

SNOWMAN NETWORK



Knowledge
for
sustainable
soils

Preface

SNOWMAN currently carries out an investigation on the future of the network and at the same time reviews the network organisation. New developments at the European level, especially within the context of Horizon 2020, may open opportunities for new ways of funding and of working. We relate the self-sustained SNOWMAN network to the H2020 themes and challenges and align our activities with H2020 instruments (EIPs, JPIs, ERA-NETs, KICs).

SNOWMAN wants to build strong transnational and subnational collaboration on sustainable soil management in Europe in order to get soil issues higher on the agenda of the EC as a cross cutting theme to address the H2020 societal challenges.

Although not formally a JPI, the ambition of SNOWMAN is to become a truly European platform ('umbrella') for sustainable soil and land management with special emphasis on soil as a natural resource within H2020. Soil natural capital is closely related to soil changes as affected by land use (change). Resource efficiency could be described in this respect as sustainable land management with special emphasis on sustainable management of the soil-water system for sustained delivery of ecosystem services.

European collaboration to develop a shared knowledge & research agenda on sustainable soil management is crucial for addressing the (global) societal challenges. In this sense soil issues should be incorporated in a strategic research agenda relating to several themes (like Energy, Environment, KBBE, Health, Socio-Economics and other themes) thus enhancing cross-thematic cooperation, for example with PLATFORM (KBBE ERA-NETs & JPI-FACCE) and other networks.

This booklet provides you with the SNOWMAN Network portfolio and invites you to join our network as a new partner to develop and disseminate knowledge about sustainable management of soil and (ground)water in Europe.



Source: McBratney et al., 2013

SNOWMAN NETWORK



OBJECTIVE

SNOWMAN is a transnational group of research funding organisations and administrations in the field of sustainable management of soil and groundwater in Europe. SNOWMAN projects aim at bridging the gap between knowledge demand and supply (Science-Policy-Practice Interface).

The SNOWMAN network wants to develop and share knowledge for the sustainable use of soil and groundwater by:

- Executing our research programme by organising calls for projects;
- Disseminating knowledge by sharing the knowledge developed in the SNOWMAN projects among the members and our broader networks.

Members

- BE Public waste agency of Flanders OVAM
- BE Department of Environment, Nature & Energy LNE
- BE Public Service of Wallonia SPW DGARNE
- FR Ministry for the Protection of Nature and the Environment MEDDE
- FR French Environment and Energy Management Agency ADEME
- SE Swedish Environment Protection Agency SEPA
- SE Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning FORMAS
- NL Netherlands Centre for Soil Quality Management and Knowledge Transfer SKB

Contact person

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Website

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Full members:



Affiliate members:



Cooperation from:

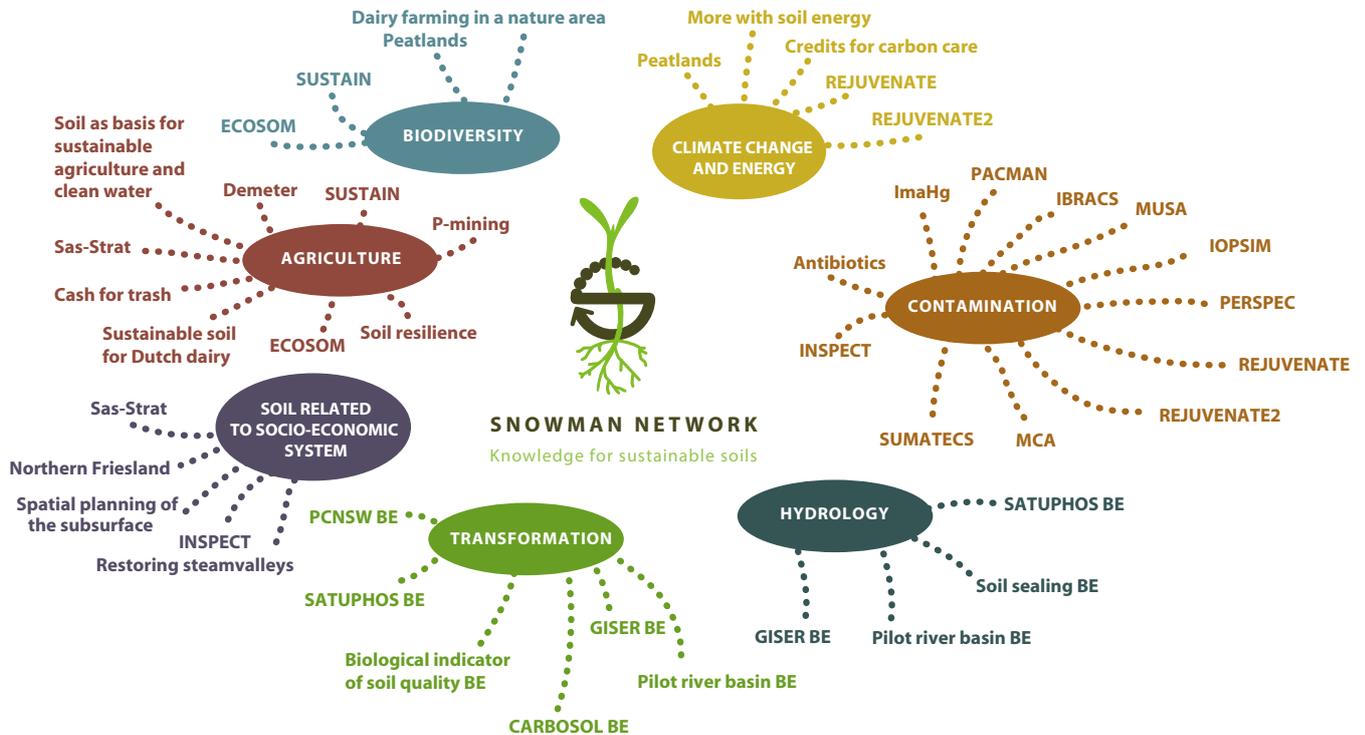


SNOWMAN NETWORK



SNOWMAN THEMES

- *Agriculture and Forestry*
- *Biobased economy*
- *Climate change*
(adaptation, mitigation) and energy
- *Soil Degradation*
(soil threats: water and wind erosion, organic matter decline, compaction, salinization, landslides, contamination)
- *Ecosystem Services & Biodiversity*
- *Socio-economics*
(governance, economic valuation, juridical, sociological, spatial planning and sustainable urban development)





SNOWMAN has launched four calls until June 2013.

Joint calls

FIRST CALL 2006

Pilot call 2006/2007

In December 2006, the SNOWMAN consortium opened its pilot call for trans-national research in the field of "Sustainable Management of Soil and Groundwater Pollution". SNOWMAN received a total of 23 project proposals, which have been evaluated in a stepwise process. Almost € 800.000 was available for the call; the budget was over-subscribed by 3,5 times. Of the 23 proposals there were four with partners outside the SNOWMAN consortium (namely: Czech Republic, Denmark, Italy, Russia, Spain) willing to bring in external funding into the respective projects.

Five research projects were funded by SNOWMAN. The smallest consortium consisted of two organisations from two SNOWMAN partner countries. The largest research consortium included 11 organisations from six SNOWMAN partner countries and one organisation from the Czech Republic and Italy each.

Projects Call 1:

1. PERSPEC - Perspectives on mobilisation of prioritised contaminants in soil. Coordinator: Umeå University (Sweden). Participating countries: Austria, Sweden, United Kingdom
2. MUSA - Integrating Multiple Scale Assessment on Ecosystems for Contaminated Land Management. Coordinator: SETEMIP-Environnement (France). Participating countries: France, The Netherlands
3. IOPSIM - (Im)mobilization of organic pollutants by soil constituents in the soil/groundwater system - Strategies for innovative management. Coordinator: Universität für Bodenkultur Wien BOKU (Austria). Participating countries: Austria, Germany, the Netherlands
4. SUMATECS - Sustainable management of trace element contaminated soils - Development of a decision tool system and its evaluation for practical application. Coordinator: Universität für Bodenkultur Wien BOKU (Austria). Participating countries: Austria, Czech Republic, Flanders (Belgium), France, Germany, Italy, Sweden, United Kingdom
5. ENACT - Extending the Natural Attenuation of Chlorinated solvents Toolbox. Coordinator: Tauw bv (The Netherlands). Participating countries: The Netherlands, Flanders (Belgium), Germany



6. Rejuvenate - Rejuvenate: Crop Based Systems for Sustainable Risk Based Land Management for Economically Marginal Degraded Land. Coordinator: R3 environmental technology ltd (United Kingdom). Participating countries: United Kingdom, Germany, The Netherlands, Sweden

Final results were presented in Vienna on June 17th, 2009 during the **SNOWMAN Science day**.

SECOND CALL 2009

The second call of SNOWMAN was opened between 12 January 2009 and 31 March 2009. This call was launched in the ERA-NET period and finalized in the self-sustained network.

THE SCOPE OF THIS CALL

1. Areal management of contaminated soil and ground-water
2. Integration of soil management into spatial planning
3. Use of contaminated land for biofuel crop production

Available budget: € 1.800.000,-- .

Of this budget € 994.000,-- was rewarded.

SNOWMAN received a total of 10 project proposals, which have been evaluated in a stepwise process. This evaluation resulted in the selection of 3 projects in Call 2.

Projects Call 2:

1. MCA - Multi-criteria analysis (MCA) of remediation alternatives to assess their overall impact and cost/benefit, with focus on soil function (ecosystem services and goods) and sustainability. Coordinator: Umeå University (Sweden). Participating countries: Sweden, Austria
2. INSPECT - INtegration of SPatially Explicit risks of ConTam-inants in Spatial Planning and Land Management. Coordinator: Chrono-Environnement, university of Franche-Comté/CNRS (France) Participating countries: Flanders (Belgium), The Netherlands.
3. Rejuvenate2 - Crop Based Systems for Sustainable Risk Based Land Management for Economically Marginal Degraded Areas, Phase II: Demonstration projects and evaluation decision support tool. Coordinator: Swedish Geotechnical Institute. Participating countries: Romania, Flanders (Belgium), The Netherlands.

Kick-off meeting: Vienna, February 9th and 10th 2010

Midterm meeting: Paris, November 9th, 2011

Final meeting: Paris, November 18th, 2013



THIRD CALL 2011

This call was open from 15 September 2010 until 15 December 2010.

THE SCOPE OF THIS CALL

Topic 1: Soil functions and ecosystem services

Topic 2: Sustainable agriculture and forestry

Topic 3: Contamination

Available budget : € 2.000.000,--

The available budget was completely spent and even exceeded by about 10% (extra funding)

SNOWMAN received a total of 14 project proposals, which have been evaluated in a stepwise process. This evaluation resulted in the selection of 6 projects in Call 3.

Projects Call 3:

1. SUSTAIN - Soil Functional Biodiversity and Ecosystem Services, a Trans disciplinary. Coordinator: University of Rennes (France). Participating countries: The Netherlands, France
2. ECOSOM - Soil organic matter as a key factor in the provision of soil ecosystem services. Coordinator: Institut National de la Recherche Agronomique. Participating countries: Sweden, France, The Netherlands
3. SAS-STRAT - Sustainable Agriculture and Soil: comparative study of strategies for managing the integrated quality of agricultural soils in different regions of Europe/Belgium, France, The Netherlands. Coordinator: Mutadis (France). Participating countries: France, the Netherlands, Wallonia (Belgium)
4. IBRACS - Integrating Bioavailability in Risk Assessment of Contaminated Soils: opportunities and feasibilities. Coordinator: Swedish Geotechnical Institute (Sweden). Participating countries: Sweden, Wallonia (Belgium), Flanders (Belgium), France
5. ImaHg - Enhanced knowledge in mercury fate and transport for improved management of Hg soil contamination. Coordinator: Bureau de Recherche Géologique et Minière (France). Participating countries: Flanders (Belgium), France, United Kingdom
6. PACMAN - Assessment and Management of polar PACs in contaminated soils and remedial processes. Coordinator: Umeå University (Sweden). Participating countries: Sweden, France

Kick-off meeting: Paris, November 8th 2011

Midterm meeting: Paris, November 18th - 19th, 2013

FOURTH CALL 2012

This call was open from September 17th, December 17th 2012

THE SCOPE OF THIS CALL

Integrating natural, social and economic science perspectives on soil research

The scope of the 4th Call was based on the relationship between soil, on the one hand, and social and economic sciences on the other.

All SNOWMAN partners believe soil quality management should change from being a specific, sectoral policy and management issue into an integrated factor in decision making processes. There is lack of knowledge in terms of how society understands, perceives and values soils. The 4th call was therefore focussing on integrating natural, social and economic science perspectives on soil research. Attention has thus been drawn to the coupled interactions between economic (profit), ecologic (planet) and social (people) systems. Ten major "issues" in the context of social and economic research related to soil have been defined:

1. Consideration of soil (quality) in the holistic approach to land management and redevelopment.
2. Assessment of the trade-offs between different soil services
3. Ignorance and the appeal of (using) the soil
4. Ownership relationships with regard to soil
5. Formal framework for achieving efficient and sustainable use of soil
6. Sectoral (or private) versus social (or public) value systems
7. Fragmented share of costs and benefits
8. Consideration of specific characteristics of the soil system as an object of concern in environmental management and policy
9. Communication, risk perception and awareness raising:
 - 9a. Risk perception of contaminated soils by different stakeholders and communication with the general public.
 - 9b. Communication and awareness-raising (on all soil issues, not just contamination)

In the 4th call these 10 issues were addressed within two specific thematic clusters:

- I. Soil contamination
- II. Agricultural and forest soils (with special emphasis on research related to climate change)

Available budget: € 1.800.000,--

Of this budget € 856.716,-- was awarded.

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SNOWMAN received a total of 8 project proposals, which have been evaluated in a stepwise process. This evaluation resulted in the selection of 3 projects in Call 4.

Projects Call 4:

1. BALANCE4P - Balancing decisions for urban brownfield regeneration - people, planet, profit and processes. Coordinator: Chalmers University of Technology (Sweden). Participating countries: Sweden, The Netherlands, Belgium
2. RAI SOILCOMP - Raising awareness on the Impact of subSOIL COMPaction. Coordinator: Alterra (The Netherlands). Participating countries: The Netherlands, Flanders (Belgium), Sweden
3. URBAN SOIL - Relationship between City-Dwellers and soils: How to use urban and Peri-urban soils to face the urban challenge. Coordinator: Fondation Maison des sciences de l'homme (France). Participating countries: France, Wallonia (Belgium), The Netherlands

Kick-off meeting: Planned for November 19th 2013 in Paris.

Portfolio



BALANCE 4P

Balancing decisions for urban brownfield regeneration - people, planet, profit and processes

1-10-2013 - 15-08-2015

Topic: Soil contamination

Parties involved:

- Lead organization: Chalmers University of Technology, Sweden
- Research partner organization: Deltares, The Netherlands
- Research partner organization: Delft University of Technology, The Netherlands
- Research partner organization: VITO, Belgium
- Participating case: Municipality of The Hague, The Netherlands

AIMS AND OBJECTIVES of BALANCE 4P

The overall aim of the proposed project is to deliver a holistic approach that supports sustainable urban renewal through the redevelopment of contaminated land and underused sites (brownfields). In order to reach the overall aim, the specific project objectives focus on different parts of the holistic approach:

1. application and assessment of methods for design of urban renewal/land redevelopment strategies for brownfields that embrace the case-specific opportunities and challenges;
2. development of a method for sustainability assessment of alternative land redevelopment strategies to evaluate and compare the ecological, economic and social impacts of land use change and remedial technologies; and
3. development of a practice for redevelopment of contaminated land in rules and regulations to enable implementations.

The different parts will be integrated into a decision process framework to support urban renewal through the redevelopment of contaminated land and underused sites. The framework will have a strong focus on integrating urban planning and soil issues, such as remediation decisions and will facilitate proper accounting for the soil functions currently under-considered in land management.

Land take as a result of urbanization is one of the major soil threats in Europe. One of the key measures to prevent further urban sprawl and additional land take, is redevelopment of urban brownfields (instead of greenfields): underused urban areas with, in many cases, soil and groundwater pollution. A difficulty for brownfield redevelopments is that in urban projects the responsibilities, tools and knowledge of sub-surface engineering and urban planning and design are not integrated, they work together but sectorial. The urban designer is usually dealing with the opportunities for socio-economic benefits and the subsoil engineer with the challenges. BALANCE 4P will provide methods for and examples of application of a holistic approach that supports redevelopment of brownfields by integrating technical, economic and social aspects. Underpinning the holistic approach in rules and regulations will enable implementation in practical situations.

The problem of underused land is owned by a range of different public and private stakeholders whom are impacted in both the short and the long term. Stakeholders will be active participants in all activities of the project. By means of case studies, the applicability of the knowledge and tools that are developed in the work packages is secured, as well as stakeholder participation. The stakeholders are representing the corners of "the golden quadrant" involving: knowledge, regulators, business, community and society. The methodology of the project will be a mix of reviews, method development, case studies, analysis and evaluation.

Research coordinator BALANCE 4P:

Jenny Norrman, Chalmers University of Technology, Sweden



RAI SOILCOMP

Raising Awareness on the Impact of subSOIL COMPaction

1-10-2013 - 31-12-2014

Topic: Agricultural and forest soils

Parties involved:

- Lead organization: Alterra, The Netherlands
- Research partner organization: Ghent University, Belgium (Flanders)
- Research partner organization: Swedish University of Agricultural Sciences, Sweden
- Research partner organization: Inagro Onderzoek & Advies in Land-en Tuinbouw, Belgium (Flanders)
- Research partner organization; CLM centre for Agriculture and Environment, The Netherlands
- Research partner organization: Wageningen University, Department of Environmental Sciences, The Netherlands

AIMS AND OBJECTIVES of RAI SOILCOMP

This project aims at

1. raising awareness on the (economic and environmental) impact of soil compaction and thus
2. preventing (further) soil degradation as caused by compaction related to land use, soil type and climate.

Specific objectives that have been defined for this project are:

- a) to assess the economic and environmental impact of soil compaction at farm and regional level, based on specific key indicators, related to soil functions and ecosystem services;
- b) to extend the soil compaction tool TERRANIMO® with innovations in machinery related to caterpillar tracks;
- c) to extend the applicability of TERRANIMO® for Dutch, Belgian and Swedish soils;
- d) to raise awareness among relevant stakeholders in the Netherlands, Belgium and Sweden on the risks related to soil compaction;
- e) to actually reduce the risk of soil compaction, through both practice (e.g. farmers) and policy (e.g. regional administration), using the soil compaction tool TERRANIMO®.

Activities

The project will start with an impact assessment study of economic and environmental effects. This will be based on an inventory of indicators related to the economic and environmental effects of soil compaction, both on-site and at farm level, as well as off-site and at regional level. For selected key indicators the impact assessment study will be carried out for 50 farmers in each country, providing important comparative insights. Economic impact will deal with costs and benefits such as labour/time, soil productivity, machinery (at farm level), as well as flood damage and agricultural production at regional level. Considered environmental effects will deal with ecosystem services and their valuation at farm and regional level.

RAI SOILCOMP also involves fieldwork, soil analysis and model development. The tool involved is Terranimo®, which is a web-based decision support tool that facilitates the evaluation of the risk of compaction in field traffic (www.soilcompaction.eu). Terranimo® incorporates a database of several hundred agricultural tyres and a database of the most common soil types of some countries. The tool will be refined e.g. by incorporating information for rubber tracks and a database of common soil types in the Netherlands, Belgium and Sweden in order to improve the model as a decision-making tool for farmers.

Awareness raising and dissemination will focus on three groups: farmers/ contractors, industry/ machinery companies and policy makers. These three groups in each country will be invited to participate in practical workshops. Communication and discussion material will be provided and spread via farming and innovation networks. At least 5.000 farmers per country will be reached by articles in magazines and journals.

Research coordinator RAI SOILCOMP:

Mirjam Hack- ten Broeke, Alterra, The Netherlands

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URBAN SOIL

Relationship between City-Dwellers and soils:

How to use urban and Peri-urban soils to face the urban challenge?

1-10-2013 - 30-09-2016

Topics: Soil Contamination
Agriculture and forest soils

Parties involved:

- Lead organization: Centre National de la Recherche Scientifique, France
- Research partner organization: Soil and Water Systems Department Gembloux Agro - Bio Tech, University of Liege, Belgium (Wallonia)
- Research partner organization: National Institute for Public Health and the Environment, The Netherlands

AIMS AND OBJECTIVES of URBAN SOIL

What is the question addressed? The question is to identify how better use the urban and outer-urban soils to face the urban challenge.

What is the problem? There is strong growth in the use of soils for urban gardening in cases of economic crisis. This was the case in Brazil, Cuba, the United States, and Russia and now in the European Union. Urban and peri-urban soils may be used to confront three dimensions of the urban challenge: poverty, violence, and major ecological risks, among which the expected influx of climatic refugees. And with good practises, gardening improves soil quality. This potential has not yet yielded large-scale policies in the EU or its Member States. The reason is that urban and peri-urban gardening is a blind spot not acknowledged as a sector of activity and unknown in statistical nomenclatures.

Who holds the problem? The problem depends first of all on gardening organisations, which are inventing new models of agrobiological practices for working soils in experiments with community, insertion and educational gardens, and in the new generation of allotment gardens today. It depends on educational systems, in particular at the primary education level. It presupposes an enlightened and voluntary policy on behalf of decision-makers at the city, state and EU levels.

Research coordinator URBAN SOIL:

Louiza Boukharaeva, Centre National de la Recherche Scientifique, Éco-anthropologie et Ethnobiologie (UMR 7206) lab of the CNRS, France



MCA

Multi-criteria analysis (MCA) of remediation alternatives to access their overall impact and cost/benefit, with focus on soil function (ecosystem services and goods) and sustainability

Overall objective: The aim of the project is to demonstrate the use of multi-criteria analysis (MCA) in evaluating management and remediation alternatives to access their overall impact, with focus on soil function (ecosystem services and goods) and sustainability. As some aspects of soil function cannot be easily quantified in monetary terms, MCA offers a complementary approach in comparison to cost-benefit analysis (CBA). Maintained soil function is a key parameter in sustainable developments and the proposed project will demonstrate a method for including soil function and related geographical, cultural and soil use aspects of soil function into MCA.

The project will be based on studies of a few representative polluted sites provided via the EURODEMO network, and include a range of conventional and innovative remediation technologies and strategies, including soft, low cost on-site, harder hard on-site, and off-site alternatives. The impact of the remediation strategies on soil function will be assessed and used as input during the MCA. The analysis will utilize recent results regarding baseline levels for organic and metals pollutants and contaminants as well as input on fate of pollutants and contaminants on a regional scale (e.g. through the Snowman PERSPEC and the FP6 AquaTerra projects). The deliverables of the proposed project will be aligned with the first topic of the SNOWMAN 2nd coordinated call, Area management of contamination, and targets the following questions listed in the scope of the call:

- Which cost/benefit analyses can be applied with area management approaches of contaminated land?
- How can we calculate the economical and societal costs for land use restrictions caused by contamination?

The above mentioned topics are of high interest according to the Funders' priorities as described in table 2 on page 6 in the Applicants' Guide. Additional questions will also be addressed, including:

- What is the impact of remediation scenarios on soil function?
- What are the consequences of geographical, cultural and soil use differences when ranking aspects of soil function?
- What is the impact of geographical (e.g. soil properties and morphology) and climate (e.g. temperature and precipitation) differences on the outcome of different remediation scenarios?

PARTIES INVOLVED

Umeå University, Sweden

Chalmers University of Technology, Sweden

Umweltbundesamt GmbH, Austria



INSPECT

Integration of SPatially Explicit risks of ConTaminants in Spatial Planning and Land Management

OVERALL OBJECTIVE

Integrate environmental risk assessment of contaminants into land management and spatial planning processes in order to mitigate possible risks as efficiently as possible. To reach this goal, the operational objectives of this project are to validate and extend the use of a spatially explicit decision support system (DSS) named BERISP (see details hereafter) and to spread it within the scientific community and stakeholders involved in the study and management of contaminated sites.

- Objective 1: develop BERISP-DSS for a wider range of application in spatial planning processes
- Objective 2: perform case studies for validation and extension of the BERISP-DSS and for communication (objective 3)
- Objective 3: communicate the BERISP-DSS to lay audience, stakeholders and the scientific community

The project will address the following call topics:

- Area management of contamination
- Integration of soil management into spatial planning

PARTIES INVOLVED

Centre National de la Recherche Scientifique (CNRS), France
University of Antwerp, Belgium
Alterra, The Netherlands



REJUVENATE 2

Crop Based Systems for Sustainable Risk Based Land Management for Economically Marginal Degraded Areas, Phase II: Demonstration projects and evaluation decision support tool

OVERALL OBJECTIVE:

This project will apply a decision support tool (DST), designed by the Snowman 1 project Rejuvenate, to three practical applications at realistic scales. Based on this test-work, the aims of this project are to i) validate and optimise the decision making framework, ii) provide detailed case studies for the reuse of contaminated land for biofuel crop production- in particular for secondary biofuels and iii) to extend the scope of the DST by applying and validating it in three new jurisdictions (Belgium, Netherlands and Romania). The goal of Rejuvenate 1 and this project (Rejuvenate 2) is to facilitate transparent and robust decision making to facilitate the responsible, sustainable and appropriate use of contaminated marginal land for biofuel and other biomass production. A consistent decision making approach will support an increase in the land area for biofuel crop growth, by improving the effectiveness of decision making and providing a common platform for different stakeholders, e.g. land owners, developers, planners and regulators to engage in discussions. Rejuvenate 1 developed a set of “model procedures” to support decision making for bring marginal land back into use for such nonfood crops (see Rejuvenate Consortium, 2009).

The specific objectives of Rejuvenate 2 are to:

1. Establish three full scale case studies in three participating countries.
2. Provide a mechanism for other countries and third party funders to add further case studies to the project over its three year life span.
3. Validate the decision support approach based on Strength, Weakness, Opportunity and Threat (SWOT) analysis, with regard to i) crop and site management and ii) biomass use and delivery of value to stakeholders.
4. Perform environmental, legal, economical and ethical assessment of the crop based systems for sustainable risk based land management (RBLM), including the full chain of choice of fields to biomass use.
5. Identify ongoing research, developments and experience of implementation agendas for the re-use of contaminated land for biofuels.

The project will begin with case studies in Sweden and Romania, however, the mechanism will be open and will enable third party funders to attach their case studies to the project. This project is cross cutting across the three areas of the Snowman 2 Call, but focuses in particular on the use of contaminated land for biofuel production.

PARTIES INVOLVED

Swedish Geotechnical Institute, Sweden
R&D National Institute for Metals and Radioactive Resources INCDMRR-ICPMRR, Romania
Centrum voor Milieukunde (Centre for Environmental Sciences), Belgium
Bioclear, The Netherlands



SUSTAIN

Soil Functional Biodiversity and Ecosystem Services, a Transdisciplinary Approach

TOPICS

Soil functions and ecosystem services
Sustainable agriculture and forestry

AIMS AND OBJECTIVES OF SUSTAIN

The main objectives of SUSTAIN are (i) to understand how reduced tillage systems, as compared to conventional tillage systems, impact soil functional biodiversity and soil functions such as soil structural maintenance, organic matter and nutrient cycling, water regulation, filtering and pest regulation; (ii) to quantify the consequences of reduced tillage systems on the soil ecosystem services of food production and GHG mitigation, (iii) to investigate the socio-economic sustainability of reduced tillage systems, (iv) to develop and disseminate tools as soil disturbance indicators, system sustainability evaluation. SUSTAIN brings together a broad spectrum of expertise in soil biology, soil physic, soil chemistry and agronomy as well as tools for integrated soil ecosystem analysis. This expertise is combined with the economic and social evaluation of services provided by soil biodiversity. Such trans-disciplinarity in integrating soil sciences and social and economic aspects is novel when assessing the impact of reduced tillage systems. The study will be conducted in France and the Netherlands in order i) to compare data from two European countries strongly interested in the development and evaluation of reduced-tillage systems, ii) to exchange and enhance the skills of the respective research groups. Moreover, the complementarity of the experimental sites will allow the assessment of many soil services under contrasting conditions and help to derive generic soil quality indicators. SUSTAIN will combine the use of field experiment and desk study as it will be based on the analysis of new data recorded during the project, combined with assessment of existing datasets already recorded by each team (since 10 years for France, 3 years for the Netherlands). The combination of new and existing data sets will allow for a broader perspective, reflecting different time scales. Tasks will be carried out at different experimental field sites and through regional farm networks, which allows for the integration of studies carried out under controlled experimental conditions versus on farm conditions, different geographical levels such as site, regional, national (France, Netherlands) and cross-national scales. This set-up also facilitates the dissemination of know-

ledge and best practices among relevant stakeholders, from farmers to policy makers at national and European levels.

PARTIES INVOLVED

University of Rennes, France
Institut National de la Recherche Agronomique-SAS, France
Chambre Regionale d'Agriculture de Bretagne, France
Wageningen University, The Netherlands
European Centre for Nature Conservation, The Netherlands
PPO (Institute for Agricultural Research), The Netherlands
SUSTAIN will work in cooperation with the ECOSOM project.



ECOSOM

Soil organic matter as a key factor in the provision of soil ecosystem services

TOPICS

Soil functions and ecosystem services
Sustainable agriculture and forestry

AIMS AND OBJECTIVES OF ECOSOM

The general scope of ECOSOM is on the good ecological status of soil in arable lands. The project is focussed on 2 management practices (organic waste recycling and tillage reduction) that can sustainably enhance the provision of ecosystem services (ES) to farmers as well as to other indirectly involved stakeholders who may benefit from other ES also enhanced (or reduced) by these practices. Central in our research is soil organic matter (SOM) and soil structure as key factors in soil functioning and subsequent provision of ES, and the relationship with key functional groups of soil biodiversity that interact with the regulation of SOM and soil structure. Through biological, chemical and physical analyses ECOSOM will increase the mechanistic understanding of relationships between soil functioning and soil ecosystem services, as affected by organic waste recycling and reduced tillage measures. Thus we will provide guidance for farmers and stakeholders in a transition process of sustainable agriculture in a modernised society with greater adaptability and resilience to the effects of climate change.

ECOSOM will address:

- Supporting services such as regulation of SOM, soil structure, nutrient dynamics
- Regulating services such as organic contaminant filtering or degradation, pathogen behaviour, water regulation (infiltration, soil moisture), regulation of greenhouse gasses,
- Provisioning services: crop production through nutrient availabilities

ECOSOM will obtain knowledge and validated expertise that is relevant and applicable to much of the SNOWMAN research agenda, including:

- recognition and management of functional soil biodiversity
- assessment of good ecological soil status
- integration of soil ecosystem services in decision making
- impact of agricultural practices on soil quality
- significance of soil in climate proofing the agricultural sector
- risk assessment and management.

PARTIES INVOLVED

Institut National de la Recherche Agronomique, France
Alterra, Institute Agricultural research, The Netherlands
Umeå University, Sweden

RVEOLIA Environnement - Research and Innovation France
ECOSOM will work in cooperation with the SUSTAIN project.



SAS-STRAT

Sustainable Agriculture and Soil: comparative study of strategies for managing the integrated quality of agricultural soils in different regions of Europe / Belgium, France, Netherlands

TOPICS

Soil functions and ecosystem services
Sustainable agriculture and forestry

AIMS AND OBJECTIVES OF SAS-STRAT

The project aims at identifying, describing and analysing conditions and means for a sustainable management of cultivated soils in Europe, that takes into account a variety of current or potential qualities of these soils, including and beside agricultural production.

The objectives of the research project are to :

- Explore what are the different qualities that constitute the integrated agricultural soil quality (e.g. support for economical activities and income generation, including agriculture ; land planning ; property as a place where to exert its individual freedom and as a patrimony to hand down ; environmental compartment and object of ecosystem services transactions; vector of chemical quality of our environment and health, etc.).
- Describe regional governance approaches experimented in Belgium, France and the Netherlands in the European context to improve the integrated quality of agricultural soil (case studies).
- Analyse the conditions for an integration of new soil challenges (biodiversity, climate change, ecosystemic, cultural, identity and social... services) in agricultural soil.
 - Analyse the successes and failures of the regional approaches for integrated quality of cultivated soil
 - From an analysis of the relations between local, national and European governance framework, outline the conditions for a better multi-level governance framework for the quality of cultivated soil.
- Establish a community of stakeholders involved in integrated quality of soil, at local, regional, national and European level (Belgium, France, Netherlands, EU), and a first group of researchers-experts involved on integrated soil quality.
- Analyse with stakeholders the lessons learnt from the case studies investigated, consider the value of these experiences for the wider community, and develop in

cooperation with stakeholders recommendations for the development of integrated approach, combining regional and local initiatives, national and EU policy.

- This research will be developed in strong cooperation with stakeholders, who will contribute with their own expertise on integrated soil quality. This very nature of cooperative research will ensure a proper dissemination of the research, by sharing the knowledge of existing local, national and European approaches, and by involving key stakeholders in the production of research and recommendations.

PARTIES INVOLVED

Mutadis, France

Association pour le Développement et la Promotion de la Recherche et de l'Innovation à AGROPARISTECH, France
Université de Liège, Belgium

Sol et Civilisation, France

Boerenverstand, The Netherlands



IBRACS

Integrating Bioavailability in Risk Assessment of Contaminated Soils: opportunities and feasibilities

TOPIC

Contamination

AIMS AND OBJECTIVES OF IBRACS

It is well established that total concentrations of soil contaminants are useful to indicate pollution, however they do not necessarily indicate risk. Alternative measures are used to denote the availability and risk, the so-called bioavailability of soil contaminants. A myriad of soil testing methods have been developed to predict uptake, toxicity and degradation potential of soil contaminants. Some generic soil limits already account for bioavailability of metals, for example by making limits dependent on soil properties (pH, CEC: limits in Flanders). However, despite many years of intensive research, there is no generally accepted methodology to incorporate contaminant bioavailability in risk assessment models, likely because too little attention has been given to the practical aspects, i.e. sufficient calibration and validation, and sufficiently accounting the cost-benefit analysis. This project addresses these issues, with focus on soil remediation as well as wide area management of soils affected by proximal atmospheric deposition.

The overall aim of IBRACS is to provide policymakers, other authorities and service providers with guidelines on how bioavailability tests and results of bioavailability-based risk assessment models can be used for risk-based management decisions on contaminated land.

The specific objectives are:

1. To review existing risk assessment models for soils with focus on bioavailability, including proposed test methods (Cd, Cu, Zn, Pb and PAHs).
2. To evaluate the ability of so-called passive samplers and established soil extracts to predict toxic responses of plants to exposures of metals (Cu, Pb, Zn) and organic contaminants like PAH. This evaluation will be based on field contaminated soils sampled across the three countries involved. Recommendations will be reported in a handbook.
3. To propose appropriate plant uptake models and soil tests for Cd and PAH and to incorporate them into risk assessment models.

4. To make a cost-benefit analysis of including bioavailability tests in site specific risk assessment. This analysis will be based on 5-7 contaminated sites in Sweden, Belgium and France and involve both stakeholders and end-users (Cd, Cu, Zn, Pb and PAHs).
5. To develop a guidance paper on how to use the results of the tests applied in the project in risk assessments (Cd, Cu, Zn, Pb and PAHs).

The proposed project fits well within the SNOWMAN Call 3 research topic "Contamination", where integration of pollutant bioavailability in risk assessment models is being stressed and a comparison of European risk assessment models and their validation is addressed. If bioavailability is accounted for, in a proper way, the accuracy of the risk assessments will be improved, promoting right decisions about amounts of contaminated masses to be treated and priority-order of contaminated sites to be remediated. Not taking bioavailability into account may result in excessive remediation actions and, in worst case, a net negative impact on the environment.

PARTIES INVOLVED

Swedish Geotechnical Institute, Sweden

Luleå technical University, Sweden

Stockholm University, Department of Applied Environmental Sciences (ITM), Sweden

Katholieke universiteit Leuven, Belgium

Institute National Polytechnique de Lorraine (INPL), Institute National de la Recherche Agronomique (INRA), Laboratoire Sols et Environnement, France

Université Catholique de Louvain, Earth and Life Institute, Belgium



IMAHG

Enhanced knowledge in mercury fate and transport for improved management of Hg soil contamination

TOPIC

Contamination

AIMS AND OBJECTIVES OF IMAHG

Overall Aim

The overall aim of the project is to provide recommendations and to highlight needs to improve management of sites contaminated by mercury. Recommendations and needs will be established based on i) enhanced understanding of mercury forms fate, transport and modelling in the vadose zone and on ii) comparison of available and currently used practices in characterisation, assessment and remediation of mercury contamination.

SPECIFIC OBJECTIVES

Recommendations for improved management of mercury contaminated sites are proposed to be formulated through achieving the following specific objectives:

- To compile knowledge on various forms of mercury fate and transport (chemical species and physical states) in the vadose zone and associated available physical, chemical and thermodynamic constants
- To improve mercury geochemical modelling to assess and predict mercury species partitioning in the different compartments (air, soil and water) of the vadose zone
- To compare available and currently used European approaches and practices in characterisation, risk assessment and management of mercury through both literature review and feedback from European practitioners
- To draw some recommendations and identify further research needs for mercury characterisation, risk assessment and management, based on enhanced understanding of mercury forms behaviour in the vadose zone and on available and currently used practices.

PARTIES INVOLVED

Bureau de Recherche Géologique et Minière, France
 Belgian Nuclear Reserch Centre (SCK-CEN), Belgium
 Swedish Geotechnical Institute, Sweden
 Contaminated Land: Applications in Real Environments,
 United Kingdom

PACMAN

Assessment and Management of polar PACs in contaminated soils and remedial processes

TOPIC

Contamination

AIMS AND OBJECTIVES OF PACMAN

The objectives of this project are to assess to what extend the compounds belonging to the group polar PACs (e.g. oxy-PAHs and azaarenes) involve additional risk at PAH-contaminated sites, and also to find ways to manage and reduce this potential risk. The first objective will be fulfilled through collection of data regarding the occurrence and distribution of polar PACs at contaminated sites, their potential formation in remediation processes as well as regarding their negative effects on human health and the environment. The data collected will be supplemented by sampling and monitoring at selected contaminated sites, and by experimental studies of selected remediation processes in laboratory and field conditions.

The second objective will be fulfilled by data collection aiming at identifying knowledge gaps that need to be filled for proper risk assessment of the polar PACs (e.g. for the development of generic guideline values for the compounds), supplemented by experimental studies that will fill some of these gaps (i.e. leaching experiments), and by identifying and evaluating remediation processes that potentially can minimize the risk associated with polar PAC formation.

The knowledge gained with the project will be important in future risk assessments of PAC-contaminated sites, and also in the decisions regarding how the risk at these sites should be managed. Analytical development will be valorised both as pre-normative and as pre-regulatory research. Furthermore, the project will facilitate the dissemination of the knowledge gained about polar PACs, both within the partner countries as well as in whole Europe.

PARTIES INVOLVED

Umeå University, Sweden
 Bureau de Recherche Géologique et Minières, France
 Centre National de la Recherche Scientifique, France

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