

Carbon management by land and marine managers

England's soils, vegetation and coastal systems store significant amounts of carbon and play a vital role in regulating our climate. By helping to protect these ecosystems from degradation and loss, land and marine managers can help mitigate the causes of climate change.

What was done

We undertook a wide-ranging review of the scientific evidence on how land and marine managers can protect carbon stores and enhance carbon sequestration (that is, the process by which CO₂ is absorbed from the atmosphere and stored in soils and vegetation). Focussing on five key ecosystems - peatlands, woodlands, agricultural soils, coasts and marine, we:

- assessed how much CO₂ and other greenhouse gases are emitted and stored according to the way each ecosystem is used and managed;
- determined how land and marine managers can protect and enhance natural carbon stores; and
- reviewed the potential for land and marine managers to engage with the emerging carbon market.

As far as we are aware, this is the first time that such a review has been undertaken for England.

Results and conclusions

The review identified five key findings:

- **Peatlands are England's most important carbon store.** However peatlands also emit significant amounts of CO₂ when they are degraded. This report has estimated that in England's lowland fens alone, degraded peatlands could release between **2.8 and 5.8 million tonnes** of CO₂ each year. This is

significantly higher than is currently recorded in the UK's formal Greenhouse Gas Inventory, which does not even account for any further potential carbon losses from degraded peat bogs in England's uplands.



Bog species - Moorthwaite © Natural England

- **Peatland restoration will reduce carbon losses.** However, there is a need for more information on how much methane is emitted from restored peatland sites. Methane is a more potent greenhouse gas than carbon dioxide and will reduce or counteract carbon savings in some situations. More research is needed to establish the greenhouse gas benefits of restoration before carbon revenues could be generated on a large scale.
- **Woodlands make the most important contribution to CO₂ sequestration in the UK.** The evidence suggests that bringing neglected woodlands into management for bio-energy and low-carbon products will deliver more carbon benefits than

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widespread tree planting. New markets for wood products could also generate additional income streams for farmers while increasing biodiversity.

- **Increasing carbon storage in agricultural soils has limited potential.** Practices that could make a contribution include changing tillage (for example adopting farming techniques where the land is not ploughed or turned), increasing organic returns (applying farmyard manure and other organic matter to increase the soil's organic carbon) and taking some land out of cultivation (including allowing buffer strips at the edges of fields). However, the evidence that permanent greenhouse gas benefits can be gained from such changes is weak. Consideration of the extent to which food production could be displaced also needs to be taken into account.
- **Coastal and marine ecosystems are vital global carbon stores.** However, we do not currently have sufficiently strong evidence on the carbon benefits from maintaining, restoring and creating these habitats. More research is required before this potential can be quantified.

Natural England's viewpoint

Carbon management by land and marine managers could deliver significant benefits for climate change mitigation and the provision of a range of ecosystem services. It also offers potential new market opportunities for those who manage England's land and marine systems. However, to realise these opportunities in full, the following actions need to be taken:

- **Develop the evidence base.** The gaps in our understanding need to be bridged. A comprehensive research programme is needed. This should focus initially on UK peatlands.
- **Engage with the carbon markets.** We need to develop methodologies so that it is possible to verify the carbon savings from projects that restore or enhance carbon stores. These projects will also have to demonstrate that they are additional (i.e. would not have taken place without carbon funding).

- **Raise the profile of carbon stores.** It is important for policy makers to understand the potential contribution that carbon stores can make to climate change mitigation while also delivering other benefits.

Selected references

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Further information

For the full details of the research covered by this information note see Natural England Research Report NERR026 - *Carbon management by land and marine managers*.

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