




Responding to the impacts of climate change on the natural environment: The Broads

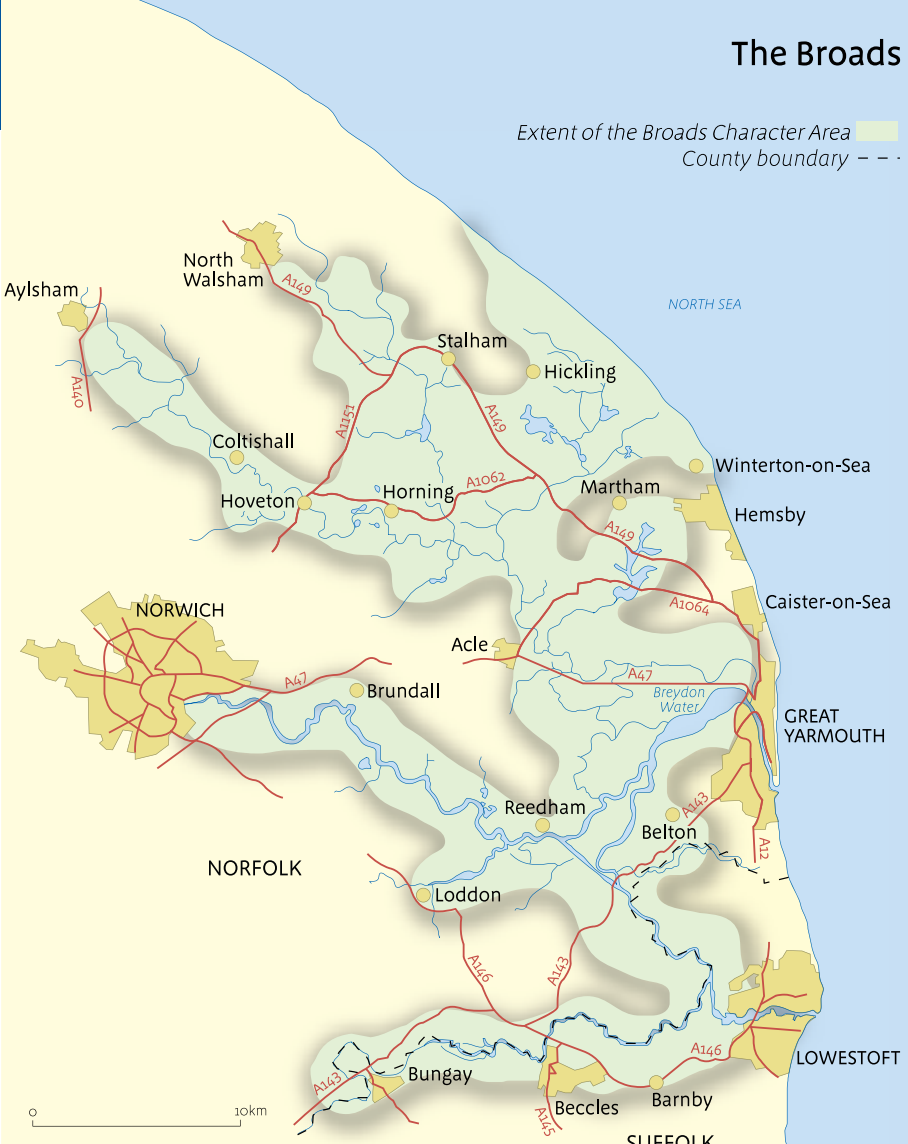
A summary

www.naturalengland.org.uk



The Broads

Extent of the Broads Character Area 
County boundary - - -



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Introduction

Natural England is working to deliver a natural environment that is healthy, enjoyed by people and used in a sustainable manner. However, the natural environment is changing as a consequence of human activities, and one of the major challenges ahead is climate change.

Even the most optimistic predictions show us locked into at least 50 years of unstable climate. Changes in temperature, rainfall, sea levels, and the magnitude and frequency of extreme weather events will have a direct impact on the natural environment. Indirect impacts will also arise as society adapts to climate change. These impacts may create both opportunities and threats to the natural environment.

Natural England and its partners therefore need to plan ahead to secure the future of the natural environment. One way in which we are doing this is through the Character Area Climate Change Project.

The project aims to identify the local responses required to safeguard the natural environment and our enjoyment of it. In the pilot phase we are focussing on four of the 159 'Character Areas' in England,

one of which is the Broads. The others are the Shropshire Hills, Cumbria High Fells, and Dorset Downs and Cranbourne Chase.

This leaflet is a summary of the more detailed findings from the pilot project (these are available on our website at www.naturalengland.org.uk). The leaflet:

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

What we learn from the four pilot projects will be used to extend the approach across England as part of our aim to build a healthy and resilient natural environment for the future.

Although the project is primarily concerned with the natural environment, it has also considered the impacts of climate change on other areas of Natural England's remit, including access and recreation, landscape, and the historic environment.



About the project

The objective of the Character Area Climate Change Project is to ensure that when decisions on the future of places like the Broads are made, proper account is taken of impacts on the natural world, as well as on communities and their livelihoods. It is not Natural England's role, or intention, to take such decisions, but to initiate debate on the impacts of climate change on the natural world, so that well informed decisions about its future can be taken.

Communities and their livelihoods are vital considerations in the development of any future strategy to respond to climate change. This leaflet does not attempt to cover these issues, not because they are unimportant, but because Natural England's role is primarily in relation to the natural environment.

In producing this report, Natural England is acutely aware of the need for a socially just approach and the need for adequate tools and resources to enable communities to adapt to climate change. Ensuring a strong, healthy, diverse and inclusive society that lives within environmental limits is the key objective of sustainable development. Natural England seeks to contribute to this through its management of the natural environment. We recognise that environmental and social solutions need to proceed in tandem. Informed by this project, we will engage with communities, other organisations and Government to find approaches that deliver successful and long-term adaptation to climate change.

The challenges presented by climate change are significant, and nowhere more so than the Broads. Time is required to consider the range of impacts on all aspects of society and to develop integrated responses. Taking action to respond to climate change will also depend on the cooperation of those who own and manage the land. We do not take that cooperation for granted and are aware that many measures will require appropriate incentives. At this stage we wish to explore with others potential responses which are feasible and acceptable in principle, and have not yet considered the detailed mechanisms of change.

Significant natural assets

The Broads Character Area is a low-lying area on the eastern edge of East Anglia, between Norwich and the North Sea coast. Its boundary roughly follows the edge of the floodplain of the rivers Yare, Waveney and Bure and its tributaries, the Ant and the Thurne. As well as the flat floodplain the pilot area also takes in the valley sides. Much of the Broads is open country with few urbanised areas. Large parts of the floodplain are in grazing agriculture; however there are extensive areas of wet woodland and fen habitats in the middle valley reaches.

The Broads is one of Europe's finest and most important wetland areas. The most significant biodiversity assets found in the Broads include:

- open water bodies;
- freshwater wetland habitats;
- coastal habitats;

- lowland habitats;
- internationally important numbers of wintering wildfowl and wetland birds; and
- nationally important invertebrate and plant assemblages.

The Broads has the largest expanse of species-rich fen in lowland Britain, while more than 200 species of invertebrate have been recorded from its drainage ditches. A number of iconic species are present in the Broads including the swallowtail butterfly, Norfolk hawker dragonfly, European crane and the bittern.

To many people the flat, open, wet landscape of the Broads is iconic. Over half of the Character Area forms the Broads nationally protected landscape, equivalent to a National Park. In addition, a small part of the Norfolk Coast Area of Outstanding Natural Beauty overlaps the area.



The most significant landscape assets include:

- broads and rivers and other shallow open water bodies;
- carr woodland;
- drained peat and peat clay mix;
- estuary;
- heathland;
- dune and coastal levels;
- estuarine marshland; and
- grazing marsh and fen.

It is also recognised that the area has a significant archaeological and built heritage interest. Approximately 250 buildings within the pilot area are listed. There are 74 surviving drainage mills and 13 ancient monuments. A number of important geodiversity sites are also present.

The Character Area is an attractive and popular destination for visitors, with

a rich array of significant access and recreation assets. The Broads is one of the most extensive waterway systems in the UK, offering 190 km of boating on lock-free tidal rivers and a significant fleet of private and hire boats. Specialist pike angling is particularly significant in the Broads and angling for coarse fish such as bream, eel, perch, pike, rudd and tench is very popular. Cycling is increasingly important in the Broads and National Route 1 and Regional Route 30 pass through the area. The area also has a varied rights of way network, sandy beaches and sand dunes and interesting historic buildings and settlements.

The most significant ecosystem services provided by the Broads, from which we all benefit, include:

- water resources and water quality;
- provision of food and recreation;
- tourism and education;
- flood protection; and
- climate regulation.



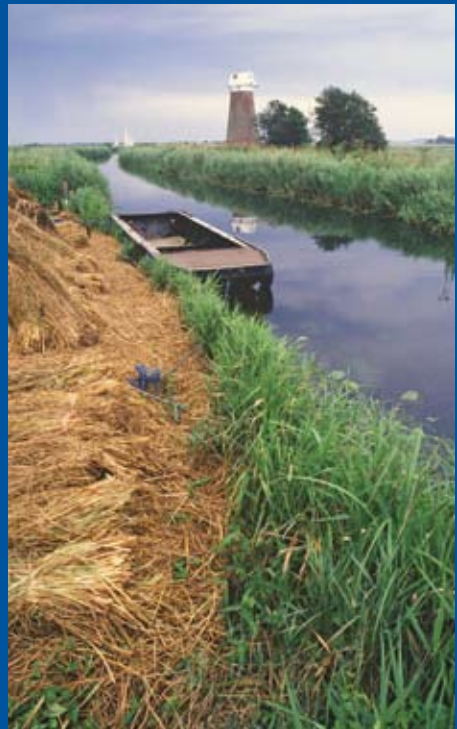
Saltmarsh on Breydon estuary at Great Yarmouth © Natural England

Likely impacts of climate change on the Broads

Evidence from the UK Climate Impacts Programme (2002) shows that the climate in the Broads over the coming century is likely to become warmer and wetter in winter and hotter and drier in summer, while sea levels will rise. In addition, rainfall intensity will probably increase. Extreme events such as heat waves and storms are predicted to increase in frequency and severity.

If no action is taken the most significant impacts of climate change on the Broads will be:

- an increase in the area of coastal and saline habitats;
- a reduction in the area of freshwater habitats;
- an increase in the frequency and duration of salt water ingress;



The Upper Thurne © Peter Wakely

¹ The contamination of freshwater habitats with sea water, as a result of flooding and sea level rise.

- damage to wetland habitats from repeated flooding and drought;
- loss of some species of animals and plants currently present in the Broads;
- the arrival of new animal and plant species, including non-native and invasive species.

Changes in temperature will affect the timing of periodic phenomena such as flowering, breeding and migration, which are likely to affect species' populations and habitat composition.

Further impacts will be:

- reduced water quality and increased saline penetration, with impacts on fish and angling;
- increased erosion;
- arrival of new pests and diseases;
- poorer air quality;
- reduced summer water levels in lakes and rivers, with impacts on plants and animals and also on recreation;
- algal blooms in broads and rivers;

- increased need for waterway management;
- greater visitor numbers;
- changes in the appearance of the landscape and historic features; and
- a reduction in the water resources available.

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 of the Broads. Indeed climate change may have a greater impact on biodiversity through changes in agriculture than through direct biophysical impacts. Population growth in the East of England is likely to put further pressure on the area as demand for housing, recreation, transport and other infrastructure increases. Further development of wind power could impact on the landscape of the Broads. Our project does not try to assess these, although they will have significant implications for the area and any proposed adaptation measures.



Adaptation

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 to prevent the natural environmental assets and the social and economic benefits that they provide from being lost.

In the short term there are some immediate actions that we can take to increase the resilience of existing features to climate change.

Based on the likely climate change impacts, a list of adaptation responses for the Broads has been compiled. These have been informed by the Defra guidelines²

for ‘conserving biodiversity in a changing climate’. These guidelines provide a sound basis for implementing climate change adaptation in the Broads for at least the short term, and in the majority of instances probably into the medium term and beyond. It is critically important that efforts are maintained to continue to restore, maintain and enhance the natural environment of the Broads, thereby making them more resilient to future change.

It should be noted that there may be policy, economic or other constraints to the delivery of some adaptation responses. Additionally, some of the actions identified may not have a delivery mechanism at present. The following adaptation responses are pertinent to the Broads:

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



How Hill Conservation Centre
© David Burton/Natural England

- Maintain the quality of existing habitats: alter the timing and duration of grazing; alter the hay cutting date; reduce agricultural intensity on grazing marshes; create new wetland to moderate flooding of existing wildlife sites;
- Adapt dredging depths throughout the rivers to moderate saline intrusion; and create fish refuges;
- Bring existing habitats and species into a healthy state and conserve them for the future by appropriate management so they are resilient to climate change: undertake floodplain planting of wet woodland; restore water meadows and introduce permeable surfaces;
- Restore the structure and function of river channels; reduce sediment loading through catchment-sensitive farming; block coastal drains and raise water levels in the Upper Thurne to reduce saline ingress; and restore connectivity between river channels, their floodplains and wetland habitats;
- Extend existing habitats and create new areas. There may be limited opportunities in the Broads to recreate freshwater habitats as the area of suitable climate space declines; this will have to be elsewhere. However, there will be significant scope within the Broads to create brackish, transition and inter-tidal habitats;

- Monitor and plan for future potential catastrophic events such as storms or pests and diseases that may occur as a result of, or be exacerbated by, climate change;
- Assess the likely increase in visitor numbers and identify areas most at risk from the negative impacts of recreation. Provide shade and drinking water at tourist attractions and, if necessary, place restrictions on water based recreation during periods of poor water quality;
- Use the spatial planning system to maintain adequate land for the natural environment, and identify research needs and commission appropriate studies to increase the effectiveness of strategies when implemented.

In the longer term, there are difficult issues that will need to be considered in relation to the potential climate change impacts for this area. A great deal of further work is required to fully understand the detailed social and economic implications of climate change and the adaptation responses that could help to respond to the impacts. Flood risk management has a critically important part to play in the future of the Broads and the Shoreline Management Plan and the Broads Flood Alleviation Strategy form the mechanisms for the exploration of possible future flood

risk management options. The preferred policy option in the current draft of the Shoreline Management Plan (SMP) is to maintain the flood defences which stop the sea encroaching into the low lying parts of the Broads for at least the next 50 years. Natural England supports this policy and will continue to work with all relevant authorities and stakeholders to explore the best long term approach.



Drainage mill on Halvergate Marshes © Natural England



The beach at Winterton-on-Sea © David Burton

Next steps

This project on how climate change could affect the natural environment of the Broads Character Area, and the adaptation responses required, is a significant first step but cannot be conclusive. It provides an indication of what may happen. However, the future impacts of climate change are still uncertain and are partly dependent on the amount of greenhouse gases that society releases and how much is released by natural feedback loops from the environment (one of our biggest unknowns).

The long-term future for the Broads presents challenges given the potential impact of climate change. This project

starts to identify the impacts and potential responses from an environmental perspective. These cannot be considered or implemented in isolation and Natural England believes that integrated solutions are required. In parallel with the short-term actions referred to above, Natural England will focus its attention on working with communities, Government and other stakeholders to ensure that policies and tools are put in place that enable successful adaptation to climate change, securing a future for the economy, people and environment of the Broads.

When identifying adaptation responses, existing strategies, policies and initiatives



Upper Thurne basin in 2007 © Mike Page

need to be considered. Some actions defined as climate change adaptation are already occurring under a different name and it may be possible to modify existing programmes to provide a mechanism for delivering adaptation. An example of this is the planned incorporation of climate change adaptation into Natural England's Environmental Stewardship Scheme.

Natural England will be using this report to work with partners to refine the detail, seek consensus and implement the adaptation actions identified within the report.

Natural England is now working on the following:

- An implementation plan for the possible adaptation responses, which may include a demonstration project. Natural England will work in partnership with local stakeholders

to ensure that this builds upon and dovetails with other initiatives;

- Providing ongoing input and support to the Shoreline Management Plan process and the Broads Authority led Broads Climate Change Adaptation Panel;
- Learning from the pilot process to assess likely climate change impacts and the possible adaptation strategies for other Character Areas both regionally and nationally.

The future of the Broads depends on the actions we all take today to reduce our greenhouse gas emissions. This, combined with decisions we make about managing our landscapes to adapt to unavoidable climate change, will determine whether we continue to have a high-quality landscape that is cherished and respected by all.



The above picture has involved the manipulation of the original on Page 12 to show a possible adapted landscape that results in a healthy and resilient freshwater wetland that meets the needs of people and their livelihoods.

© Mike Page

Front cover photograph:
View over Hickling Broad and
the Upper Thurne © Mike Page



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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