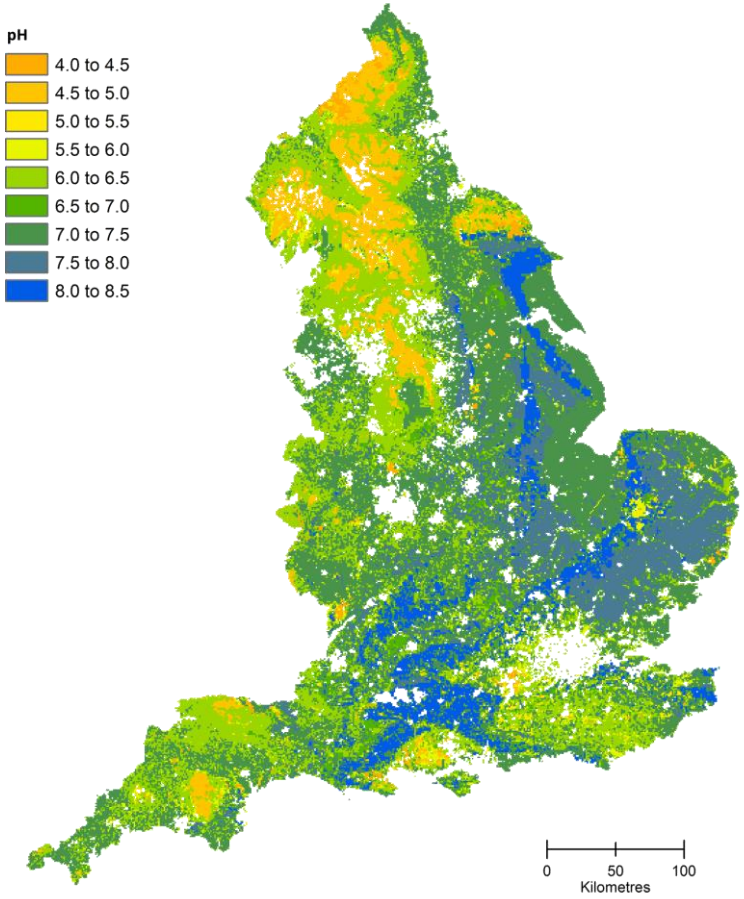
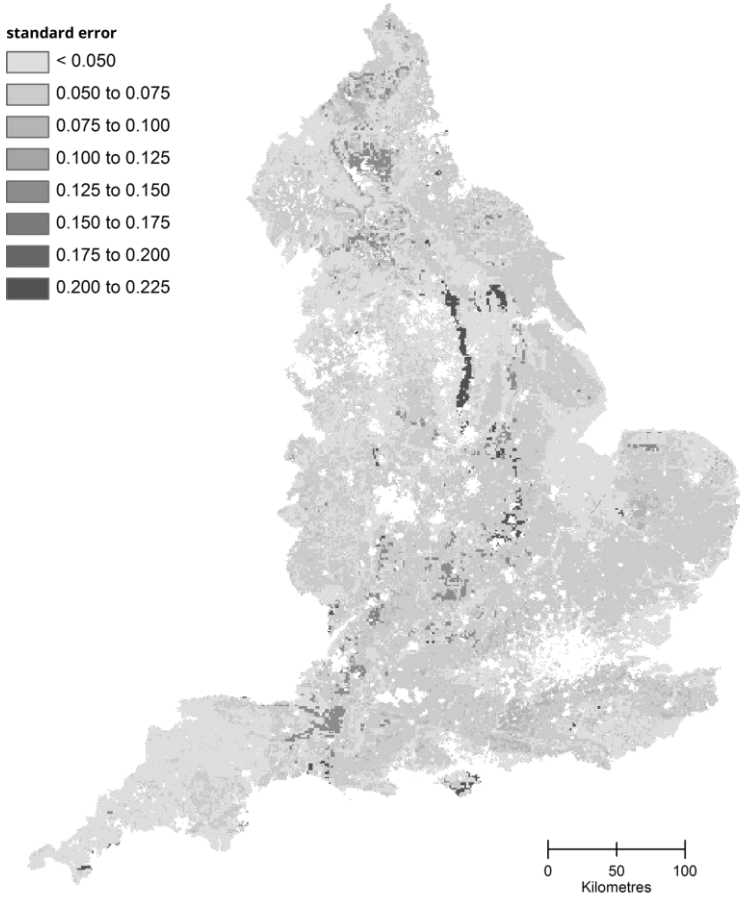
Soil pH

Mean estimates of topsoil pH (0-15cm depth)



Uncertainty: Standard error from the mean estimates



Soil pH
Mean estimates of topsoil pH.

What does this map show?

Mean estimates of pH in topsoil (0-15cm depth). Measures of pH give an indication of soil acidity. Soil pH also affects the concentrations of trace elements in soils; in general most trace elements become more available to plants and microbes in neutral or slightly acidic soils.

The UK National Ecosystem Assessment (UKNEA 2011) recognises soil pH as a key component of natural capital for supporting ecosystem services, in particular nutrient cycling, as well as soil formation and primary production. The supporting services underpin the delivery of provisioning and regulating ecosystem services; soil pH is particularly important for food, fibre and energy from agriculture and forestry, soil quality and water quality. The UKNEA notes, that it is well established that there has been a recent decrease in soil acidity due to declines in sulphate deposition and "acid rain" since the late 1970's.

Soils beneath enclosed farmland broad habitats (including arable habitats, improved and semi-improved neutral grassland) are the least acid in England with pH generally >6. More acidic soils (pH<5) are associated with upland habitats such as acid grassland, bog and heathland [1]. The map reflects these differences showing, for instance, soils with higher pH in East Anglia and lower pH in upland areas in the North West.

Soil pH has high spatial variability. The standard error map gives an indication of the uncertainty in the estimated values shown on the mean pH map; the greater the standard error the greater the uncertainty.

How was this map produced?

This map was produced by using measurements of pH from soil 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 pH 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. Topsoil pH was measured for each core [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 soil pH 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 soil pH 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 pH and bulk density [Countryside Survey]. NERC Environmental Information Data Centre. http://doi.org/10.5285/5dd624a9-55c9-4cc0-b366-d335991073c7

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