The European Commission's science and knowledge service

Joint Research Centre

OUTLOOK ON AGRICULTURAL LAND IN EUROPE

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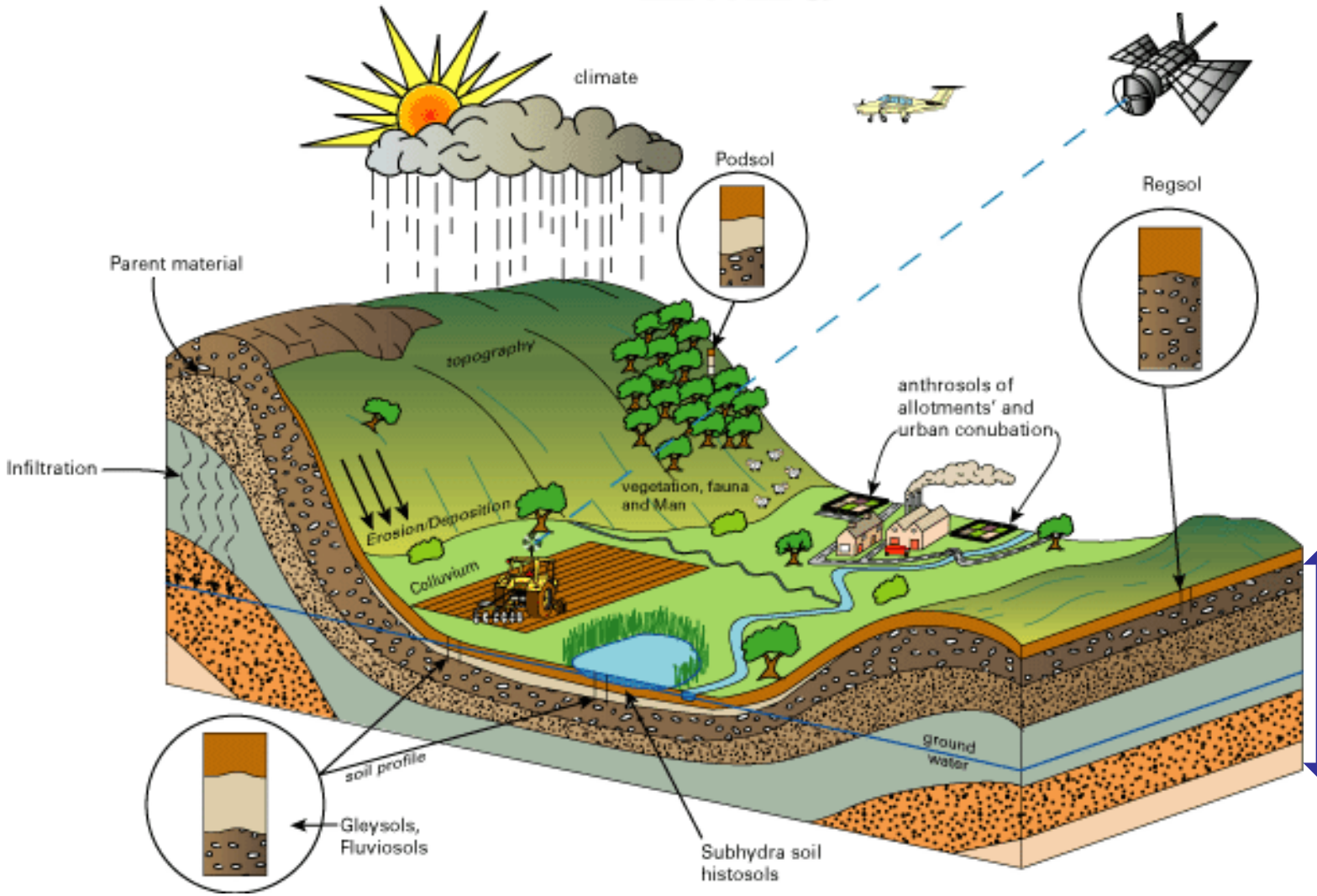
Land



Soil

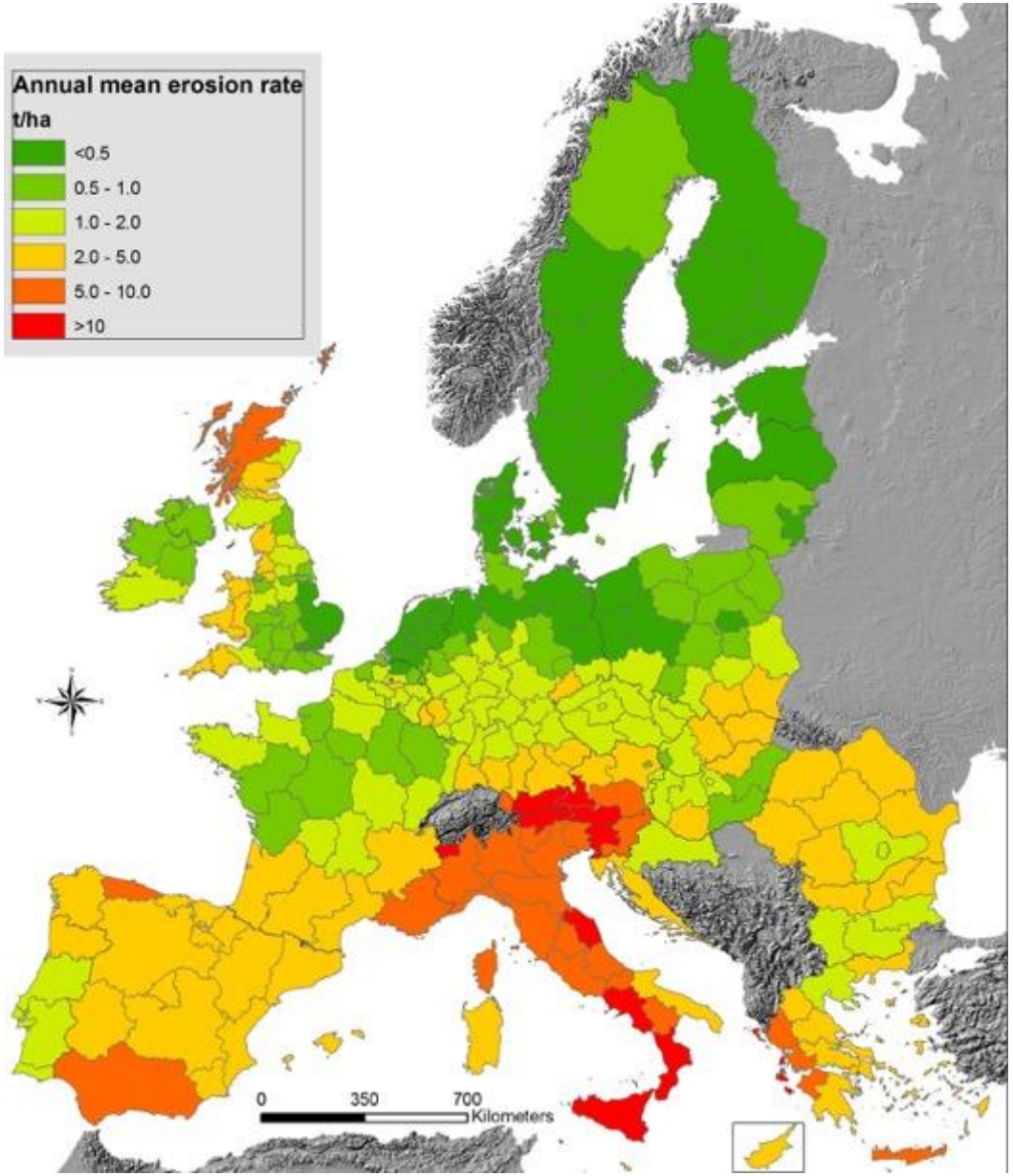
The urgency to act

Soils are threatened: **60-70% of all soils in Europe are unhealthy** due to current management practices;
Indirect effects of air pollution and climate change add to that pressure.

EU Examples:

- 2.8 million potential **contaminated sites**, but only 24% inventoried;
- 65-75% of agricultural soils with nutrient inputs at levels risking **eutrophication of soils and water** affecting biodiversity;
- Cropland soils **losing carbon** at a rate of 0.5% per year and 50% of peatlands drained and losing carbon
- 24% of land with **unsustainable water erosion rates**;
- 25% of land at High or Very High risk to **desertification** in Southern, Central and Eastern Europe in 2017
- The **costs associated with soil degradation in the EU exceed 50 billion € per year**.

Soil Loss by water erosion (2016)



Average EU-28: **2.45 t ha^{-1} yr^{-1}** (in the erosive prone areas: 90% of EU)

Data produced for years: **2000 – 2010 – 2016**

Mean erosion rate in agricultural areas: 3.2 t ha^{-1} yr^{-1}

Soil formation rate: 1.0-2.0 t ha^{-1} yr^{-1}

24% of EU lands have rates >2 t ha^{-1} yr^{-1}

11% of total area contributes to almost 70% of total Soil Loss (hotspots)

2000-2010: decrease by 9% in erosion rates

- 1/3 due to increase of forestlands (decrease of croplands)
- 2/3 due to change of management practices (proposed by *GAEC/CAP, Soil Thematic Strategy)*

2010-2016: decrease by 0.4% in erosion rates

Outlook: A more incisive set of soil conservation measures is needed to mitigate soil erosion across the EU.

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Management practices for soil conservation

Low erosive | **Medium erosive** | **High erosive**

0.05	0.15	0.20	0.22-0.25	0.30 -0.32	0.35	0.38	0.50
Permanent Grasslands	Other fodder areas (Alfa,etc)	Wheat, Barley	Olives, other Fruits..	Energy crop, sunflower	Sugar beets, Potatoes		Maize, Tobacco







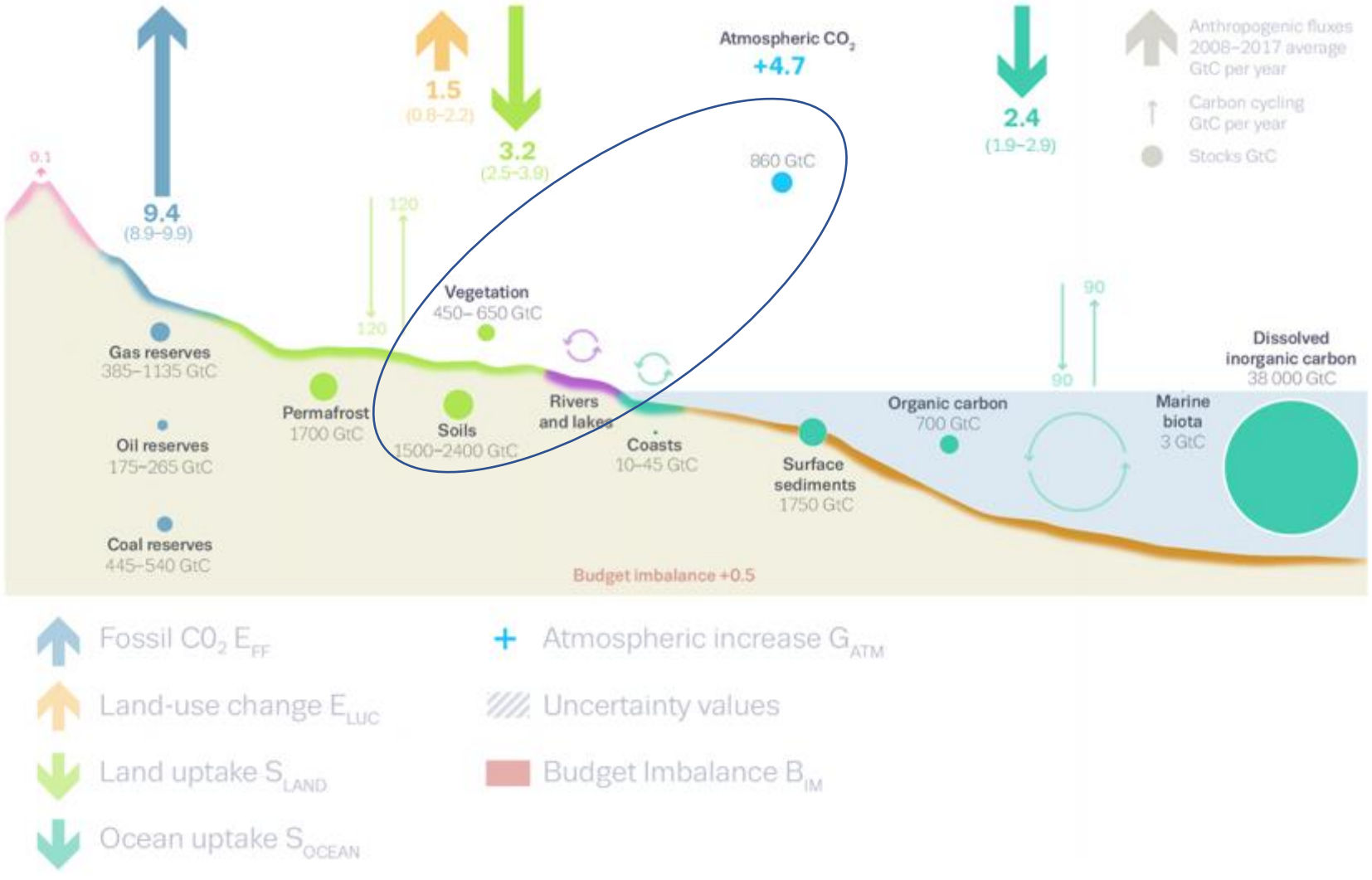
Modelled Management practices against erosion

-65%	-12%	-20%	-25%	-10-15%(density)	-40% - 5%(slope)
Reduced Tillage	Plant Residues	Cover Crops	Stone walls	Grass margins	Contour farming






The global carbon balance



C. Le Quéré et al.: Global Carbon Budget 2018

Soils contain:

- 2-3 time more carbon than the atmosphere
- and more than 3 time of carbon than vegetation

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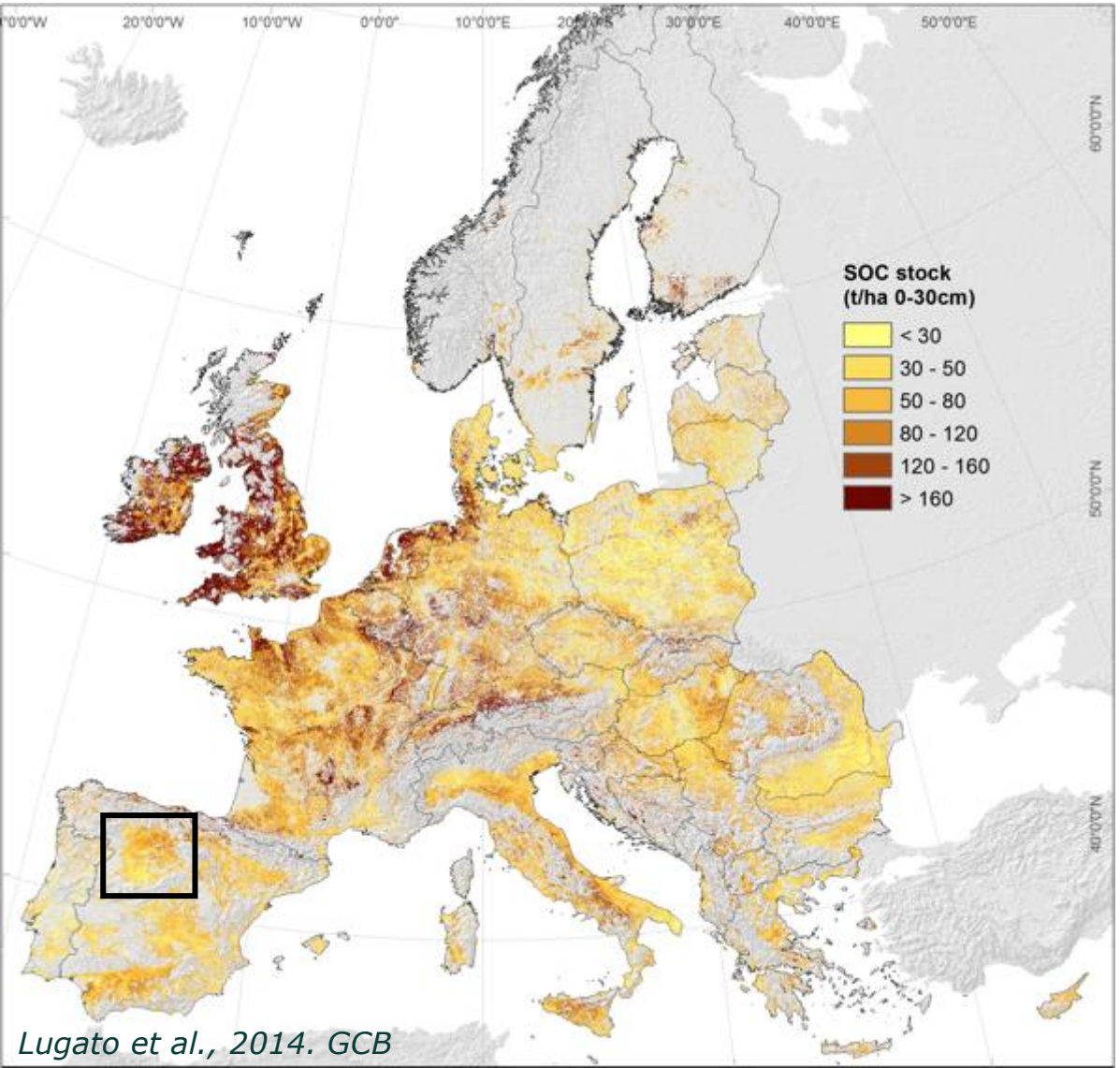
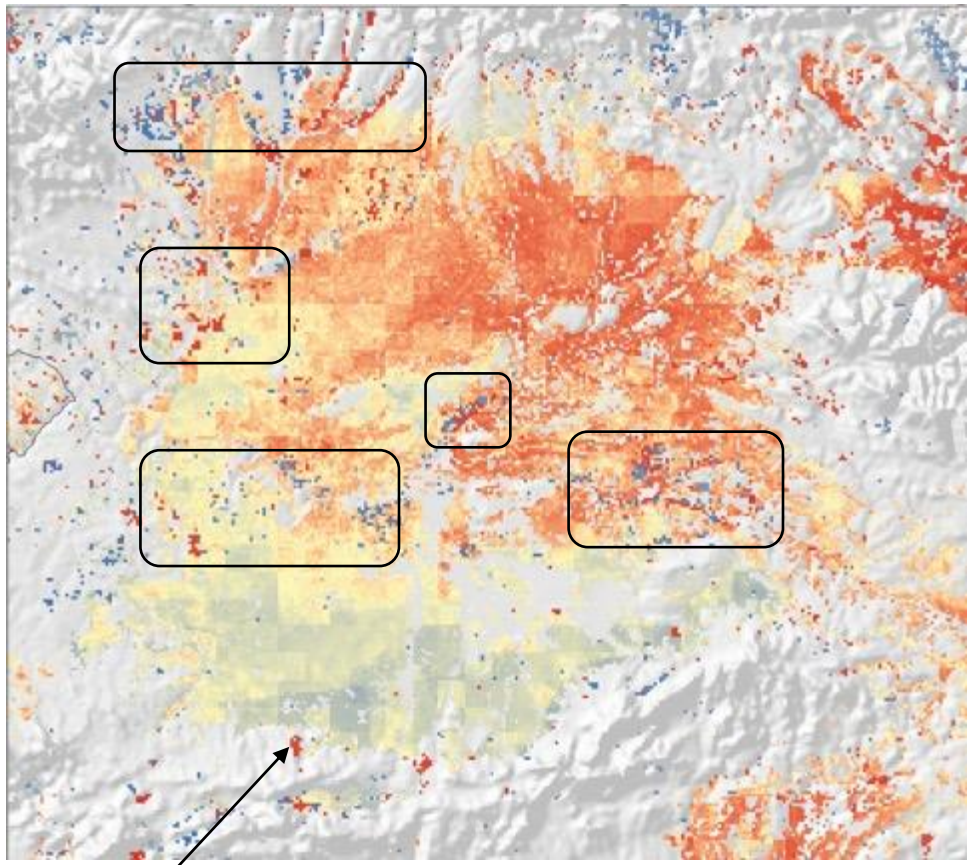
JRC (D.3) is modelling the current soil organic carbon stock and changes

Current SOC stock in agricultural soils



Lugato et al., 2014. GCB

SOC changes 2015-1990



Smooth changes

Land use change

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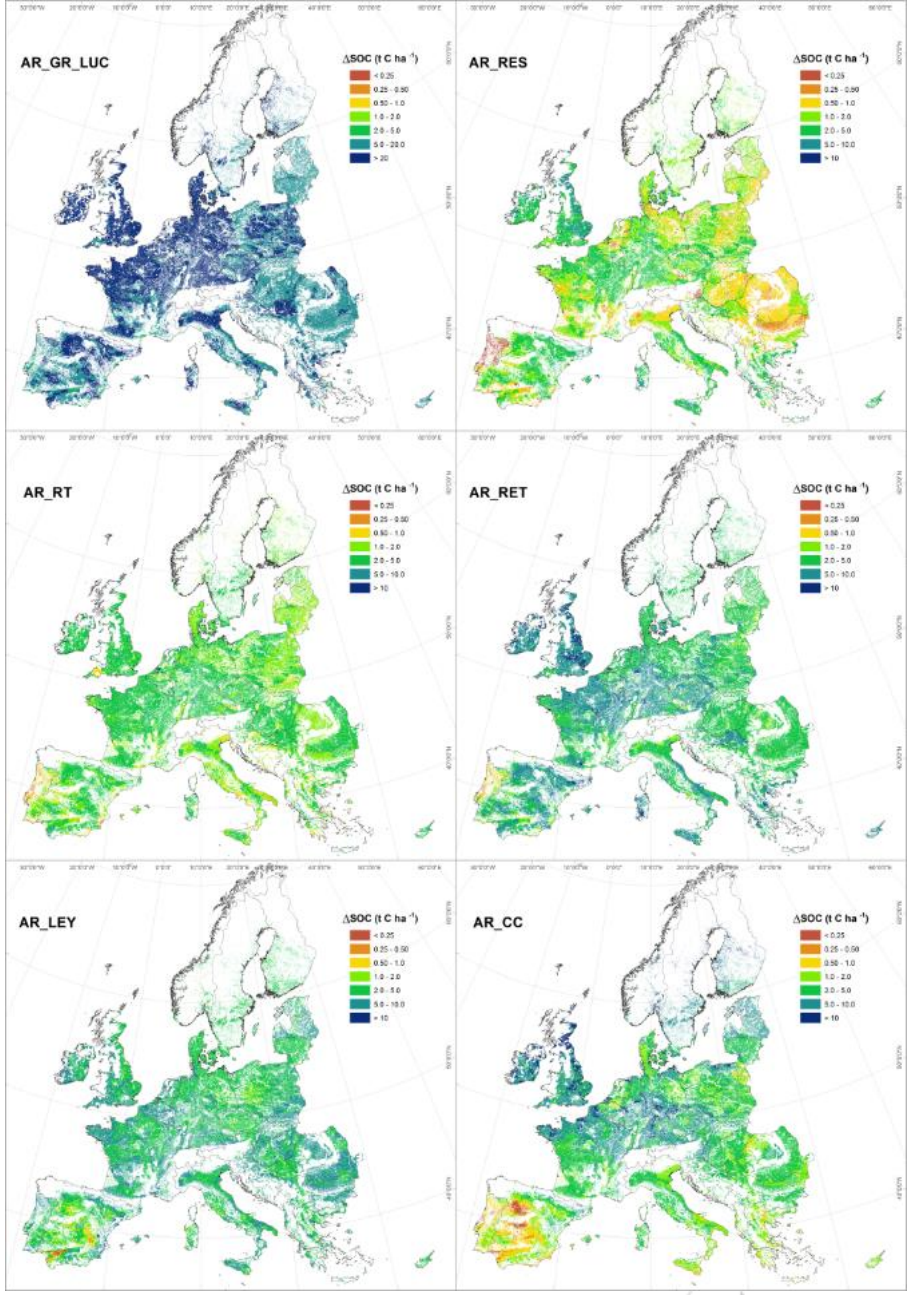
Scenario analysis of mitigation potential under agricultural management

(carbon sequestration by 2050)

1) Conversion from arable to grassland (**LUC_AR_GR**);
2) Crop residue management (**AR_RES**);
3) Reduced tillage scenario (**AR_RT**)
4) Combined residue incorporation + reduced tillage (**AR_RET**);
5) Ley in rotation (**AR_LEY**);
6) Cover crop (**AR_CC**);



Lugato et al., 2014. GCB

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Soil management within the EU Green Deal

EU 2030 Biodiversity strategy

30% of land in Europe as protected areas

Planting 3 billion trees by 2030

Increasing organic farming and biodiversity-rich landscape features on agricultural land

Reducing the use and risk of pesticides by 50% by 2030

From Farm to Fork

Reduce by 50% the use of more hazardous pesticides by 2030

Reduce Nutrient losses by at least 50%

Reduce fertilizer use by at least 20% by 2030.

The European Climate Law

Reduce CO_2 emissions
Increase sink of soils & wetlands

The European Green Deal

Erosion 2 times higher than soil formation

Carbon stocks in peatlands might be reduced by 13-36%

Earthworms affected by land use intensity

Cadmium in fertilisers
Copper in vineyards

23% of EU soils have critical high densities in subsoils

2.43% of EU lands are sealed

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EU SOIL OBSERVATORY (EUSO)

Target

Operational EU soil monitoring system supporting soil related EU policies fully integrated with National soil monitoring systems in MS

Future deliverables

- ❑ **EU soil status reporting (in collaboration with EEA)**
- ❑ **Soil pollution indicators** (Zero Pollution Strategy)
- ❑ indicators in relation to the **soil aspects** of the **European Green Deal** including the **Farm to Fork**, **Biodiversity** and **Climate Change** Strategies

Implementation

Available

- **ESDAC** as the primary soil knowledge hub for the EU and global data
- **Coordination of EU-wide and global sampling surveys**
  LUCAS Soil since 2009, Africa in 2020
- **Modelling and indicator development**

Missing

- **Integration with EU MS's National soil monitoring systems**

FPI | ESTAT | CLIMA | ENV | AGRI | DEVCO | SANTE

European Green Deal
- Biodiversity Strategy 2030
- Zero Pollution Strategy

European Climate Law

Farm to Fork strategy's international dimensions

Stronger Europe in the World
- Comprehensive Strategy on Africa

Protecting our European Way of Life
- Cooperation towards Sustainable Growth

EU SOIL OBSERVATORY: KEY COMPONENTS

Horizon Europe and Mission

Integrated Monitoring

Indicator for Policy Options

Supporting Citizen Engagement

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Measure success with appropriate indicators

Goal: By 2030, at least 75% of all soils in each EU Member State are healthy, i.e. are able to provide essential ecosystem services (100% increase in healthy soils).

Specific objectives include:

- **Restore 50% of degraded land**
- High **soil organic carbon stocks are conserved** and current carbon concentration increased by 0.1-0.4% per year
- **No net soil sealing** and an increased **re-use of urban soils** for urban development from the current rate of 13% to 50%
- **Reduced soil pollution** and a doubling of the rate of **restoration of polluted sites**
- **Prevention of erosion** on 30 to 50% of land with unsustainable erosion rates
- Improve **habitat quality for soil biota** and crops including a 30 to 50% reduction in soils with high-density subsoils
- 20-40% **reduced global footprint** of EU's food and timber imports on land degradation

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Thanks

Questions?

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http://esdac.jrc.ec.europa.eu