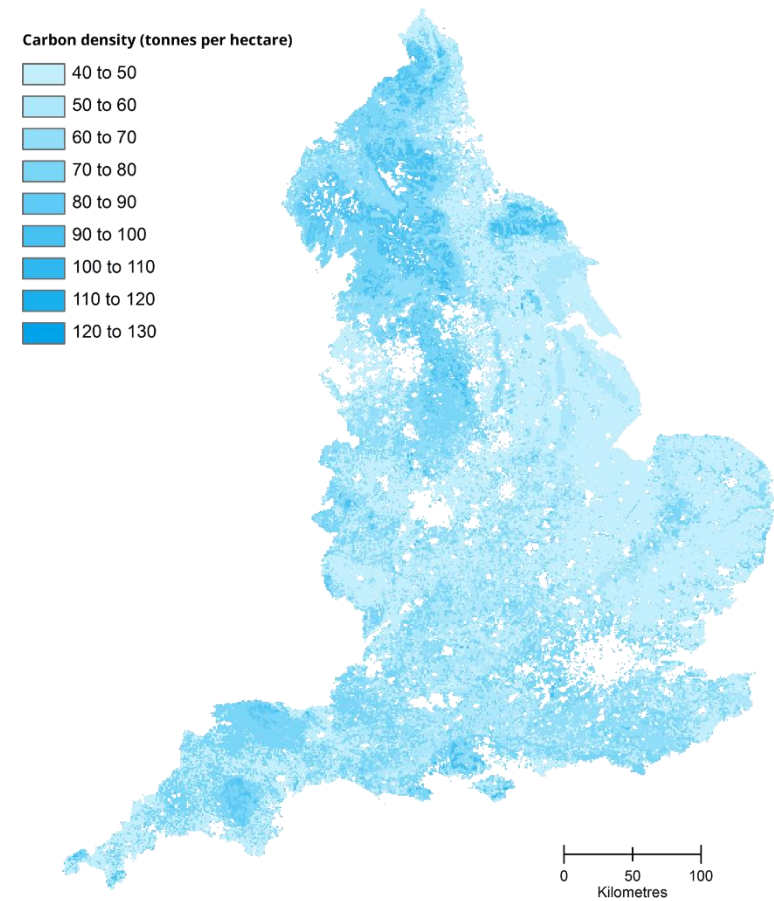
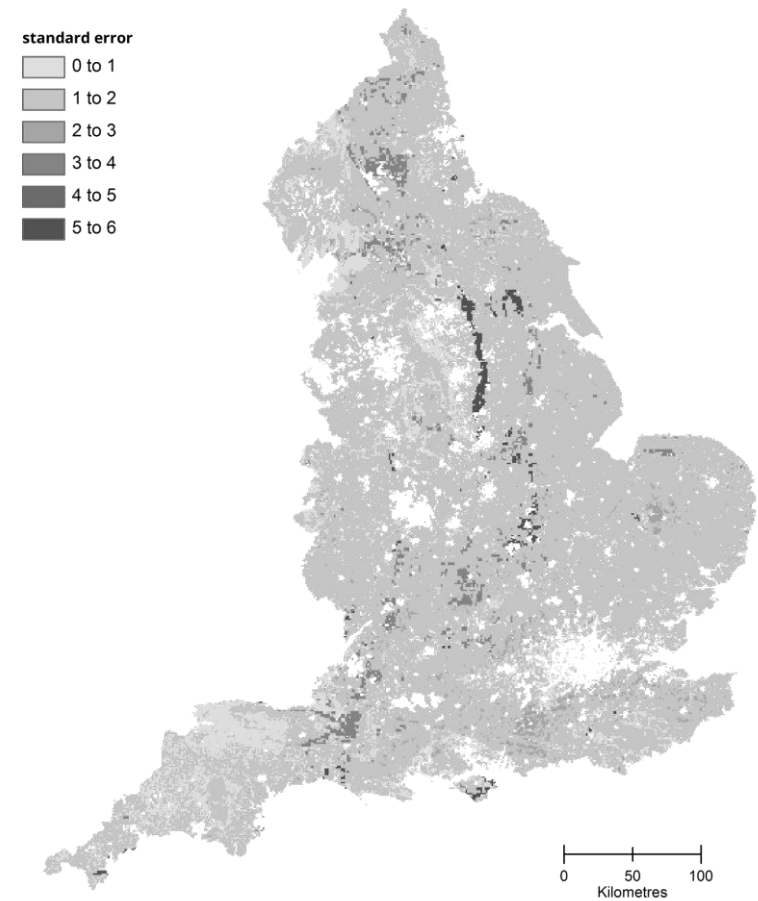


Soil carbon

Mean estimates of carbon density in topsoil (0-15cm depth)



Uncertainty: Standard error from the mean estimates



Soil carbon

Mean estimates of carbon density in topsoil (tonnes per hectare).

What does this map show?

Mean estimates of topsoil (0-15cm depth) carbon density in tonnes per hectare. Soil organic carbon is essential to soil function due to its role as the primary energy source in soils and in maintaining soil structural condition, resilience and water retention. As soil carbon is the biosphere's largest carbon reservoir, soils play a vital role in climate regulation.

The UK National Ecosystem Assessment (UKNEA 2011) recognises soil carbon as a key component of natural capital for supporting ecosystem services, in particular soil formation, primary production and nutrient cycling, as well as the water cycle, through its effect on water storage in soil. The supporting services underpin the delivery of provisioning and regulating ecosystem services; soil carbon is particularly important for climate regulation and soil quality. The UKNEA found that it is well established that loss of carbon from soil, due to climate warming, with increased rates of organic matter decomposition and leaching, is a threat to soil formation.

Certain habitat types are associated with greater densities of soil carbon; these include acid grassland, coniferous woodland, bogs and heathland. Soil carbon is found at lower densities in arable habitats and improved grassland [\[4\]](#). The map reflects this variation with greater carbon densities in upland peatland areas of England and lower densities in areas where arable crops or pastoral systems dominate. Soil carbon has high spatial variability. The standard error map gives an indication of the uncertainty in the estimated values shown on the mean carbon density map; the greater the standard error the greater the uncertainty.

How was this map produced?

This map was produced using measurements of carbon from soil collected in the Centre for Ecology & Hydrology Countryside Survey (2007) at 2614 sample locations across GB, within 591 1km squares. Measurements were extrapolated up to a national level using statistical analysis. This extrapolation was based on carbon density values associated with a combination of habitat type and soil parent material: the geological material, bedrock, superficial and drift, from which soil develops.

What are the limitations of this map?

1. Areas such as urban and littoral rock are not sampled by Countryside Survey and therefore have no associated data. These areas are shown in white on the map.
2. In some circumstances sample sizes for particular habitat/parent material combinations were insufficient to estimate mean values. These areas are also shown in white on the map.
3. The map shows mean values at a 1 km square resolution. The standard error attributed to the mean estimates is only valid at 1km square resolution. The standard error at different resolutions is unknown.

4. The values for each 1 km square are generated from a statistical model of samples from approximately 591 1 km squares. Hence the map does not show direct measurements at all locations.

Further detail on the steps for creating this map

1. Top soil (0-15cm depth) cores were taken from 2614 Countryside Survey sample locations within 591 1km squares [\[1,2\]](#).
2. Carbon density was calculated for each core, by combining measurements of carbon concentration with bulk density (grams of soil per cm³) [\[1,2\]](#).
3. Areas of each unique combination of broad habitat (as documented by JNCC [\[3\]](#)) and parent material, were identified using data derived from the Land Cover Map 2007 [\[4\]](#) and Parent Material Model 2009 [\[5\]](#), respectively for each 1km square.
4. Values for carbon density from Countryside Survey sampled locations were then combined with habitat/parent material data.
5. Using a statistical model (a generalized additive model [\[6\]](#)), a mean estimate of carbon density for each unique combination of habitat and parent material, was extrapolated across the whole of England.
6. The statistical model was also used to produce an associated standard error map. High values reflect high variability and hence greater uncertainty in the mean estimates.

How to obtain the data

Data can be downloaded from <https://eip.ceh.ac.uk/naturalengland-ncmaps>.

Reuse of the data is subject to the terms of the [Open Government Licence](#) and you must cite:

Henrys, P.A.; Keith, A.M.; Robinson, D.A.; Emmett, B.A. (2012). Model estimates of topsoil carbon [Countryside Survey]. NERC Environmental Information Data Centre.
<http://doi.org/10.5285/9e4451f8-23d3-40dc-9302-73e30ad3dd76>

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