



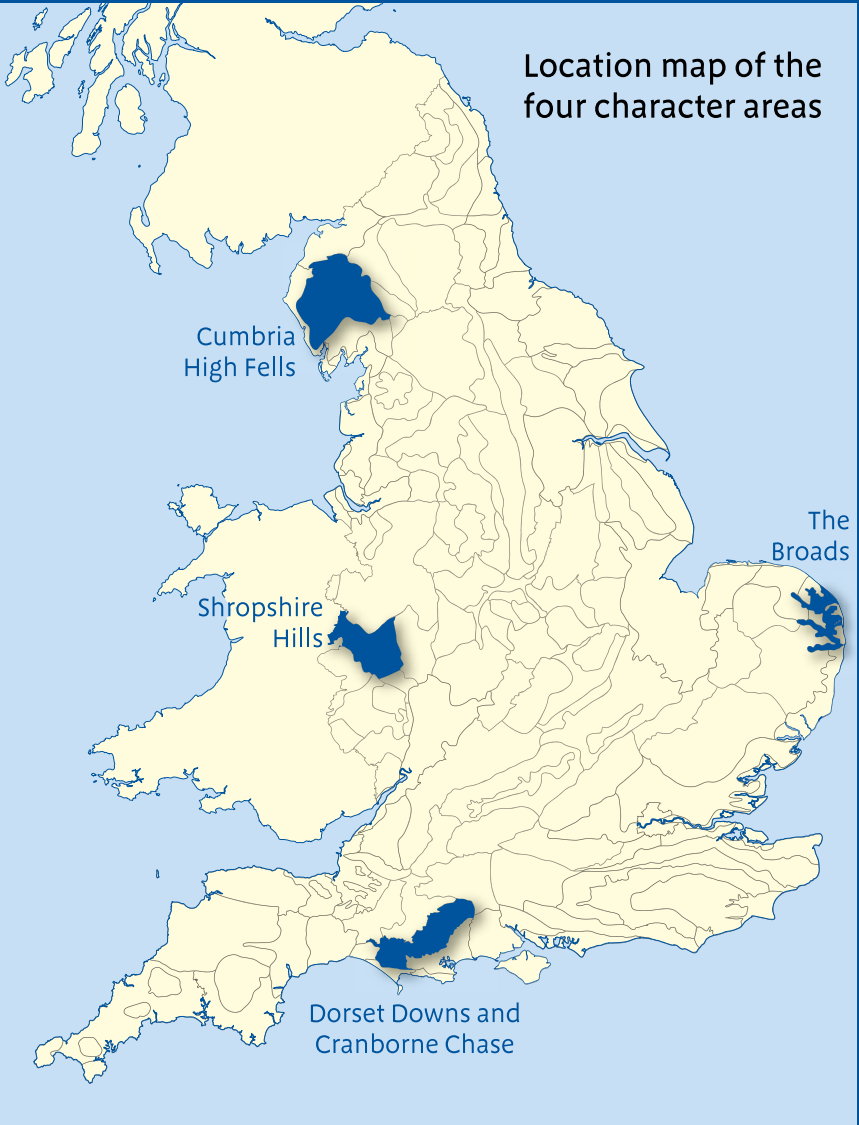
The natural environment

Adapting to climate change

www.naturalengland.org.uk



Location map of the four character areas



Introduction

Climate change represents the most serious long-term threat to the natural environment. Climate Scenarios for the UK show that we can expect rising temperatures, changing precipitation patterns, sea-level rise and more extreme events such as storms, all of which will affect the natural environment. In order to minimise this threat we need to address both the causes and consequences of climate change.

Natural England's role in the climate change arena is shaped by our purpose: to conserve, enhance and manage the natural environment for its intrinsic value and for the benefit of current and future generations, thereby contributing to sustainable development. Our work is driven by two priorities:

- **Adaptation** - The need to increase the capacity of the natural environment to cope with unavoidable climate change. This is our primary focus.
- **Mitigation** - The need to reduce the long term risk to the natural environment from climate change, by being an active participant in overall efforts to reduce greenhouse gas emissions.

This leaflet describes a project Natural England has carried out to determine the practical actions and approaches that need to be taken to adapt to climate change. Without such adaptation our rich heritage of landscape and wildlife will be less resilient to the impacts of climate change.

We looked at four specific Character Areas¹ in England, which represent contrasting habitats and landscapes that are likely to be affected by climate change. This is the first time that the likely impacts of climate change have been assessed at such a localised scale and adaptation options developed.

The four areas are:

- **Cumbria High Fells**
a mountainous landscape which is likely to be affected by an increase in temperature;
- **Shropshire Hills**
a farmed landscape that is likely to be affected by higher temperatures and less rain;
- **Dorset Downs and Cranborne Chase**
a chalk grassland landscape which is likely to face drought; and
- **The Broads**
a low-lying wetland landscape which will be impacted by on-going coastal erosion and sea-level rise.

¹ Character Areas are areas of the English countryside that contain a unique combination of landscape, wildlife, natural and cultural features. There are 159 Character Areas in England. Each has been mapped and described. Together they provide a picture of the variety of landscapes to be found across England. For more information see Natural England's website.



Hartsop, looking towards Angletarn Pikes © Charlie Hedley

Our approach

Our approach in each of the four areas was to:

- identify and map significant biodiversity, landscape, recreational and historic environment assets;
- assess the potential risks climate change poses to these assets; and
- suggest practical actions that would make them more resilient to the impacts of climate change.

Following discussions with local experts we refined our conclusions, which are summarised here. The full reports for each area can be found on our website at www.naturalengland.org.uk.

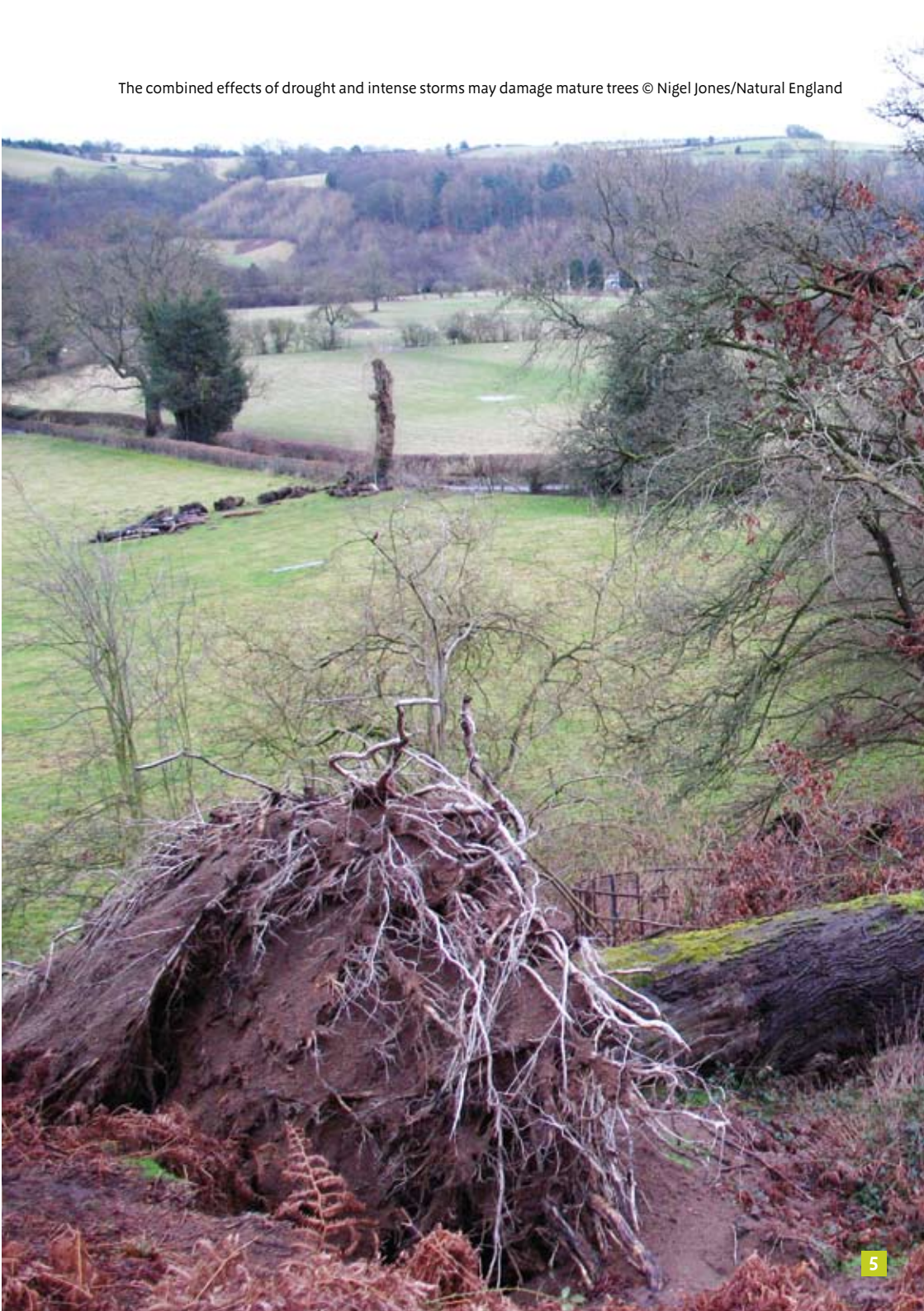
What are the likely impacts of climate change?

For all four areas:

- there will be changes in the plant and animal species that can survive in particular habitats;
- new species will move into the area as climatic conditions change, and some established species may be lost as their 'climate space' disappears;
- the timing of seasonal events such as flowering, breeding and migration will change;
- there will be greater risk of soil erosion and flooding during intensive rainfall events;
- extreme weather events are likely to occur more frequently, and habitats may not be able to recover from repeated disturbance.

It is important to remember that climate change will not be the only change over the coming century. Changes in farming systems, the economy, population patterns and cultural values will also affect the natural environment. Indeed, climate change may have a greater impact on natural assets through changes in agriculture than through direct biophysical impacts. Changes in the types and varieties of crops, sowing dates, irrigation, pests, diseases and soil erosion are all likely. Our project does not try to assess these, although they will have significant implications for the areas and any proposed adaptation measures.

The combined effects of drought and intense storms may damage mature trees © Nigel Jones/Natural England





How should we respond to these changes?

We have identified practical measures and changes in policy that would help each of the four areas to become more resilient to the impacts of climate change. We have drawn on guidance from Defra² on conserving biodiversity in a changing climate, as well as current good practice in landscape and access management.

The key practical steps that would help safeguard the natural environment are to:

- improve the condition of existing habitats;
 - restore lost and degraded habitats;
 - extend existing habitats and create new areas for wildlife;
 - increase the variety of microclimates in existing habitats and create a wide range of microclimates in new habitats; and
 - adopt sensitive farming methods – for example, by leaving ‘buffer strips’ around fields rather than planting right up to the edge.
- The changes in approach or policy that we would encourage are to:
- identify research needs and commission studies to better understand the vulnerability of the natural environment to climate change;
 - plan for potential catastrophic events, such as major storms, and new pests and diseases;
 - expand agri-environmental schemes to maintain and improve the delivery of ecosystem services (the processes by which the environment provides the essential services people need such as clean air and water);
 - use the spatial planning system to provide sufficient land for the natural environment to thrive, for example by restricting building in floodplains and ensuring there is green space within new developments.

Each of the four areas we studied is likely to experience their own particular impacts. These are considered below.

² Conserving biodiversity in a changing climate: guidance on building capacity to adapt. Published by Defra on behalf of the UK Biodiversity Partnership, 2007.

Cumbria High Fells



What are the likely impacts of climate change?

- Habitats that are already in poor condition will come under further pressure.
- Arctic-alpine species, such as alpine saxifrage, viviparous bistort and downy willow, that are currently found at high altitudes may disappear forever.
- Some species, such as the heath fritillary butterfly, ruddy darter dragonfly and greater horseshoe bat will move into upland areas, and will have to compete with species that are already there.
- Some fish species that have survived since the last ice age, such as the Arctic Char, may be lost.
- Lake levels will be lower in summer.
- Peat soils and blanket bog will dry out, releasing damaging carbon dioxide into the atmosphere.

What needs to be done?

The Cumbria High Fells may be more resilient to climate change than the rest of England because of its varied landscape and rich mosaic of habitats. In spite of this, action needs to be taken now to make sure that it can continue to be a refuge for upland plants and animals. The focus



should be on improving the condition of habitats and water resources by:

- making sure that grazing regimes (the intensity, seasonality and type of animal) are appropriate;
- encouraging an expansion of woodland and other semi-natural habitat up the fell side to allow species to move from their current locations lower down the valley sides;
- removing conifers from ancient woodland sites and peat habitats and encouraging a return to semi-natural habitat;
- bringing neglected woodlands back into active management for wood fuel production;
- creating open-space habitats within commercial forestry plantations;
- restoring degraded peat bogs;
- as far as possible, creating space to allow rivers to take their natural course, to reduce the risk of flooding and improve biodiversity;
- repairing the most eroded footpaths through projects such as 'Fix the Fells', to reduce soil erosion and siltation of water bodies.

The Shropshire Hills



What are the likely impacts of climate change?

- Heathland areas will be more susceptible to wildfire.
- More frequent droughts and severe storms will damage and even destroy trees.
- The types of crop and livestock that can be farmed will change.

What needs to be done?

The habitats of the Shropshire Hills have become highly fragmented by farming and other human activity. Here, the focus should be on increasing areas of habitat and joining up existing ones that are now separated from one another. The area also contains important rocks, minerals and landforms that require specific responses to climate change. The area could be made more resilient by:

- restoring and creating areas of woodland, heathland and grassland, especially where these will link with existing habitats;



- investigating the potential for using more drought-tolerant tree varieties and species, to eventually replace existing mature trees;
- bringing back pollarding³ in historic parklands to reduce the susceptibility of mature trees to drier conditions and storms;
- recording and rescuing those structures and archaeological features that are most at risk, so that they are not lost through climate change;
- making sure that important geological sites remain visible;
- preventing fires by controlling hazards (for example, keeping vegetation under control) and reducing risk (by educating visitors and restricting access at times of high fire risk).

³ A form of management in which the top branches of a tree are cut back to the trunk so that it produces a dense growth of new shoots.

The Dorset Downs and Cranborne Chase



What are the likely impacts of climate change?

- The most significant impacts of climate change are likely to be a decrease in water availability in the summer and an increased risk of floods in the winter.
- Species and habitats will find it more difficult to recover from repeated seasonal drought and flood events.
- Aquatic species in the headwaters of temporary streams (i.e. those that are only present after rain or snow) will be lost.
- Soils will dry out, which could severely affect beech woodlands, veteran trees and orchards.
- Some chalk grassland species are unlikely to survive drier, warmer conditions, particularly on south facing slopes.
- Changes in the species composition of woodlands and chalk grasslands, and the loss of scattered trees, could have a dramatic affect on the character of the landscape.



What needs to be done?

The area's agricultural nature and proximity to urban areas poses particular challenges for adaptation. Active responses should focus on balancing the many demands placed on water resources in the area, by:

- extending the existing woodland and grassland habitat networks;
- linking recreation and biodiversity networks in rural and urban areas;
- planting locally native replacements for existing mature trees, avoiding those susceptible to drought, and bringing back pollarding regimes to help them adapt to drier conditions;
- using farming methods that protect water and soil resources, such as vegetated field margins and not leaving field edges bare in autumn and winter.

The Broads



What are the likely impacts of climate change?

- There will be increased areas of coastal and saline habitats.
- The frequency and duration of salt water ingress ⁴ will increase.
- The extent of freshwater habitats will decrease.
- Wetland habitats will be damaged by repeated flooding and drought.

What needs to be done?

The scale of the potential impacts in the Broads, in relation to its coastal nature and generally flat landscape, means that it is particularly vulnerable to the impacts of climate change. Responding to the impacts of climate change will require adaptation if we are to prevent the natural environmental assets, and the social and economic benefits that they provide, from being lost.

Over time the opportunities to maintain fresh water habitats will reduce, although there will be more scope to create brackish, transition and intertidal

⁴ The contamination of freshwater habitats with sea water, as a result of flooding and sea level rise



habitat. In the short term there are some immediate actions that we can take to increase the robustness of the natural environment to climate change. Activities that will help the Broads adapt to climate change include:

- altering the timing and duration of grazing and the hay cutting date to take account of changes in the growing season;
- adapting dredging depths in rivers to moderate saline intrusion;
- blocking coastal drains and raising water levels to reduce saline ingress;
- creating fish refuges so that species that would otherwise be lost can survive;
- planting wet woodland in floodplains;
- restoring water meadows;
- restoring river channels to their natural course to reduce the risk of flooding and to improve biodiversity;
- improving the connections between river channels, their floodplains and wetland habitats; and
- restricting water-based recreation during periods of poor water quality.

⁵ Containing a mixture of sea and fresh water.

Next steps

This project is a first step in helping our natural environment adapt to climate change. There are many uncertainties, but the longer we postpone action the more severe the impacts are likely to be. It is our view that rather than focusing too much time and effort on trying to get precise projections of future climate change, it is better to adopt a pragmatic approach and make sure that the natural environment is in good condition and equipped to respond to a range of possible futures.

We have found that there is a real appetite on the ground for practical action to safeguard the natural environment. Many of the actions identified here have already started, but they need to happen more widely and on a larger scale. Existing tools such as Environmental Stewardship are already making a significant contribution to adaptation, but we recognize that much more needs to be done. We will continue to work with Government and partners to ensure policy and practice is delivering climate change adaptation.

We are committed to seeing through the work that must happen now. We will:

- work with local people, stakeholders and Government to identify actions to implement the adaptation strategies, ensuring that this builds on and dovetails with other initiatives;
- undertake further research to increase our understanding of how climate change will impact on the natural world;
- examine the costs and benefits of different approaches and practical actions;
- roll out the approach we have piloted in the first four areas to other regions of England, beginning this year;
- consider the contribution to climate change mitigation that adaptation can make, through enhancing the storage of carbon.

The future of England's cherished areas depends on decisions we make about managing our landscapes to adapt to unavoidable climate change. This, combined with the actions we take to reduce our greenhouse gas emissions, will determine whether we will continue to have landscapes that are attractive, rich in wildlife, and able to provide essential services to us all.



Chalk stream at Broad Chalke © Simon Bates

Front cover photograph:
Great Langdale
© Robert Goodison



Natural England is here to conserve and enhance the natural environment, for its intrinsic value, the wellbeing and enjoyment of people and the economic prosperity that it brings.

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