# EU Soil Observatory (EUSO)

## The role of EUSO Dashboard in the Soil Monitoring Law

Joint Research Centre

European Commission

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IMPEL: Water and Land, Bucharest 17 October 2023

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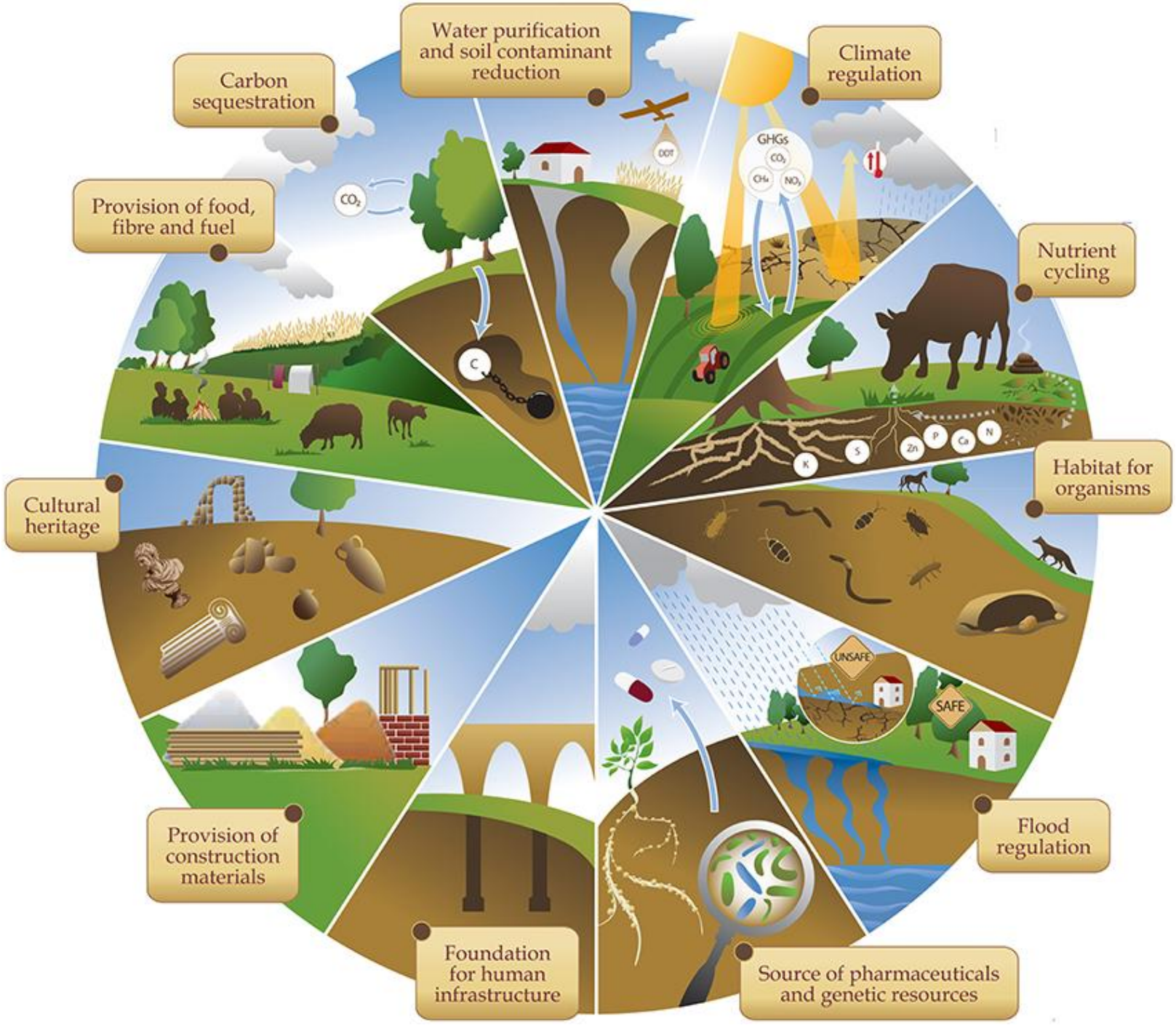
# Healthy Soils

What **soils** do for us?



# Soil Threats

What are we doing to **soils**?

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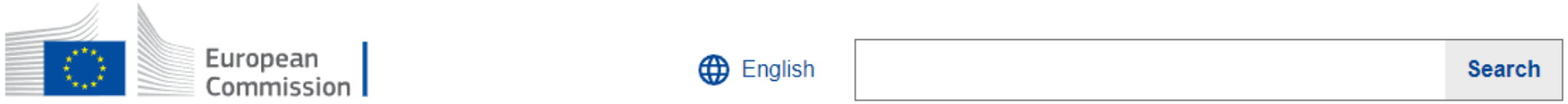
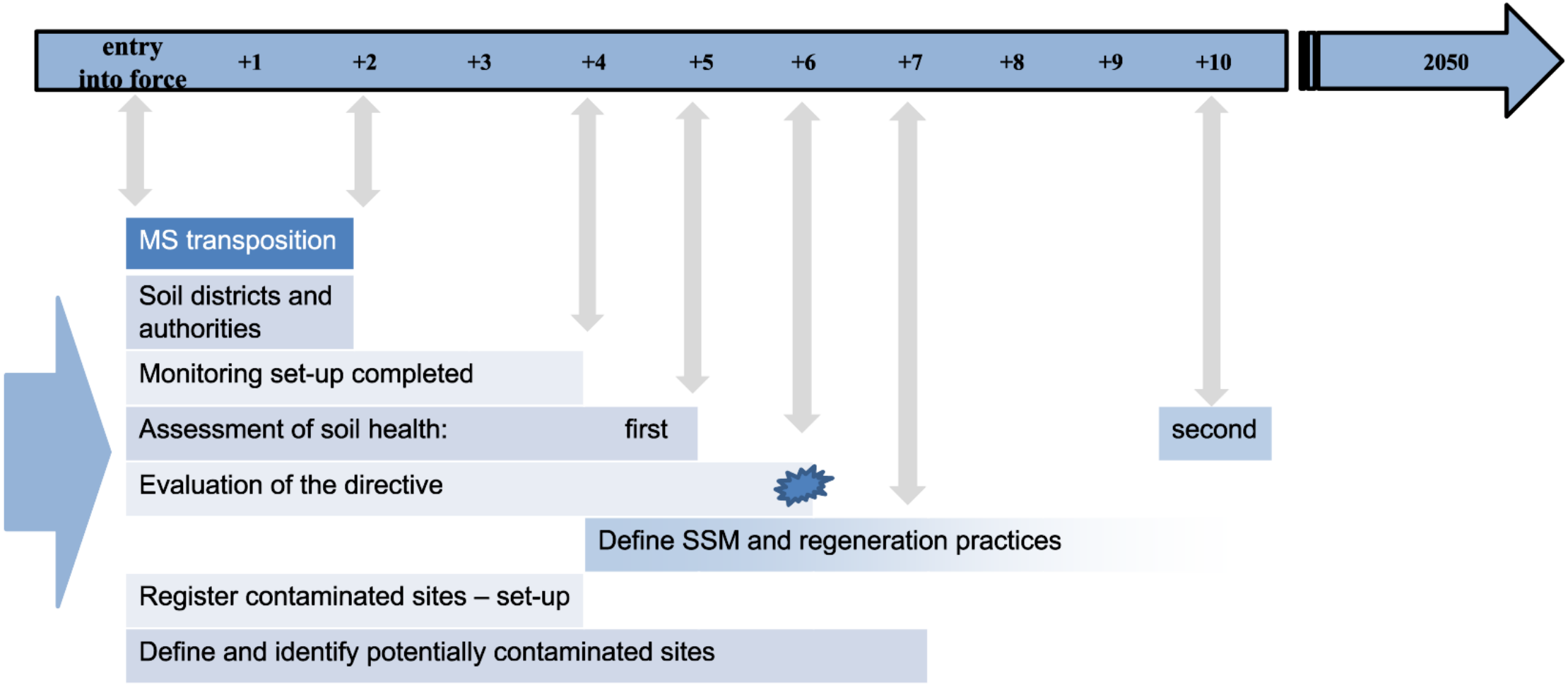
# Soil Monitoring & Resilience Directive



# Soil Monitoring & Resilience Directive



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# EU Soil Observatory

https://esdac.jrc.ec.europa.eu/euso

# EUSO Soil Health Dashboard

## *Rationale*

- A **wealth of soil data** available but not easily accessible for non-experts
- Mission ‘A Soil Deal for Europe’ estimated 60-70% of unhealthy soils. **Where are they located?**
- **Evidence base to support** the need for an EU Soil Monitoring Directive

https://esdac.jrc.ec.europa.eu/esdacviewer/euso-dashboard

ESDAC website

- ➢ EUSO
  - ➢ EUSO dashboard

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# Soil Health

**Where** are healthy and unhealthy **soils**?

0 250 500 1,000 Km

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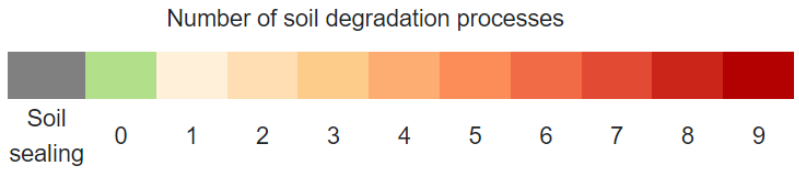
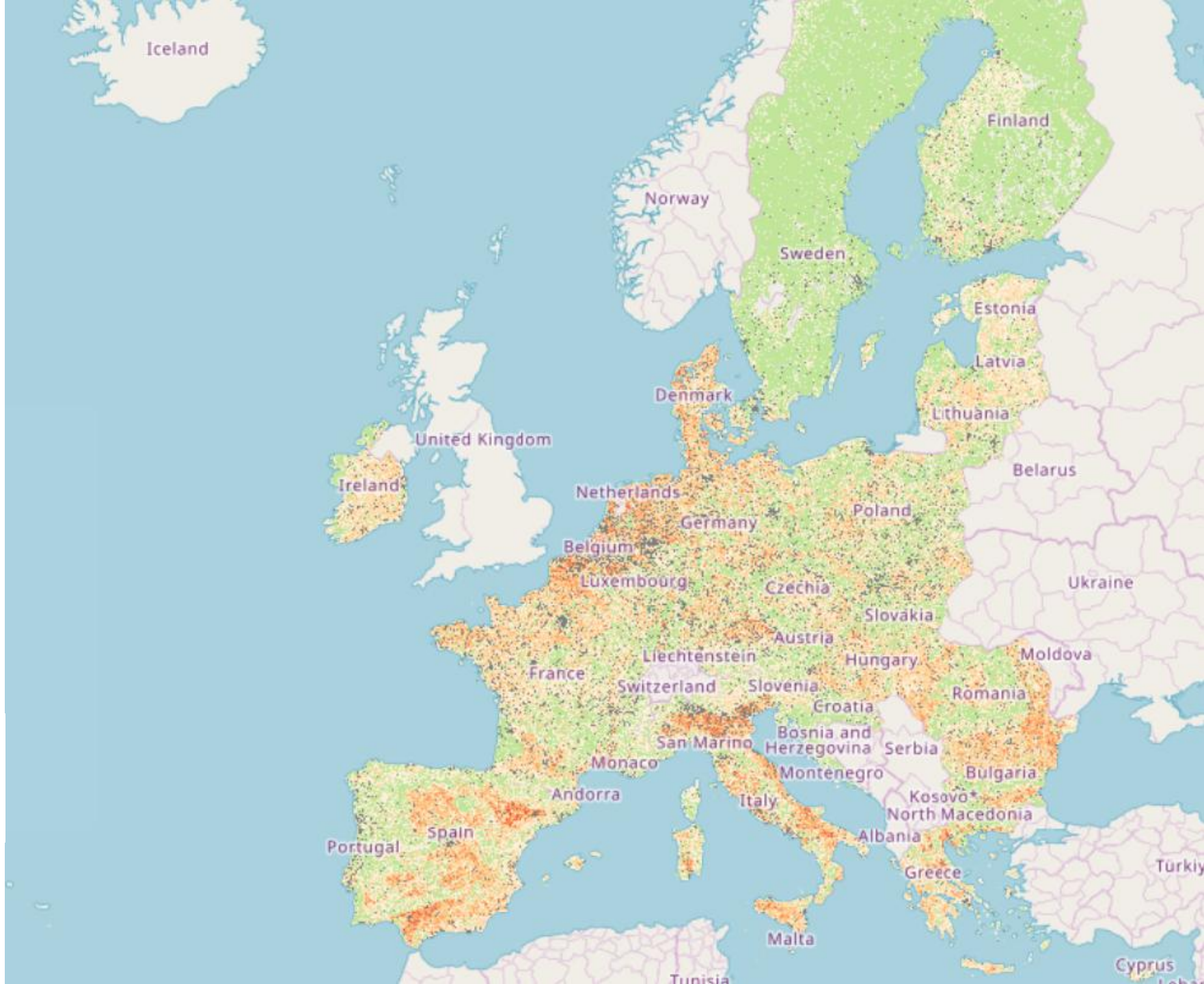
# Soil Health

Where are healthy and unhealthy **soils**?



# EUSO Soil Health Dashboard

## Soil degradation indicators

Select a soil degradation indicator: Copper

Indicator | Nuts 0 | Nuts 2

- **Soil erosion**
  - Water erosion
  - Wind erosion
  - Harvest erosion
  - Tillage erosion
  - Post-fire recovery
- **Soil pollution**
  - Copper
  - Mercury
  - Zinc
- **Soil nutrients**
  - Nitrogen surplus
  - Phosphorus deficiency
  - Phosphorus excess
- **Loss of soil organic carbon**
  - Distance to maximum SOC level
- **Loss of soil biodiversity**
  - Potential threat to biological functions
- **Soil compaction**
  - Susceptibility to soil compaction

Copper is both a micronutrient essential
environmental well-being. In soil, copper
from agriculture (e.g. fungicides) or indu
and land use, this layer shows copper c
concentration of more than 50 mg $kg^{-1}$.
mg $kg^{-1}$ is the lowest limit value for copp
more accurate thresholds in future iterat

s, a contaminant which can create a potential risk to human health and
tions between climate, parent material, soil properties and external inputs
topsoil survey data and regression models based on environmental drivers
EU. The layer shows areas which were estimated to have a copper
pper threshold values for the definition of risk in the EU, the threshold of 50
e Sludge Directive. National critical limits may differ and could be used as

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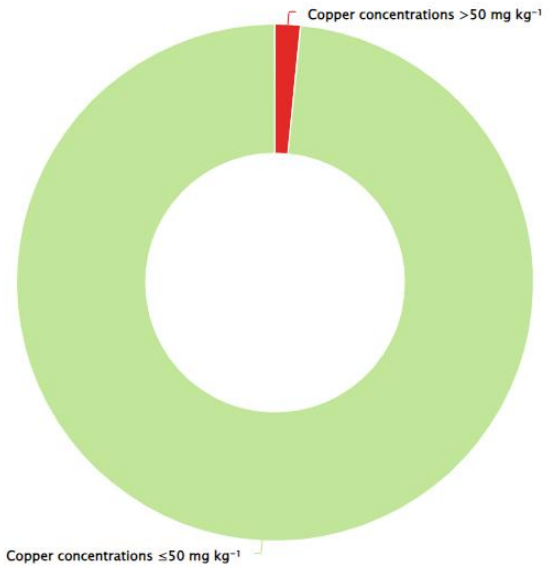
eas with copper concentrations >50 mg $kg^{-1}$, in % (based on areas with data)




Highcharts.com

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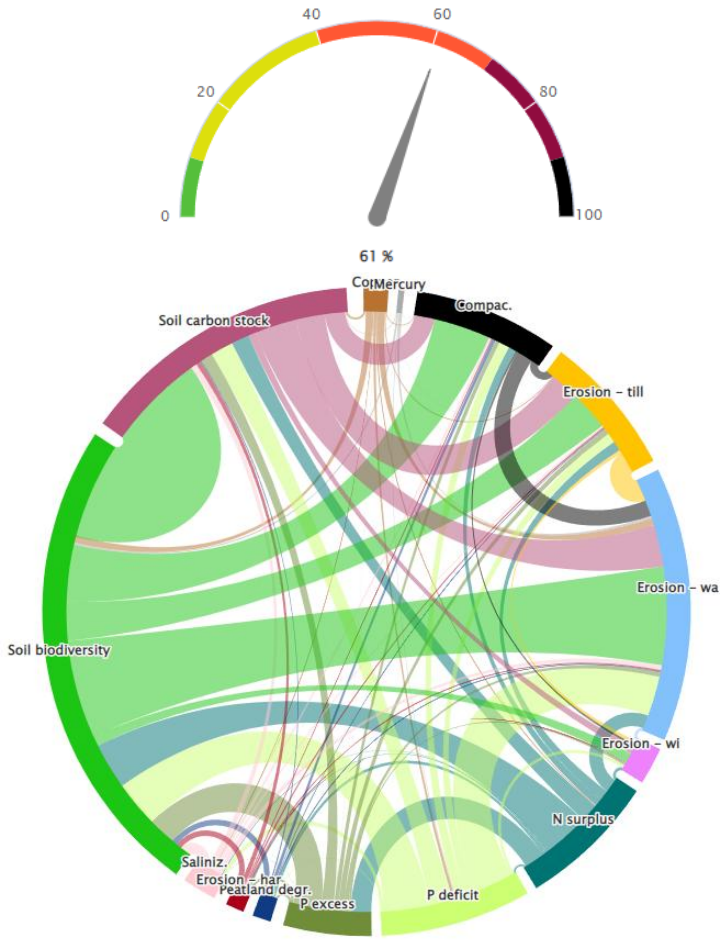
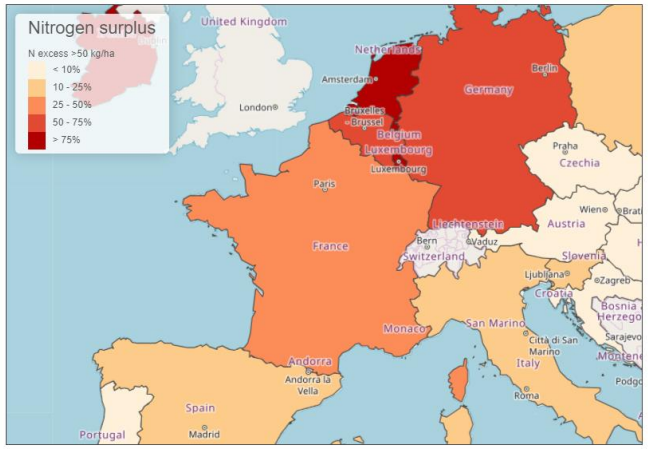
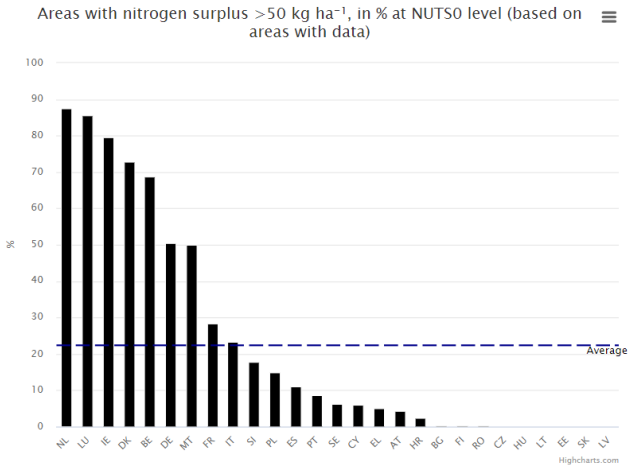
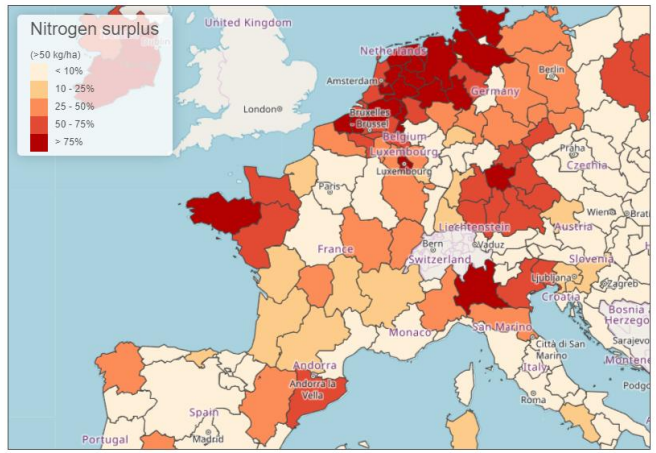
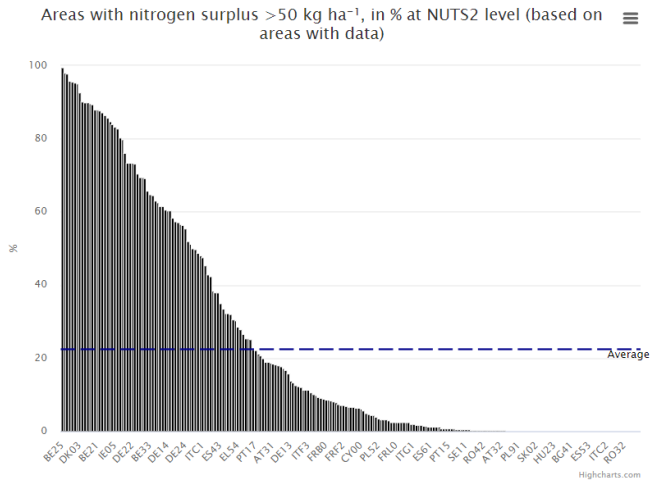
# EUSO Soil Health Dashboard



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# EUSO Soil Health Dashboard

- Soil erosion (water, wind, harvest, tillage, fire)
- Soil pollution (copper, mercury, zinc)
- Nutrients balance (nitrogen, phosphorous)
- Loss of Soil Organic Carbon
- Loss of Biodiversity
- Soil Compaction
- Salinization
- Loss of organic soils
- Soil Sealing

**Convergence of evidence!**

Supported with peer-reviewed publications.

Updates on current and additional indicators are foreseen.

Support for the forthcoming Soil Monitoring Directive.



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# EUSO Soil Health Dashboard

Share of quantified soil health issues by MS for each indicator

| | Unsustainable soil erosion (water, wind, tillage, harvest) | | High Risk for loss of soil biodiversity | SOC (mineral soils only) | | High or Very High susceptibility for topsoil compaction | High Copper concentrations | High Mercury concentrations | N excess | | P excess | | Peatland under hotspot of agriculture | | Areas at risk of secondary salinization | | Sealing | All indicators (1Out AllOut - excluding overlaps) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Member State | % of cropland area | % of MS area | % of MS area | % of Cropland and Grassland area (except for land above 1000 m a.s.l.) | % of MS area | % of MS area | % of MS area | % of MS area | % of Agricultural land (CORINE) | % of MS area | % of Agricultural land (CORINE) | % of MS area | Peatland | % of MS area | Mediterranean biogeographical region | % of MS area | % of MS area | % of MS area |
| AT | 68% | 10% | 23% | 47% | 9% | 4% | 0% | 8% | 4% | 1.1% | 2% | 1% | 5% | 0% | 0% | 0% | 1% | 38% |
| BE | 63% | 17% | 66% | 46% | 15% | 11% | 0% | 2% | 69% | 34.8% | 58% | 36% | 0% | 0% | 0% | 0% | 6% | 79% |
| BG | 71% | 26% | 29% | 84% | 31% | 7% | 1% | 0% | 0% | 0.1% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 50% |
| DK | 65% | 45% | 53% | 16% | 10% | 6% | 0% | 0% | 73% | 50.3% | 31% | 25% | 84% | 4% | 0% | 0% | 2% | 85% |
| ES | 72% | 18% | 54% | 86% | 20% | 7% | 0% | 1% | 11% | 2.8% | 1% | 0% | 0% | 0% | 8% | 7% | 1% | 60% |
| EE | 22% | 3% | 19% | 2% | 0% | 45% | 0% | 0% | 0% | 0.0% | 0% | 0% | 72% | 18% | 0% | 0% | 0% | 63% |
| EL | 60% | 10% | 53% | 83% | 13% | 11% | 1% | 0% | 5% | 1.0% | 0% | 0% | 28% | 0% | 11% | 10% | 1% | 64% |
| CY | 46% | 14% | 41% | 21% | 6% | 9% | 0% | 0% | 6% | 2.2% | - | - | 0% | 0% | 2% | 3% | 2% | 56% |
| CZ | 64% | 26% | 46% | 52% | 22% | 10% | 0% | 0% | 0% | 0.1% | 4% | 3% | 0% | 0% | 0% | 0% | 2% | 62% |
| DE | 47% | 19% | 50% | 43% | 20% | 11% | 0% | 1% | 50% | 27.7% | 33% | 20% | 91% | 6% | 0% | 0% | 4% | 73% |
| FR | 53% | 16% | 50% | 41% | 18% | 8% | 3% | 0% | 28% | 15.6% | 16% | 10% | 0% | 0% | 5% | 1% | 2% | 63% |
| FI | 17% | 1% | 7% | 0% | 0% | 6% | 0% | 0% | 0% | 0.0% | 2% | 0% | 19% | 7% | 0% | 0% | 0% | 16% |
| HR | 31% | 2% | 50% | 76% | 7% | 1% | 0% | 0% | 2% | 0.4% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 41% |
| HU | 41% | 24% | 65% | 70% | 41% | 14% | 0% | 0% | 0% | 0.1% | 0% | 0% | 80% | 2% | 0% | 0% | 1% | 82% |
| IE | 42% | 3% | 63% | 0% | 0% | 8% | 0% | 1% | 79% | 45.6% | 11% | 8% | 62% | 12% | 0% | 0% | 0% | 76% |
| IT | 80% | 23% | 52% | 68% | 19% | 8% | 14% | 1% | 23% | 7.8% | 3% | 2% | 1% | 0% | 7% | 4% | 3% | 66% |
| LT | 26% | 9% | 29% | 29% | 11% | 8% | 0% | 0% | 0% | 0.1% | 0% | 0% | 98% | 9% | 0% | 0% | 0% | 48% |
| LU | 87% | 12% | 48% | 2% | 0% | 7% | 0% | 0% | 86% | 30.6% | 1% | 1% | 0% | 0% | 0% | 0% | 4% | 66% |
| LV | 25% | 4% | 21% | 10% | 2% | 13% | 0% | 0% | 0% | 0.0% | 0% | 0% | 62% | 6% | 0% | 0% | 0% | 39% |
| MT | 97% | 0% | 100% | - | 0% | 0% | 0% | 0% | 0% | 0.8% | 0% | 0% | 0% | 0% | 0% | 0% | 18% | 18% |
| NL | 63% | 16% | 78% | 19% | 10% | 7% | 0% | 0% | 87% | 62.6% | 90% | 69% | 97% | 8% | 0% | 0% | 7% | 90% |
| RO | 59% | 22% | 47% | 71% | 31% | 8% | 1% | 0% | 0% | 0.1% | 0% | 0% | 50% | 2% | 0% | 0% | 0% | 59% |
| PL | 36% | 17% | 21% | 58% | 29% | 8% | 0% | 0% | 15% | 8.3% | 6% | 3% | 87% | 4% | 0% | 0% | 1% | 56% |
| PT | 60% | 9% | 12% | 29% | 3% | 4% | 0% | 0% | 9% | 1.7% | 0% | 0% | 0% | 0% | 3% | 3% | 2% | 25% |
| SE | 37% | 3% | 2% | 7% | 0% | 0% | 0% | 1% | 6% | 0.4% | 5% | 0% | 6% | 1% | 0% | 0% | 0% | 7% |
| SI | 64% | 4% | 32% | 41% | 3% | 8% | 0% | 19% | 18% | 3.9% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 51% |
| SK | 62% | 22% | 23% | 68% | 23% | 5% | 0% | 3% | 0% | 0.0% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 43% |
| EU | 54% | **14%** | **37%** | 53% | **16%** | **8%** | **2%** | **1%** | 23% | **8.1%** | 10% | **5%** | 30% | **2%** | 7% | **2%** | **1%** | **52%** |

# EUSO Soil Health Dashboard

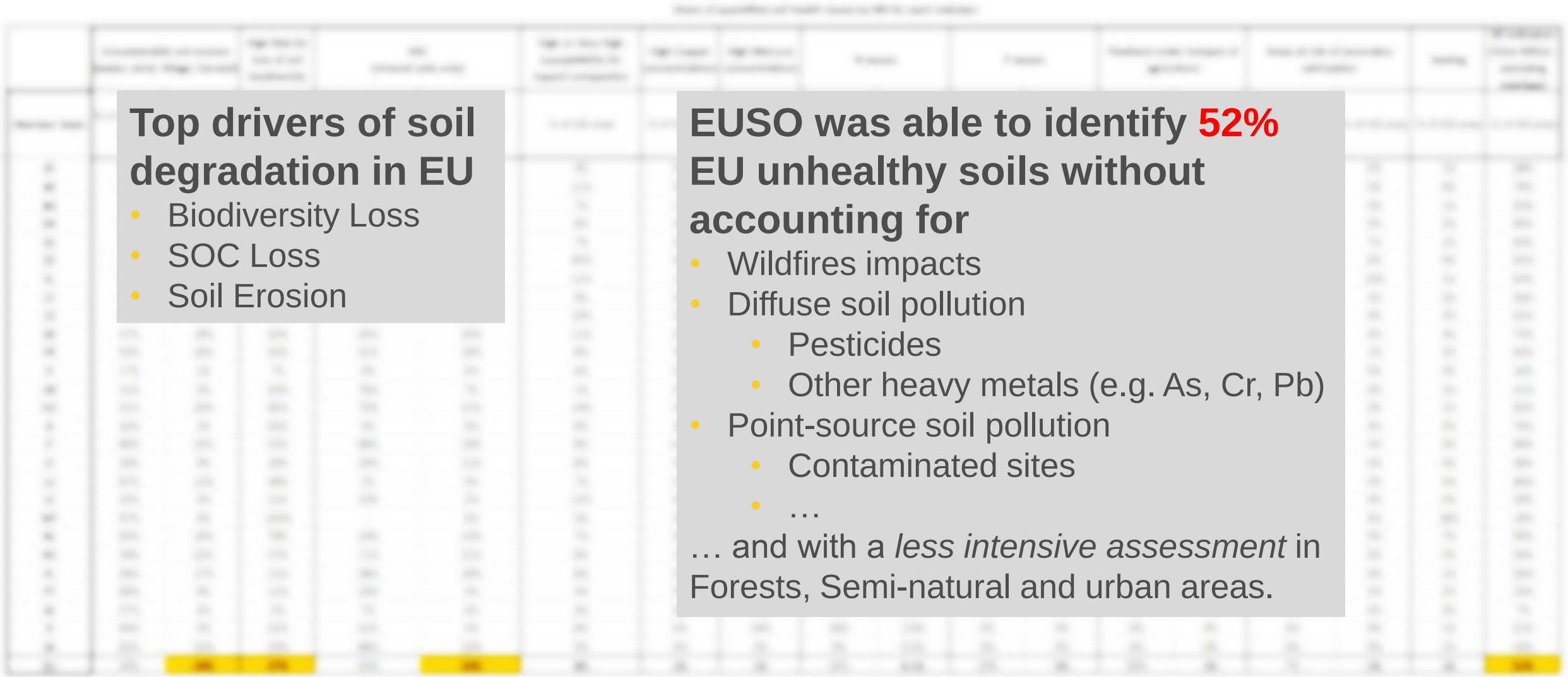
**Top drivers of soil degradation in EU**

- Biodiversity Loss
- SOC Loss
- Soil Erosion

**EUSO was able to identify 52% EU unhealthy soils without accounting for**

- Wildfires impacts
- Diffuse soil pollution
  - Pesticides
  - Other heavy metals (e.g. As, Cr, Pb)
- Point-source soil pollution
  - Contaminated sites
  - …

… and with a *less intensive assessment* in Forests, Semi-natural and urban areas.



# Take home message - Dashboard

Dashboard provides **status on the Soil health** in the EU for all citizens

- Citizens, Policymakers, Scientists, Land Managers.

**Supports** the proposed Soil Monitoring Law

- Trends, Progress achieving policy goals.

With increasing knowledge additional/current indicators will be **updated**

- New indicators, Improved Methodologies, New Data.

Knowledge on Soil Pollution is still missing

- **Diffuse Pollution**, **Contaminated sites**.

**Expansion** to all EU **land uses** required

- Low emphasis in Urban areas.



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# Keep in touch

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# Thank you

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