BRIEFING NOTE

National Audit Office

Climate change adaptation: the government's role and progress

A briefing for the Environment, Food and Rural Affairs Committee – February 2022

Introduction

This is a briefing for the Environment, Food and Rural Affairs (Efra) Committee. It sets out how the government is organised and the role of the Department for Environment, Food & Rural Affairs (Defra) in fulfilling its lead responsibility for climate change adaptation policy.

The UN defines climate change adaption as "adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. In simple terms, countries and communities need to develop adaptation solutions and implement action to respond to the impacts of climate change that are already happening, as well as prepare for future impacts."

Overview

- Climate change is already resulting in significant costs to the UK. Costs arising from climate change are expected to exceed £7 billion per year by 2050 and could be as much as £20 billion per year by 2080 under a 4°C rise in temperatures (page 5).
- Defra has overall responsibility for leading government policy on climate change adaptation in England, but successful delivery of adaptation measures will require coordinated work across the public sector. The second National Adaptation Programme, published in July 2018, includes actions for over 50 public bodies (pages 8 to 10).
- Climate change adaptation measures are likely to achieve best value for money when they are delivered early. However, there are concerns over whether climate change adaptation has been receiving enough attention within government and it has been tagged as a 'Cinderella' issue compared to mitigation (pages 6, 15 and 16).
- Government accepts that action on adaptation has lagged behind the growing risks posed by climate change and that more needs to be done (pages 16 to 21).

What this briefing includes

- An introduction to the risks posed by climate change and how climate adaptation addresses them.
- A description of Defra's roles and responsibilities for climate adaptation and government's key policies in the area.
- A summary of government's progress on adaptation and recommendations for how it can improve.
- Case studies providing further detail on some of Defra's main adaptation policies.

Approach

This report summarises publicly available data and reports from Defra, the Climate Change Committee (CCC), the National Audit Office (NAO), the National Infrastructure Commission and the Met Office. We have not performed any additional audit and assurance work on these reports and data for this briefing.

On some pages we have included issues arising from the facts set out which the Efra Committee or others might like to consider.

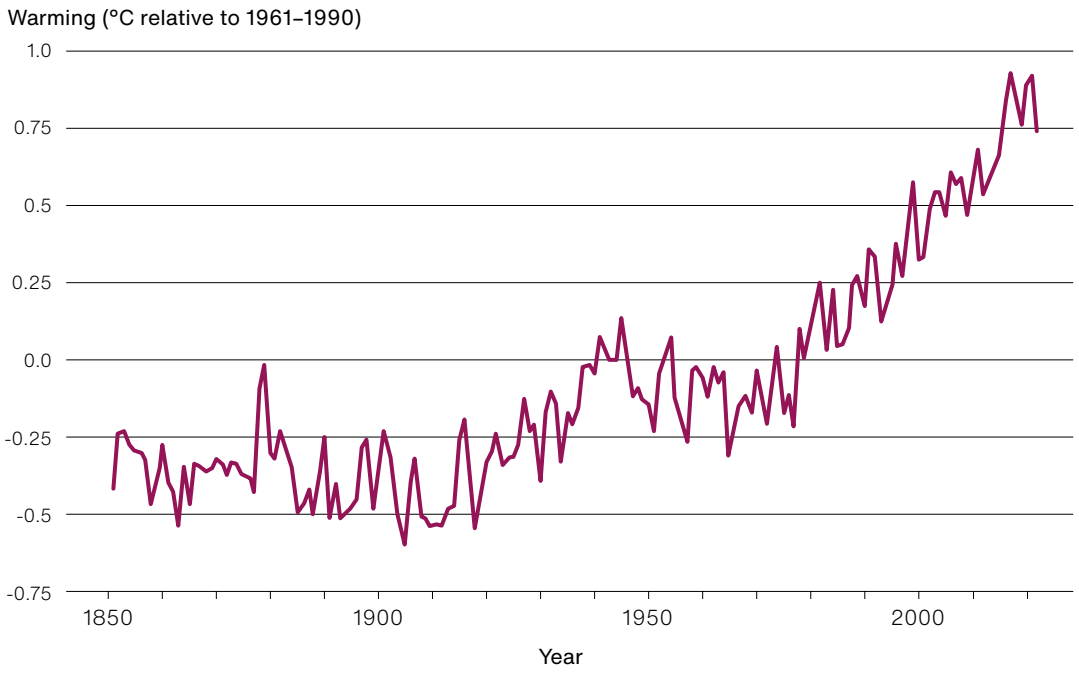
Risks posed by climate change and adaptation actions to address them

Current and future climate change

In July 2021 the Met Office updated its UK Climate Projections, which were initially published in 2018. It concluded that climate change is already affecting the UK:

- The decade 2009–2018 saw average temperatures 0.3°C higher than during 1981–2010 and 0.9°C higher than 1961–1990. The 10 warmest years in the UK since 1884 have all occurred since 2002.
- The world's longest-running dataset from central England suggests 2009–2018 was on average 1°C warmer than the second half of the nineteenth century. This is consistent with levels of warming recorded globally.
- Extreme heat is becoming more common: the average hottest day of the year during 2008–2017 was 0.8°C warmer than during 1961–1990.
- The highest ever temperature in the UK, 38.7 °C, was officially recorded in July 2019 in Cambridge. The previous highest temperature had been recorded in August 2003.
- Over the decade 2009–2018, the UK received on average 5% more rainfall than during 1961–1990. Instances of extreme wet weather have become more common in parts of the UK, particularly Scotland.
- Average sea levels around the UK have risen by 17cm since 1900.

Global surface air temperature change, 1850–2021



Source: National Audit Office analysis of Met Office Hadley Centre observation datasets

The Met Office predicts that during the 21st century the UK is likely to see warmer, wetter winters and hotter, drier summers, with more frequent and more intense extremes of weather.

- The Met Office's predictions use a range of scenarios based on differing future levels of greenhouse gas emissions. Under its high-emissions scenario, it predicts that hot spells (two or more consecutive days where temperatures exceed 30°C) would become 20 times more frequent and no longer be restricted to south-east England. Peak summer temperatures could increase by up to 6.8°C.
- The rainfall predictions are broader, but suggest a change in precipitation of -47% to +2% in summer and -1% to +35% in winter by 2070 in a high-emissions scenario. Despite the predicted drier summers, more intense heavy summer rainfall events are expected, which will increase the frequency and severity of flooding, especially in urban areas.[1]

The risks to the UK posed by climate change

These eight priority risk areas require the most urgent UK-wide action over the next two years

Priority risk area	Magnitude of risk	Key policy areas
Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards	High	Biodiversity; Soil and water protection and restoration; Environmental land management; Sustainable farming and forestry; Net Zero; Green finance.
Risks to soil health from increased flooding and drought	Medium but will increase to high by 2050	Biodiversity; Soil and water protection and restoration; Environmental land management; Sustainable farming and forestry; Net Zero; Green finance.
Risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions	Medium but will increase to high by 2050	Biodiversity; Soil and water protection and restoration; Environmental land management; Sustainable farming and forestry; Net Zero; Green finance.
Risks to crops, livestock and commercial trees from multiple hazards	Medium but will increase to high by 2050	Biodiversity; Soil and water protection and restoration; Environmental land management; Sustainable farming and forestry; Net Zero; Green finance.
Risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks	Medium but will increase to high by 2050	Public procurement; Business resilience; Environmental land management; Trade.
Risks to people and the economy from climate-related failure of the power system	High	Infrastructure; Energy; Net Zero.
Risks to human health, well-being and productivity from increased exposure to heat in homes and other buildings	High	Building regulations and strategies; Planning reform.
Multiple risks to the UK from climate change impacts overseas	High	National resilience; Overseas aid; Research and capacity building.

Source: HM Government, *UK Climate Change Risk Assessment 2022*, January 2022

1 Met Office, *UK Climate Projection: Headline Findings*, July 2021.

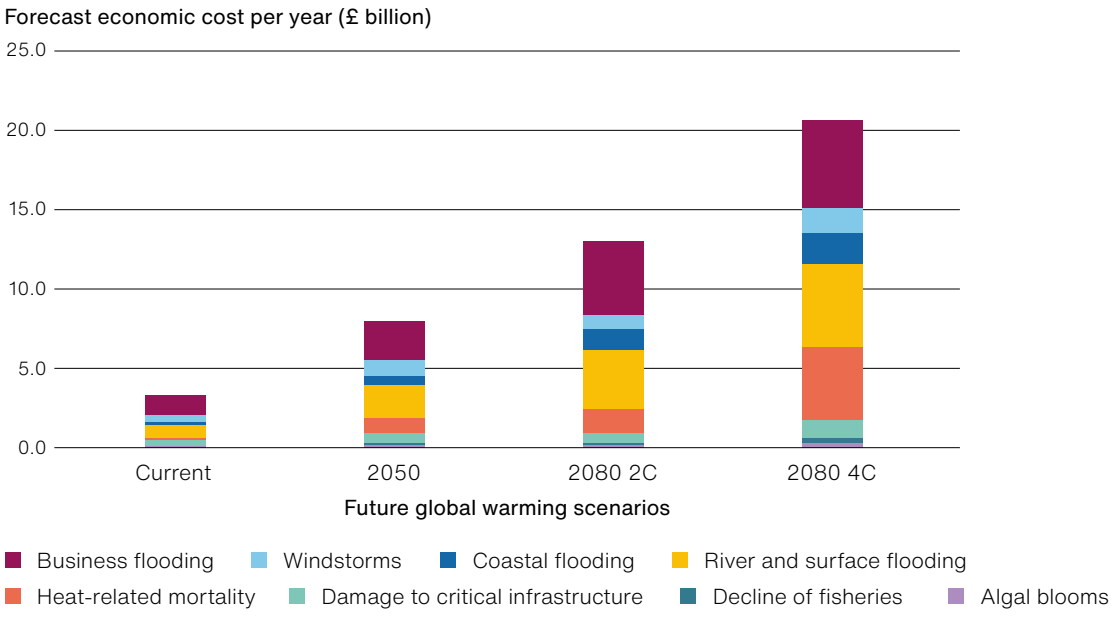
The economic impact of climate change

As part of its work on identifying and quantifying climate change risks, the CCC commissioned an expert analysis to place monetary values on the risks and opportunities, as well as indicative costs and benefits, of adaptation. The report concluded that:

- several of the climate threats identified by the government have high economic costs amounting to billions of pounds each year by as early as the middle of the century. The most severe threats include risks to natural carbon stores, risks from river and surface water flooding, risks to health and well-being from high temperatures, and risks to food availability;
- later in the century there is a significant difference in the likely economic costs of climate change, depending on whether the UK faces average temperature rises of 2°C or 4°C;
- the cost estimates of the impact of climate change have increased considerably since the government's first Climate Change Risk Assessment; and
- early investment in adaptation delivers strong value for money, with most measures delivering £2 to £10 of net economic benefits for every £1 spent. In addition to reducing potential losses from climate change, the analysis found that almost every kind of adaptation measure generated additional economic, social and/or environmental gains.

The analysis did not calculate an aggregate cost of potential damage that could be caused by climate change or of adaptation in the UK owing to the considerable level of uncertainty. However, it did include broad estimates of the range of costs likely to arise from the main climate change risks. A valuation of the more significant risks is shown in the figure below, which demonstrates the considerable difference in economic damage caused by the more severe warming scenario of 4°C.

Annual economic costs of climate change in the UK (£ billion) for a selection of risks



Source: Paul Watkiss Associates, *Monetary Valuation of Risks and Opportunities in CCRA3: Report to the Climate Change Committee as part of the UK Climate Change Risk Assessment 3*, May 2021

What is climate change adaptation?

The United Nations Framework Convention on Climate Change has been ratified by 197 countries and its ultimate aim is to prevent dangerous human interference with the climate system. It defines adaption as "adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. In simple terms, countries and communities need to develop adaptation solutions and implement action to respond to the impacts of climate change that are already happening, as well as prepare for future impacts."

"The UK has a strong framework for emissions reduction and planning for climate risks set out in the Climate Change Act 2008. But adaptation remains the Cinderella of climate change, still sitting in rags by the stove: under-resourced, underfunded and often ignored."

Climate Change Committee, ***Independent Assessment of UK Climate Risk***, June 2021

Examples of where climate adaptation is needed in the UK and actions that help to address them:

Increased vulnerability of the power system to climate-related risks

- Increasing the uptake of smart technologies that use electricity during times of low demand.
- Developing large-scale, long-duration electricity storage to increase efficiency and security of supplies.

Inland flooding

- Developing systems to cope with extreme rainfall as UK winters get wetter.
- Planting trees and restoring peatlands as a natural barrier to flooding.
- Reforming planning so that increased flood risks are factored into decision-making.

More frequent droughts

- Strengthening the UK's resilience to droughts as summers get drier and extreme droughts become more likely.
- Increasing water supply and reducing domestic and commercial demand.
- Reforming agriculture so that it is able to cope with changing climatic conditions.

Risks to soil health

- Increasing the use of soil-friendly farming practices, including no-till and precision farming.
- Improving water management on agricultural land to keep soil moisture in balance.

"A UK Net Zero goal does not preclude the need to adapt to the changing climate"

"The changing climate poses risks to meeting most of the government's economic, social and environmental goals. The UK's National Risk Register for the next five years places flooding, severe weather (including storms, heatwaves, cold snaps, wildfire) and human and animal diseases among its top risks to the country. All of these risks are increasing due to the changing climate.

"If the world succeeds in meeting the goals of the Paris Agreement, the latest UK climate projections suggest the country will experience an additional warming of around 0.6°C between now and 2050. This is the minimum change we must adapt to.

"In the absence of the required very rapid global decarbonisation, UK annual mean temperatures would likely increase by a further 2°C to 3°C from today (up to 4°C above pre-industrial levels) by the end of the century. Sea level rise, rainfall patterns and severe weather would also see similarly more extreme changes."

Source: Climate Change Committee, ***Reducing UK emissions: Progress Report to Parliament***, June 2020

The government's role and policies for climate adaptation

Government responsibilities for adaptation

Climate Change Act

The Climate Change Act 2008 commits government to a five-yearly cycle of action on climate change adaptation:

- The Met Office, in partnership with Defra, the Department for Business, Energy & Industrial Strategy (BEIS), the devolved administrations and the Environment Agency, produce **UK Climate Projections** to inform climate change risk assessments. The latest was published in November 2018 and updated in July 2021.
- Defra publishes a **Climate Change Risk Assessment (CCRA)** every five years, setting out the key climate change risks that need to be addressed and how urgent they are. This is prepared with input from the Adaptation Committee of the Climate Change Committee (CCC). Defra published the latest CCRA in January 2022.
- Defra publishes a **National Adaptation Programme (NAP)** every five years, setting out how government will address the risks identified in the CCRA. The actions are the responsibility of a wide range of public bodies. The last NAP was published in July 2018 and covers the period 2018–2023. It assigned responsibility for delivery actions to around 50 organisations (see page 9).
- The CCC publishes reports on government's progress on climate adaptation every two years. The most recent was published in June 2021.

The Act gives Defra discretionary powers to direct or invite key organisations to prepare reports on how they are adapting to climate change under the **Adaptation Reporting Power (ARP)**. Around 90 infrastructure providers and public bodies have been invited to participate in the third ARP reporting round (from 2019–2021), including those responsible for water, energy, transport, environment, heritage, health and finance.

Policy and legal framework

Responsibility for climate change adaptation is split between the four countries of the United Kingdom, with national governments in Northern Ireland, Wales and Scotland responsible for adaptation in all devolved policy areas.

Within government, Defra has lead responsibility for climate change adaptation policy, but it will require a large number of departments and public bodies to work together effectively to deliver the government's adaptation goals.

Defra leads on climate change adaptation policy in England. The UK government holds UK-wide responsibility for reserved policy areas such as international trade and national security.

Governance

The Domestic Adaptation Board has been replaced by an internal **Adaptation Subgroup**, which oversees cross-government action on adaptation. It sits under the Climate Change Integrated Review Implementation Group. The subgroup members consist of relevant directors and deputy directors from across government.

In England, Defra oversees the **Local Adaptation Advisory Panel**, which provides a forum for dialogue on climate change adaptation between local government, central government and arm's-length delivery bodies.

Defra is represented on the **Climate Change Integrated Review Implementation Group**, which reports to two Cabinet committees and is chaired by BEIS. Its role is to promote cross-government action on climate change adaptation.

Issue to consider

Does Defra have sufficient cross-government leverage to ensure that all government bodies work together effectively on adaptation?

Second National Adaptation Programme

Defra published its second *National Adaptation Programme* (NAP) in July 2018 setting out a programme of actions to address the priority areas identified in its *Climate Change Risk Assessment*. Defra cannot deliver the programme on its own. It will need the active cooperation of a wide range of public bodies and the NAP gives delivery responsibility for key actions to more than 50 bodies. A range of these are set out below:

Actions required to address Climate Change Risk Assessment priority areas

Priority area	Delivery body or bodies	Action(s)
Natural Environment	Defra, Environment Agency	Reduce the harm from flooding and coastal erosion including through greater use of natural flood management solutions.
	Defra, Environment Agency and The Water Services Regulation Authority (Ofwat)	Reform the approach to water abstraction; reverse the deterioration of groundwater.
	Defra and Forestry Commission	Expand woodlands and increase their resilience to climate change, pest and diseases, and natural hazards.
Infrastructure	BEIS	Increase the resilience of energy infrastructure to flooding; improve understanding of interdependencies within energy networks.
	Department for Transport	Increase the resilience of all transport infrastructure to flooding; increase the resilience of embankments to heavy rainfall events; compile national database of bridges critical to essential services.
	Department for Digital, Culture, Media & Sport (DCMS) and The Office of Communications (Ofcom)	Increase the resilience of telecommunications infrastructure to flooding.
	Cabinet Office	Improve arrangements for local infrastructure operators to share information and improve understanding of critical risks.
People and the built environment	Defra, Environment Agency	Manage floods and coastal erosion to save lives, better protect communities and support economic growth.
	Cabinet Office	Ensure that emergency and local services are prepared for extreme weather events.
	Department for Levelling Up, Housing & Communities (DLUHC)	Improve understanding of how climate change affects business; ensure a climate-resilient food supply chain.
Business and industry	Defra	Ensure that demand for water is reduced and supplies maintained.
	Whole of government	Deliver the sustainability targets set out in the Greening Government Commitments.
Local government	Defra and local government	Plan for and implement climate adaptation at local government level.

Source: Department for Environment, Food & Rural Affairs, *The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting*, June 2018

National Resilience Strategy

National Infrastructure Commission (NIC)

In May 2020 the NIC published its review, *Anticipate, React, Recover: Resilient infrastructure systems*, looking at how UK infrastructure could be made more resilient to climate change and other threats. A major driving factor behind the review was recent flooding and power outages caused by extreme weather events. The NIC concluded that much of what is needed is already in place, but improvements can still be made:

1 Government should publish a full set of resilience standards every five years, following advice from regulators, alongside an assessment of any changes needed to deliver them.

2 Infrastructure operators should carry out regular and proportionate stress tests, overseen by regulators, to ensure their systems and services can meet government's resilience standards, and take actions to address any vulnerabilities.

3 Infrastructure operators should develop and maintain long-term resilience strategies, and regulators should ensure their determinations in future price reviews are consistent with meeting resilience standards in the short- and long-term that drives adaptation before it is too late (see figure below).

The NIC published a timeline setting out when it felt its key recommendations on resilience needed to be addressed

2021	Government to ensure that Ofwat, Ofgem and Ofcom have resilience **duties** (as recommended in the Commission's regulation study), and consider whether to extend this to road and rail. Government to introduce a **statutory requirement** for Secretaries of State to publish **resilience standards** every five years, starting in 2022, alongside an assessment of where changes are needed to existing structures, powers and incentives to support the delivery of these standards. Regulators to set out initial plans for **stress tests**.
2022	Regulators to advise government on costs and benefits of different **resilience standards**. Secretaries of State to publish the first set of **resilience standards** and assessment of changes to structures, powers and incentives.
2023	Regulators to introduce new **obligations** on infrastructure operators, to ensure they: • meet government's **resilience standards**; • undertake regular **stress tests**; • develop and implement plans to address vulnerabilities identified by **stress tests**; and • develop and maintain **long-term resilience strategies from 2023 onwards**
2024 (at the latest)	Regulators to ensure the first round of the new **stress tests** are complete.
Future price reviews	Regulators to ensure their determinations in future price reviews are consistent with **meeting resilience standards** in the short term.

Source: National Infrastructure Commission, *Anticipate, React, Recover: Resilient infrastructure systems*, May 2020

Government's response and the National Resilience Strategy

The government published the Integrated Review in March 2021, which set out its overarching vision and the strategic framework for building the UK's resilience. While this addressed building resilience to climate change risks, it also looked at broader threats to the UK. It committed the government to develop a comprehensive National Resilience Strategy, to be published in the first half of 2022. The lead department for this work is the Cabinet Office.

The government said that it would respond to the NIC's first two recommendations in the National Resilience Strategy. It will not formally respond to the third recommendation until the Strategy is published so it can assess what obligations should be placed on infrastructure operators in the context of the Strategy.

Issue to consider

Whether government's development of the National Resilience Strategy is on track?

Defra's adaptation actions and commitments

National Flood and Coastal Erosion Risk Management Strategy (FCERM)

FCERM is the largest climate change adaptation programme, delivered by the Environment Agency (EA) in partnership with a range of other bodies under the overall direction of Defra. Around 5.2 million homes and properties in England are at risk from flooding and coastal erosion and the EA estimates that, as the UK population grows, the number of properties in the flood plain will almost double over the next 50 years.

FCERM is a rolling cycle of six-year programmes backed with dedicated funding. The first period ran from April 2015 to March 2021, and the current strategy runs from April 2021 to March 2027. It covers flooding caused by the sea, rivers, surface water and other less common sources of flooding.

- Between 2015 and 2021 £2.6 billion was invested to better protect 300,000 homes from flooding.
- For the second six-year period, HM Treasury has increased funding to £5.2 billion to protect a further 336,000 homes and properties and achieve £32 billion of wider economic benefits.

FCERM's long-term aims are:

- to ensure climate-resilient places;
- to ensure that economic growth and infrastructure is resilient to climate change; and
- to create a nation ready to respond and adapt to flooding and coastal change.

The NAO's assessment of how the FCERM strategy is progressing is set out in more detail on pages 24 and 25.[2]

Other actions highlighted in Defra's annual report and accounts[3]

- In 2019-20 Defra announced £50 million for a new Woodland Carbon Guarantee and a £640 million Nature for Climate Fund to drive improvements in tree-planting, peatland restoration and nature recovery. (There is more information on tree-planting on pages 28 and 29.)
- Defra updated the 2018 UK Climate Projections with new local-scale projections, in conjunction with the Met Office. These are the first national climate projections in the world to provide locally relevant climate change information on a similar resolution to that of weather forecast models.
- Defra worked with the former Department for International Development to launch an adaptation and resilience Call for Action at the United Nations Climate Action Summit in September 2019.
- Defra has used its Adaptation Reporting Power to ensure that more than 90 organisations will report on their plans and actions to strengthen preparedness for climate change risks by the end of 2021. This includes bodies responsible for water, energy, transport, environment, heritage, health and finance.
- In conjunction with HM Treasury, Defra has updated the Green Book guidance to ensure that climate adaptation is factored into the appraisal of government programmes and policies (see page 14).
- Defra worked in partnership with the Association of Directors of Environment, Economy, Planning and Transport and the Local Adaptation Advisory Panel to produce a guide on climate adaptation for local government.

2 Environment Agency, *National Flood and Coastal Erosion Risk Management Strategy for England*, July 2020.
3 Department for Environment, Food & Rural Affairs, *Annual Report and Accounts 2019 to 2020*, December 2020.

Green Book guidance

Many areas of government activity need to take account of climate change risks if they are to achieve optimal value for money. To ensure that climate adaptation and resilience is considered across government, Defra published supplementary Green Book guidance in November 2020.

The Green Book is guidance issued by HM Treasury on how government bodies should appraise policies, programmes and projects in order to develop and identify the best options. Defra's supplementary guidance supports analysts and policy-makers in ensuring that government policies, programmes and projects are developed to be resilient to the effects of climate change. The standard Green Book approach uses cost:benefit analysis to identify which policy, programme or project option is likely to deliver the best value for money. The supplementary guidance prompts users to account for climate change at three key stages:

Developing options – Identifying climate risks and adapting options where necessary: policy options are developed based on a rationale for intervention, but an assessment of potential climate change risks needs to be conducted at this stage. Once climate risks have been identified, options can be improved and revised to include adaptation measures at the design stage where net benefits are greatest.

Appraisal of options – Incorporating climate change risks and impacts into the appraisal process: climate change effects should be included in the costs and benefits of the shortlisted options. It may be necessary to consider multiple scenarios and compare options with and without adaptation measures to ascertain which option provides the best value given climate change risks.

Decision-making, monitoring and evaluation – valuing flexibility and adapting accordingly: when selecting options, some value should be given to options that address uncertainty (for example, options that offer some flexibility over time may offer greater value). It may be possible to quantify the value of flexibility as part of the benefits appraisal.[4]

Issues to consider

What do Defra and HM Treasury do to ensure that departments and arm's-length bodies are following this guidance?

Are there any examples where the decision to follow a particular policy or programme was crucially influenced by considerations of climate resilience?

4 Department for Environment, Food & Rural Affairs, *Accounting for the Effects of Climate Change: Supplementary Green Book Guidance*, November 2020.

The government's progress on adaptation

Relevant NAO work

November 2020 findings on adaptation

In November 2020, the NAO published *Achieving government's long-term environmental goals*, which looked at the full range of the government's stated ambitions for the environment. The NAO's key findings on climate change adaptation were:

- **there had been a lack of interim objectives and costed plans:** while government had articulated high-level environmental goals, these were not underpinned with clear, specific medium- and long-term objectives and milestones. Without clear objectives and plans it will be difficult to persuade people within and outside government to take goals seriously, particularly when government has other high-priority issues to deal with such as COVID-19 and EU Exit;
- **the Domestic Adaptation Board, a key body for coordinating cross-government action on adaptation, had met less than once a year:** arrangements for joint working between departments on climate change adaptation were not working effectively. Defra chairs a cross-government Domestic Adaptation Board (DAB), which includes representation from 12 government departments. However, although government has stated that it wants "all policies, programmes and investment decisions to take into account the possible extent of climate change this century", the DAB had met only twice over the previous three years. The DAB was subsequently replaced by the Adaptation Subgroup; and
- **the Climate Change National Strategy Implementation Group (NSIG) had yet to address climate change adaptation:** the NSIG is the senior cross-government group for overseeing government's development and implementation of climate policy. The NSIG reports to two climate Cabinet committees and is chaired by a director general from BEIS, the senior responsible owner who is accountable to the Cabinet committees for climate action. While in principle its remit covers both domestic and international aspects of climate change mitigation and adaptation, the focus of the NSIG has been on decarbonising the economy and the UK's Net Zero target with little consideration of adaptation.

Lessons from wider NAO work

Our wider work on Defra's environmental programmes have highlighted a number of cross-cutting issues and lessons that could be applied to its action on climate adaptation:

- When delivering at speed, it should ensure that there is a clear rationale for doing so and that the risks to value for money are understood, including the trade-offs between speed, cost and outcomes.
- It should develop clear SMART (Specific, Measurable, Achievable, Realistic and Time-limited) objectives at the outset of programmes.
- It needs to understand the wider benefits and how to achieve them.
- It should provide strong and proportionate oversight of its delivery partners.
- It should develop robust monitoring and evaluation frameworks.
- It should build an approach to fraud and error into policy design at an early stage.[5]

Issues to consider

Has the Adaptation Subgroup been more active and effective than its predecessor, the Domestic Adaptation Board?

Has the National Strategy Implementation Group increased its focus on climate change adaptation?

Climate Change Committee's 2021 headline findings

The most recent report by the Climate Change Committee (CCC) on the government's progress on climate change adaptation, *Progress in adapting to climate change*, was published in June 2021. The report noted that "climate change resilience remains a second-order issue, if it is considered at all" and identified a number of problems:

- **Not enough progress has been made in the majority of areas highlighted in the climate change risk assessments.** The CCC acknowledged that there had been progress made in certain areas where the government has taken a leading role, such as the FCERM Strategy and setting planning requirements for the water sector. However, in most other areas, neither the government nor stakeholders have taken effective action on adaptation. The CCC attributes this to a range of factors such as financial constraints, behavioural barriers and incomplete understanding of the risks posed by climate change.

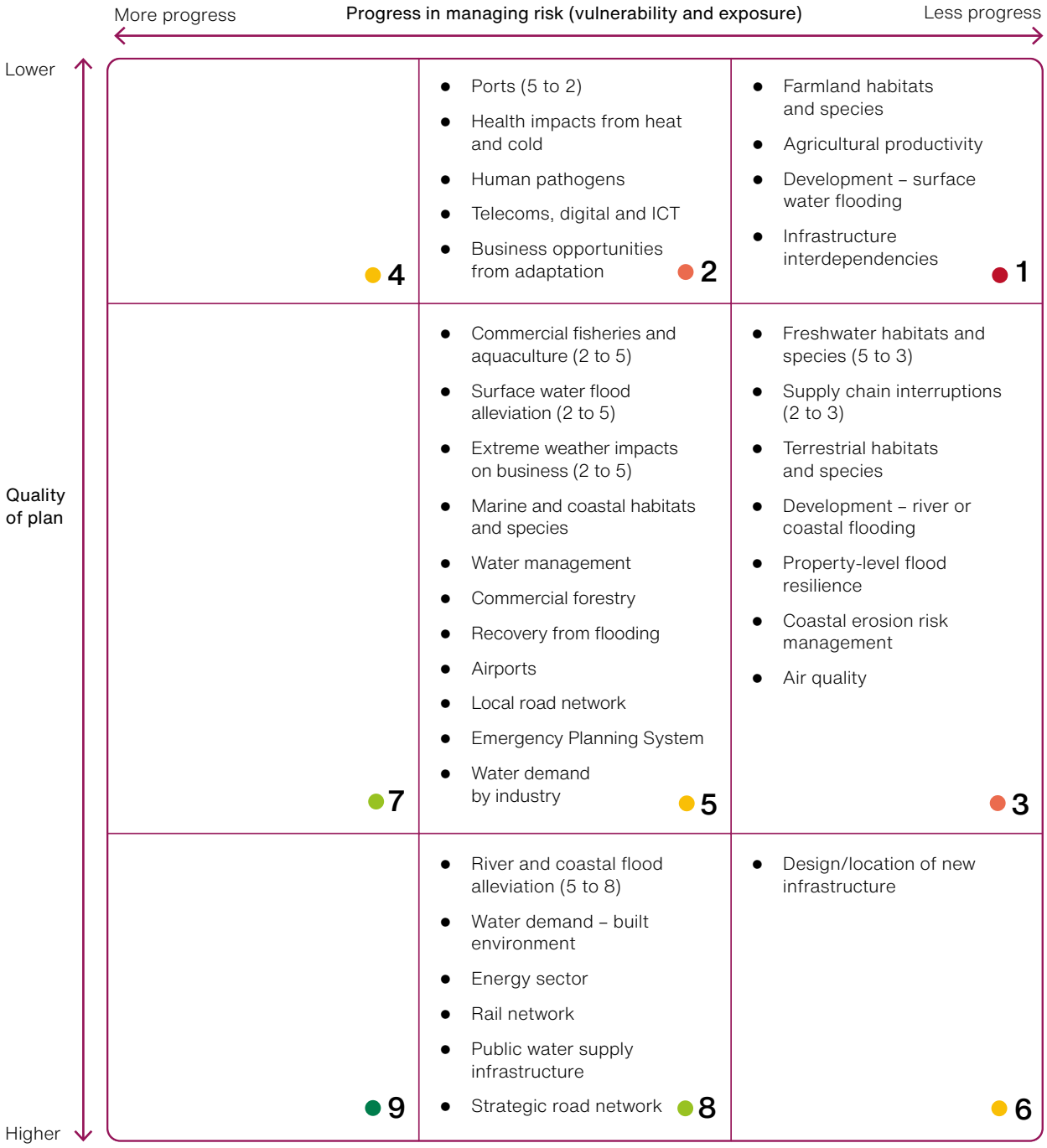
5 National Audit Office analysis.

- **The gap between future levels of risk and planned adaptation has widened in the last five years.** The CCC concluded that although the government has published (in 2013 and 2018) and worked to implement two National Adaptation Programmes, it has yet to deliver a minimum level of resilience to current and expected future climate change. The CCC's third UK Climate Change Risk Assessment, published in January 2022, highlights that more than half (56%) of the risks have been given the highest urgency score, signalling that more action is needed than is currently planned. In comparison, only around one-third (36%) of the risks were given the highest urgency score in its 2016 assessment.
- **Planning for 2°C and consideration of 4°C warming is still not happening.** The CCC found that current plans and policies do not, for the most part, address the risks of the climate changing by more than the 1.5°C that is the stated government target. There is insufficient planning for a slightly greater increase of 2°C and minimal consideration of how the UK could cope with an increase of 4°C. Of the 34 adaptation priorities assessed, sufficient consideration of more extreme warming scenarios was given in only seven of them, including: flood and water management; road; rail; energy; and the design of new critical infrastructure.
- **The UK is leading in diagnosis but lagging in policy and action.** The CCC concluded that while the UK has world-leading climate science expertise, it is not matched in policy ambition and implementation. It stated that the UK "has good evidence on future climate risks, good evidence on the importance of prudent risk planning and good evidence on the benefits of UK adaptation. In the wake of the COVID-19 pandemic, it has never been clearer that we need robust, well-resourced plans for known risks, however small or distant they seem and even if the decision is not to act at the end."

Climate Change Committee's 2021 detailed assessment of progress

The CCC assessed government's performance and progress against 34 climate change priorities by considering the actions it had taken and the quality of its adaptation plans. Only five scores had improved since the CCC's last assessment in 2019 and no sectors were given a high score for risk management (see figure on page 18).

The Adaptation Committee's scoring of adaptation priorities (2021)



Notes

1 The numbers and RAG (red, amber, green) ratings show the overall level of risk, based on the progress made in each area and the plans in place to address them; 1 reflects the highest risk rating, 9 the lowest.

2 Adaptation priorities where scores have changed since 2019 are highlighted with the change in score provided in brackets.

3 The score has dropped from 5 to 2 but this is due to the splitting of a joint airports/ports priority in 2019 into separate priorities for this report. The level of planning has not changed for ports since 2019.

Source: Climate Change Committee, *Progress in adapting to climate change 2021 Report to Parliament*, June 2021

The CCC concluded that the lack of progress on adaptation over the past five years had also led to lock-in, irreversible changes and higher future costs for the government:

- **Lock-in:** Since the second Climate Change Risk Assessment was published in January 2017, more than 570,000 new homes have been built in England that are not resilient to future high temperatures. These will require costly retro-fitting to make them safe, habitable and water-efficient in the future. In the next five years, another 1.5 million homes are due to be built across the UK, which will also lock in increased climate vulnerability unless planning and building policy is changed.
- **Irreversible impacts:** Since 2018, more than 4,000 heat-related deaths have been recorded in England. Three major wildfires at Saddleworth Moor, the Flow Country and the Mourne Mountains reportedly burned between 70 and 140 square kilometres, the area of a medium to large city, although there are uncertainties about the extent of the damage. Wildlife has been lost, emissions have increased and it will take decades for those areas of peatland, heathland, forest and moorland to recover.
- **Increasing costs:** Over the last five years, current and future risks from climate change have increased and the need for action has become more urgent. The future costs from climate change over the 21st century are estimated to be higher now than they were five or 10 years ago: the longer action is delayed, the higher the costs the government will face as the insurer of last resort and the higher the costs of adaptation.[6]

Issue to consider

What action is Defra taking to ensure that it gets progress back on track?

6 Climate Change Committee, *Progress in adapting to climate change 2021 Report to Parliament*, June 2021.

Third Climate Change Risk Assessment

The CCC published its own independent climate change risk assessment (CCRA) in June 2021, which informs the official government CCRA, which was published in January 2022.

The CCC's overall conclusion was that adaptation action has failed to keep pace with the worsening reality of climate change risk and the UK needs to take additional steps to adapt to climate change above those already planned. Of the risks identified by the CCC, 56% received the highest urgency score, compared with 36% in its 2016 assessment. The magnitude (that is to say, the potential impact of these risks) is increasing more quickly than the CCC's earlier assessments predicted. The figure on page 21 sets out CCC's detailed risk assessment.[7]

HM Government published CCRA3 in January 2022 and accepted the findings and recommendations of the CCC, including that: "to date our actions have not been sufficient in meeting the increasing risks from climate change." It confirmed the eight priority risk areas that require urgent UK-wide attention over the next two years as:

- risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards;
- risks to soil health from increased flooding and drought;
- risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions;
- risks to crops, livestock and commercial trees from multiple hazards;
- risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks;
- risks to people and the economy from climate-related failure of the power system;
- risks to human health, well-being and productivity from increased exposure to heat in homes and other buildings; and
- multiple risks to the UK from climate change impacts overseas.[8]

Issue to consider

Has Defra identified what actions are needed to address each of the areas where progress to date has been insufficient?

7 Climate Change Committee, *Independent Assessment of UK Climate Risk*, June 2021.
8 HM Government, *UK Climate Change Risk Assessment 2022*, January 2022.

Climate Change Committee's assessment of UK-wide climate risks

Risks to terrestrial species and habitats	Risks to terrestrial species and habitats from pests, pathogens and INNS	Risk to soils from changing conditions, including seasonal aridity and wetness	Risks to natural carbon stores and sequestration from changing conditions	Risks to and opportunities for agricultural and forestry productivity
Risks to agriculture from pests, pathogens and Invasive Non-Native Species (INNS)	Risks to forestry from pests, pathogens and INNS	Risks to freshwater species and habitats	Risks to freshwater species and habitats from pests, pathogens and INNS	Risks to marine species
Risks to marine species and habitats from pests, pathogens and INNS	Risks and opportunities to coastal species and habitats	Risks to infrastructure networks from cascading failures	Risks to infrastructure services from river and surface water flooding	Risks to transport networks from slope and embankment failure
Risks to public water supplies from reduced water availability	Risks to transport from high and low temperatures, high winds, lightning	Risks to health and well-being from high temperatures	Risks to people, communities and buildings from flooding	Risks to people, communities and buildings from sea level rise
Risks and opportunities from summer and winter household energy demand	Risks to health from vector-borne disease	Risks to cultural heritage	Risks to health and social care delivery	Risks to education and prison services
Risks to business sites from flooding	Risks to business locations and infrastructure from coastal change	Risks to business from disruption to supply chains and distribution networks	Risks to UK food availability, safety and quality from climate change overseas	Risks to international law and governance from climate change overseas that will impact the UK
Risks to the UK from international violent conflict resulting from climate change	Risk to UK public health from climate change overseas	Risks from climate change on international trade routes	Risk multiplication from the interactions and cascades of named risks across systems and geographies	Opportunities from new species colonisations in terrestrial habitats
Opportunities for agricultural and forestry productivity from new species	Risks to aquifers and agricultural land from sea level rise, saltwater intrusion	Opportunities for marine species, habitats and fisheries	Risks and opportunities from climate change to landscape character	Risks to infrastructure services from coastal flooding and erosion
Risks to bridges and pipelines from flooding and erosion	Risks to hydroelectric generation from low or high river flow	Risks to subterranean and surface infrastructure from subsidence	Risks to energy generation from reduced water availability	Risks to energy from high and low temperatures, high winds, lightning
Risks to digital from high and low temperatures, high winds, lightning	Opportunities for health and well-being from higher temperatures	Risks to building fabric	Risks to health and well-being from changes in air quality	Risks to food safety and food security
Risks to health from poor water quality and household water supply interruptions	Risks to businesses from water scarcity	Risks to business from reduced employee productivity – infrastructure disruption and higher temperatures	Opportunities for business – changing demand for goods and services	Opportunities to marine species, habitats and fisheries
Risks to offshore infrastructure from storms and high waves	Risks to finance, investment, insurance, access to capital	Risk to the UK finance sector from climate change overseas	Opportunities for UK food availability and exports	Risks to the UK from climate-related international human mobility
Opportunities (including Arctic ice melt) on international trade routes				

- More action needed
- Further investigation
- Sustain current action waching brief

Source: Climate Change Committee, *Independent Assessment of UK Climate Risk*, June 2021

CCC recommendations for government

The CCC published its own independent risk assessment in June 2021, concluding that adaptation action has failed to keep pace with the worsening reality of climate change risk. Its recommendations included:

- the third National Adaptation Plan (NAP), expected in 2023, should contain a comprehensive set of actions on climate adaptation, with clear links to the government's ambitions for a sustainable economic recovery from the COVID-19 pandemic and its levelling-up agenda. Key policies that the NAP needs to engage with include: the Plan for Growth; the National Infrastructure Strategy; the Environment Bill; the Environmental Land Management Scheme; the Tree and Peat Action Plans; the Net Zero Strategy; the Planning Bill and developments in energy, housing and health policy;
- the government should set out a clear vision of what a well-prepared UK would look like. Its plans to achieve this should be supported with quantifiable targets to embed adaptation in policies across the natural environment, planning, infrastructure, homes and transport as they advance in the coming 12 months and beyond;
- climate change adaptation needs to be more effectively integrated throughout government's policy and planning decisions to ensure that further costs are not built up for the future. In particular, government's proposed planning reforms need to ensure that climate change resilience is given sufficient weight;
- the government should ensure that local authorities are properly funded with resources and training available to tackle climate change; and
- the third NAP needs to respond to the risks the UK faces from climate change overseas such as risks to the UK's food supply and risks to international supply chains.[9]

9 See footnote 7.

The CCC also set out 10 principles for government to follow in drawing up its next National Adaptation Programme:

1 Set out a vision for a well-adapted UK

2 Integrate adaptation into policies, including for Net Zero

3 Adapt to 2°C; assess the risks up to 4°C

4 Avoid lock-in

5 Prepare for unpredictable extremes

6 Assess interdependencies

7 Understand threshold effects (that is, where a non-linear change in a system occurs because of a climate variable. For example, algal blooms only occur when water temperature exceeds 17°C) as this is vital for understanding when certain actions are and are not needed

8 Address inequalities

9 Consider opportunities from climate change

10 Support the implementation of adaptation through funding, resources, indicators, and research to link adaptation actions to reductions in risk

Issues to consider

What steps are Defra taking to effectively integrate adaptation with other key government policies?

What quantifiable targets has it put in place to measure progress on adaptation?

Case studies

Case study: Managing flood risk

The NAO published *Managing flood risk* in November 2020, looking at how government was managing the increased risk of flooding posed by climate change. Defra has overall responsibility for the area, but most of the work is done by the Environment Agency (EA) as part of the National Flood and Coastal Erosion Risk Management Strategy (FCERM).

The EA estimates that 5.2 million homes and businesses in England are at risk of flooding. It had received £2.6 billion of capital funding to address this through FCERM for 2015–2021. At the time of our report, EA had improved the flood protection for more than 242,000 homes and was on course to meet its target of 300,000 homes by March 2021. HM Treasury confirmed a further £5.2 billion to fund a second six-year FCERM strategy for 2021–2027.

We acknowledged that the programme was expected to achieve a positive benefit-cost ratio of around 8:1, but found several shortcomings with the management of the programme:

- Defra's role is to provide oversight and challenge to EA but we found that Defra does not do enough to challenge EA's approach and performance.
- Defra had focused narrowly on reaching the stated target of protecting 300,000 homes rather than on ensuring the maximum impact from the money it was spending.
- Defra had not assessed the overall flood risk in England and therefore did not know whether the FCERM programme had actually reduced the cumulative risk of flooding.
- The proportion of funding to deprived areas has reduced substantially since 2014 despite the government's approach being designed to ensure deprived areas do not miss out on funding.

In response to the findings and recommendations in the NAO's report, Defra has:

- strengthened its governance and oversight by establishing an Investment Portfolio Board, which will undertake quarterly monitoring and assurance of performance, as well as taking an independent view of programme risks;
- now published its investment plan for 2021 to 2027, which sets out what it aims to achieve, including a range of other indicators alongside 336,000 properties being better protected;
- committed to improving its understanding and forecasting of risk to maximise the benefits from the investments made; and
- committed to working with EA to report on properties being better protected in deprived areas to track performance against its investment plan.

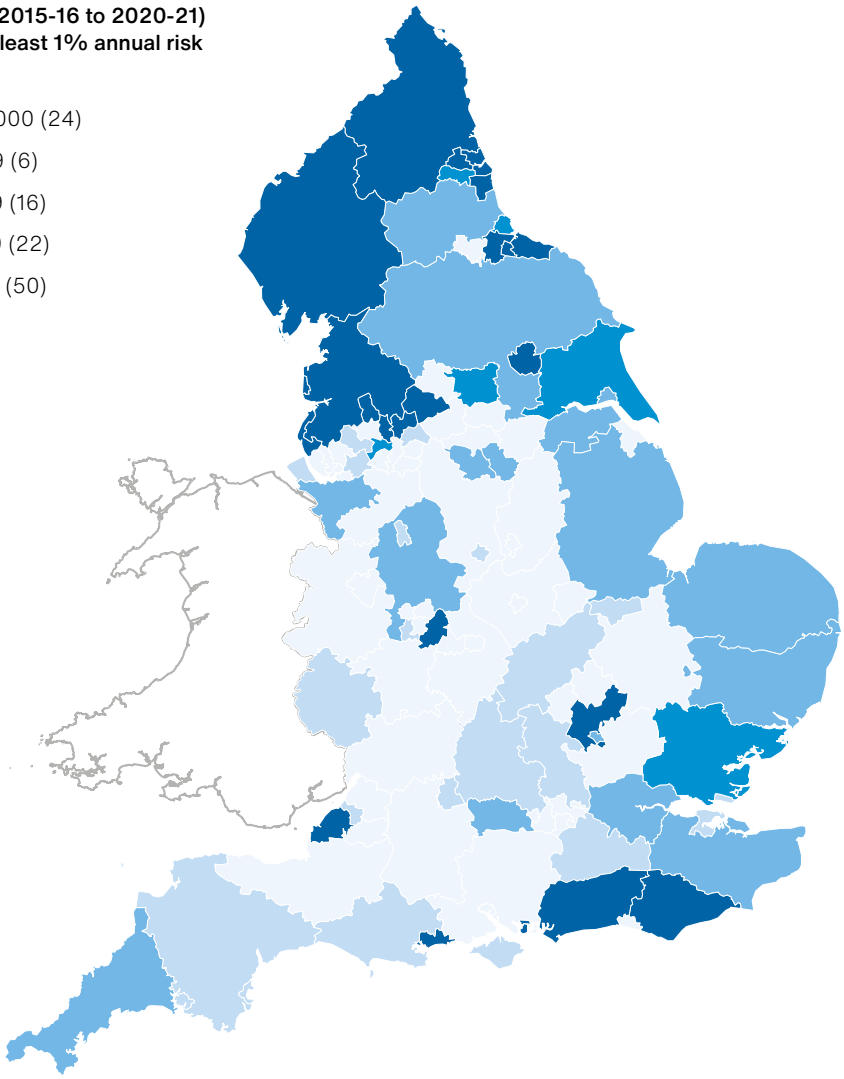
There was considerable regional variation in FCERM investment and we are concerned that this was driven by factors other than the merits of the flood defence schemes under consideration.

Average capital expenditure on flood defences per property with an annual likelihood of flooding of at least 1%, by local authority, in England 2015-16 to 2020-21

There are wide variations between local authority areas in the average capital investment per property at risk

Total capital spend (2015-16 to 2020-21) per property with at least 1% annual risk of flooding

- Greater than £5,000 (24)
- £3,750 to £4,999 (6)
- £2,500 to £3,749 (16)
- £1,250 to £2,499 (22)
- Less than £1,249 (50)



Notes

1 The number of properties at risk is as at 2016.

2 Includes local levy funding. The Environment Agency (EA) generates part of its income through a levy on local authorities.

3 The median spend per property at risk was £1,864 across local authorities in England, 2015-16–2020-21.

4 The numbers in brackets shown in the key refer to the number of local authorities within each level of capital spend.

Source: National Audit Office, *Managing flood risk*, November 2020

Issue to consider

What is Defra doing to ensure that the money for the 2021–2027 period is distributed in a way that more closely matches the level of flood risk?

Case study: Managing water supply and demand

There is already considerable stress on water supplies in many areas of the country, and climate change is expected to make these more severe. The NAO published *Water supply and demand management* in June 2020, looking at the steps government was taking to ensure the future resilience of the UK's water supplies.

- Defra has overall responsibility for setting the policy and regulatory framework for water in England, with the overarching objective of ensuring a clean and plentiful supply of water.
- The delivery landscape is complex, with Ofwat regulating the privatised water industry and the Environment Agency regulating water abstraction licences.
- The government wants to end unsustainable levels of water abstraction, which will require a reduction of 480 million litres per day by 2045. Drier weather as a result of climate change is expected to reduce supplies by a further 600 million litres per day.
- If current trends continue, parts of southern and south-eastern England will run out of water in the next 20 years.

We concluded that:

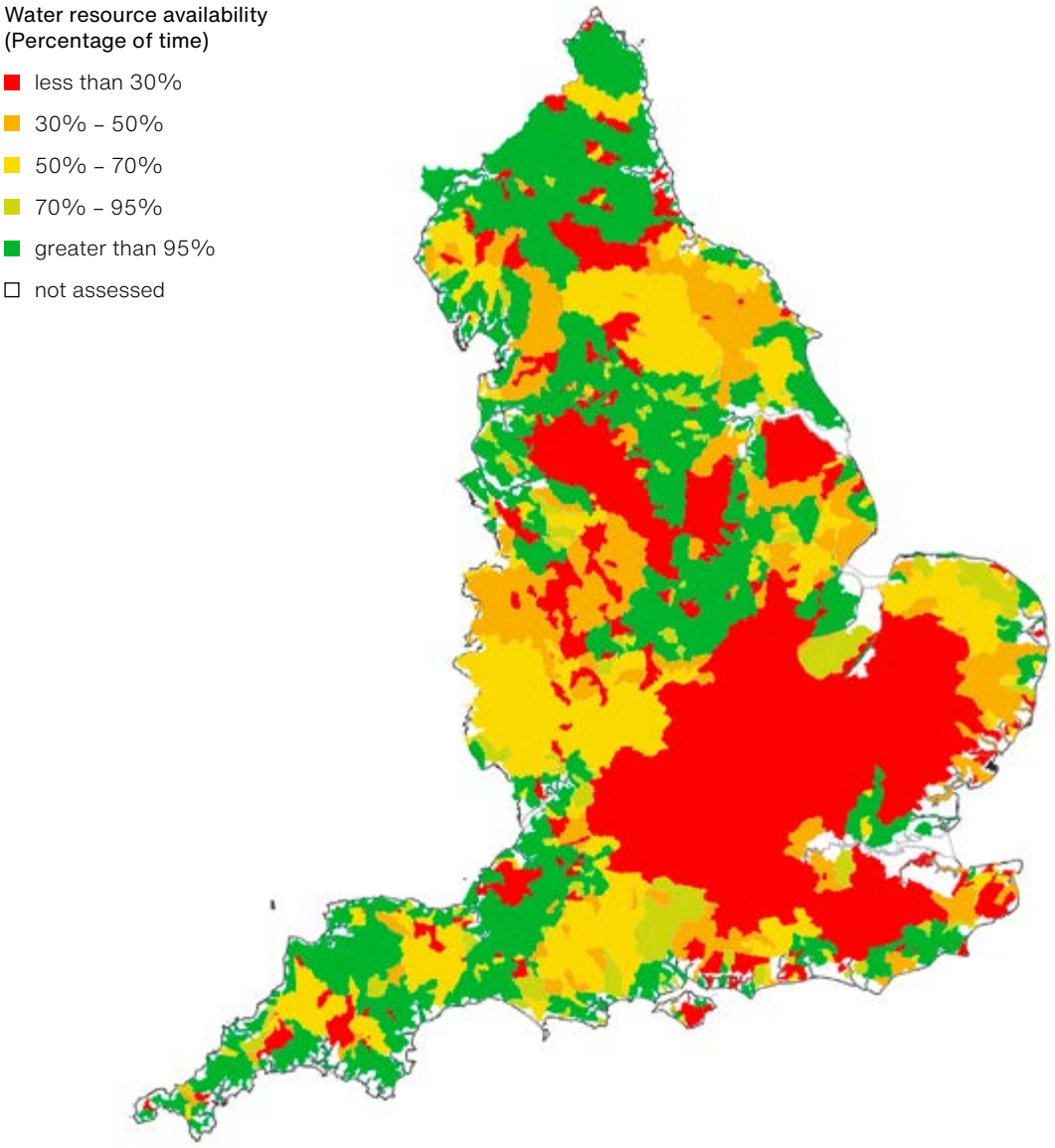
- although Defra is committed to reducing water consumption, household consumption continues to rise. Reforms to the business retail market have not delivered the expected reduction in commercial consumption;
- water companies' progress on reducing leakage has stalled over the past five years: 20% of water abstracted is lost through leakage, roughly three billion litres per day; and
- Defra has taken some positive steps towards a more strategic approach to water management, but much more needs to be done to ensure that water companies work effectively together to tackle supply issues.

Since the NAO report, Defra has increased its focus on measures to better manage demand. The government is now backing an industry-wide campaign to reduce personal water consumption and Defra intends to set a statutory water demand target that would bring together leakage, personal water use and business use. Ofwat has initiated a project to identify regulatory and other barriers to managing non-household consumption use and Defra is facilitating the provision of data to the relevant government departments on consumption in schools and hospitals as a first step to reducing their water consumption.

Water companies and retailers have worked with Defra, regulators, the market operator (MOSL) and Waterwise to produce an action plan, published in January 2021, to reduce water use in the non-household sector. Progress against the plan is monitored at Defra's Senior Water Demand Reduction Group. MOSL has supported the Department for Education with information on water consumption in schools as part of its wider analysis to improve understanding of non-household water consumption.

Proportion of the year when water could be taken sustainably from the environment in England in 2019

Water resource availability is lowest in the east and south-east of England. Additional resources are available less than 30% of the time in many parts of the country



Notes

1 Water resources availability is considered for consumptive abstraction.

2 Availability is the percentage of days during the year additional water resources can be taken sustainably from the environment.

Source: National Audit Office, *Water supply and demand management*, June 2020

Issue to consider

What is government doing to ensure water companies work effectively together to tackle supply issues?

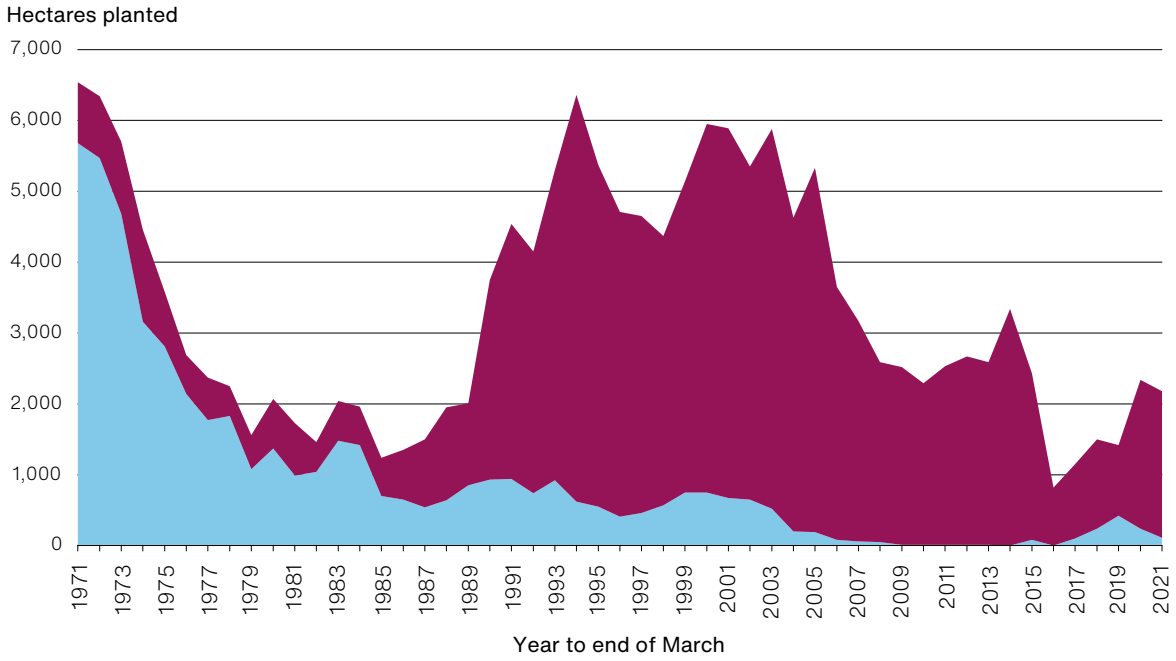
Case study: Planting trees

In addition to mitigating carbon emissions, planting trees can contribute to climate change adaptation by reducing flood risk and providing habitats for wildlife. In March 2022, the NAO will be publishing a report looking at Defra's management of the government's tree-planting programme. HM Treasury (HMT) allocated more than £500 million in the March 2020 Budget to fund trees and woodland as part of a Nature for Climate Fund (NCF), covering the five years from 2020-21 to 2024-25. In October 2021, HMT announced a further £124 million for the NCF to cover both trees and peatland restoration.

- Defra has overall responsibility for the tree-planting programme including leading on policy, strategy, programme management, communications and stakeholder engagement. The Forestry Commission is Defra's senior delivery partner and leads key aspects of the tree-planting programme including administering grant schemes to support private and public landowners to plant trees and establish woodlands. It is also responsible for supporting the forestry and nursery sectors to ensure there are enough saplings and a skilled workforce.
- In May 2021, Defra published its *England Trees Action Plan 2021 to 2024* (ETAP) setting out the actions government will take this Parliament, in partnership with the private sector, the third sector and communities, to set England on course to at least treble woodland planting rates and achieve the target of at least 7,500 hectares of annual tree-planting by March 2025.
- Defra expects tree-planting rates to at least treble during the period covered by the NCF, as England's contribution to meeting the UK's overall target of 30,000 hectares per year by the end of this Parliament and new planting to continue to grow after 2025. Defra's 25-year Environment Plan includes an aspiration to increase woodland cover in England from 10% to 12% by 2050. The Net Zero Strategy stated that government will explore a long-term statutory tree target in England as part of the suite of targets to be introduced using powers in the Environment Act.
- From 2025, tree-planting will be funded through the new Environmental Land Management scheme.

Tree-planting in England, 1971-2021

In recent decades, tree-planting rates in England have never reached 7,500 hectares per year, the Department for Environment, Food & Rural Affairs' target for March 2025



Note

1 Figures are based on grant-supported new planting and (where possible) with estimates for areas planted without grant aid.

Source: National Audit Office analysis of data published by Forest Research under Forestry Statistics. Available at: www.forestresearch.gov.uk/documents/8095/ planting1976-2021.xlsx

Issues to consider

Does Defra have a clear plan to ensure that such a large increase in tree-planting rates is sustainable over a period of decades?

How will it ensure that, once planted, the trees reach maturity?