

SOILS4EU: TRANSBOUNDARY EFFECTS OF SOIL DEGRADATION IN THE EU

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Why Motivation and problem statement

Soil degradation occurs in different forms such as erosion, soil organic matter decline, salinization and contamination, sealing and compaction, and floods and landslides. The transboundary impacts of such soil degradation can be economic, social and environmental. For example, it can be a driver of climate change, health problems and food shortage. The provision of information, maps and figures, especially permanently available quality-proven data and technologies are crucial for scientists, land users, planners and decision makers to avoid and combat soil degradation and its transboundary effects and thereby overcome societal challenges together.

What Approach, results; keymessages

The participants of the workshop were separated into three working groups to discuss "Agricultural and forest soils", "Urban and industrial soils" and "Climate change and carbon emissions"

Alltogether, the focus on transboundary impacts raised a lot of interest because soils are not static and the drivers of soil degradation are often global. The impact also is in many cases not local but trans-border. It is relevant for many stakeholder groups, e.g. for reaching the SDGs that require collaboration. Participants see an added value of the Soils4EU Report 1 because it provides valuable information and evidence that has so far not been collected.

Several challenges were identified in the group discussions, which are that people have different opinions about the relevant scale. Whereas one group is close to the soil and its interaction with other sources such as wind, water air, the other sees the greater picture and looks from a transboundary and inter-sectorial perspective. It is difficult to differentiate between local and transboundary effects.

We can hardly disentangle the different components that influence transboundary impact because of the many interlinkages. We should also differentiate between anthropogenic and natural drivers. The issue is too complex to approach it deeply in a single report.

We can quantify the amount of degradation but not the impact; this means we can say a lot about soil loss or contamination, but for example in a flood event we cannot precisely say much about the impact the soil loss has in this event (40%, 50%,), even though we know there is one.

Some approaches and methods could be useful for focusing the issue of transboundary impacts. E.g. umbrella framework, Nexus approach (water-soil-sediment). Regarding the context, Habitat, Flood and Water Directives should be taken into account as having transboundary implications.

Key Conclusions and take home message

The following actions need to be taken:

- Reward upstream actions such as flood control, nutrients, local climate effect (that is the goal)
- A National soil use inventory is need; at the moment Member States do not have a spatial planning and impact framework (so we do not know, what are the consequences of soil use?)
- There are internationally recognized concepts that can be used to frame the issue of transboundary impacts of soil degradation. Sustainable Development Goals (SDGs) ► reducing degradation will support reaching many of the SDGs. Land Degradation Neutrality as a driving force for soil protection
- Masterplan for cooperation between countries, e.g. on habitat protection



Transboundary impacts of soil degradation

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Problem statement I

The **global** population could reach ca. 9 billion people in 2050 and at the same time European and global **soils degrade** further (Panagos et al., 2016; FAO, 2012).

- Mean **soil loss rate in Europe** is by far higher than the soil formation rate (Panagos et al., 2015).
- **Global production** of food has to **increase** by about **70 % to 100 %** in order to feed this predicted population (Godfray et al., 2010).
- Increasing pressure on already degraded soils.

Problem statement II

- Soil degradation as a consequence of sealing, land use intensification etc. = local or regional challenge.
- Impact often not limited to the area of degradation but much broader, examples:
 - Salination of soils in Spanish region = loss in agricultural production, increasing prices for vegetables and increasing pressure on soils elsewhere (even outside Europe).
 - Soil sealing within catchments increases flood risks = impact on downstream users (economic costs, health effects due to polluted water).

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Transboundary impacts of soil degradation

Objectives:

- Identification and presentation of **facts and evidence** of transboundary impact of soil degradation (economic, ecological and social).
- Focus on societal challenges of transboundary impacts of soil degradation, drivers and impacts.

Scale: Impacts on EU level, incl. examples from EU Member States

Target group: Policy makers (agriculture, urban land and water management)

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Report structure

1. Introduction
2. Societal challenges of transboundary impact
3. Drivers and transboundary impact of soil degradation
 - 3.1 Natural conditions (climate, topography, soil properties)
 - 3.2 Land use changes
 - 3.3 Land management (especially agricultural activities)
 - 3.4 Urbanization and development of infrastructures
 - 3.5 Consumption patterns and economic drivers
4. Identification of key challenges to address transboundary impacts
5. Recognition of transboundary impact in policies
6. Need for actions

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Definitions

Soil degradation:

“Soil degradation is defined as a change in the soil health status resulting in a diminished capacity of the ecosystem to provide goods and services for its beneficiaries. Degraded soils have a health status such, that they do not provide the normal goods and services of the particular soil in its ecosystem.” (FAO, 2017)

Transboundary dimensions:

- Drivers (cause of degradation) are often distant and cross-borders (= transboundary).
- Soil degradation is often considered as local phenomenon but soil particles move (e.g. forced by either wind or water), e.g. when mixed with water, soil may become sediment.
- Degraded soils do not only affect people but can have broader economic (increasing imports), ecological (loss of biodiversity networks) or social (food security) impact

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The (societal) challenges

- Climate change
- Food security and safety
- Land foot print
- Migration
- Water security
- Loss of biodiversity & ecosystem functions
- Human health



Source: Global Footprint Network

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Societal challenges: Example I

Food security and safety I

- Approximately 95% of global food is produced in soil (FAO, 2015).
- Food demand is expected to increase up to 3 billion tonnes in 2050 (FAO, 2009).
- Approximately 50% of global land area is already devoted to agriculture (about 1/3 cropland and 2/3 grazing land).

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Societal challenges: Example I

Food security and safety II

- Economic importance of agriculture and food commodities for EU: 350 billion Euro trade on the internal market (for the year 2016) and 129.1 billion Euro trade in exports to third countries (in 2015) (EC, 2017).
- During past 40 years about 30% of the world's cropland has become unproductive (much of this land has been abandoned) (Pimentel, 2006).

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Societal challenges: Example II

Water security & quality

- Flooding and droughts
- Nutrient pollution
- Chemical contamination
- Securing water quality
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Source: Mohtar, 2015

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Societal challenges: Example III

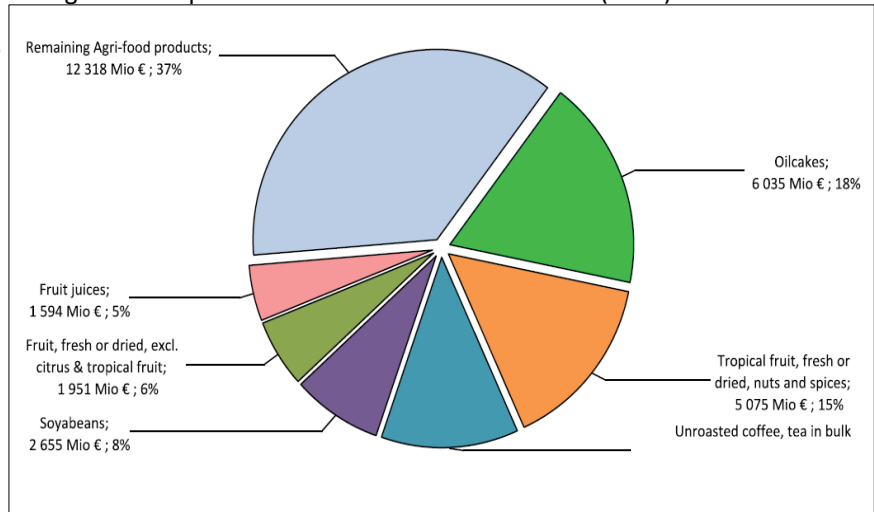
Migration

- Millions of people are migrating each year due to degraded land (UNCCD, 2017).

- Reasons are manifold:

- Consumption patterns require food imports → degradation in these countries.
- Land grabbing (investors also from EU to produce, e.g. biofuels elsewhere)

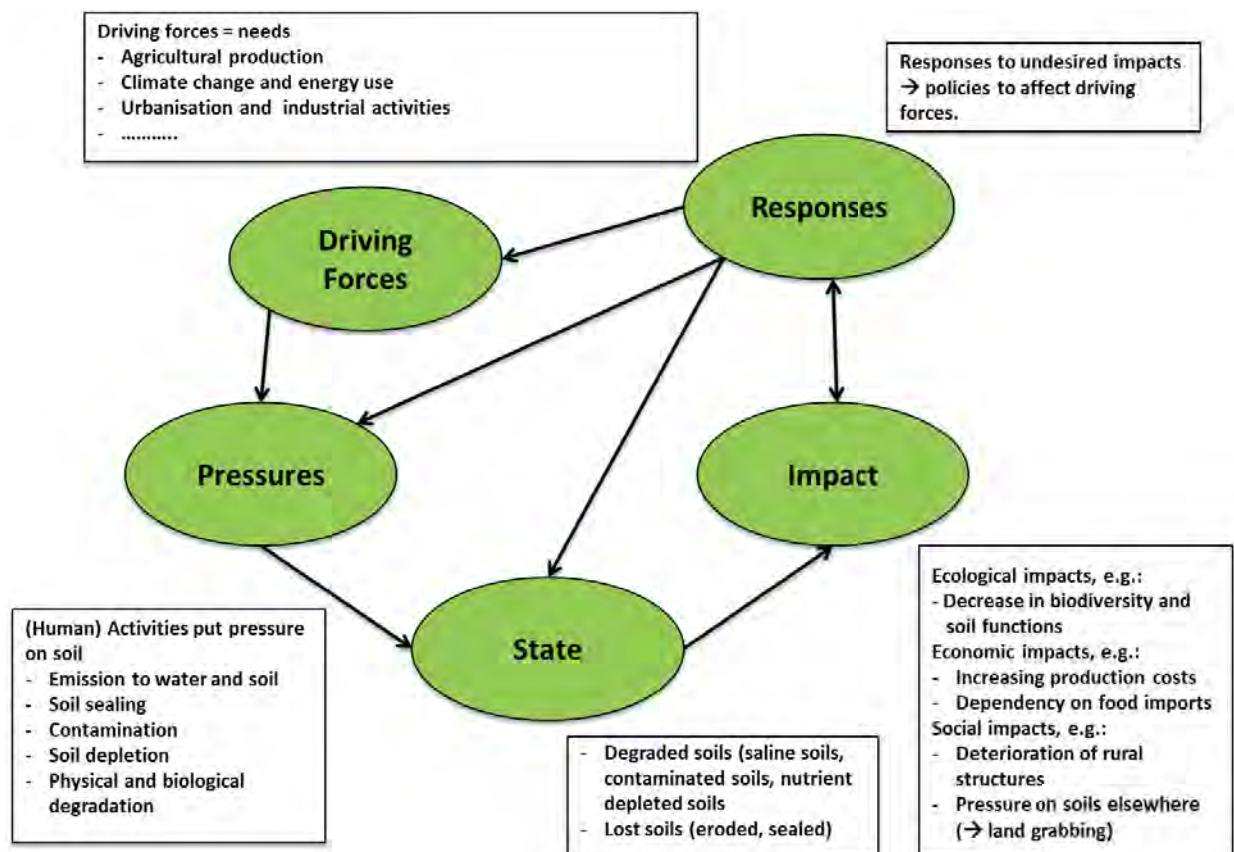
EU Agri-food imports from Latin American countries (2016)



Source: EC, 2017

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Drivers and impacts



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Example I: Agricultural production

Driver background:

Global/European demand and economic pressure = intensification of agricultural production

Pressure (rather local):

Diffuse contamination, compaction, soil salination (irrigation), nutrient depletion, physical and biological degradation

State (rather local):

Degraded and lost soil

Impact (rather transboundary):

Reduction in food production can have several different impacts:

- Price increase for cereals (for Italy >70% over last 10 years) (FAO, 2013)
- Pressure on agricultural land elsewhere (e.g. land grabbing)



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Example II: Urban development

Driver background:

Migration from rural to urban areas (more jobs in cities, better infrastructure)

E.g. in 2020 about 80% of the EU population will be living in urban areas (EC, 2013)

Pressure (rather local):

Soil sealing (soil often irreversible lost), soil compaction, emission to air, water and soil

Degradation (rather local):

Degraded and lost soil

Impact (local as well as transboundary):

Loss of biodiversity, water stress, pressure on agricultural land (produce more on less land), floods



Source: EC (2012)

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Policy framework

- Different regulations with indirect soil relevance (e.g. nitrate directive, emission regulation)
- EU legislation transboundary by definition, but cross-boarder in practice rarely addressed
- Water Framework Directive – A role model?
 - Member State need to cooperate on managing transboundary waters
 - Holistic approach of management
 - Cross-sectoral approach
 - Policy integration
 - Several challenges involved, e.g.
 - High transaction costs (e.g. exchange, negotiations and cooperation)
 - Data availability and comparability



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Identified gaps

What we have:

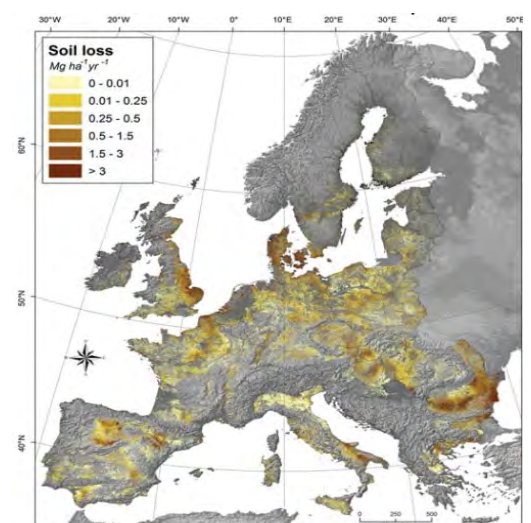
Information of the different forms of soil degradation in the EU and data on severity of degradation.

What we don't have:

Due to the complexity of relationships it is very difficult to **measure** the proportion of **transboundary impacts and drivers**.

What is needed:

Provision of information (maps, figures, examples), especially permanently available quality-proven data.



Source: Borelli et al. (2017)

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Aim of the afternoon workshop

- For the report we still need evidence/information on pressures which are most relevant from a transboundary perspective.
- Specific examples for and data on the transboundary impacts of degradation (e.g. urbanization → soil sealing → flooding → damage costs).
- Objectives:
 - Specify and quantify pressures and impacts (ecological, economic social) for specific drivers.
 - Exchange examples
 - Discuss the information and data needs to address transboundary impact of soil degradation.



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Timeline

	Welcome
2:00-2:10pm	Welcome
2:10-2:20pm	Introduction and aim of the workshop
2:20-2:40pm	Discussion of draft report and key drivers
2:40-3:25pm	3 working groups to discuss pressures and impact of agricultural production, urbanisation and industrial activities, climate change and energy security
3:25-3:45pm	Feedback from groups and opportunity for others to add
3:45pm	Coffee break
4:15pm	Continue with 3rd workshop

Background information

What we have:

Information of the different forms of soil degradation in the EU and data on severity of degradation.

What we don't have:

Due to the complexity of relationships it is very difficult to **measure** the proportion of **transboundary impacts and drivers**.

What is needed:

Provision of information (maps, figures, examples), especially permanently available quality-proven data.

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Aim of the workshop

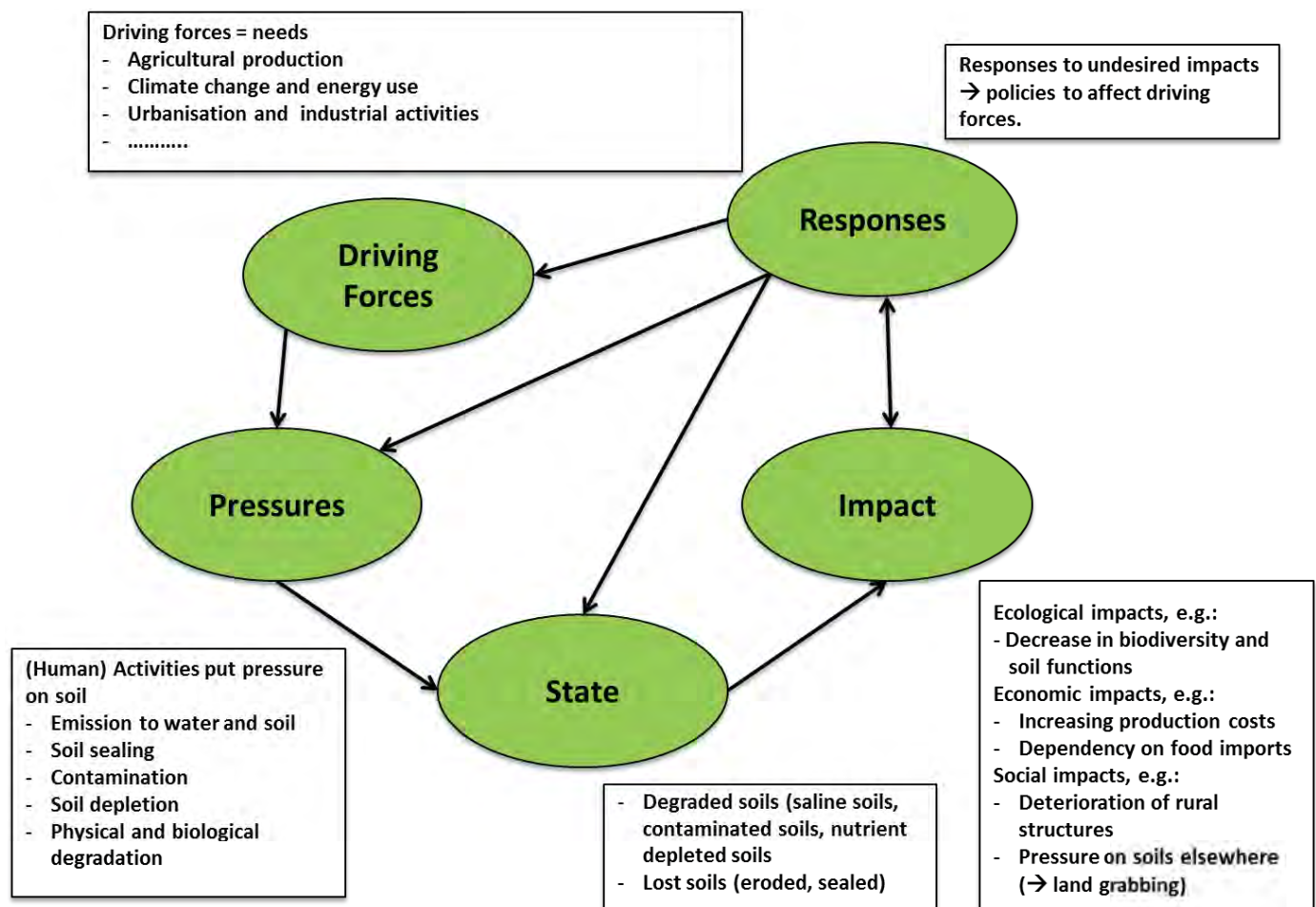
- Specify and quantify pressures and impacts (ecological, economic and social) for specific drivers.
- Discuss examples
- Discuss the information and data needs to address transboundary impact of soil degradation.
- Format: Working groups

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Questions on the report?

1. Introduction
2. Societal challenges of transboundary impact
3. Drivers and transboundary impact of soil degradation
 - 3.1 Natural conditions (climate, topography, soil properties)
 - 3.2 Land use changes
 - 3.3 Land management (including agricultural practices)
 - 3.4 Urbanization and development of infrastructures
 - 3.5 Consumption patterns and economic drivers
4. Identification of key challenges to address transboundary impacts
5. Recognition of transboundary impact in policies
6. Need for actions

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What are other relevant drivers of soil degradation?

Introduction to working groups I

- Three groups, each working on one specific driver
 - Agricultural production
 - Urbanisation and industrial activities
 - Climate change and energy security
- Guiding questions for each table
- Each table has a convenor (project team)
- After 25 minutes participants can move from one table to another

Introduction to working groups II

Afterwards:

- Reporting back the results of the discussion to the plenary of workshop 1 (outlining specific examples) – allowing other participants to add.
- Reporting back key messages in workshop 3 (3 minutes per working group).

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