

Opportunities for soil sustainability in Europe

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Science and recent knowledge

2 The role and importance of soils from recent science

3 Soil biodiversity and above-ground biodiversity

4 Soils and modern farming

4.1 Current challenges to soils in farming

4.2 Opportunities in the future Common Agricultural Policy

5 Soils, plant health and human health

5.1 Concept of soil 'health'

5.2 Plant health and food quality

5.3 Soils and human health

6 Soils and climate change

6.1 General considerations

6.2 Specific issues on peatlands

6.3 The '4 per mille' initiative

What are the policy implications?

Pace of activities



2015
International
Year of Soils



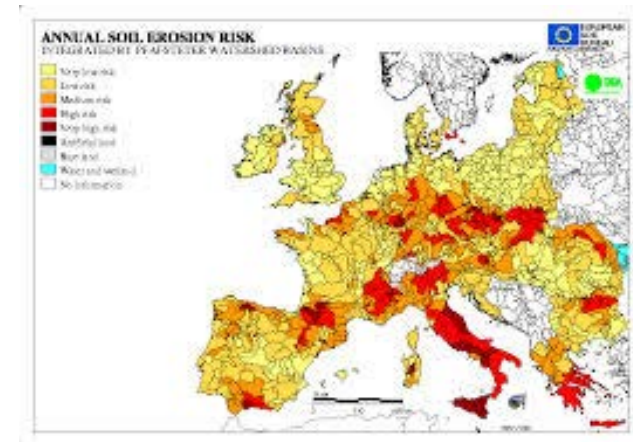
- EU in hiatus since 2014 Soil Directive Withdrawal
- Globally:
 - International Year of Soils (2015)
 - Formation of Intergovernmental Technical Panel on Soils (ITPS)
 - IPBES global assessment of land degradation and restoration
 - FAO's Global Soil Partnership
 - G20 summit in Argentina (July 2018) included special meeting on soils
 - forthcoming UN and FAO Global Soil Biodiversity Assessment...
- The nexus of actions related to soil sustainability is thus shifting from the EU to the global dimension
- Time for Europe to review its soil priorities?

ITPS have defined soil sustainability

ITPS Definition

- Leakage of nutrients is low;
- biological production is high relative to the potential limits set by climate and water availability;
- levels of biodiversity within and above the soil are relatively high;
- rainfall is efficiently captured and held within the root zone;
- rates of soil erosion and deposition are low...;
- contaminants are not introduced into the landscape and existing contaminants are not concentrated to levels that cause harm;
- systems for producing food and fibre for human consumption do not rely on large net inputs of energy;
- net emissions of GHGs are zero or the soil is a net sequester of carbon.

EU can apply these criteria



- ITPS criteria should inform a review of EU-wide measurement and monitoring coordination between Member States and establish locally appropriate benchmarks to allow policy makers and land managers to determine whether they are moving towards sustainability.

EU has an important role to play



2015
International
Year of Soils



- Contribute to international actions
- Improve available data arising from different national monitoring systems to provide consistent and comparable data – role for ESDAC?
- Integrate soil issues into biodiversity regulations and initiatives (above-ground depends on below-ground)
- Research priorities- informed by our analysis (Table 7.1)

Soil Ecosystem Services

Ecosystem service	Soil functions
Supporting services	
Soil formation	Weathering of primary minerals and release of nutrients Transformation and accumulation of organic matter Creation of structures for gas and water flow and root growth Creation of charged surfaces for ion retention and exchange
Primary production	Medium for seed germination and root growth Supply of nutrients and water for plants
Nutrient cycling	Transformation of organic materials by soil organisms Retention and release of nutrients on charged surfaces
Regulating services	
Water quality regulation	Filtrating and buffering of substances in soil water Transformation of soil contaminants
Water supply regulation	Regulation of water infiltration and flow within the soil Drainage of excess water from the soil and into ground and surface water
Climate regulation	Regulation of GHG emissions
Erosion regulation	Retention of soil on the land surface
Disease regulation	Control of plant, animal, and human diseases
Provisioning services	
Food supply	Providing water, nutrients, and physical support for growth of plants for human and animal consumption
Water supply	Retention and purification of water
Fibre and fuel supply	Providing water, nutrients, and physical support for plant growth for bioenergy and fibre
Raw earth material supply	Provision of topsoil, aggregates, peat, etc.
Surface stability	Supporting human habitations and related infrastructure
Refuges	Providing habitat for soil animals, birds, etc.
Genetic resources	Source of unique biological materials
Cultural services	
Aesthetic and spiritual	Preservation of natural and cultural landscape diversity Source of pigments and dyes Place for burial (ashes to ashes, dust to dust)
Heritage	Preservation of archaeological record

Link to SDGs



Soil Sealing

- Large scale loss continues leading to permanent loss of soils' many ecosystem services
- Direct effect externally via imports causing deforestation (more than the EU area lost)



New global study reveals the 'staggering' loss of forests caused by industrial agriculture

By [Erik Stokstad](#) Sep. 13, 2018, 3:30 PM



Loss of land= loss of production= increased imports= increased deforestation/ dryland overuse

Soil Sealing- we should do more



EUROPEAN COMMISSION

Brussels, 12.4.2012
SWD(2012) 101 final

COMMISSION STAFF WORKING DOCUMENT

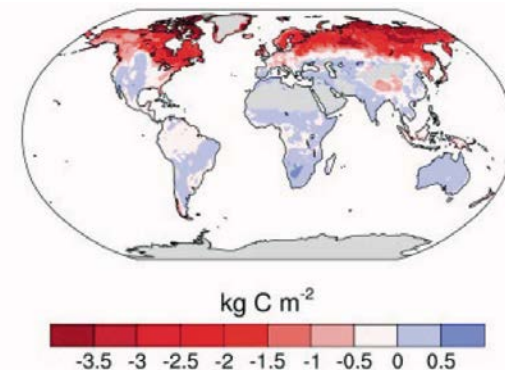
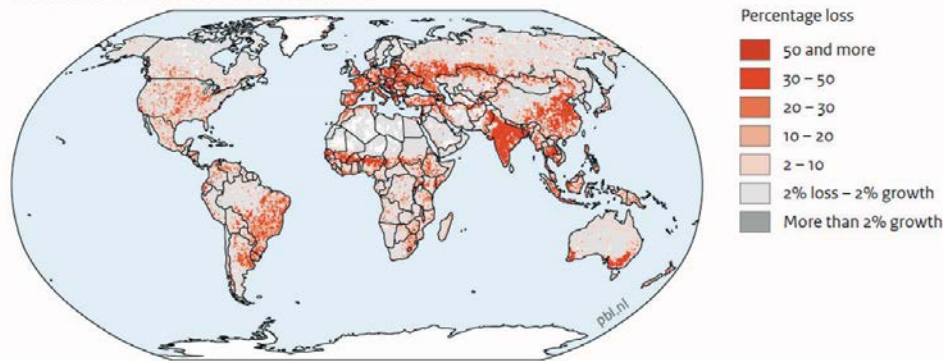
Guidelines on best practice to limit, mitigate or compensate soil sealing



- Politicians and land use planners must recognize shortage of agricultural land and threats to the world's remaining natural ecosystems and minimise soil sealing
- Soils' multi-functionality and ecosystem services should be better integrated into the social and economic demands of development. Avoid conversion of green areas; re-use of already built-up areas, such as brownfield sites, etc;
- Requires incentives to urban developers to minimise soil sealing- various models available in Member States which Commission has summarised

Soil Organic Carbon

Change compared to natural situation, 2010



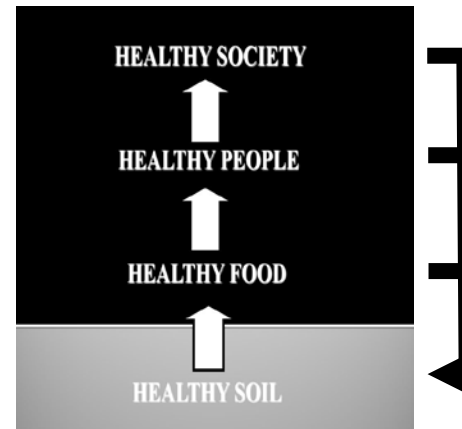
- 133 Gt carbon lost from soils to the atmosphere. Still being lost in Europe
- ‘4 per mille’ has beneficial side effects (for soil biodiversity, soil structure, water holding capacity, nutrient cycling and biological control) and is supported.
- SOC loss will increase with further warming, and thus potential to increase SOC may be over-estimated.
- Advice on good soil management to increase SOC and enhance resilience of soils needs to be customised for different areas and soil types; local advice is essential.

Soil Organic Carbon- peat



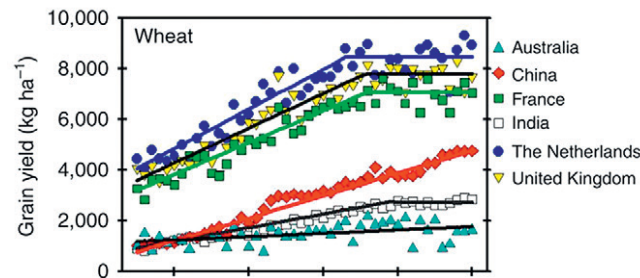
- Must not overlook the potential for large losses of soil carbon through continued unsustainable use of peat soils and loss of wetlands. (EU the world's second largest CO₂ emitter from degraded peatlands). Options to reverse this include:
 - Funding rewetting rather than drainage
 - LULUCF accounting
 - Responsible peat accreditation
 - Energy use reduced

Soils and Health



- Soils and soil biodiversity contribute to healthy food, clean drinking water and air, as well as helping to prevent human allergies and to control outbreaks of human pathogens and parasites
- Micronutrients and secondary metabolites (e.g. flavonoids)
- Antibiotic resistance pathways through soils.
- Potential source of new antibiotics, enzymes etc.

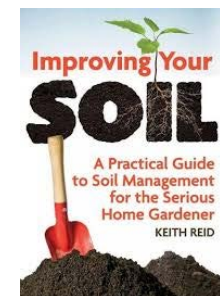
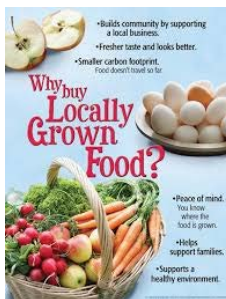
Soils and Agriculture



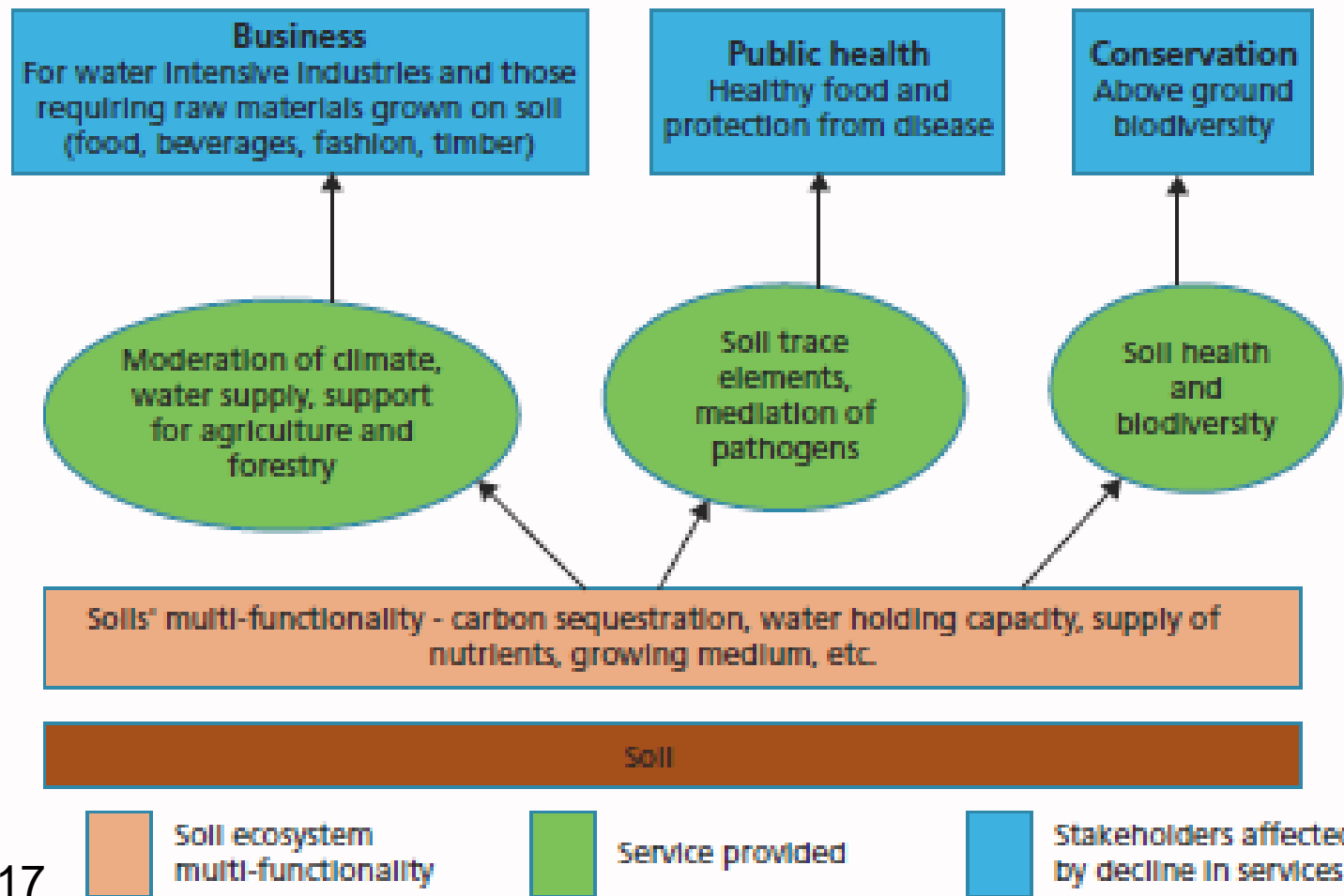
- Yields levelling off?
- Some crops inherently susceptible to erosion
- 2013 CAP joint provision of private and public goods is right
- Some positive impact (e.g. EFAs at 9.7% and encouraging nitrogen-fixing crops).
- Could be improved now by encouraging crop rotation and diversification, retaining more areas of permanent grassland.
- In the next reform of the CAP (post 2021), apply recent research to allow agriculture to adapt to and mitigate climate change, while improving soil sustainability and biodiversity

Soils and Agriculture- other ideas

- Encourage local food production linked to local soils
- Labelling schemes which show that farmers have managed their soil to reduce erosion, enhance fertility and maintain good soil structure in a sustainable and environmentally sensitive way.
- Expert advisory and extension services to advise farmers on soil health, functions and soil enhancement approaches.



Stakeholders not just food supply..



Davies, 2017

Valuing Soils multifunctionality

- Market failure to cater for longer-term soil sustainability, so society loses the common goods and services.
- Soil natural capital needs to be better understood and valued
- Incentives to mainstream values of ecosystem services can help to avoid, reduce and even reverse land degradation.
- Mainstreaming the values of soil natural capital into decisions by farmers will reduce costs of environmental damage.
- The EU, national agencies and local authorities should provide a supportive policy environment for a soil awareness and education strategy to show the ways in which soils contribute to human well-being

Thank you!

Next is

Panel Discussion

Questions and answers

Panel Discussion

(moderator: Professor Michael Norton)

- | **Ms Josiane Masson**, DG ENVI (Directorate D, Natural Capital, Unit 1: Land Use and Management)
- | **Dr Rainer Baritz**, European Environmental Agency
- | **Dr Jabier Ruiz**, World Wide Fund for Nature
- | **Mr Evangelos Koumentakos**, Copa-Cogeca