

# Science for Environment Policy

## New map of soil loss by water erosion across Europe

**Soil erosion is an important issue in Europe**, with consequences for water quality, ecosystem services supply and crop production. In this study, researchers enhanced an existing model to estimate soil loss and create an updated map of soil erosion across the EU. The authors say the tool can simulate the effects of land use changes and management practices and will support effective policy decisions.

**When the rate of [soil](#) loss exceeds the rate of soil formation**, it causes land degradation. This process of soil erosion is changing the landscape and reducing the supply of environmental services. The continued and unsustainable loss of soil has consequences for natural ecosystems, biodiversity, food production and climate, leading the European Commission to adopt a [Soil Thematic Strategy](#) to protect soils across the EU. Alongside this, a number of policy initiatives have called for quantitative assessments of soil rates across Europe, including the [Common Agricultural Policy](#), [Europe 2020](#) and the [7<sup>th</sup> Environmental Action Programme](#).

Modelling approaches are currently used to assess soil erosion and are based on the main factors that cause soil loss, including precipitation, type of soil, and land management<sup>1</sup>. The most frequently used erosion model is the [Revised Universal Soil Loss Equation](#) (RUSLE), which estimates long-term average annual soil loss and can predict the effects of different scenarios. This study aimed to develop a new [map of soil loss](#) across the EU by improving the input factors of RUSLE.

The updated model, called RUSLE2015, estimated soil loss in Europe for 2010. Its five inputs – Rainfall erosivity, Soil erodibility, Cover management, Topography and Support practices – were updated with the most recent European datasets. All inputs were high-resolution (100 metre) and peer-reviewed.

The authors then applied the model to produce a soil loss map for the EU. The map showed that the EU has a mean annual soil loss rate around 2.46 tonnes per hectare<sup>2</sup>, amounting to a total loss of approximately 970 megatonnes (Mt). The areas with the highest rates of soil loss include the Mediterranean and Alpine regions of Slovenia and western Austria, due to high intensity rainfall and steep landscapes.

Spatial analysis also showed which types of land lose the most soil. Croplands have a mean annual soil loss similar to shrublands, while pastures have significantly lower rates. In forests, there was almost no soil erosion. The greatest rates of soil loss were found in sparsely vegetated areas.

The map highlighted areas that require special attention. The authors say special protection measures are needed in the 5.2% of land areas suffering severe soil loss (over 10 t/h/yr), which contribute to 52% of the total soil loss in Europe, and recommend measures such as afforestation or re-vegetation of sparsely vegetated areas. A further 14 million hectares (12.7%) of arable lands currently have soil loss rates greater than 5 t/ha/year. A layer of at least 0.4 mm is eroded each year from those areas, which are in urgent need of sustainable management practices.

A key benefit to the updated version of the model is its ability to consider the effects of different policy options. This includes the impact of the Good Agricultural and Environmental Condition (GAEC) requirements of the Common Agricultural Policy (CAP)<sup>3</sup>.

*Continued on next page.*



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**Contact:**  
[panos.panagos@jrc.ec.europa.eu](mailto:panos.panagos@jrc.ec.europa.eu)

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1. This article refers to soil loss due to water, the majority cause of soil erosion.
2. This excludes non-erosion prone areas, such as urban areas, bare rocks, glaciers and water bodies.
3. Panagos, P., Borrelli, P., Robinson, D.A. Common Agricultural Policy: Tackling soil loss across Europe. *Nature* 526, 195 (07 October 2015). doi:10.1038/526195d



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The GAEC includes mandatory soil-protection measures including reduced tillage and contour farming. The authors say implementation of GAEC in agricultural lands has helped to significantly reduce soil loss rates. From 2003–2010, it reduced soil loss across the EU by 9.5%, and by over 20% in arable lands. The management practices with the greatest impact on soil loss rates were the reduced and no-tillage practices, which are currently applied in over 25% of agricultural lands in the EU.

To view the map of soil loss in the EU, visit:  
[http://esdac.jrc.ec.europa.eu/public\\_path/RUSLE2015\\_news.png](http://esdac.jrc.ec.europa.eu/public_path/RUSLE2015_news.png)

