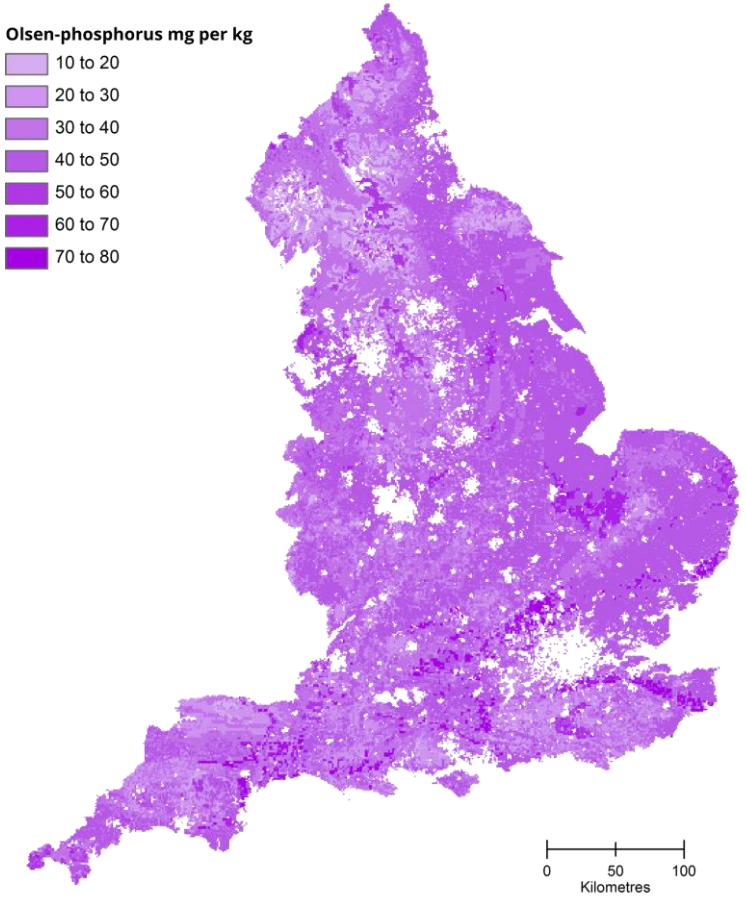
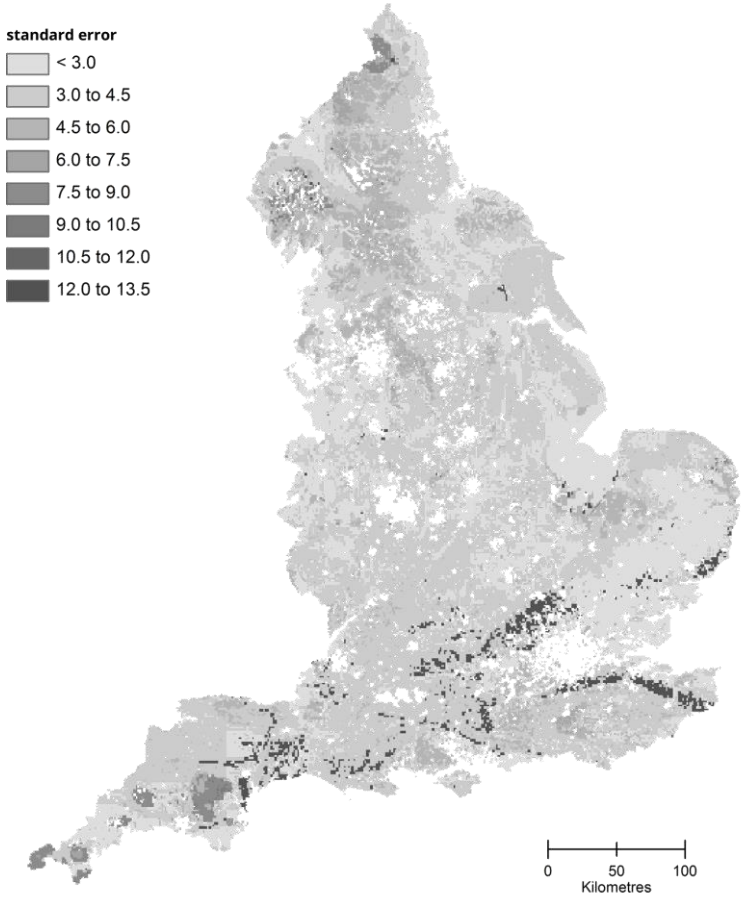
Soil phosphorus

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



Uncertainty: Standard error from the mean estimates



Soil phosphorus
Mean estimates of phosphorus concentration in topsoil.

What does this map show?

Mean estimates of Olsen-phosphorus concentration in topsoil (0-15cm depth) in milligrams per kg dry soil. This was calculated using the Olsen-phosphorus method, which is a measure of the amount of soil phosphorus available to plants.

The UK National Ecosystem Assessment (UKNEA 2011) recognises phosphorus in soil 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 phosphorus particularly influences food, fibre and energy from agriculture and forestry, soil quality and water quality.

Soil phosphorus provides an index of fertility of agricultural soils, phosphorus concentration varies across habitat type but is greatest in soil from arable habitats and improved grassland [1]. It would be expected that areas of managed agricultural land in southern and eastern England would have greater phosphorus concentrations and could be distinguished from semi-natural areas in the north and west. In habitats such as grasslands, high soil phosphorus concentrations can constrain the restoration of plant species diversity.

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

How was this map produced?

This map was produced by using measurements of Olsen-phosphorus from soil collected in the Centre for Ecology & Hydrology Countryside Survey (2007), at 1054 sample locations across GB, within 256 1km squares. Measurements were extrapolated up to a national level using statistical analysis. This extrapolation was based on phosphorus concentration 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 256 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 1054 Countryside Survey sample locations within 256 1km squares [1,2].

2. Olsen-phosphorus concentration was calculated for each core to measure the amount of soil phosphorus available to plants. [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 Olsen-phosphorus concentration 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 phosphorus concentration 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 nutrients [Countryside Survey]. NERC Environmental Information Data Centre. http://doi.org/10.5285/7055965b-7fe5-442b-902d-63193cbe001c

References

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