



Towards a harmonised soil database for the Danube Basin

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*Scientific Support to
Danube Strategy
JRC, Ispra
21-22 March 2013*



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Land is an essential resource



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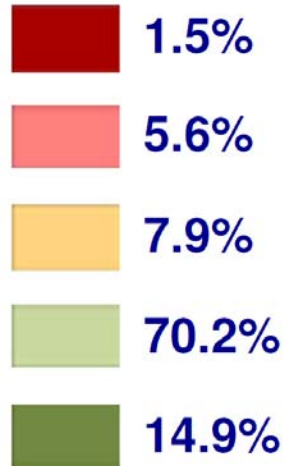
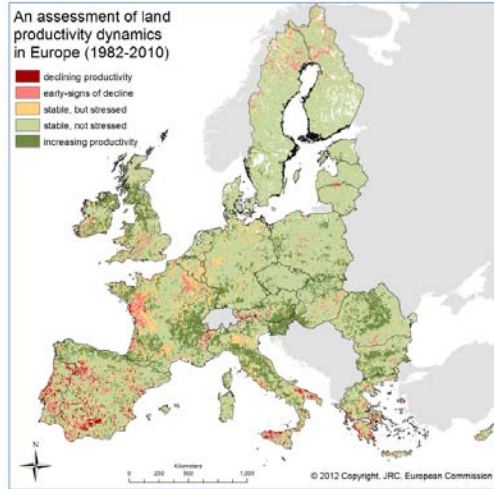
- the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system.
- fundamental for key economic sectors, environmental issues and cultural aspects.
- **soil process** drive majority of land (productivity) functions.

Land is a neglected/complex resource?





- trends are difficult to assess and/ or interpret?



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Policy perspective on land and soil

Europe 2020 Strategy
COM(2011) 21 final

Soil Thematic Strategy
COM(2006) 614

Roadmap to
a Resource Efficient Europe
COM(2011) 571 final

EUROPE 2020 A strategy for smart,
sustainable and inclusive growth
COM(2010) 2020 final

Common Agricultural Policy and
associated instruments (LFA, GAEC, Rural
Development)

Our life insurance, our natural
capital: an EU Biodiversity
strategy to 2020
COM (2011) 244 final

Rio+20: towards the green economy
and better governance
COM(2011) 363 final

UNCCD

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A 2020 framework

SMART GROWTH, SUSTAINABLE GROWTH, INCLUSIVE GROWTH

Land - a central factor in the efficient use of resources.

Re-focus R&D and innovation policy on the challenges facing land management.
Particular attention to prevention of biodiversity loss.

Land used to produce food may compete with land use for energy and both may compete with land which supports biodiversity or provides ecosystem services such as carbon sequestration.

Key task is to provide knowledge and tools for effective decision making and public engagement.

Rio+20 UNDERLINES the fundamental importance of tackling ecosystem degradation, desertification, land degradation in achieving sustainable development – **zero land degradation by 2050.**

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Land and soil issues are central themes to the Danube Strategy -1

Environment protection

- Land degradation affects the environment by modifying ecosystems and thereby reducing productivity and biodiversity.
- Fragmentation of ecosystems, land use intensification and urban sprawl are major pressures (drivers: erosion, salinisation, GHG fluxes, sealing, pollution...)

Agriculture

- Issues affecting food security.
- Tackling pressures on soil functions caused by agriculture.
- Reduction of soil erosion and the preservation of soil organic matter are critical agriculture conditions of rural development policy.

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Land and soil issues are central themes to the Danube Strategy -2

Navigability

- Sediment inputs resulting from soil erosion.
- Impact of soil sealing on water quantity.

Capacity building and awareness raising

- Soil science and **collection of policy relevant data** are suffering from a lack of investment.
- Good planning should be based on a **credible scientific base** and understanding of best practices.
- Investment in people and communicating science / best practices.

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Pillars and Priority Areas



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European Soil Partnership

FAO Global Soil Partnership sees establishment of Regional elements.

Build on existing regional networks or collaborative processes (e.g. Danube, ESNB) by linking national and local networks, partners, projects and activities.

Address regional goals / priorities through implementation of Action Plan to strengthen work on soils and to develop synergies with other relevant initiatives and activities.

Pillar 4: Enhance the quantity and quality of soil data and information: data collection (generation), analysis, validation, reporting, monitoring and integration with other disciplines.

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Land and Soil Nexus: Key goals

1. Land and soil availability
2. Land and soil quality
3. Pressures on land and soil
4. Preservation and restoration of above- and below-ground ecosystems and biodiversity
- 5. Harmonised data collection and monitoring**
6. Awareness raising and capacity building

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Harmonised data collection and monitoring

Current assessments of the state and trends of soil characteristics across Europe are difficult due to a lack of current and harmonised data and monitoring systems. Policy makers require up-to-date information for effective decision-making.

- **Development of harmonised high-resolution soil database for Danube Region (1:250,000, based on the E-SOTER methodology).**
- Development of harmonised soil sampling programme for non-EU countries in the Danube river basin based on the JRC's LUCAS-Soil methodology;
- Development of benchmark soil sites to assess changes in soil conditions;
- Focused collection of land and soil data through EIONET-SOIL network.

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Development of harmonised high-resolution soil database for Danube Region

Currently, the only harmonised soil databases for the Danube Region are:

- 1:1 million scale Soil Geographical Database of Eurasia
http://eussoils.jrc.ec.europa.eu/library/esdac/Esdac_DetailData2.cfm?id=1
- Harmonised World Soils Database
<http://webarchive.iiasa.ac.at/Research/LUC/External-World-soil-database/HTML/>
- ISRIC SoilGrid_1km
<http://www.isric.org/content/soilgrids>
- 2009-2012 LUCAS-Soil database (approximately 3200 points)
<http://eussoils.jrc.ec.europa.eu/projects/Lucas/Data.html>

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Current state

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LISFLOOD DATABASE

JRC Flood warning system for Danube (LISFLOOD)

2005 – Profile data for Austria, Czech Republic, Hungary and Slovakia (c. 6500 profile points + 10,000 profiles from Serbia)

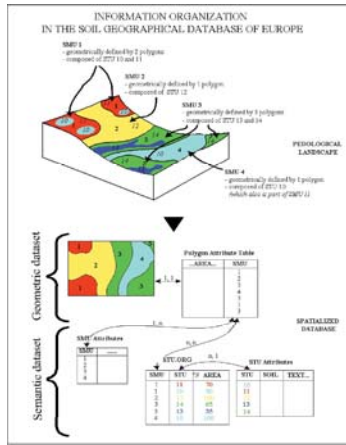
Geo-referenced > Depth, particle fraction, coarse fragments, om content (%), WRB, Parent Material, depth for roots, depth to water table

Data "NOT TO BE USED for construction of soil map of Europe in scale 1:250,000."

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SGDBE

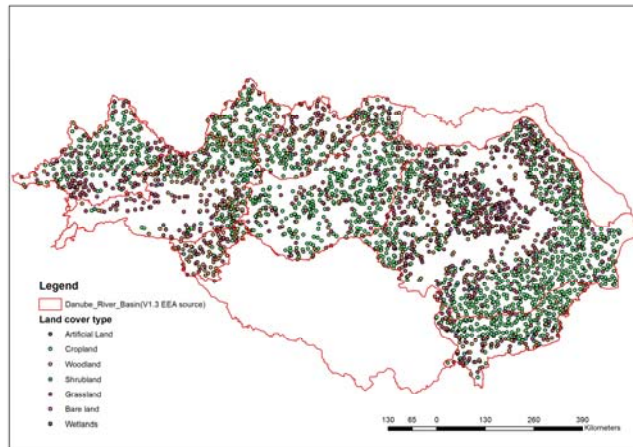


The Soil Geographical Database of Europe at a scale of 1:1 million consists of a geometrical dataset (digital map) and a semantic dataset (list of attributes that link polygons to the polygons of the geometrical dataset). The above diagram illustrates how map polygons, SMI's and STU's are linked together. To read further the diagram for understanding that polygon 1 from the digital map (the red area) corresponds to SMI 1, which consists of two STU's and 12 other maps, only and that of SMI 1 corresponds to the semantic dataset of the SGDBE and the STU attributes table would show that the database of SMI 1 would be STU 11, see National (AN) (EN).

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LUCAS 2009-2012



texture, organic matter content, pH, carbonates, key nutrients, land use, land use change
Not representative of all soils, all land cover types

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Proposed Approach

To evolve the model of the existing 1:1 million product to a scale of 1:250,000 by the **fusion of the European Manual of Procedures** and the methodology developed under the **FP7 project E-SOTER**, which also supports the soil association concept used in the SGDBE.

The SOTER (SOil and TERrain) approach initiated to create up-to-date 1:1 million scale digital soil map and database that would replace the 1:5 million FAO-Unesco Soil Map of the World.

Subsequently, the SOTER methodology has been used to develop small-scale soil mapping for large parts of the world



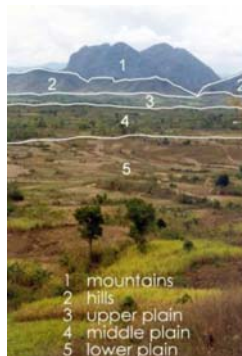
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SOTER with soil profile data
1: 1M to 1:250k
2: 1:1M

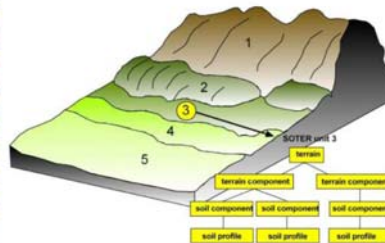
SOTER without soil profile data
1: 1M

SOTER

Underpinning SOTER is the identification of areas of land with a distinctive, often repetitive, pattern of landform, lithology, surface form, slope, parent material and soil. Tracts of land distinguished in this manner are named SOTER units. Each SOTER unit thus represents one unique combination of terrain and soil characteristics (i.e. a SMU and STU).



- 1 mountains
- 2 hills
- 3 upper plain
- 4 middle plain
- 5 lower plain





E-SOTER

e-SOTER: EC-funded FP7 project, 3.5 years, 14 partners

show how advances in land sensing technologies could be used to support and advance the SOTER methodology.

The e-SOTER project showed that

- landform units could be successfully derived from DEM,
- soil patterns could (in some conditions) be mapped by remote sensing
- legacy data already held in the European Geographical Soil Database and various national databases could be used to describe SOTER soil units.

A further conclusions of the project was that the SOTER methodology **could be adapted to develop a 1:250,000** product for Europe.

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Methodology

JRC and Danube counties agree on a common database structure to support soil and land policy development.

Attribute tables linked to the structures and standards outlined in the documentation of the INSPIRE, SGDBE and e-SOTER schemes.

Develop a coherent physiographic polygon base of the Danube Basin derived from SOTER principles based on high resolution DEM coverage.

Soil information to be extracted from relevant national sources (e.g. legacy data, profile archives, remote sensing, etc.) to populate the physiographic polygons.

This approach has a strong subsidiarity status as there is no obligation for the transfer of primary datasets from Member States to the JRC as the generation/assignment of soil data are carried out by the relevant national organizations.

Data will be INSPIRE compliant.

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Production scenarios

- Dependent on national data holdings and technical capacity
- Web-services infrastructure
- Scope of meeting

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Next steps

- Confirm status as national data holders and willingness to collaborate.
- establish current status of national soil data holdings with attributes proposed by new methodology.
- Confirmation of methodology
- Define eventual database structure, spatial infrastructure, road map and timeline.
- Technical advisory panel to assist in implementation of project.
- Establishment of regional development groups (based on Soil Regions model, proximity, climate zones,...?).

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Thank you very much.

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