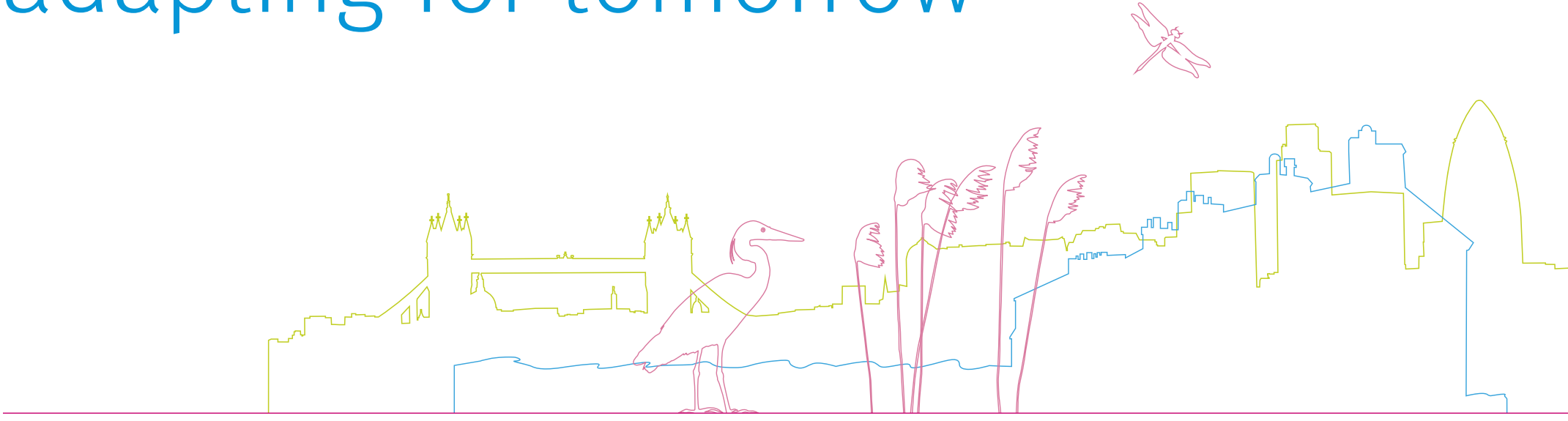
Environment Agency

climate change, adapting for tomorrow



We are the Environment Agency. It's our job to look after your environment and make it a better place – for you, and for future generations.

Your environment is the air you breathe, the water you drink and the ground you walk on. Working with business, Government and society as a whole, we are making your environment cleaner and healthier.

The Environment Agency. Out there, making your environment a better place.

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We often hear about the threats posed by climate change – more rain, flooding, rising sea levels, heatwaves and droughts. Scientific evidence confirms that these risks will grow as the climate changes. Some of these things are happening now and some will happen more gradually. No matter when they occur, changes in the climate and to the weather will have a significant impact on people's lives and the natural environment. Steps should be taken to make people and places less vulnerable to these changes. Not adapting is no longer an option.

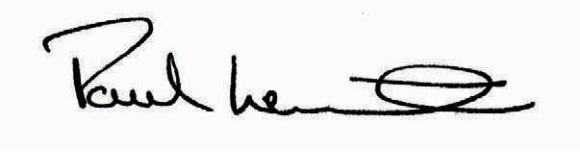
Adapting to climate change does not mean that there is no hope of stopping it or slowing it down. To avoid the worst effects, increasing efforts to cut greenhouse gas emissions remains the best response. But even if all emissions stopped today, there would still be some degree of climate change. And global emissions are rising, not falling. Adaptation is essential and action is needed now.

Every organisation should now be taking seriously the part it needs to play in adapting society, infrastructure and the economy to the unavoidable impacts of climate change.

The Environment Agency will be at the front line. Dealing with extreme weather – flooding, drought, storm surges, sea level rise – is at the heart of everything we do, and we are already preparing for change. We are working, often in partnership with others, to help communities and businesses adapt, while still protecting the natural environment. We will use the best science and evidence available to help us understand what the impacts might be and to plan the actions to address these.

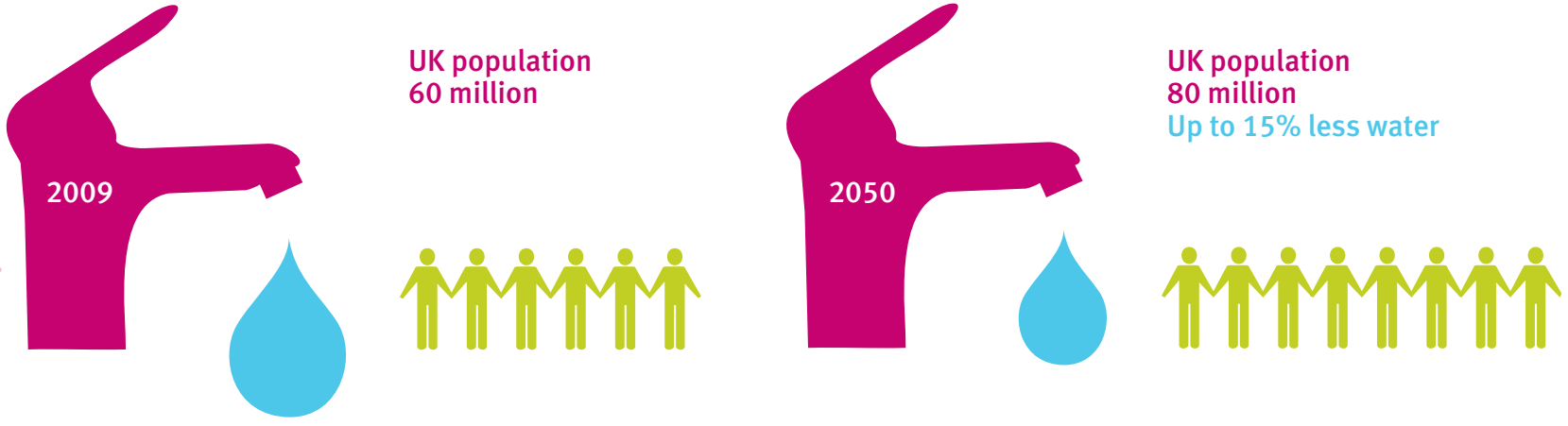
Because of climate change, the world will look very different in fifty years' time. A different world will require different thinking. Adaptation will require initiative and innovation. It's not certain how much things are going to change, so adaptation will require flexibility, the assessment of risk, and the reviewing of decisions on the basis of observed changes. It is important that this flexibility is included to allow for the uncertain effects of climate change.

Adaptation is a journey that must be started now if the worst effects of a changing climate are to be avoided.



Paul Leinster
Chief Executive, Environment Agency

Climate change is real, and is happening now. The impacts already seen will increase over time, with winters getting warmer and wetter, while summers become hotter and drier. Sea levels are rising and it is expected that there will be more extreme weather leading to floods, heatwaves, droughts, and intense rainfall. These will affect people's lives, homes and businesses as well as essential services and supplies such as transport, hospitals, water supply and energy. There will also be significant impacts on biodiversity and the natural environment.



In the Environment Agency, we see climate change as the number one environmental challenge. We are one of the organisations in England and Wales taking a lead on helping people and places adapt. Some of the greatest risks are flooding, coastal erosion, and water scarcity:

- By 2035, if investment in flood risk management is kept at current levels, there could be an additional **350,000** properties at a significant risk of flooding from rivers and the sea in England – on top of 490,000 properties at significant risk today (Long-Term Investment Strategy, 2009).
- By 2050, the population of England and Wales could increase by as much as **20 million**, but there could be between **10 and 15 per cent** less water available than at present (Water Resources Strategy for England and Wales, 2009).
- By the 2080s, annual economic damage from flooding in the UK could increase from **£1 billion** to between **£15 billion** and **£21 billion** (Foresight Future Flooding, 2004).

We will focus our adaptation work on reducing the vulnerability of people, property and the environment to these risks.

We believe that there has never been a more important time for other organisations and businesses to join us on this journey. We are not working alone. To be successful, our adaptation work must happen alongside that of others. By working together, society can continue to function and lifestyles and the environment can be adapted to the impacts of climate change.

The examples in this document will show how we are joining with partner organisations across England and Wales to plan for adaptation and protect people and places. By showing what we and others are doing, we hope to give you an idea of how you and your organisation can start to plan to adapt.

Above all, we want people to know that the time has come to act on adaptation. Many organisations and businesses have already started this process, but many have not. We now know enough about the future climate and the likely impacts of climate change.

We are planning how we can respond to these changes. This includes developing flexible solutions that can be adjusted as our understanding of climate change improves. There must be no delay – now is the time to act to avoid the worst impacts of climate change.

›› For more case studies, examples and information, look online at:
www.environment-agency.gov.uk/adapt

What is adaptation?

Adaptation means altering lifestyles, communities, and infrastructure to respond to climate change. This not only includes addressing the threats it poses such as increased risks from flooding, sea level rise and drought, but also exploiting any opportunities.

Adaptation often includes building up the capacity to adapt as well as minimising, adjusting to and taking advantage of the consequences of climatic change.

To avoid the dangerous extremes of climate change, global greenhouse gas emissions will need to be reduced to prevent more climate change. This is known as mitigation and can be achieved through greater energy efficiency and more use of low-carbon and renewable energy technologies, such as wind power.

Framework for action. The climate is changing, but many of these changes will happen slowly. There is time to adapt, but only if the process is started now. People and their homes, businesses, the broader economy and the natural environment in which we all live need to be protected.

Adaptation requires a co-ordinated response. Everyone needs to work together to address common problems. We believe that if public bodies and businesses fail to do their part, they should be compelled to act. No one should ignore climate change any longer.

The Climate Change Act became law in November 2008. As a result, the UK now has a legal framework for addressing climate risks and promoting adaptation. The Act also establishes the Committee on Climate Change to advise the Government. There will be an Adaptation Sub-Committee to champion adaptation and keep the issue firmly on the political and policy agenda. In Wales, the Assembly Government's Climate Change Commission is working hard to reach consensus on the actions needed to address climate change issues in Wales.

The UK Climate Projections 2009 (UKCP09) provide an important new resource for those planning for adaptation. They use the latest science to project how climate change is likely to affect the UK up to 2100. A variety of tools is included, such as a Weather Generator, to help organisations understand and assess potential risks.

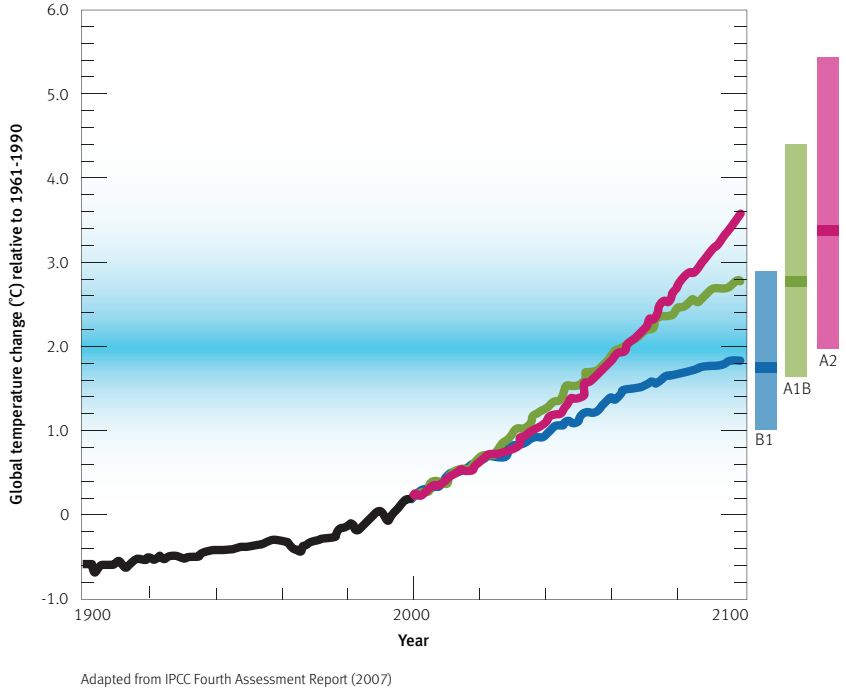
Adapting to climate change also makes good business sense. Companies and organisations must take proportionate steps at the right time to avoid threats and exploit opportunities. In the Environment Agency we are adapting our work, and we will continue to do so. We want other public bodies and businesses to address climate risks too. We need others to take action to help us to address challenges such as flooding, coastal erosion, pressures on water resources and improving freshwater ecology.

Overwhelming international scientific consensus, combined with the momentum of the Climate Change Act, the new information from UKCP09 and the potential organisational and economic benefits of planning and acting now should provide a catalyst for action. The guidance and support we offer, alongside other organisations like the UK Climate Impacts Programme, gives organisations and businesses the help and incentives they need to act now on adaptation.

The Climate Change Act

- Establishes the independent Committee on Climate Change and the Adaptation Sub-Committee
- Requires Government to report at least every five years on the risks of climate change, and to publish a policy programme setting out how these risks will be addressed
- Gives Government new powers to direct public bodies and other organisations such as water companies to address climate risks and take action on adaptation
- Requires Government to produce statutory guidance on how to undertake climate change risk assessments

Global Temperature Rise 1900 – 2100



Adapted from IPCC Fourth Assessment Report (2007)

The black line represents the temperatures already seen. The coloured lines represent the projected changes in temperature for a range of different levels of greenhouse gas emissions into the future. The uncertainty bands represent the likely range in these estimates.There has been a 0.8 degree rise between 1900 and the present day. A temperature rise of over four degrees compared to pre-industrial temperatures is possible by 2100 even if some measures are taken to reduce dependence on fossil fuels. Therefore, adaptation is essential.

UK Climate Projections 2009

The UK Climate Projections 2009 (UKCP09) are the latest set of UK climate change scenarios. They describe how the UK's climate might change during the 21st century.

UKCP09 represents a major advance in how the uncertainty associated with future climate change is understood and presented. This allows a fuller range of potential risks to be understood. This means smarter adaptation and better decisions that are more sustainable and cost effective in the long term can be made.

Until now, we have been using the earlier scenarios, UK Climate Impacts Programme 2002, (UKCIP02), to incorporate future climate change impacts into our work. While there are differences between UKCIP02 and UKCP09, we are confident that our adaptation planning to date is sound.

For example, for flood risk we are already testing our plans for 20 per cent higher river flows. This margin remains sensible under UKCP09 but we will be able to further improve our future flood planning.

For sea level rise, we have been planning for approximately one metre rise by the end of the century. While UKCP09 presents plausible worst case scenarios that go beyond this, they remain highly unlikely events, and one metre still looks like a good central estimate.

We are now working with Government on a major science project to help us use the results of UKCP09 in our policy and operational work.

To find out more about UKCP09, visit **www.ukcip.org.uk**

Flooding is one of the most visible and destructive effects of extreme weather. It can have devastating consequences, threatening people's lives, homes and possessions, businesses, communities and the natural environment.

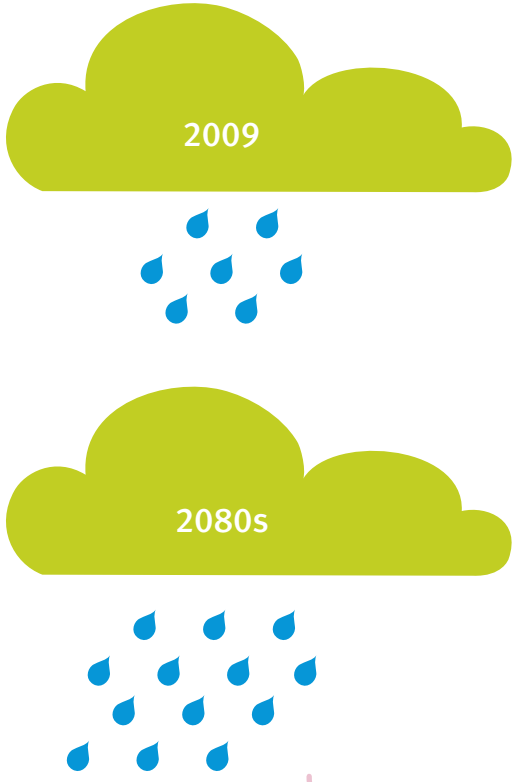
Over the past few years there have been a number of severe floods, including the flash floods in Boscastle in 2004, the flooding in Cumbria in 2005 and the widespread floods in summer 2007. Our Long Term Investment Strategy for flood and coastal risk management in England suggests that by 2035, if the level of investment in flood risk management is not increased to keep pace with climate change, a further 350,000 properties will be at a significant risk of flooding compared to today. This means that these properties have at least a 1 in 75 chance of flooding in any given year. However, by April 2009 more than 413,000 people had already signed up to our Floodline Warnings Direct service.

We anticipate that climate change will increase the likelihood of flooding. We expect that winters will get significantly wetter. On the wettest days of the year, this could mean an increase in rainfall of 40 per cent or more by the 2080s.

It is not possible to stop flooding altogether, but risks and consequences can be managed better so people are better prepared.

We already take the likely impacts of climate change into account when designing and building flood management schemes, by testing for river and sea levels that are higher than they are now.

On the wettest days of the year, rainfall could increase by 40%



We have developed Catchment Flood Management Plans. These consider the current flood risk and what might happen in 50 and 100 years time, and they provide a guide for our work and that of our partners. We have developed a Long Term Investment Strategy (2010-2035) for flood and coastal risk management in England. Within the context of needing to adapt to climate change, this strategy will set out the scale of flood and coastal erosion risk and the investment needed to manage it over the next 25 years and beyond. In Wales, we are working with the Welsh Assembly Government on the flood risk investment needs for the long term.

But we have more to do, and we need others to work with us.

Planners and architects need to look at the whole community and consider how developments could be affected by rainfall and the different flood pathways. They should use strategic flood risk assessments and surface water management plans to help with this, as well as guidance on how buildings can be made more resistant and resilient to climate change by including features such as green roofs or raised floor levels.

350,000

people were without mains water after the 2007 floods

Local authorities and developers continue to underestimate the risks of flooding. In 2007/08, we objected to over 6,000 planning applications because of flood risk concerns. In over 95 per cent of these cases, the outcomes were in line with our advice. However, 15 major developments went ahead against our advice, including six in areas at the highest risk of flooding. We want those involved in planning decisions to come to us early, to work with us and to listen to our advice.

As a consequence of the floods in summer 2007, 350,000 people were without mains water for over a week, after a water treatment works flooded. We want all critical infrastructure providers, including water companies, energy companies and transport providers to take action to address climate change, for example by improving the resilience of their assets and activities.

We also want more households and businesses to sign up for our flood warning service. Visit our website to find out how.

›› For more case studies, examples and information, look online at: **www.environment-agency.gov.uk/adapt**

Case study
Flood risk management scheme

Dealing with flooding in Carlisle, Cumbria

Factoring climate change into the location and design of developments is an important way to reduce the risk of future flooding. Carlisle has a long history of flooding. In January 2005, one of the most severe floods ever recorded in the North West affected more than 1,700 properties in the city.

The Environment Agency was already planning a flood alleviation scheme – a series of improvements to reduce the risk of flooding from rivers – for Carlisle. Following the floods, we updated proposals for the scheme to take into account new information on river flood levels and to further factor the impacts of climate change into the design. The new scheme will protect against flood events that only have a one in 200 chance of happening in a year. Where possible, foundations for the flood defences have been widened so that their height can be increased in the future if needed.

Case study
Integrated planning

Brent Cross Cricklewood regeneration project, London

The natural environment is complex and must be managed in an integrated way – planning for climate change adaptation must consider a variety of elements. Both flood risk and wider issues such as biodiversity and recreation have been taken into account as part of the redevelopment of Brent Cross Cricklewood in North West London. A survey of flood risk carried out early in the planning process led to areas at high risk of flooding becoming riverside walkways instead of being built on. Extra flood storage – areas that can be filled with water to prevent flooding elsewhere – was created so that floods in other areas, including a major A road, could be reduced. The development will also include a wetland area, an important habitat for wildlife. Developers have also taken steps to reduce surface water runoff by including sustainable drainage such as green roofs and permeable paving.

Case study
Adapting buildings

Green roofs

Getty Images and Arup on behalf of the London Sustainable Development Commission

Green roofs are an important example of the kind of techniques that can help adaptation to climate change. These roofs are partly or completely covered in plants, and a material made up of soil and recycled construction waste such as crushed bricks. In addition to cooling and insulating buildings, depending on the outside temperature, they also provide important habitats for wildlife and reduce the speed at which rain water runs off buildings. Green roofs are being used in several high profile development sites including the Greenwich Peninsula and Barking Riverside.

Sea level rise. The coastline of England and Wales is continually changing, with the cliffs, sand dunes and mudflats shifting. Over the years, the coast has changed naturally and to meet society's needs, and steps have been taken to prevent erosion and flooding. We protect coastal areas where we can with measures such as sea walls, but there will be locations where this won't be sustainable or affordable.

Climate change, and the threat of sea level rise, bring new challenges for coastal management. If nothing is done to adapt, then many communities currently protected by defences could see the risk of flooding increase each year.

Rates of erosion are expected to increase as a result of rising sea levels and more frequent storms.

Shoreline management plans are used as high level strategic planning documents, providing a framework for coastal management. We are working with local authorities to update the plans by 2011. The first revised plan will be published late in 2009. Where appropriate, some of these shoreline management plans published early in 2010 will include coastal erosion maps. These maps will show the coastal erosion risk linked to the shoreline management plans.

We cannot defend everywhere but we will do so wherever we can: where it is practical, affordable and sustainable to do so. We are already planning for sea level rise of up to one metre when we design and construct flood risk management schemes. When looking at how we will manage flood risk in the Thames Estuary, we have considered a two metre rise as a worst case scenario, although one metre is much more likely by the end of the century.

We need partners to work with us to manage the coast.

Shoreline management plans must reflect future risk and outline protection options where possible and necessary. There must be flexibility in the design and location of new developments and existing settlements should be moved to safer locations over time.

Partnerships between the Environment Agency, local authorities, and other organisations will be essential to tackle increasing risk and to meet the challenge of creating a sustainable coast. Government should take a lead in providing the necessary long term vision for the coast.

Coastal communities and local partners will need to work together to plan how to adapt to the effects of sea level rise and erosion.

›› For more case studies, examples and information, look online at: **www.environment-agency.gov.uk/adapt**

Case study
Involving the community

Alkborough Flats, North Lincolnshire

Adapting to the future risks of climate change could require some significant changes so it is important to involve the wider community in planning. In North Lincolnshire, the Alkborough Flats project aims to provide flood water storage during extreme weather and a new permanent habitat for wildlife. The local community has been involved throughout the project. The plans were outlined at a series of public events and regular newsletters to keep people informed. Local communities also had the chance to get involved in educational and volunteer activities. More than fifty organisations and individuals helped the project group with different aspects of the work. This partnership approach aims to ensure that the interests of all users of the estuary are considered as the plans are finalised.

Case study
Long term planning

North Norfolk Coast

Planning for climate change over an appropriate timescale is vital to ensure a suitable response. This is particularly important on the coast, where erosion and sea level rise can have an impact on a large number of people and businesses over the longer term. Erosion is a particular problem on the Norfolk coast, where the rate of erosion can be up to three metres per year.

Second generation Shoreline Management Plans (SMPs) will be developed for the East Anglia coastline over the next two years. These plans will set out sustainable coastal management policies determining how each particular section of the coast could be managed over the short term (up to 20 years), medium term (20 to 50 years) and long term (50 to 100 years). They will replace earlier plans which only set out options for the medium term. These new plans should give more flexible solutions for coastal management by taking a range of factors such as sea level rise into account. By looking at the effect that these factors will have both now and in the future, the plans will aim to ensure long term sustainability for the area.

Case study
Flexible planning

Thames Estuary 2100

Adaptation plans must remain flexible, as the effects of climate change are uncertain. The Thames Estuary 2100 (TE2100) project has been considering how to plan for and manage tidal flood risk until the end of the century for London and the Thames Estuary. The area is at risk of flooding for a number of reasons, and it's not yet clear exactly what impact climate change will have. The project has recommended what actions the Environment Agency and others will need to take in the short (next 25 years), medium (the following 40 years) and long term (to the end of the century).

Different options have been tested and modelled with a range of climate change scenarios to ensure that the plan is flexible. The work has found that the current flood defences – already of a higher standard than those elsewhere in the country – provide a greater degree of protection against predicted water levels than previously thought. The final plan will recommend flood risk management measures, and set out where and when they will be needed. The adaptation options outlined will be flexible, so it will be possible to move from one to another depending on the level of climate change actually experienced.

Water resources and drought. Climate change represents the single biggest risk to secure, safe and sustainable water supplies. Water resources are already under pressure because of population growth and increasing development.

The best available science makes clear that climate change is set to alter the balance of water for both people and the environment. Adaptation is needed now if water supplies and the environment are going to be resilient to unavoidable climate change.

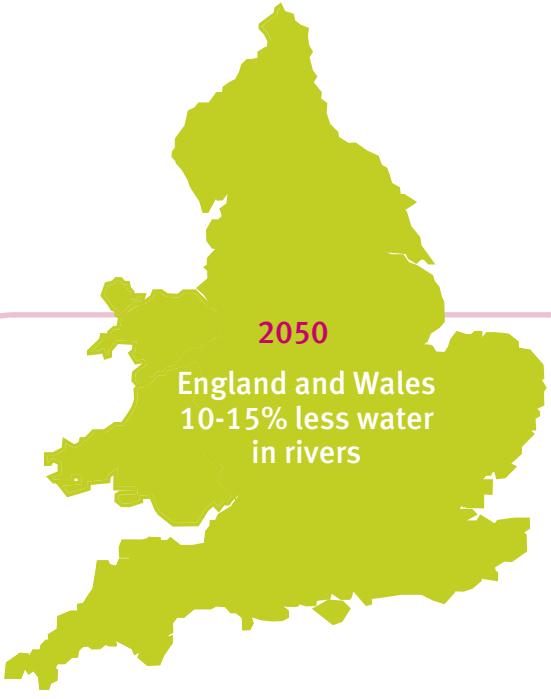
Climate change will affect the amount and distribution of rainfall, which will alter the water environment we know today. Warmer weather is set to increase demand for water at the very time that supplies will be reduced. Warmer weather will mean that people need more water and will also affect both the types of crops grown and the amount of irrigation that they need.

By the 2050s, there could be 10 to 15 per cent less water in rivers in England and Wales over the year. The pattern of river flows is also likely to change with higher flows in the winter months and significantly lower flows in summer. There is time to adapt to these changes if the right decisions are made now.

There is a need to reduce reliance on this critical yet highly vulnerable natural resource. Reducing demands for water now will mean a greater ability to cope in the future. This means reducing water use in homes and businesses, as well as reducing leakage.

To manage water resources better, we look at the whole of a river catchment when we assess how much water is available for people and the environment. We manage access to water through abstraction licences. These are now issued for a defined number of years and will only be renewed if certain conditions are met, such as water being used efficiently or if abstraction will not harm the environment. These time limited licences provide us with the flexibility to respond to a changing climate. We are also including climate change projections in all of our water resource planning and in our advice and guidance to water companies.

We need to work with others to prepare for the impacts of climate change.



Households and businesses must become more water efficient to reduce pressures on water resources. Over the last decade, household consumption of water has remained at around 150 litres of water per person each day. This is despite the development of new technologies which can help to save water and money and to reduce emissions from treatment processes. We believe that water metering and charging incentives to limit water use play an important part in increasing water efficiency, particularly in water stressed areas.

Government, local authorities and developers must work together to ensure that new homes and developments are able to use water more efficiently. In areas where water resources are under pressure, we promote a move towards water neutrality, which means no overall increase in total water demand as a result of new developments.

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Case study
Restoring the peat

Mires on the Moors, Exmoor

The destruction of England's natural moorland is concerning for several reasons. This includes the ability of moorlands to help with climate change adaptation. The peat in the uplands can store water, slow down runoff, and improve water quality. On Exmoor in South West England, a project is working to improve peat condition and protect the important services provided by the peat. So far 1,000 hectares of moorland have benefited by blocking drainage ditches with natural materials to hold water back and make the area wet again. This rebuilds carbon storage capacity, contributes to flood protection and a sustainable water supply and regenerates natural habitats. This works by restoring the peat so that it can hold water in times of high rainfall and then gradually let it drain into the streams and rivers in the area. This innovative project has won first prize at the annual Water Industry Achievement Awards, in the Sustainable Drainage and Flood Management of the Year category.

Case study
Adaptation on the land

Horticulture and the Vale of Evesham, Worcestershire

Adaptation planning and action is vital to ensure the viability of agricultural businesses. Less rainfall in summer would have a big impact on the many horticultural businesses in the Vale of Evesham. Research has shown that by the 2050s, farmers in the area could need 20 per cent more water to irrigate their crops.

However, farmers could take measures to reduce this need. Farmers need to think about adaptation actions now and plan what they will do if there is less water available. Many are already doing things like harvesting rain that falls on their land and farm buildings and re-using waste water. Raising awareness of the problem and sharing knowledge is encouraging people to take action.

Case study
Adaptation in the home

Savings on Tap, Kent

Using water more efficiently in the home is an essential part of adaptation. In Ashford, Kent, households have been offered a range of simple, low-cost devices to use as part of a water efficiency project. These include Save-a-Flush bags, which save a litre of water every time the toilet is flushed; a device which gives the option of a regular flush or half flush; and tap restrictors. Householders have also been given water efficiency advice. The project is monitoring the amount of water that is being saved through the use of these devices. Future work will look at fitting more devices to help save energy and water as part of a 'green neighbourhood' scheme.

Wildlife and habitats. Wildlife is already declining and efforts to halt the overall loss of species are failing. Conservation work has attempted to address this, and has been successful in increasing the populations of some species such as the otter.

Natural England suggests that only 40 per cent of the most important wildlife is either stable or increasing in England, with 28 per cent showing a clear decline. Existing problems, such as damage to habitats, pollution, increasing demand for water and invasive non-native species already put huge pressures on nature.

Climate change will put additional pressure on wildlife. It will mean that some species will be unable to survive in their current location and there will be limits on how much they can adapt.

The MONARCH study on the UK has shown that some species, such as the turtle dove, are more likely to thrive in the future climate. Other species, such as the song thrush, are likely to decline in the UK. Insects such as dragonflies and damselflies may just shift their location to a more suitable habitat. Some species, such as salmon, are more sensitive to temperature increases than others, and some habitats, such as wetlands, could be under threat from increased droughts. However, there is a lot of uncertainty about species and habitats and how they will respond as the climate changes. There is a need to increase knowledge and understanding of this.

It's not possible to change what climate species thrive in, but we can help their habitats become more resilient or make it easier for species to move to new locations. As the climate changes, so do the geographical ranges of species.

Reducing pressures such as pollution is key to maintaining functioning ecosystems as the climate changes. The fewer pressures that plants and animals have to deal with, the more easily they will adapt. We are helping species, for example by reducing pollution in protected areas and reducing the impacts caused by some non-native invasive species.

More habitats need to be restored and created. We have created more than 2,000 hectares of priority Biodiversity Action Plan habitats, including river, freshwater wetlands and inter-tidal habitats over the last five years. We aim to create a further 1,200 hectares by 2015.

A clear picture of biodiversity requirements in the longer-term would help set objectives in the short and medium term. This would help integrate biodiversity outcomes in other sectors. Our work to introduce integrated River Basin Management Plans as part of the Water Framework Directive demonstrates how such an approach might work for sectors such as water and farming.

Regional and local planners should take the entire landscape into account when identifying opportunities for habitat development. This work should be supported by policies that indicate how landscape should best be managed to help maintain and develop habitat networks. Government should continue to build on its existing programme to restore and improve habitats and conserve species, through the existing network of sites.

decline in the most important wildlife populations

There is a large body of research currently being undertaken by others to reduce the uncertainties about the impact of climate change on species and habitat, to identify which species and habitats will be particularly vulnerable and to identify adaptation measures that may work. We are working to develop a better understanding of the impact of climate change on freshwater ecosystems.

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Case study
A better future for wetlands

The Wetland Vision for England

Looking at the entire landscape when planning for the long term will be essential to ensure a viable future for biodiversity and the environment. The Wetland Vision for England is a 50-year plan which aims to secure a better future for wetlands and highlight and promote their role in climate change adaptation. The plan includes maps showing where the different types of freshwater wetlands can be created, restored and maintained over the long term, and sets out a strategy to achieve these plans.

This wider planning will help to ensure that wetlands can become more resilient and help society adapt to the impacts of climate change. In the right locations, wetlands can help to protect people and property from the impacts of increased rainfall and sea level rise by storing flood waters and slowing the rate at which flood water flows. They can also help to recharge aquifers and protect water quality by storing sediment and processing nutrients.

Case study
Spatial planning for wildlife

Wildlife and habitats

To enable wildlife to adapt to climate change, the land use planning system needs to provide opportunities for wildlife to move through the landscape. BRANCH (Biodiversity Requires Adaptation in Northwest Europe under a CHanging climate) is a project which provides guidance on how spatial planning can be used to help biodiversity adapt to climate change.

BRANCH has found that Europe's fragmented landscape is likely to prevent many species from moving into new areas as the climate changes. It argues that if spatial planning creates networks of high quality, well-connected habitats, then wildlife will be more resilient to climate change. New planning policies and tools are required to achieve this, and BRANCH's work has laid the foundation for these.

Planning for the future. It's known broadly what can be expected as a result of climate change. Even though there is uncertainty about the exact changes that will happen, we are in a good position to start planning for the future.

In some cases, adapting to the future climate will only require small changes to existing ways of working. But in other cases, new and innovative approaches will be needed. Climate change will bring threats and opportunities and appropriate steps need to be taken to address these. Inevitably, there's still some uncertainty but now is the time to start assessing, planning and acting.

Research by AXA Insurance found that 85 per cent of small and medium sized businesses in the UK recognise that climate change poses a serious problem, but only one in four see it as a direct threat to their business. Vulnerability to risks will vary, and not all businesses will be equally affected by climate change. However, businesses that plan ahead will be better equipped to deal with the impacts of climate change than those that don't.

Local authorities, too, are increasingly having to adapt their estates and services to take climate change into account. More than a third of English local authorities have chosen to focus specifically on adaptation as part of their new performance targets.

Companies that operate the critical infrastructure in England and Wales need to adapt. Generally, those providers that have already been affected by weather events are taking a more proactive approach to this. We are encouraging operators to take action to mitigate flood risk, and are sharing our information with them to help them to do this.

In the Environment Agency, we have made adaptation to climate change a priority. Limiting and adapting to climate change has been part of our strategy for nearly ten years. We are considering potential impacts of climate change as part of all our work. This includes planning for a range of scenarios, monitoring the effects of climate change and updating our plans to take these observations into account.

For businesses and public bodies, communities and individuals, increasingly the challenge is to consider what actions they need to take on climate change – both preventing it and dealing with the effects it will have.

›› For more case studies, examples and information, look online at: **www.environment-agency.gov.uk/adapt**

Only one in four small and medium sized businesses in the UK see climate change as a direct threat to their business

Case study
Local authorities

Helping local authorities to adapt: Changing Climate, Changing Places

Local authorities are now increasingly required to plan how they will adapt to climate change. This is a new area of work for many. A project in Wales called Changing Climate, Changing Places is helping four local authorities tackle adaptation planning. The project aims to develop tools and techniques to simplify the process which can be used by any local authority in Wales. These will be based on existing tools available to local government, including the UK Climate Impact Programme's 'Adaptation Wizard', Local Climate Impacts Profile (LCLIP) and Business Areas Climate Impacts Assessment Tool, and the Nottingham Declaration Partnership website.

Case study
Business adaptation

Industry planning: AWE Burghfield

Putting plans in place to deal with extreme weather events is vital if businesses are to be resilient to climate change. The Atomic Weapons Establishment (AWE) in Burghfield has carried out an assessment of the risks it could face as a result of extreme weather, including flooding. The site is on a floodplain, and parts of the site have been flooded in the past.

Since the flood, AWE has carried out work to ensure that its current facilities are protected and have invested in and improved emergency arrangements. The company has recently received planning permission for a replacement warhead facility at Burghfield. We have been involved in assessing the flood model that looks at a very rare 1 in 10,000 year flood event.

Case study
A co-ordinated approach to planning for water

Integrated River Basin Management Planning

Adaptation requires many different sectors to work together. We are responsible for implementing the Water Framework Directive, an EU law to help improve the ecological quality of rivers, lakes, groundwater, estuaries and coastal waters. We have developed the first set of draft River Basin Management Plans, in liaison with others, including farmers and the water industry. River Basin Management allows us to take a more co-ordinated and sustainable approach to the water environment. This includes a more systematic and consistent approach to considering climate change risks and adaptation. Improved management of existing pressures will make the water environment more resilient to future climate changes.

What you can do now

Are you at an early stage in thinking about adaptation?

Here's what you need to consider:

- **How vulnerable is your organisation to the effects of climate change?** Think how you might be affected – how soon, how often and to what degree. This will help you decide what steps to take.
- **What do you need to do now?** Remember that some changes, such as sea level rise, will be gradual whereas others, such as intense rainfall, may come sooner and with little warning. Work out what action you should take quickly to improve your ability to cope with effects in the short term, as well as what you need to do to prepare for longer term changes.
- **What can you do to adapt and who with?** Once you've carried out an assessment and made plans, you need to act. This may include working in partnership with us, and others.
- **Can you change your plans if you need to?** As far as possible, your plans should be flexible so that you can adjust them if necessary.

Look on our website for guidance and advice, including links to other important sources of information.

Are you already taking steps to adapt?

If you have started to plan for adaptation but want to do more, here are some things to consider:

- **Is your evidence up to date?** Use the latest data, such as the UKCP09 climate projections, to identify all the main threats and opportunities and incorporate these into your plans.
- **Are you being innovative?** It may not be enough to modify existing plans – new ways of thinking and working are needed. And above all, you need to turn planning into action.
- **Can you learn from others' work?** Partnership working is especially important. We all need to share our experience and insights as we take our journey towards adaptation. You can find out what we've learned so far by visiting our website.

For more case studies, examples and information, look online at:

www.environment-agency.gov.uk/adapt

For more information visit:

www.defra.gov.uk/adaptation
www.ukcip.org.uk
www.nottinghamdeclaration.org.uk

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›› Key to case study icons:


Flooding


Land use planning


Sea level rise and the coast


Wildlife and habitats


Communities and people


Land management


Water resources


Business and industry

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