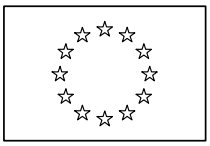

EUROPEAN COMMISSION

Brussels, 13.2.2012
COM(2012) 46 final

# REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

## The implementation of the Soil Thematic Strategy and ongoing activities

**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS**

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## 1. INTRODUCTION

This report provides an overview of the implementation of the Thematic Strategy for Soil Protection[1] since its adoption in September 2006. The objective of the Strategy is to protect the soil while using it sustainably, through the prevention of further degradation, the preservation of soil function and the restoration of degraded soils. This report also presents current soil degradation trends both in Europe and globally, as well as future challenges to ensure protection.

## 2. THE FOUR PILLARS OF THE STRATEGY – AN UPDATE

### 2.1. Awareness raising

Soil functions – despite their fundamental role for the ecosystem and the economy, and unlike air and water – are taken for granted and perceived to be in abundance. Soil degradation generally goes unnoticed, as it is a slow process in which immediate dramatic effects rarely occur. For these reasons, raising awareness about soil presents a particular challenge. Recently it has been helped by several films and documentaries[2].

The Commission has organised several public events dedicated to soil, including major conferences on soil, climate change and biodiversity, contributions to meetings on the Convention on Biological Diversity, and several talks at Green Week. Moreover, leaflets and brochures have been made available in a number of EU languages[3]. The Commission has also published a number of soil atlases, including the *Soil Atlas of Europe* and the *European Atlas of Soil Biodiversity*. It has also established a working group on Awareness Raising and Education in the context of the European Soil Bureau Network (ESBN)[4].

The Strategy has acted as an important driver for numerous soil awareness raising tools and networks that have been developed in Member States, including the European Network for Soil Awareness (ENSA).

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1 COM(2006) 231.

2 For example Dirt (USA), Humus (Austria), Solutions locales pour un désastre global (France), and Il suolo minacciato (Italy).

3 More information at http://ec.europa.eu/environment/soil/index_en.htm.

4 http://eusoils.jrc.ec.europa.eu/esbn/Esbn_overview.html.

## 2.2. Research

Since the adoption of the Strategy, around 25 research projects have been funded under the Seventh Framework Programme for Research[5] specifically to address soil issues and help complete the knowledge base for action. For example, RAMSOIL has identified a number of risk assessment methodologies for soil degradation processes, demonstrating comparability among different methodologies; ENVASSO has proposed minimum requirements for a gradual harmonisation of soil monitoring activities and policy-relevant soil indicators; SOILSERVICE has drawn up long-term land use change scenarios and indicated that intensive agricultural production which fails to pay proper attention to soil biodiversity and soil functions may not be economically profitable after 2050, unless corrective action is taken.

Interesting results are expected from LUCAS, a survey on land cover, land use and agro-environmental indicators[6]. In the 2009 and 2012 surveys, a specific soil module has been integrated in order to provide statistics and indicators for the European Soil Data Centre (ESDAC)[7] hosted by the Joint Research Centre (JRC) of the Commission. This could be a starting point for harmonised European monitoring of soil parameters for a whole range of statistical, research and policy purposes.

The BIOSOIL project, launched in the context of the Forest Focus Regulation[8], has reported an increase in organic carbon in some European forest soils.

## 2.3. Integration

Different Union policies play a key role in working towards the goal of sustainable use of soil. Since the Strategy was adopted, the Commission has continued its work on soil integration, in particular in the context of the following:

- **Common Agricultural Policy (CAP).** Aspects of soil protection have been an integral part of Good Agricultural and Environmental Conditions (GAEC) since the introduction of cross compliance in 2003. Emphasis has been placed on limiting erosion, retaining and improving organic matter, and avoiding compaction. Taking stock of the experience gained, in October 2011 the Commission proposed to further clarify and specify soil-related standards in the context of the overall CAP reform to 2020[9]. In particular, it proposed a new GAEC on organic matter protection, including a ban on arable stubble burning and an obligation not to plough wetlands and carbon-rich soils. Member States have a broad margin of discretion in determining national GAEC obligations for farmers provided that the EU framework is respected[10]. Cross compliance provides for minimum soil protection conditions and, by its nature, cannot adress all soil degradation processes. Rural Development[11] provides for agri-environment schemes which may specifically support soil-protective operations (8.8% of the budget spent in 2007-2008[12]). It is expected that 21.4% of the utilised

5 http://cordis.europa.eu/fp7/projects_en.html.
6 Decision No 1578/2007/EC.
7 http://esdac.jrc.ec.europa.eu/.
8 Regulation (EC) No 2152/2003.
9 http://ec.europa.eu/agriculture/cap-post-2013/legal-proposals/index_en.htm.
10 http://ec.europa.eu/environment/soil/study1_en.htm.
11 Regulation (EC) No. 1698/2005.
12 Rural Development Information System-Indicator Database Information Monitoring.

agricultural area will be covered by measures targeting soil quality in the period 2007-2013, as compared to 30.7% dedicated to avoiding marginalisation and 33.0% to protect biodiversity[13]. There is therefore scope for increasing the uptake of measures to improve soil quality and extend the surface area covered. In addition, the new Rural Development proposal includes the objectives of sustainable management of natural resources and climate mitigation and adaptation, including by means of improved soil management and enhanced carbon sequestration in agriculture and forestry. The greening of the first pillar of the CAP, as proposed by the Commission, would improve the situation further, particularly in relation to erosion and soil organic matter.

- **Industrial installations**. The recently adopted Industrial Emissions Directive (IED)[14] has introduced provisions to ensure that the operation of an installation does not lead to a deterioration in the quality of soil (and groundwater). These provisions set a sort of "zero tolerance" policy for new pollution and underpin the 'polluter pays' principle. However, a large number of potentially polluting activities are not within the scope of the IED, which in any event only covers active installations. A potentially important tool for tracking industrial pollutants is the European Pollutant Release and Transfer Register (E-PRTR)[15]. However, in 2009 only 144 installations reported a release of pollutants to soil, compared to almost 3,000 for water and more than 11,000 for air.

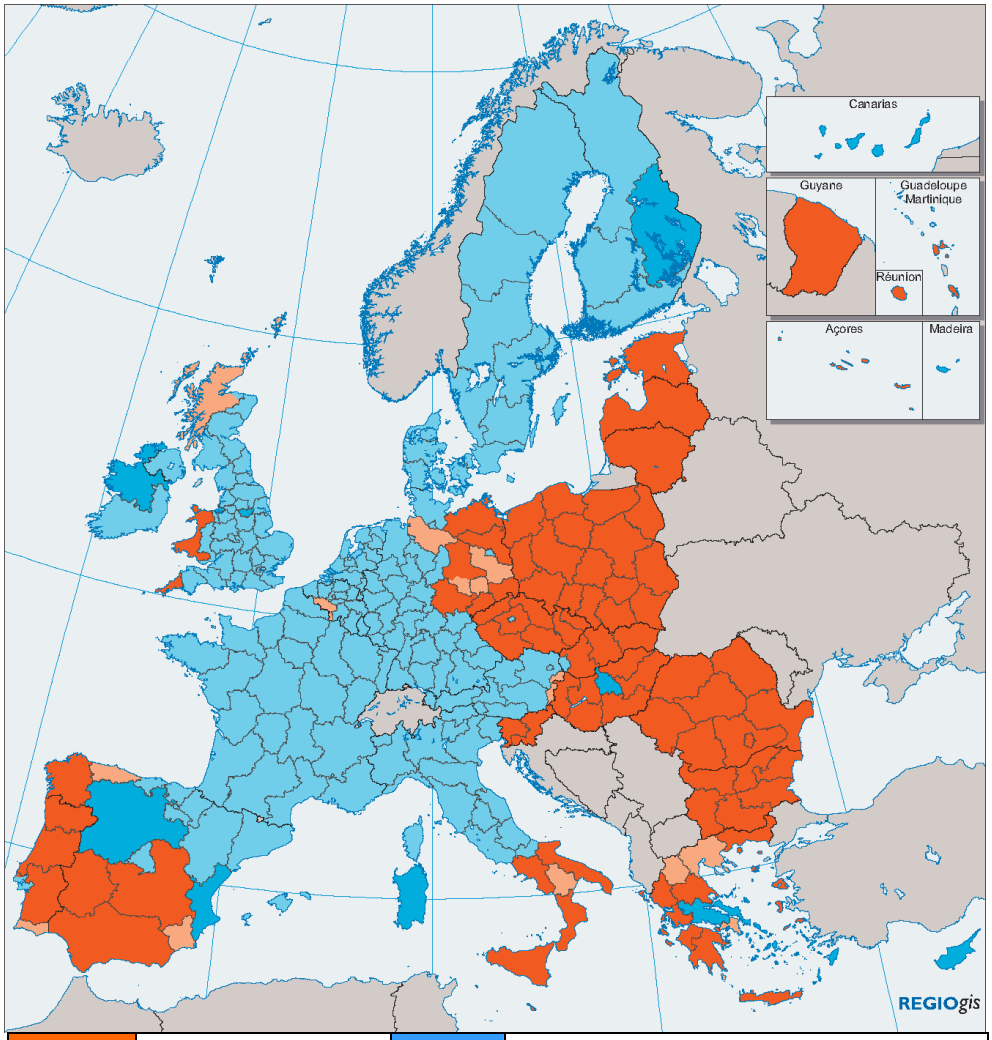
- **Cohesion Policy.** Despite the fact that there is no specific EU legal basis for soil protection, around €3.1 billion have been allocated to the rehabilitation of industrial sites and contaminated land as part of the Cohesion Policy in the period 2007-2013 out of a total of around €49.6 billion of planned EU investments under the Environment theme[16]. Hungary, the Czech Republic and Germany have allocated the most funding (€475, 371, and 332 million respectively). By the end of 2010, Member States had allocated about 28% of funds to specific projects. Thus, considerable resources are available to tackle the EU's industrial legacy in eligible regions (see Figure 1). The Commission has proposed that the Cohesion Funds and the European Regional Development Fund should continue to support the regeneration of brownfield sites in the next programming period 2014-2020[17]. In addition, the EU macro-regional strategies include some specific actions on soil protection (particularly on solid waste).

- **State aids for the remediation of soil contamination.** Member States may grant State aid for carrying out soil remediation under the Environmental aid guidelines[18]. However, such aid can be granted only if the 'polluter pays' principle is fully respected, i.e. the polluter liable for the contamination is unknown or cannot be made to bear the costs. In the period 2005-2010, the Commission deemed several schemes or individual measures aiming at remediating contaminated sites in Austria, Belgium, the Czech Republic, Estonia, Germany, the Netherlands, Slovakia and the United Kingdom to be compatible with the Treaty. It verified that the 'polluter pays'

13 COM(2011) 450.
14 Directive 2010/75/EU.
15 http://prtr.ec.europa.eu/.
16 SEC(2010) 360.
17 COM(2011) 612 and COM(2011) 614.
18 OJ C 82, 1.4.2008, p. 1–33.

principle was properly applied, in particular by ensuring that environmental liabilities were correctly transferred. The total aid thus approved was in excess of €8 billion[19].

*Figure 1: Eligible areas under the Structural Funds (2007-2013)*[20]




## 2.4. Legislation

Based on a need to tackle soil productivity, risks to human health and the environment, and to provide opportunities for climate mitigation and adaptation as well as stimulating business opportunities for soil remediation, the Commission proposed a Soil Framework Directive[21] in 2006, which also addresses the transboundary nature of soil degradation. The European Parliament adopted its first reading on the proposal in November 2007 by a majority of about

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19 Aid above the *de minimis* threshold (currently set at €200,000 over three years) provided for by Regulation (EC) No 1998/2006.

20 http://ec.europa.eu/regional_policy/atlas2007/index_en.htm.

21 COM(2006) 232.

two thirds. At the March 2010 Environment Council, a minority of Member States blocked further progress on grounds of subsidiarity, excessive cost and administrative burden. No further progress has since been made by the Council. The proposal remains on the Council's table.

## 3. SOIL DEGRADATION CONTINUES…

Land degradation in its various forms is a fundamental and persistent problem. The situation in Europe is mirrored and magnified in many parts of the world. It is also a global development issue, as soil degradation, poverty and migration are mutually reinforcing, but that is often largely ignored, because observed impacts are gradual.

### 3.1. … globally…

Desertification, land degradation and drought affect over 1.5 billion people in more than 110 countries, 90% of whom live in low income areas. According to UNEP[22], up to 50,000 km² are lost annually through land degradation, mainly due to soil erosion. Each year, the planet loses 24 billion tonnes of topsoil. Over the last two decades, enough has been lost to cover the entire cropland of the United States. Desertification costs the world more than $40 billion a year in lost productivity[23].

Soil degradation caused by human activities contributes to climate change. It is responsible for 20% of the carbon emitted to the atmosphere between 1850 and 1998[24]. The drainage and conversion of the world's peatlands alone causes emissions of up to 0.8 billion tonnes of carbon a year, much of which could be avoided through restoration[25].

A legacy of contaminated sites is common to all old industrial heartlands, but also affects developing countries and countries with economies in transition. A recent report estimates the number of contaminated sites (mainly waste dumps) in India[26] at 36,000; experts believe that there are between 300,000 and 600,000 contaminated sites in China[27].

### 3.2. … and in the EU

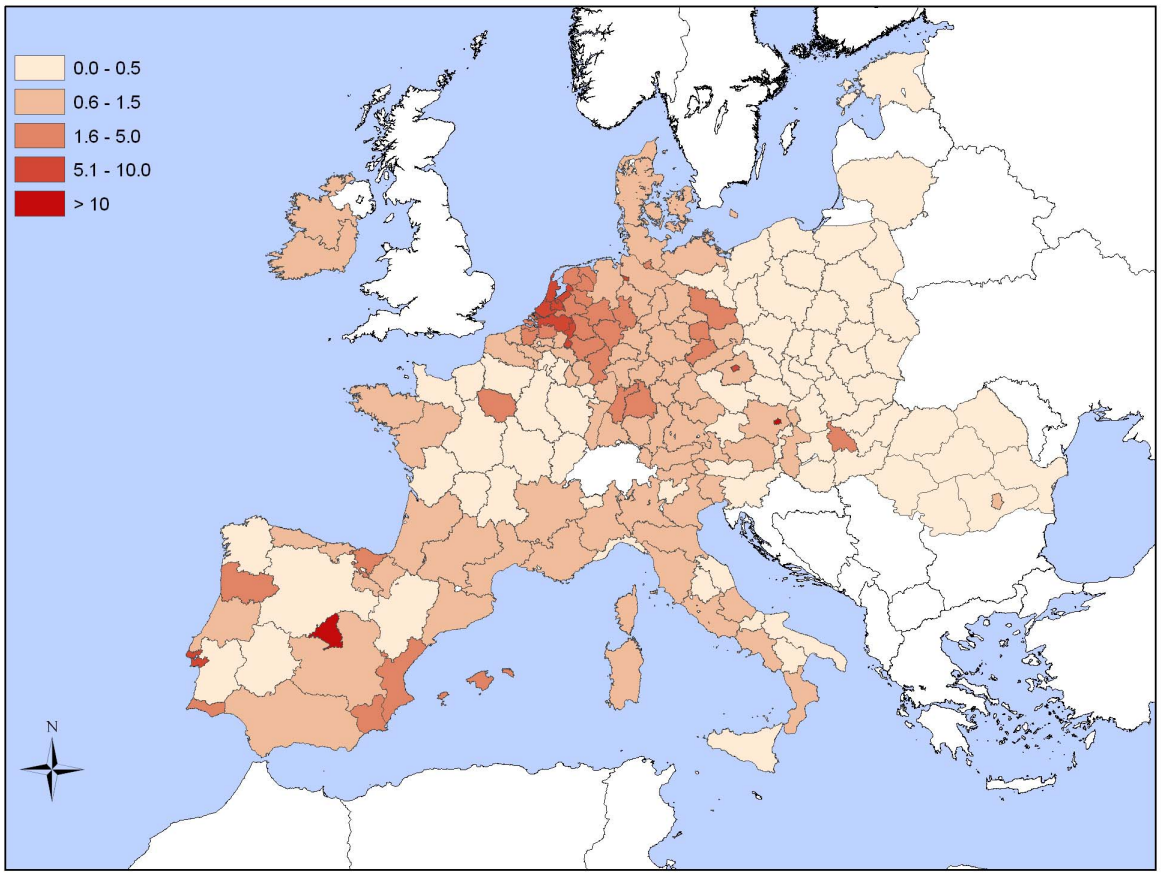
The 2010 Status of the Environment Report of the European Environment Agency demonstrates that soil degradation is increasing[28], as the following examples show:

- **Soil sealing** (the permanent covering of soil with an impermeable material) and associated land take lead to the loss of important soil functions (such as water filtration and storage, and food production). Between 1990 and 2000, at least 275 hectares of soil were lost per day in the EU, amounting to 1,000 km² per year. Between 2000 and 2006, the EU average loss increased by 3%, but by 14% in Ireland

22 http://www.unep.org/geo/GEO4/report/GEO-4_Report_Full_en.pdf.
23 http://www.nyo.unep.org/action/15f.htm.
24 R. Lal (2004), Soil Carbon Sequestration Impacts on Global Climate Change and Food Security, Science 304, 1623-1627.
25 http://ec.europa.eu/environment/soil/pdf/report_conf.pdf.
26 Remediation of contaminated sites. Sharing experiences and international practice feasible for India, APSF, 2011 (http://apsfenvironment.in/).
27 http://www.chinadaily.com.cn/2011-03/10/content_12146168_2.htm.
28 http://www.eea.europa.eu/soer.

and Cyprus, and by 15% in Spain[29]. In the period 1990-2006, 19 Member States lost a potential agricultural production capability equivalent to a total of 6.1 million tonnes of wheat, with large regional variations (see Figure 2). This is a far from insignificant figure, given the levelling off of agricultural productivity increases that has already been experienced and the fact that, to compensate for the loss of one hectare of fertile land in Europe, it would be necessary to bring into use an area up to ten times larger in another part of the world[30].

*Figure 2: Potential wheat yield losses (%) in 19 EU countries (1990-2006).*




- A recent new model of **soil erosion** by water constructed by the JRC has estimated the surface area affected in EU-27 at 1.3 million km² (see Figure 3). Almost 20% of these are subjected to a soil loss in excess of 10 t/ha/y. Erosion is not only a serious problem for soil functions (estimated to cost €53 million per year in the United Kingdom alone[31]); it also has an impact on the quality of freshwater, as it transfers nutrients and pesticides to water bodies. For example, agricultural losses of phosphorus exceed 0.1 kg/ha/y across much of Europe, but reach levels in excess of

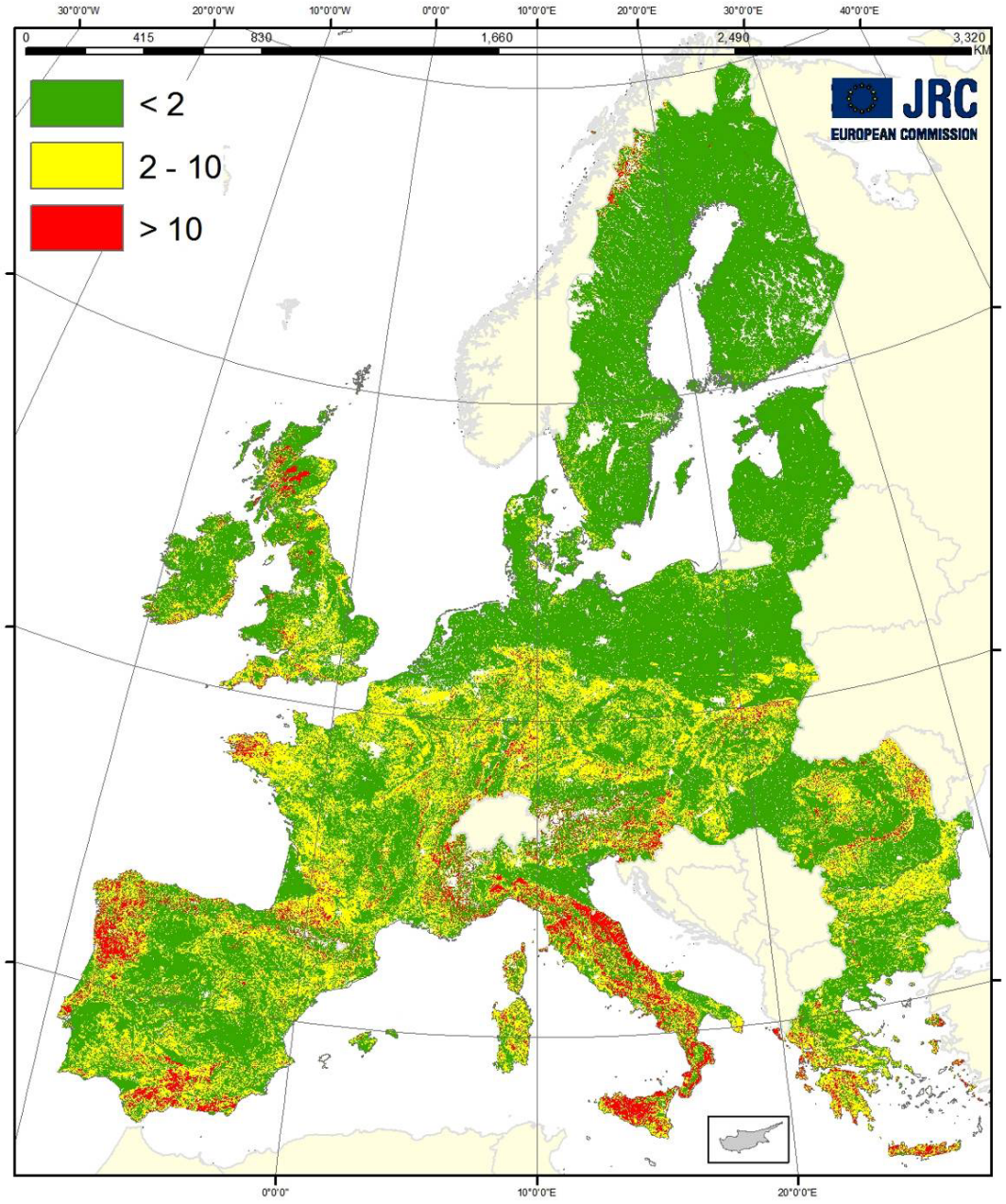
29 http://ec.europa.eu/environment/soil/sealing.htm.

30 C. Gardi, P. Panagos, C. Bosco and D. de Brogniez, Soil Sealing, Land Take and Food Security: Impact assessment of land take in the production of the agricultural sector in Europe, JRC, 2011 (under peer review).

31 Safeguarding our Soils. A Strategy for England, DEFRA, 2009, p. 11.

1.0 kg/ha/y in hotspots[32]. Addressing erosion will thus be a key contribution to achieving EU water objectives. Soil erosion is particularly intensive in forest fires areas, estimated at 500,000 ha/y by the European Forest Fire Information System (EFFIS)[33].

*Figure 3: Soil erosion by water in the EU (t/ha/y).*



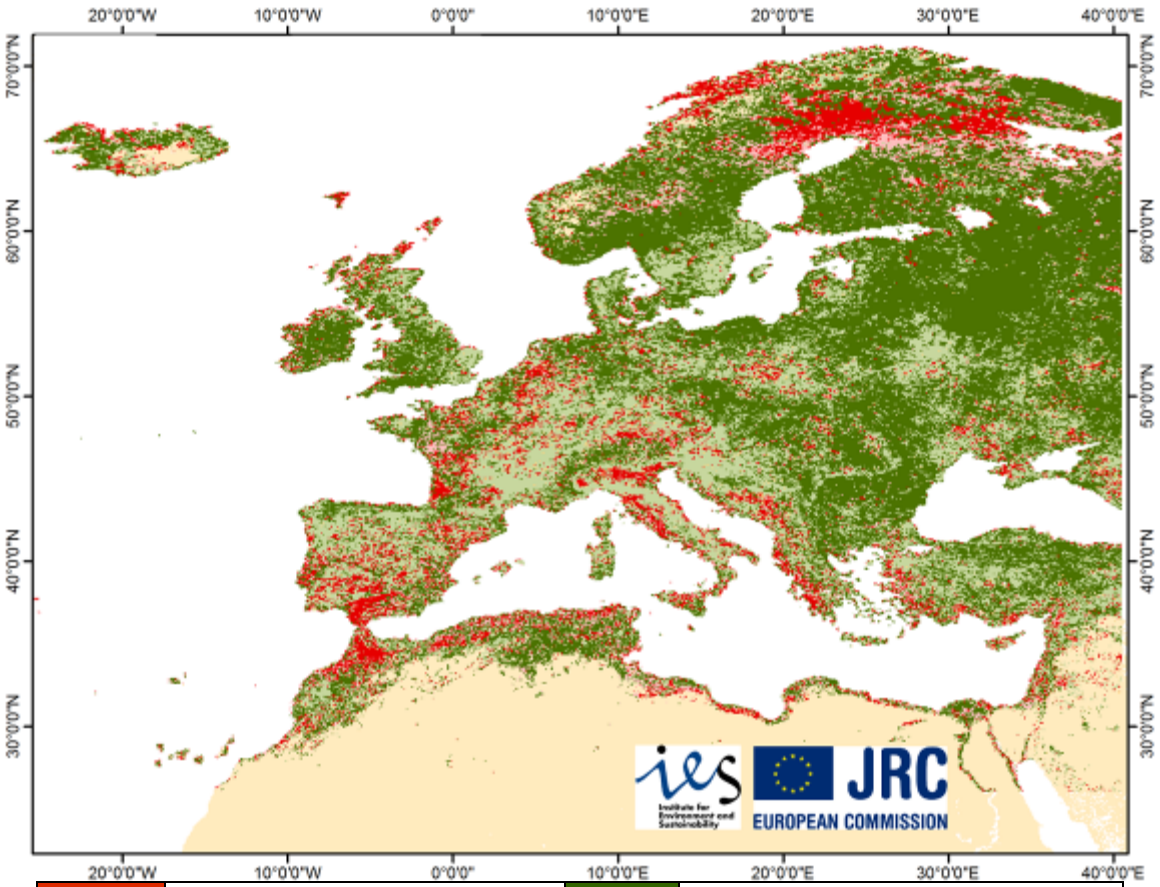

- As an extreme form of land degradation, **desertification** results in a serious impairment of all soil functions. While there is still no scientifically-sound assessment at European level, one factor that contributes to desertification is an

32 http://www.eea.europa.eu/soer/europe/freshwater-quality.

33 http://effis.jrc.ec.europa.eu.

unfavourable trend in productive capacity. Figure 4, produced by the JRC in preparation for the World Atlas of Desertification[34], shows the areas where productive capacity has been constantly decreasing in the past few decades. If confirmed by other factors, this could indicate increasing desertification across Europe.

*Figure 4: Evolution of net primary productivity (1982-2006).*




| | | | |
|---|---|---|---|
| | Unfavourable | | Favourable |
| | Fluctuating (negative) | | Fluctuating (positive) |
| | Bare areas | | |

- While naturally saline soils exist in certain parts of Europe, irrigation water – even if it is of high quality – includes minerals and salts that are gradually accumulated in the soil, causing **salinisation**. The continuing expansion of irrigation – with related problems of water scarcity and the increasing use of groundwater of marginal quality – accelerates salinisation, thereby affecting soil productivity. However, there are no systematic data available on trends across Europe.

[34] http://wad.jrc.ec.europa.eu. The Atlas is due at the end of 2012.

- Deposition of acidifying air pollutants (e.g. ammonia, sulphur dioxide and nitrogen oxides) contributes to **soil acidification**, which lowers the pH of the soil, thereby modifying the soil ecosystem, mobilising heavy metals and reducing crop yields. While air deposition models predict a significant improvement in the period 1990-2010, at least a quarter of the measured samples in a recent assessment of forest monitoring plots showed that critical limits for acidifying substances were being exceeded to a substantial degree. The situation for other soil cover types is not known, as there is no systematic monitoring of soil acidification across Europe for non-forested soils[35].

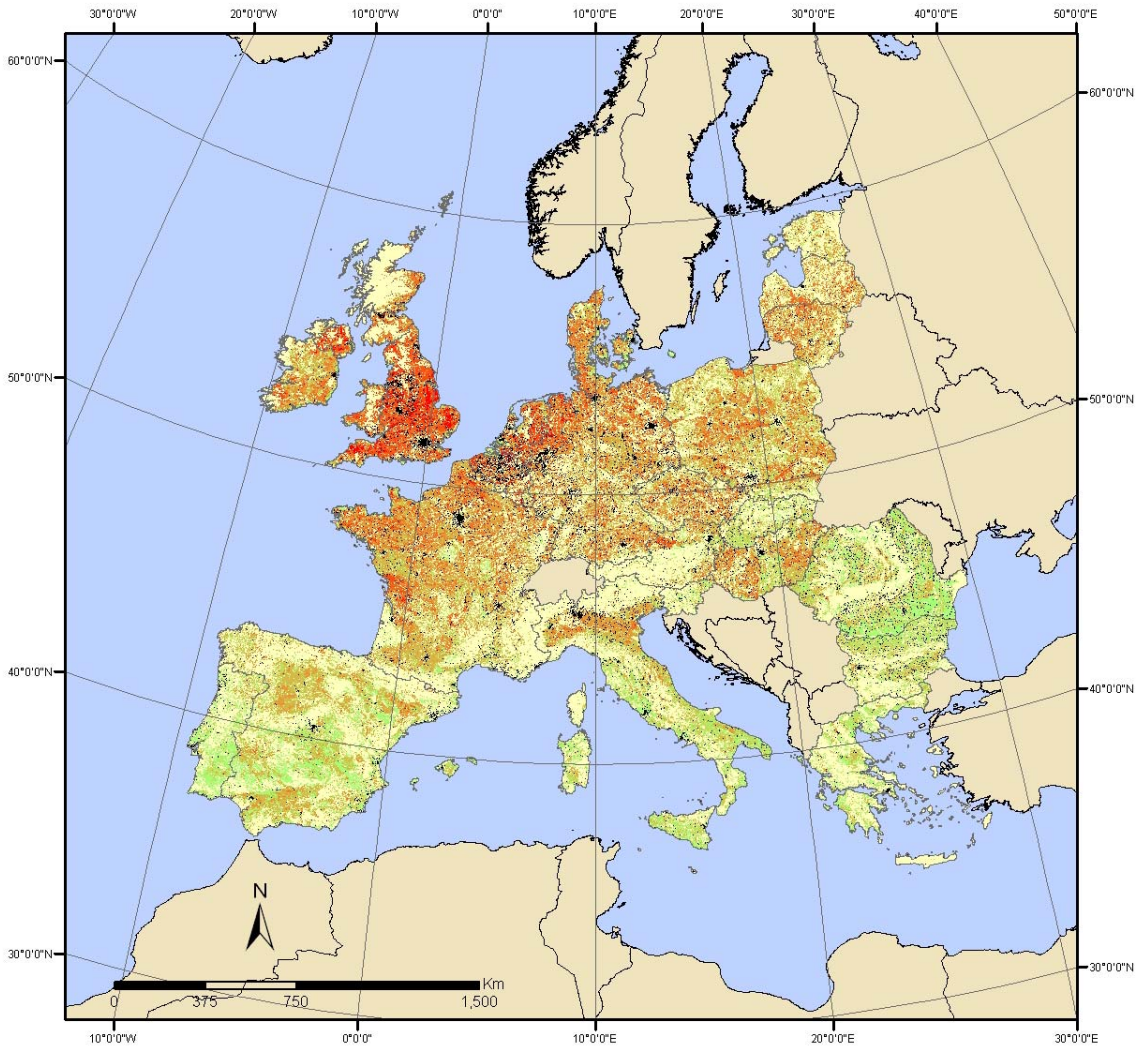
- **Soil biodiversity** provides numerous essential services, including releasing nutrients in forms that can be used by plants and other organisms, purifying water by removing contaminants and pathogens, contributing to the composition of the atmosphere by participating in the carbon cycle, and providing a major source of genetic and chemical resources (e.g. antibiotics). An indicator-based map prepared by the JRC[36] (see Figure 5) shows a preliminary assessment of where soil biodiversity is threatened. This includes areas of high population density and/or intense agricultural activity (e.g. cereals and industrial crops, animal husbandry, greenhouses, fruit orchards, vineyards and horticulture).

- **Landslides** are a major threat in mountainous and hilly areas across Europe (land abandonment being an aggravating factor), often producing serious impacts on population, property and infrastructure. Over 630,000 landslides are currently registered in national databases. The areas prone to landslides are shown in Figure 6.

- It is difficult to quantify the full extent of local **soil contamination**, as the vast majority of Member States lack comprehensive inventories, although this is covered by the proposed Soil Framework Directive. In 2006, the European Environment Agency estimated that there were a total of three million potentially contaminated sites in the EU, of which 250,000 were actually contaminated. Remediation is progressing, although there are wide variations between Member States, reflecting the presence or absence of national legislation. It has been estimated that, in 2004, the turn-over of the soil remediation industry in EU-27 amounted to €5.2 billion, of which 21.6% spent in Germany, 20.5% in the Netherlands, and 5.9% each in France and the United Kingdom[37].

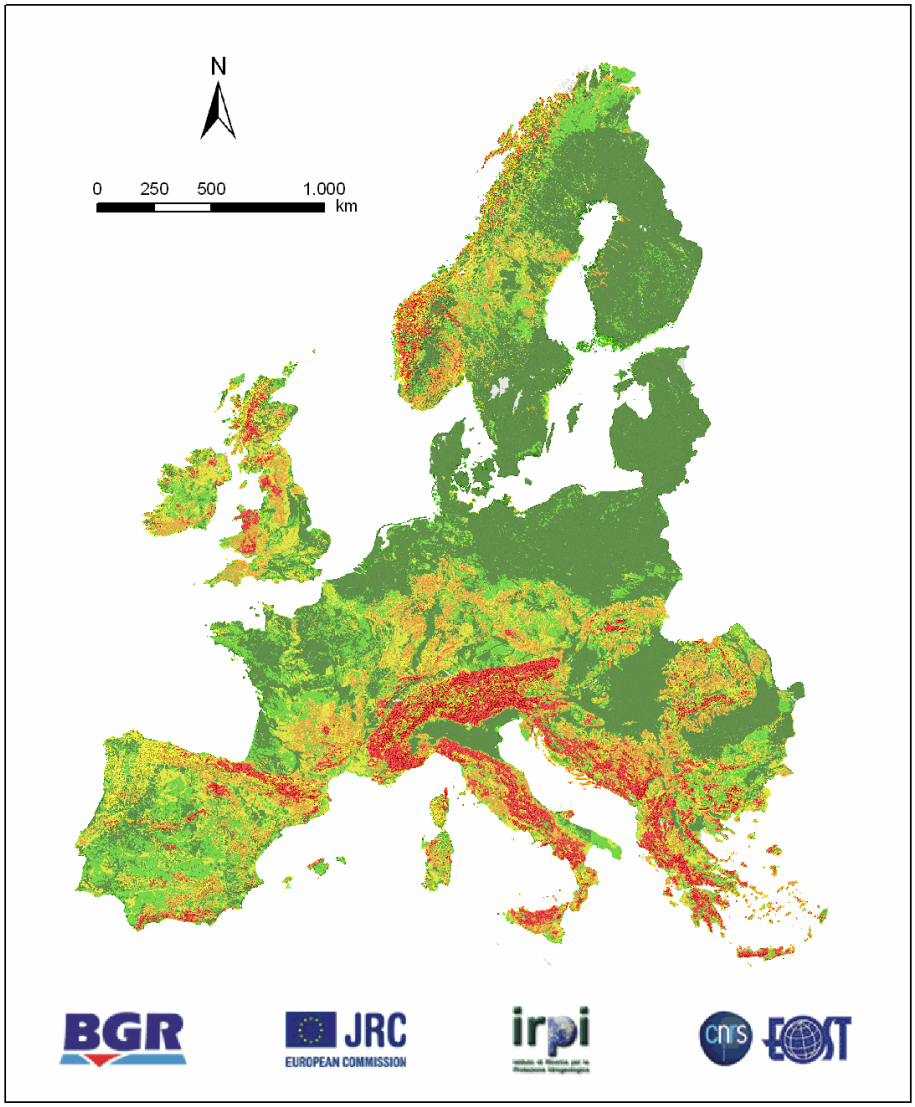
35 http://www.eea.europa.eu/soer/europe/soil, p. 16.
36 http://eusoils.jrc.ec.europa.eu/library/maps/biodiversity_atlas/index.html, p. 62-63.
37 http://ec.europa.eu/environment/enveco/eco_industry/pdf/ecoindustry2006.pdf (Table 3, p. 30).

*Figure 5: Potential threats to soil biodiversity.*




| | | | |
|---|---|---|---|
| | Extremely low | | High |
| | Very low | | Very high |
| | Low | | Extremely high |
| | Intermediate / moderate | | |

*Figure 6: Landslide susceptibility in the EU and neighbouring countries (preliminary map)*[38].




| | | | |
|---|---|---|---|
| | Very low | | Moderately high |
| | Low | | High to very high |
| | Moderately low | | |

38 A. Günther, M. Van Den Eeckhaut, P. Reichenbach, J. Hervás, J.P. Malet, C. Foster, F. Guzzetti, New developments in harmonized landslide susceptibility mapping over Europe in the framework of the European Soil Thematic Strategy. Proc. Second World Landslide Forum, Rome, 3-7 October 2011 (in press).

## 4. CURRENT AND UPCOMING CHALLENGES

Both in the EU and worldwide, soil degradation has increased in the past decade. This trend is likely to continue unless several factors are addressed:

- **Land use.** The growth in world population, the rising consumption of meat and dairy products in the emerging economies, and the increased use of biomass for energy and other industrial purposes, will all lead to increased global land use and potential soil degradation. At the same time, weather events linked to climate change, desertification and land take for urbanisation and infrastructure will exacerbate this trend. This matters to Europe because competition for land and water resources creates serious risks of geopolitical imbalances. In addition, land degradation leads to a global decrease in the amount of multi-functional land. The EU will thus be even more dependent in future on its finite land resources – which include some of the most fertile soils in the world – and on their sustainable use.

- **Preservation of soil organic matter.** EU soils contain more than 70 billion tonnes of organic carbon, which is equivalent to almost 50 times our annual greenhouse gas emissions. However, intensive and continuous arable production may lead to a decline of soil organic matter. In 2009, European cropland emitted an average of 0.45 tonnes of $CO_2$ per hectare (much of which resulted from land conversion)[39]. The conversion of peatlands and their use is particularly worrying. For instance, although only 8% of farmland in Germany is on peatland, it is responsible for about 30% of the total greenhouse gas emissions of its whole farming sector[40]. However, with appropriate management practices, soil organic matter can be maintained and even increased. Apart from peatlands, particular attention should be paid to the preservation of permanent pastures and the management of forests soils, as carbon age in the latter can be as high as 400-1,000 years[41]. Keeping carbon stocks is thus essential for the fulfilment of present and future emission reduction commitments of the EU.

- **A more efficient use of resources.** Agriculture is highly dependent on soil fertility and nutrients availability. For example, it used 20-30 million tonnes of phosphorus annually over the last thirty years, largely coming from outside the EU. Phosphate fertilisers used in the EU do contain cadmium impurities, which accumulate in soil. At the same time, large amounts of manure, bio-waste and sewage sludge are produced every year, and are sometimes disposed of despite the fact that they contain nutrients and organic matter. A way forward to address security of supply, improve soil conditions and limit cadmium pollution is to ensure a proper collection, treatment and use of these wastes and residues.

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39 http://www.eea.europa.eu/publications/european-union-greenhouse-gas-inventory-2011.

40 http://ec.europa.eu/environment/soil/pdf/report_conf.pdf, p. 17.

41 *Ibid.*, p. 13.

## 5. ONGOING ACTIVITIES

The challenges outlined above and the fact that soil degradation in Europe continues, make it important that the EU improves the way in which it deals with soil-related issues, particularly in the absence of Union legislation. Whilst the Soil Thematic Strategy has helped raise the profile of these issues, there is still no systematic monitoring and protection of soil quality across Europe some five years after its adoption. This means that knowledge about the status and quality of soils remains fragmented and soil protection is not undertaken in an effective and coherent way in all Member States.

For its part, the Commission is continuing with the following activities in line with the Strategy:

- **Awareness raising** initiatives (e.g. conferences, publications, public campaigns), training for young researchers, integration of soil and soil protection aspects in EU-funded information and training events, and specific soil deliverables for the rotating Presidencies of the Council (e.g. information material on national soil types).

- Supporting **research** projects, particularly in the areas of landslides, soil sealing, soil functions and their link to biodiversity, the soil carbon and nitrogen cycles (with a focus on peatland restoration), soil fertility, and nutrients recycling in agriculture. Continuing to expand the activities of the European Soil Data Centre which hosts soil data and information at European level.

- To consolidate harmonised soil **monitoring** for a variety of purposes, including food security and safety, diffuse contamination, and climate change adaptation and mitigation, the Commission is considering repeating soil investigations at regular intervals (five-ten years), also by using new remote-sensing techniques. This harmonised monitoring will be implemented in synergy with the Monitoring Mechanism Decision[42] currently being revised. The Global Monitoring for Environment and Security (GMES) programme[43] will also be a source of information, particularly on soil sealing.

- Further **integration** of soil protection in different policies. The Commission is developing a *European Innovation Partnership on Agriculture Productivity and Sustainability* with a particular focus on land management, including the efficient use of resources and sustainable use of agricultural soil. It will work in the context of the *EU Biodiversity Strategy to 2020*[44] to improve knowledge and raise awareness about soil biodiversity. It is actively engaged with Member States in discussing the soil-related measures in the Resource Efficiency Roadmap[45], the CAP and Regional Policy. Lastly, it will finalise guidelines on how to limit, mitigate and compensate soil sealing, which will support the development of the Blueprint to Safeguard Europe's Water[46] and be used in the implementation of Cohesion Policy.

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42 Decision No 280/2004/EC.
43 Regulation (EU) No 911/2010.
44 COM(2011) 244.
45 COM(2011) 571.
46 http://ec.europa.eu/environment/water/blueprint/index_en.htm.

- On **legislation**, the Commission in 2012 will review the Environmental Impact Assessment Directive[47], which will provide an opportunity for better integrating soil concerns at an early stage of project planning. Furthermore, it will consider how to devise incentives to reduce carbon emissions and maintaining soil organic matter by accounting for the land use, land use change and forestry (LULUCF) sector as part of the EU's climate change commitment for 2020.

- In addition to domestic action, the Commission will work at the **international level** to promote the establishment of an inter-governmental panel on soils in the context of the FAO-sponsored Global Soil Partnership[48]. Along with Germany and the Secretariat of the United Nations Convention to Combat Desertification (UNCCD), the Commission is actively supporting an initiative on the economics of land degradation[49] to set out incentives for investment in sustainable land management policies. In addition, it will assess the desirability of declaring the EU an affected party under that Convention[50].

The European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions are invited to submit their views on this report in order to protect European soils, while at the same time ensuring their sustainable use.

47 Directive 85/337/EEC.
48 http://www.fao.org/news/story/en/item/89277/icode/.
49 http://www.ifpri.org/blog/economics-land-degradation.
50 Bulgaria, Cyprus, Greece, Hungary, Italy, Latvia, Malta, Portugal, Romania, Slovakia, Slovenia and Spain have declared to be affected by desertification under the UNCCD.