. Technical report of the Global Environment Facility co-financed project GFL-2740-02-4381, Global Environmental Facility UNEP and University of Reading, Reading

Droogers P, JH Kauffman, JA Dijkshoorn, W Immerzeel and JRM Huting 2006. *Green Water Credits: Basin identification*. [Green Water Credits Report 1](#), ISRIC Report 2006/4, 87 p

Engelen VWP van and J Huting 2006 *Extrapolation study for the carbon sequestration project of pasture systems in the American tropical forest systems*. [ISRIC Report 2006/03](#), 47p

Engelen VWP van, A Verdoodt, JA Dijkshoorn and E van Ranst 2006 *Soil and terrain database of Central Africa (DR Congo, Burundi, Rwanda)*. [ISRIC Report 2006/07](#), 28p+ data sets

Grieg-Gran M, Noel S and Porras I 2006. *Lessons learned from payments for environmental services*. [Green Water Credits Report 2](#), ISRIC Report 2006/5, 24p

Gicheru P, DL Dent and JH Kauffman (editors) *1st Green Water Credits workshop, 11-12 October 2006, Nairobi*. ISRIC - World Soil Information and KARI – Nairobi (available on CD)

Mantel S and MFA Khan 2006 Chittagong Hill Tracts improved natural resource management; Proceedings of national workshop, Rangamati, Bangladesh, 15 - 16 February 2006. CHARM Project Report 1, Dhaka, 50p

On-line presentations

Batjes NH 2006 ISRIC's soil resources and Question-and-Answer Services. Paper given at the occasion of CTA's ACP Question-and-Answers Services visit to ISRIC - World Soil Information, 26 Oct. 2006 [\[PDF\]](#)

Cerri CC, CEP Cerri, D Powlson, NH Batjes, M Bernoux, K Paustian, E Milne E and CW Rice 2006 Soil organic carbon stocks/sequestration and greenhouse gas emissions *World soil issues and sustainable development: an agenda for action -ISRIC 40 seminar, 9 March 2006* [\[PDF\]](#)

* ISRIC Reports are available on-line at:
www.isric.org/UK/About+ISRIC/Staff+Publications/

TRAVEL AND MEETINGS

In connection with program activities, ISRIC staff participated in training, workshops, and presented papers and posters at international conferences and symposia

Staff	Event	Venue	Period (2006)	Organized by
Bai	WOCAT Training in China	Beijing and Dingxi, China	28 Mar–10 Apl	CPMO
Batjes	GeoLoketten Conference	Utrecht (NL)	14 Dec	GeoLoketten / RGI
Dent	GWC project meeting with international team partners IIED and SEI York	London, UK	13 Jan	ISRIC
Dent	Geo-deserts authors' meeting	Gobabeb, Namibia	24-31 Jan	UNEP
Dent	IFAD Round table on innovation	Lund, Sweden	9-10 Feb	UNEP
Dent	IFAD Round table on innovation	Rome, Italy	14-17 Feb	IFAD
Dent	UNEP GEO-4 production and authors' meetings	Nairobi, Kenya	5-8 Mar	UNEP
		Rome, Italy	12-15 Sep	
		Cairo, Egypt	13-17 Nov	
Dent	PROLAND Board meeting	Pulawi, Poland	17-23 Mar	IUNG
Dent	WOSAC meeting	Silsoe, UK	24 Apl	ISRIC
Dent	Kenya High Commission: GWC	London, UK	11 May	ISRIC
Dent	World Bank presentation: Land degradation: magnitude of the problem and proposal for global action plan. GEF discussions	Washington, USA	13-16 Jun	World Bank/GEF
Dent	GWC: discussions with Govt Kenya and KARI on work plan and workshop	Nairobi, Kenya	30 Jul-4 Aug	ISRIC
Dent	World Congress of Soil Science	Philadelphia, USA	8-15 Jul	IUSS
Dent	3 rd GEF Assembly	Cape Town, South Africa	29-30 Aug	GEF
Dent	GWC; discussions with Govt Kenya, KARI and private sector	Nairobi, Kenya	30 July-2 Aug	ISRIC
Dent	Green Water Credits 1 st workshop	Nairobi, Kenya	11-12 Oct	KARI
Dent	GEO-4	Lund, Sweden	6-8 Nov	ISRIC/LUCSUS
Dent	GWC project: Grant Management Committee	Paris, France	24 Nov	UNESCO/ISRIC
Dent	LADA meeting	Rome, Italy	28-30 Nov	FAO

Staff	Event	Venue	Period (2006)	Organized by
Hartemink	Int. Year of Planet Earth Meeting / IFA	Paris, France	27-28 Jan	IYPE/UNESCO
Hartemink	IFA annual conference	Kunming, China	25 Feb-2 Mar	IFA
Hartemink	IUSS planning meeting	NY, Philadelphia, USA	13-21 Feb	IUSS
Hartemink	Teaching, PhD supervision	Kenya, Rwanda	25 May–10 Jun	WUR
Hartemink	Digital Soil Mapping Workshop	Rio, Brazil	3-7 Jul	Embrapa
Hartemink	World Congress of Soil Science	Philadelphia, USA	8-15 Jul	IUSS
Hartemink	African Green Revolution	Oslo, Norway	30 Aug-2 Sep	Yara, Rabobank
Hartemink	Global Digital Soil Map	New York, USA	30 Nov–10 Dec	ISRIC/Columbia Univ
Kauffman	GWC project meeting with partner - IIED	London, UK	14 Jan	ISRIC
Kauffman	GWC project: discussions with Govt Kenya and KARI on workplan and workshop	Nairobi, Kenya	24 May-1 Jun; 30 Jul- 4 Aug	ISRIC
Kauffman	Green Water Credits workshop	Nairobi, Kenya	11-12 Oct	KARI
Kauffman	GWC project: Grant Management Committee	Paris, France	24 Nov	UNESCO/ISRIC
Mantel	CHARM project: preparation and organization inception workshop	Rangamati, Dhaka, Bangladesh	6-20 Feb	Eu Asia Pro Eco
Mantel	CHARM project: assessment progress workplan and provide technical input; review results pilot area study	Dhaka and Bandarban, Bangladesh	3-15 Jun; 23 Sep-17 Oct	Eu Asia Pro Eco
Mantel	CHARM project: visit project partner; discussions with stakeholder on priorities in natural res info system	Bandarban, Bangladesh	21-30 Nov	Eu Asia Pro Eco
Mantel	CHARM capacity building and consultation workshop <i>Improved Natural Resource Management in the Chittagong Hill Tracts</i>	Bandarban, Bangladesh	28-29 Nov	Eu Asia Pro Eco
Mantel	2 nd Intl Conf Sust Sloping Lands and Watershed Mngt	Luang Prabang, Lao PDR	12-15 Dec	SSLWM
Spaargaren	Digitization of ISRIC map collection	Ispira, Italy	27 Apr–1 May	ISRIC/JRC-IES
Spaargaren	18 th World Congress of Soil Sciences	Philadelphia, USA	8-15 Jul	IUSS
Spaargaren	4 th European Summer School on Soil Survey	Ispira, Italy	28 Aug–1 Sep	JRC-IES
Spaargaren	Soil Information System Workshop	Wexford, Ireland	24 Nov	TEAGASC

Staff	Event	Venue	Period (2006)	Organized by
Spaargaren	Launch of the <i>Soil of the Year 2007</i>	Berlin, Germany	1 Dec	Kuratorium Boden des Jahres
van Engelen	Land resources assessment Consultancy	Phnom Penh, Cambodia	20 Feb–3 Mar	GTZ
van Engelen	VII Intl Coord Meeting Carbon Sequestration Project (CSEQ)	Punta Leona, Costa Rica	28 Jun-1 Jul	CSEQ
van Engelen	Global Digital Soil Map	New York, USA	30 Nov–10 Dec	ISRIC/Columbia Univ.
van Lynden	SOWAP plenary meeting	Prague, Czech Republic	6-8 Jun	SOWAP
van Lynden	WOCAT training Indonesia	Solo, Indonesia	6-9 Sep	INDOCAT / Min. Forestry
van Lynden	WOCAT annual workshop & steering meeting	Cape Town, South Africa	23-28 Oct	WOCAT

PERSONNEL

(As of January 2007)

Board of Trustees

- Prof. Dr W van Vierssen (representing the Executive Board of Wageningen UR) (*Acting Chairman*)
- Ir GJA Nieuwenhuis (Centre for Geo-Information, representing Alterra BV)
- Prof. Dr L Brussaard (Environmental Sciences Group, representing Wageningen University)
- Dr A Tengberg (United Nations Environment Programme, Nairobi)
- Prof. Dr S Nortcliff (University of Reading, representing the International Union of Soil Sciences)

Changes in Board

- Dr SW Bie's term of office as Chairman expired in November 2006; Prof. Dr W van Vierssen was appointed as Acting Chairman
- Prof. Dr S Nortcliff replaced Prof. Dr H Hurni who resigned in December 2006

Honorary Fellows

- Prof. Dr Ir KJ Beek
- Prof. Dr R Dudal
- Dr R Brinkman
- Prof. Dr P Sanchez
- Prof. Dr J Bouma
- Dr L Montanarella

Staff

Dr DL Dent – Director

Ir JH Kauffman – Deputy Director; *Green Water* engineer

- M Ahmad MSc – Soil monolith preparation
- Dr ZG Bai – Global assessment of land degradation and improvement
- Ir NH Batjes – Land resources information systems; soils and global change
- WCWA Bomer – Graphic design, in-house publishing
- J Brussen – Secretariat, finance
- Ir JA Dijkshoorn – Soil and terrain databases
- Ir IJ Haas – Webmaster
- Dr AE Hartemink – Head, World Soil Museum; soil fertility
- IIM Huibers-Govaert – Library
- JRM Huting – GIS database management; modelling and mapping
- YGL Karpes – Secretariat, communications
- S Mantel MSc - Land evaluation and decision support
- AJM van Oostrum MSc – Collections management and quality control
- Dr OC Spaargaren – Head, World Data Centre for Soils; taxonomy of soils
- Ir P Tempel - Systems analysis, programming

- Drs VWP van Engelen – Research Team Leader; land resources information systems
- Drs GWJ van Lynden – Land, water and environmental management

Guest researchers

- Drs JHV van Baren - Philosophy of Soil Science (IUSS program); Soils literature and documentation
- Dr LP van Reeuwijk – Laboratory methods and quality control
- Dr MJ Kooistra – Soil micromorphology
- Dr V Rutunga – Soil fertility; food security strategy for Rwanda

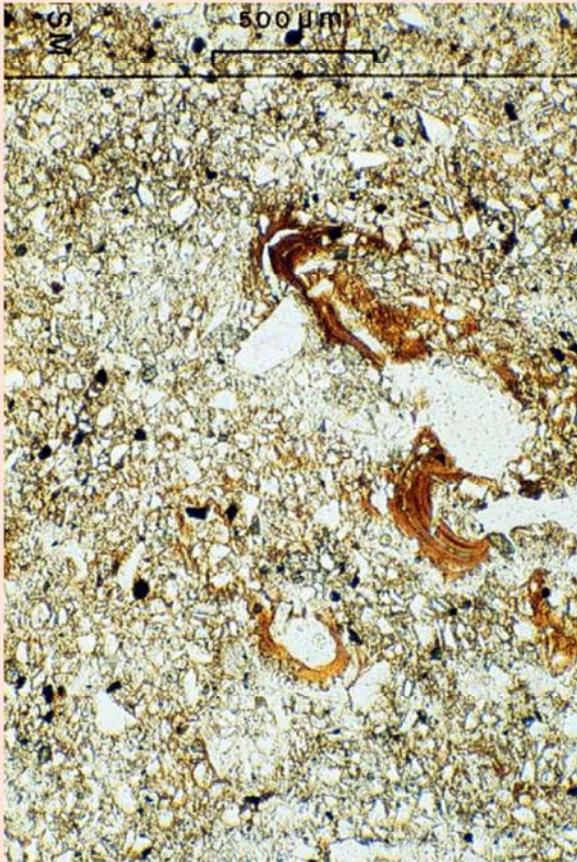
Internship

Jasmin Ozolin – University Hohenheim, Germany (22-2/2-3-2007) – soil exhibition

LIST OF ACRONYMS

Abbreviation	Description
ACP	African, Caribbean and Pacific countries
ASSOD	Assessment of Human-induced Soil Degradation in South and Southeast Asia
BSIK	Besluit Subsidies Investeren Kennisinfrastructuur
CA	Conservation Agriculture
CDE	Centre for Development and Environment, University of Berne, Switzerland
CHARM	Chittagong Hill Tracts improved natural Resources Management
CHT	Chittagong Hill Tracts, Bangladesh
CPMO	Central Project Management Office, PR China - GEF Partnership on LADA
CRIC	Committee for the Review of the Implementation of the Convention
CSEQ	Carbon Sequestration Project, The Netherlands cooperation
CTA	Centre Technique de Coopération Agricole et Rurale / <i>Technical Centre for Agricultural and Rural Cooperation</i> , Wageningen, The Netherlands
DEM	Digital Elevation Model
EC	European Commission
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária / <i>Brazilian Agricultural Research Corporation</i> , Rio de Janeiro, Brazil
EU	European Union
EuDASM	European Digital Archive of Soil Maps
FAO	Food and Agriculture Organization of the United Nations, Rome, Italy
GEF	Global Environmental Facility
GEFSOC	Global Environmental Facility co-funded, Soil Organic Carbon Project
GEO	Global Environment Outlook Program, UNEP
GIMMS	Global Inventory Modelling and Mapping Studies
GIS	Geographic information system
GLADA	Global Assessment of Land Degradation and Improvement
GLASOD	Global Assessment of Status of Human-induced Soil Degradation
GTZ	Gesellschaft für Technische Zusammenarbeit, Eschborn, Germany
GWC	Green Water Credits project
ICSU	International Council for Science, Paris, France
JRC-IES	EC Joint Research Centre - Institute for Environment and Sustainability, Ispra, Italy
IFA	International Fertilizer Industry Association, Paris, France
IFAD	International Fund for Agricultural Development, Rome, Italy
IPCC	Intergovernmental Panel on Climate Change
ISIS	ISRIC Soil Information System
ISRIC	International Soil Reference and Information Centre, Wageningen, The Netherlands
IUNG	Instytut Uprawy Nawożenia i Gleboznawstwa / <i>Institute of Soil Science and Plant Cultivation</i> , Pulawy, Poland
IUSS	International Union of Soil Sciences
JRC	Joint Research Centre of the European Union, Ispra, Italy
KARI	Kenya Agricultural Research Institute

Abbreviation	Description
LADA	Land Degradation Assessment for Dryland Areas
LEI	Landbouw-Economisch Instituut / Agricultural Economics Research Institute, Wageningen UR, The Hague/Wageningen, The Netherlands
NASA	National Aeronautics and Space Administration
NDVI	Normalized Difference Vegetation Index
NUFFIC	Netherlands Organization for International Cooperation in Higher Education
PE&RC	Production Ecology and Resource Conservation, Wageningen University
PROBUS	Stichting Probus Nederland Informatie Centrum, Delft, The Netherlands
PROLAND	EC Centre of Excellence Protection of Land and Water Quality and sustainable Development of Rural Areas, Pulawy, Poland
ProTerra	Soil protection in Mediterranean olives and vines, Syngenta, Basel, Switzerland
QAS	Question-And-Answer Service
LGP	length of growing period
RGI	Ruimte voor Geo-Informatie / <i>Space for Geo Information</i> , The Netherlands
SDC	Swiss Agency for Development and Cooperation
SEI	Stockholm Environment Institute, Sweden
SOTER	Soil and Terrain Database
SOTERLAC	SOTER database for Latin America and the Caribbean
SOWAP	Soil and Surface Water Protection Using Conservation Tillage in Northern and Central Europe
SQL	Structured Query Language
SRTM, NASA	Shuttle Radar Topographic Mission, National Aeronautics and Space Administration, USA
SSLWM	Sustainable Sloping Lands and Watershed Management
TEAGASC	Teagasc – The Irish Agriculture and Food Development Authority, Carlow, United Kingdom
UNCCD	United Nations Convention to Combat Desertification, Bonn, Germany
UNEP	United Nations Environment Programme, Nairobi, Kenya
UNESCO	United Nations Educational, Scientific and Cultural Organization, Paris, France
UNESCO-IHE	UNESCO-IHE Institute for Water Education, Delft, The Netherlands
WDC	World Data Center
WISE	World Inventory of Soil Emission potentials database
WOCAT	World Overview of Conservation Approaches and Technologies. CDE, Berne, Switzerland
WRB	World Reference Base for Soil Resources
WUR	Wageningen University and Research Centre, The Netherlands
ZDF	Centrum für Entwicklungsforschung / <i>Center for Development Research</i> , Bonn, Germany



Soils under the microscope

