

Workshops

Monday, September 19th 2011

Monday morning: Theme Food Security

Workshop 1: 'Soils and the city': Risk assessment tools to assess the impact of urban soil quality on human health

Paul Römkens¹, Piet Otte², René Rietra¹ and Johannes Lijzen²

¹Alterra, Wageningen UR, The Netherlands

²National Institute for Public Health and the Environment, The Netherlands

Background and aim of the workshop

Soils in and near urban areas are often under the direct influence of emission from industry or traffic. In other places, soils have been amended with waste materials like dredged sediments or even industrial waste. Infamous examples include the discovery of houses build on former industrial waste in the town of Lekkerkerk as well as housing areas on former mining areas in the southern parts of the Netherlands. Aside from such hot spots, soil quality within urban areas often is characterized by a rather heterogeneous degree of soil pollution. Levels of pollutants including lead and PAH's can vary on a rather small scale (< 10 m) from background levels to seriously polluted which hampers a regional assessment of soil quality.

Despite the varying quantity of pollutants in soil there is marked increase in the interest of people within the city to grow their own vegetables and spend time in a green environment. In many cases people rent small allotments on the edge of the city but recently also areas in between housing apartments are converted to communal gardens. Here, residents often share small pieces of land to grow special vegetables to be used for cooking. As such these activities have a high added value in view of the social interaction within city communities and often such activities are promoted by housing corporations. Unfortunately the less than optimal quality of soils often leads to unrest among residents. Elevated levels of metals like lead or organic contaminants like PAH's can lead to enhanced exposure of such unwanted compounds through consumption of home grown food. In some highly industrialized countries in Asia this even affects the quality of products from regular arable fields which are more and more affected by the growing urban and industrial areas.

To assess the possibilities and potentially also the risks of what is called *urban agriculture* risk assessment tools are needed that are capable of predicting both the transfer of metals and organic contaminants from soil to food as well as the calculation of the human exposure. In the Netherlands the model tool CSOIL is used for such assessments. CSOIL is a combined transfer and exposure model that enables the user to calculate acceptable levels of contaminants in soil depending on the use of the soil.

The aim of the workshop is to give participants insight in the concepts and functioning of CSOIL, its model concepts and applications. A special feature of the workshop is a 45 minute hands on course on working with CSOIL. Participants even can use their own data to perform a site specific risk assessment. By using a stand-alone version of CSOIL on available PC's participants can obtain inside knowledge of the functioning of different model parts within CSOIL.

Tentative programmer

The program of the workshop which is jointly organized by researchers from RIVM and ALTERRA contains 3 short (10-15 minutes including discussion) introductions:

- Background and concepts of CSOIL in risk assessment (RIVM)
- Uptake of metals by crops: model concepts (RIVM/ALTERRA)
- Case study Urban Agriculture in the Netherlands: 'Do we have a problem with lead?' (ALTERRA)

Following these introductions participants are invited to use the available PC's in the workshop room to work with CSOIL. This can be done using (soil) data provided by the organization or using own data from local or regional studies. In the latter case participants need to bring data on soil texture, pH and organic matter content as well as levels of contaminants in soil (total content).

Workshop 2: Global Soil Information Facilities

Tomislav Hengl (tom.hengl@wur.nl), Hannes I. Reuter, Gerard B.M. Heuvelink
GSIF development team, ISRIC, The Netherlands

GSIF stands for Global Soil Information Facilities - Open (publicly available) tools that can be used to enhance collation, harmonization and use of soil and covariate data to assist production of global soil information at high resolution (100 m). This global Soil Information System will become an important part of the Global Land Information System and will serve global land use planning and global environmental risk assessment activities.

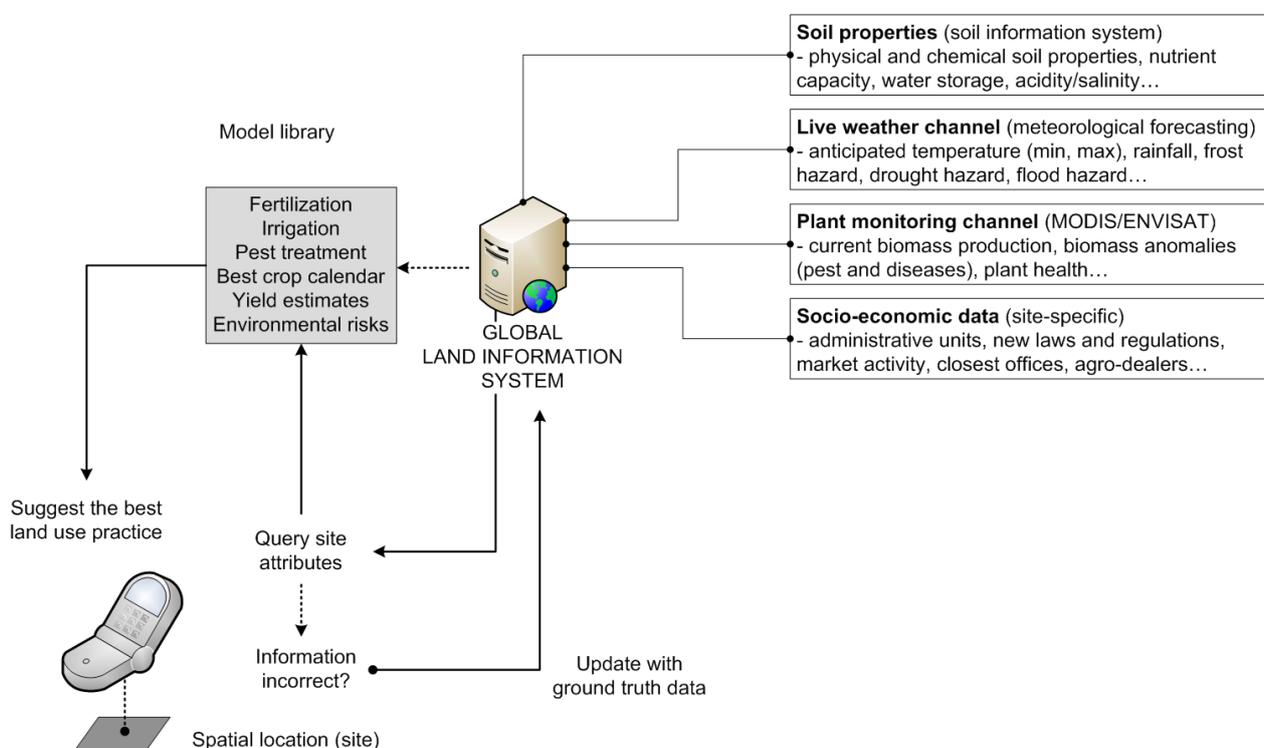
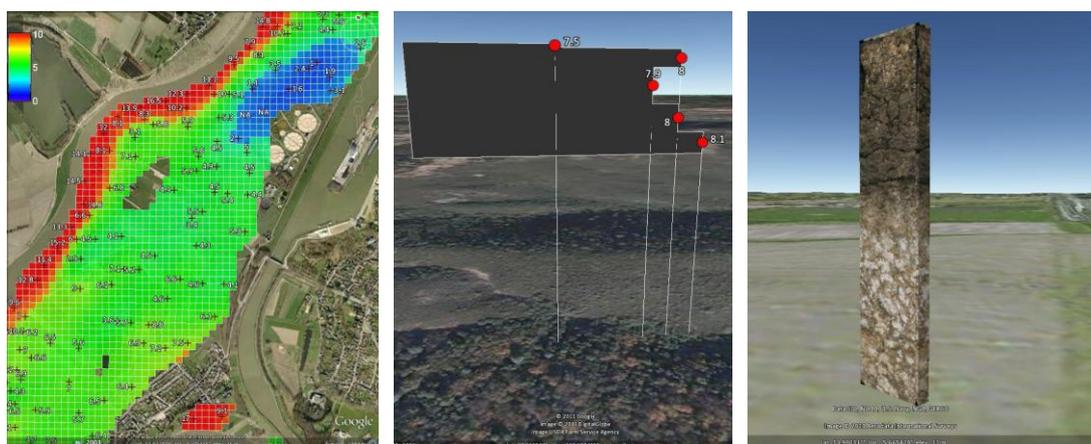


Fig. 1: Schematic example of using a Global Land Information system for site-specific decision making. The future of GSIF is in crowd-sourcing the data input to farmers, agricultural extension workers, high school pupils, ecologists and similar.

GSIF is a framework for production of open soil data. It has been inspired by global environmental data initiatives such as Global Biodiversity Information Facilities, Global Land Cover mapping, OneGeology and similar. The main practical reason for GSIF is to build cyber-infrastructure to collate all existing legacy soil data currently under threat of being lost forever (!).

The main users of GSIF will potentially be various international agencies and initiatives such as GlobalSoilMap.net and other international agricultural development and research organizations such as FAO, CIAT, USAID, Inter-American Development Bank, World Bank. We also aim at National Environmental and Soil Survey agencies, and private entities and individuals, soil surveyors and soil scientists, farmers and agriculture engineers (the public).



This workshop will present the main components of the GSIF: GlobalSoilMap.net soil property maps; Open Soil Profiles data portal (for on-line point data entry); Worldgrids geo-data service; R packages GSIF (automated analysis and mapping functionality) and plotKML (visualization of soil field data and output maps) and GSIF manual (book explaining all functionality and show cases), and then elaborate design of each component. We will also run a demo that shows how state-of-the-art mapping tools can be used to produce high resolution soil property maps of Africa (Malawi showcase).

Monday afternoon: Theme Water Resources

Workshop 1: Green water credits, Soil and Water Conservation in Africa

Hannes I. Reuter
ISRIC – World Soil Information, The Netherlands

Scope, activities and outcomes

The source of all fresh water is rainfall received and delivered by the soil. Soil properties and soil management, in combination with weather and crop type, will determine the course of rainwater as evaporation, transpiration, surface runoff, infiltration, storage in the soil and deep percolation to the groundwater. Improper soil management may result in low use as productive water, i.e. water that is transpired for plant production, and in high losses due to surface runoff or evaporation, which in turn may lead to water scarcity, land degradation, and

food insecurity. Nonetheless, farmers are paid for their crops and livestock but not for their water management, while proper management may lead to less losses and more of-farm availability of water to downstream users. In order to capture these benefits, it is necessary to develop a payment scheme for the provided water and associated services. The Green Water Credits (GWC) programme, coordinated by ISRIC – World Soil information and supported by the International Fund for Agricultural Development (IFAD) addresses this opportunity by bridging the incentive gap.

The GWC programme focusses on the beneficial effects of improved soil and water management practices on reducing destructive runoff, soil erosion and the silting of reservoirs, as well as reducing soil evaporation, while enhancing transpiration for plant production. Over the past 5 years the impact of various GWC interventions on these aspects was calculated for the Upper Tana basin, Kenya using a comprehensive agro-hydrological model that included soil, climate, hydrological, terrain and land use data. The quantitative agro-hydrological analyses are accompanied by socio-economic analyses, including institutional aspects and financial mechanisms. Knowledge of how different land management practices affect agro-ecosystem carbon stocks and greenhouse gas emissions, land degradation and sustainability remains to be studied.

In the green water credits workshop we will demonstrate the effects of implementing improved soil management practices -11 soil and water conservation practices that are common or new in Kenya – to the basin hydrology and the beneficial effects for downstream water users such as hydro-power generating companies, urban and industrial water users and irrigators.

After the presentation of results in Kenya (and Morocco) with main emphasis on the biophysical analyses, participants will have ample time to discuss the concept, the approaches, the results and the way forward in the implementation phase.

The outcome of the meeting will be an overview of ideas of how tailored soil and water conservation management can contribute to integrated water resources management, improving food security and reaping the opportunities of ecosystem services.

Workshop 2: Revitalizing Soil Science Education – how to maintain pedological literacy?

Thom Kuyper
Wageningen University, The Netherlands

Scope, activities and outcomes

In the last decade a lively debate has taken place on soil science education. In some countries soil science is facing a declining number of students, whereas in other countries a soil science renaissance is observed. Pleas to reform soil science have often included a plea to weaken the link between soil science and agriculture, and rather strengthen its link with environmental sciences. Curriculum reforms have been implemented at several universities, in order to halt declining student enrolment (BSc, MSc, PhD).

This Wageningen Soil Conference emphasises the contribution of soil science to the global challenges, rather than as a scientific discipline per se. Would such changes in focus in education really solve the underlying issues? More fundamentally, does soil science have sufficiently strong organising principles to stand as a science by itself? Whereas biologists can

use evolution as a unifying concept, as chemists have atomic theory, is Jenny's 'clorpt' model strong enough as a unifying principle in soil science? If integration in other programmes would be the solution, how can we increase visibility? How can we prevent that soil science is taught by non-soil scientists? (If that is a problem after all?) And how can we maintain a sufficient influx of new soil experts if there are no separate programmes in soil science?

In this workshop we will start with a few inspiring examples of recent reforms of soil science curricula, followed by a discussion fed by challenging propositions. The outcome will be a clearer view on how to maintain or increase pedological literacy, while maintaining an influx of students in the field(s) of soil science(s). We do not strive towards one solution – one size does not necessarily fit all countries with different education systems. However, we would like to achieve a position paper on how to best achieve pedological literacy.

Wednesday, September 21st 2011

Wednesday morning: Theme Biodiversity

Workshop 1: Readable writing: writing for the general public

Marjel Neefjes

Communication Bureau de Lynx, The Netherlands

Several topics in the communicating science to the general public will be addressed in this workshop. Short lectures will be mixed with hands-on exercises. The topics addressed will include:

1. Do you know your audience?

Who is it that you're writing for? Do you want to tell your colleagues what you've done? Do you want to convince a donor to fund your projects, or are you looking for participants for your training course?

2. Will your audience read your text?

People usually decide whether to read a text in a fraction of a second. So your headline and your first sentence are crucial! During the next few seconds they will continue to decide whether they will continue to read. So you'll have to take into account all the factors that influence these decisions. Think about headlines, subtitles, introductions, the length of your sentences and paragraphs and so forth. And content of course: why would your audience read your text? Is it of interest to them? This means you have to get to know your audience.

3. Will your audience understand your message?

It is not you who decides what's too difficult or too complicated, it is your audience! Even if they do read it, that doesn't mean they actually understand. So you have to adapt your text to their level, and try not to give too much information in one go.

4. Will your audience remember your message?

Whether your message will actually stick with your audience depends on several factors:

- The message should be relevant to your audience. There is so much information in this world, they simply can't remember everything.
- The message should be short and simple rather than long and complicated.
- Repetition of your message in different wordings helps your audience to remember it.

5. Will your audience accept your message and act upon it?

Even if you manage to convince them of the importance of your message, is your audience actually going to do something with it? Are they going to fund your proposal, or participate in your training?

Workshop 2: Soil Management and Biodiversity Workshop

Felix Bianchi and Lijbert Brussaard
Wageningen University, The Netherlands

Scope, activities and outcomes

While soil management has historically mainly focussed on increasing productivity in agriculture and forestry by manipulation of chemical and physical properties of soil, it is only more recently that the implications of soil management on the composition and diversity of soil biota have become apparent. Practices like conservation soil management and addition of organic matter may enhance the activity of soil organisms by increasing their diversity and/or density. At the same time, there is increasing awareness that interactions between soil biota and plants are ubiquitous and can have strong effects on plant growth, above-ground multitrophic interactions, and the succession of plant communities. For instance, the far majority of plant species are colonized by mycorrhiza, which can facilitate nutrient uptake and result in higher seedling survival, biomass accumulation, and improved seed quality. The community of nematodes and microorganisms in the soil have been shown to influence the nitrogen levels and phenolic concentration in plants, the population dynamics of aphids feeding on these plants, and mortality rates of aphid parasitoids. Root-feeding nematodes and larvae of click-beetles have been shown to selectively suppress plant species, thereby increasing plant species diversity and driving plant succession. These examples highlight exciting opportunities to link above- and belowground processes for managing agricultural land and natural ecosystems.

In this workshop we will explore options of implementing soil management practices (e.g. no- or minimum till, addition of compost or solid manure, planting of cover crops, introduction of plant pathogens or their antagonists) to address current challenges related to:

- sustainable agriculture
- management of invasive species
- restoration of natural habitats
- mitigation of climate change

Participants will discuss the opportunities (and risks) of implementing soil management to tackle these major challenges in breakout sessions. The outcome of the meeting will be an overview of ideas of how tailored soil management can contribute to restoring/conserving below- and above ground biodiversity and contribute to the 4 challenges indicated above.

Wednesday afternoon: Theme Governance & Policy

Workshop 1: Soil, partner in sustainable development

Sandra Boekhold¹, Piet Otte² and Margot de Cleen³

¹Soil Protection Technical Committee, The Netherlands

²National Institute for Public Health and the Environment, The Netherlands

³Ministry of Infrastructure and the Environment, The Netherlands

Climate change, energy shortages, urbanization, health and food security are some of the societal and economic challenges for the coming decades. Soil and the subsurface are part of the answer to meet these major challenges imposed to man. Goal of the workshop is to describe the international soil research needs in this perspective. Aim is to publish the results as a follow up of the workshop.

Outline of the workshop

- An introduction film 'Terra' in English, illustrating three perspectives on soil use: soil abused as a slave, protected as does Mother Earth and sustainably used as a partner (6 minutes).
- Discussion with audience about these three perspectives in relation to the research or policy field they work in.
- Short presentations on societal challenges, sustainability issues, ecosystem services, the influence of different scales and knowledge management.
- Collaborative survey on international soil relevant sustainability issues and the role of ecosystem services, leading towards definition of the main research items for an international research agenda.

Soil plays a significant role in interregional climate effects, water balance, food production, preservation of biodiversity and human health. This makes soil a vital partner in sustainable management at all levels of our environment. An understanding of the functioning of the soil, ecosystem services and the interrelations of the different soil functions is therefore essential for planning and defining the right policy measures.

The Dutch Soil Platform initiated a research agenda for the future: soil as a partner in sustainable development. The agenda starts with a description of societal trends and challenges and ends with the definition of related knowledge questions in the field of soil science. This initiative is a partnership between several ministries and major Dutch research institutes.

Workshop 2: From Ecosystem Services to Monetary Value

Lars Hein

Wageningen University, The Netherlands

The masterclass 'Ecosystem services' (1.5 hours) will provide the participants an opportunity to engage in a basic analysis of ecosystem services provided by a national park, potential indicators for their monetary value, and the link between ecosystem services and soils. In small groups, the participants will work on a specific case study. The case study site the participants will analyse is the Hoge Veluwe national park, the destination of one of the conference excursions. The Hoge Veluwe park offers a mix of forest and heather landscapes and provides a diverse mix of ecosystem services.

Workshop 3: Spatial prioritisation of soil protection actions - can meaningful priority areas be defined?

Mark G. Kibblewhite
Cranfield University, United Kingdom

This workshop will explore how risk assessment could be used to identify priority areas for soil protection. It will address the feasibility of this for soil erosion, loss of soil organic matter, compaction and diffuse contamination. Generic approaches will be explored as well as threat-specific ones. The relevance of achievable outputs to policy definition and implementation will be discussed.

Thursday, September 22nd 2011

Thursday morning: Theme Climate Change

Workshop 1: Opportunities of subsoil use for dealing with climate change

Peter Kiela¹, Dick Brand¹, Margot de Cleen¹, Piet Otte² and Sandra Boekhold³

¹Ministry of Infrastructure and the Environment, The Netherlands

²National Institute for Public Health and the Environment, The Netherlands

³Soil Protection Technical Committee, The Netherlands

It is expected that climate change may result in rising sea levels, large-scale flooding, extreme rainfall and heat stress. It represents a possible risk for the well being of man . To mitigate the effects of climate change, agreements were made concerning CO₂ reduction and the use of 'green energy'. Furthermore, urban environments should be made resistant against the negative effects of climate change. Over the past decades the Dutch policy on soil quality aimed at protecting the soil quality and restoring contaminated sites. Given new societal tasks, the soil policy is shifting to an integrated approach for spatial planning and the sustainable use of the soil-water system. The potential of the soil-water system contributing to societal tasks is a promising prospect. One of these societal tasks is the mitigation and adaptation of the effects of climate change in urban and rural environment.

In this workshop the position of the Dutch soil policy in relation to climate change and recent scientific developments will be discussed. Possible opportunities or services of the soil water system to deal with the effects of climate change will be presented, e.g.:

1. Increased use and promotion of aquifer thermal energy storage.
2. Mitigation of heat stress and extreme rainfall events in urban environments.
3. Mitigation of CO₂ emissions from peat soils by proper water management.
4. Adaptation to temporary water excess by controlled flooding and spatial renovations.

Outline of the workshop

- The presentation of the scientific, practical and policy key points of the five 'soil services'.
- A comprehensive evaluation of advantages and disadvantages, sustainability aspects and political considerations. This will be concluded with provocative questions and statements.
- Questions and statements will be discussed with the participants of the workshop in small groups. The results of the discussion in groups will be presented at the end of the workshop.

Remarks

- We will invite experts to present (in so-called flash presentations) opportunities of the soil-water system and the way soil water system can be taken into account in spatial planning instruments to participate in the discussions
- The organizers invited dr. Jacqueline Cramer (the former minister of Environment) to present the contemplative part of the workshop and to formulate questions and statements for the discussion.
- It is the objective that a discussion paper will be released prior to this session.
- After the conference the results of the workshop will be added to the paper.

Workshop 2: "Credits for Carbon Care" - from soil eco-system services to monetary value

Peter Kuikman¹ and Emiel Elferink²

¹Alterra, Wageningen University and Research Centre, The Netherlands

²CLM – centre for agriculture and environment, The Netherlands

scope, activities and outcomes

Soil management has historically focussed on increasing productivity in agriculture and forestry. It is only more recently that the implications of soil management on soil organic matter content and emissions of greenhouse gases (source of CO₂) has become apparent. This has put emphasis on practices that conserve organic carbon in soils and on sequestration of additional organic carbon in soils as means to mitigate climate change. These actions now are proposed through international climate change mitigation policies. However, internal (knowledge and recognition) and external (economic) incentives are insufficient. Farmers and land owners may be encouraged to adopt adequate management through payments from ecosystem services buyers.

In this workshop we will explore options to define, design and develop an ecosystem service for climate mitigation through sequestration and conservation of soil carbon via targeted and additional soil management. This should contribute to effective climate change mitigation and fit other current challenges in the area of sustainable agriculture and soil and land management. We will further explore what an effective monetary system to sustain such an ecosystem service and economic benefits to farmers and land owners could be like.

The participants in the workshop will learn about recent initiatives to set up climate mitigation soil services and arrange for adequate funding of such services and have the opportunity to discuss options, challenges and risks of implementing soil management to tackle these major challenges. The outcome of the meeting will be an overview of ideas of how technology (agricultural practices) and institutional arrangements (e.g. financing, ownership, certification) will work towards implementation of such an ecosystem service on climate mitigation.

