

# Science for Environment Policy

## High soil carbon in Natura 2000 sites brings potential for climate-smart conservation

**Natura 2000 sites have, on average, 10% more carbon in their topsoil than non-protected areas**, according to new research. They also generally have lower economic value for agriculture. The results suggest that there is significant potential to develop win-win biodiversity conservation and climate change mitigation efforts within the EU.

**Biodiversity loss and the effects of climate change are major environmental challenges.** Linking biodiversity conservation within protected areas and the mitigation of climate change — 'climate-smart conservation' — is therefore desirable in order to improve the cost-effectiveness of both strategies.

In this study, researchers assessed to what extent areas of high soil carbon correspond with the Natura 2000 protected area network. [Natura 2000](#) is an integral part of the EU's biodiversity conservation strategy. It is the world's largest network of protected areas, covering 18% of the land area within the EU. As well as biodiversity, the EU's 2020 Biodiversity Strategy<sup>1</sup> covers the protection of ecosystem services, such as carbon storage. The [EU's climate strategy](#) proposes storage of carbon in soils and [forests](#) and the protection of carbon-rich ecosystems. The [Soil Thematic Strategy](#) also outlines the actions required to protect soil across the EU<sup>2</sup>. The Natura 2000 network has been estimated to have a carbon storage potential of 9.6 billion tonnes of carbon. Areas of Europe with high biodiversity, high carbon content and lower land value are the most cost effective for conservation and mitigating climate change.

The researchers mapped the coverage of Natura 2000 sites along with the carbon content within topsoil across the EU for 25 EU Member States (Croatia and Cyprus were excluded due to a lack of data). The soil data were provided by the [European Soil Data Centre](#) (ESDAC) and categorised into low, medium or high carbon content across the regions mapped. They also gathered data on [agricultural](#) land prices from the EU's [Farm Accountancy Data Network](#) (FADN).

The results indicate that Natura 2000 sites tend to have a higher carbon content within topsoil — on average 10% more than non-protected areas. They also have lower agricultural land values — on average 15% lower than unprotected sites. This is most likely due to protected areas being established on less productive land. Given the economic importance of arable land within Europe, areas that are more suitable for agriculture have a higher value. Areas with lower land values are more desirable for climate smart conservation as they are cheaper to convert into protected areas, with less economic importance as agricultural land.

Regions with the highest potential for climate-smart conservation are mainly in northern and eastern Europe, which have the largest areas of high carbon and protected areas at lower land costs.

The study only examined carbon within topsoil, and so did not consider carbon contained within vegetation or deeper in the soil. The study is also limited by the relatively coarse scale of the land-value analysis, which focuses on 1-kilometre grid squares and, therefore, may exclude small-scale variations in land values within regions.

Overall, the study results suggest that, in line with EU guidelines<sup>3</sup>, Natura 2000 sites should be managed to ensure soil carbon stocks are restored and enhanced. In addition, less expensive land areas with high soil carbon outside the Natura 2000 network comprise around 330 000 square kilometres. Future conservation planning could, therefore, consider areas outside the Natura 2000 network with high carbon content and adjacent to existing protected areas. The researchers say these areas have significant potential to develop climate-smart conservation within Europe.



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1 The EU Biodiversity Strategy to 2020 (PDF):

<http://ec.europa.eu/environment/nature/info/pubs/docs/brochures/2020%20Biod%20brochure%20final%20lowres.pdf>

2. [http://ec.europa.eu/environment/soil/three\\_en.htm](http://ec.europa.eu/environment/soil/three_en.htm)

3 Guidelines on Climate Change and Natura 2000 (PDF):

<http://ec.europa.eu/environment/nature/climatechange/pdf/Guidance%20document.pdf>