

Sector Perspective

- In the UK, around 18 billion litres of water are collected, treated and supplied to customers every day, with over 16 billion litres of wastewater also collected and treated. In addition, many industrial and agricultural enterprises abstract their own supplies from rivers or groundwater. The Department for Environment, Food and Rural Affairs (Defra) has responsibility for water policy at a UK Government level, but this responsibility is devolved to the respective governmental departments of the Scottish Government, the Welsh Government and the Northern Ireland Executive.
- Water availability is one of the biggest issues facing the UK water sector with pressures on availability already evident, especially in southern and eastern England. As a result of abstraction demands, some rivers, lakes and groundwater bodies are now at risk of failing to maintain 'good ecological status'.¹
- Climate directly affects water availability. It also affects water demand, which can increase in hotter weather. Projected higher average temperatures and changing rainfall patterns may, therefore, significantly increase pressure on water supplies. Other impacts may include reductions in water quality and increases in sewer flooding and spills from combined sewer overflows.
- Social and economic drivers such as population growth and land-use changes may, however, have a greater influence than climate on water supply and demand in some key respects. Another challenge for the sector is the need to mitigate climate change by reducing energy use, while maintaining water quality and environmental standards.
- Although the water industry has a high level of awareness of potential climate change impacts on the sector, these may be intensified by interdependencies with other sectors (e.g. agriculture, energy, and business, industry and services).

¹ A body of water's ecological status is determined by the health of its ecosystems and by its hydrological and chemical characteristics.



Water

Climate change is projected to result in future changes to both temperature and rainfall patterns, as detailed in the UK Climate Projections (UKCP09) analysis. Although these changes may result in some benefits (e.g. improved dilution of some pollutants in water bodies as a result of increased winter rainfall), negative impacts on water availability, water quality and water industry assets may be significant.

The Climate Change Risk Assessment (CCRA) has completed an assessment of a range of impacts for which the water sector may need to prepare. Some of the key points from this assessment are summarised here. All results presented are for the whole of the UK unless indicated.

Except where specified, the results presented here do not take account of changes in society (e.g. population growth, economic growth and developments in new technologies); nor do they take account of responses to climate risks (e.g. future or planned Government policies or private adaptation investment plans).

Focus on... Dryness and River Flows

The UK is projected to be significantly drier by the 2080s. For the Medium and High emissions scenarios, the 2080s are projected to be drier than 1921, the driest year in parts of south-east England since 1766.

By the 2080s, reductions in summer river flows may be significant across the UK, with the largest decreases in southern and eastern England. Some headwaters may dry up completely in summer and there may be major changes to a number of iconic river systems (e.g. upland streams and lakes in northern England, Wales, Scotland and Northern Ireland).

Confidence



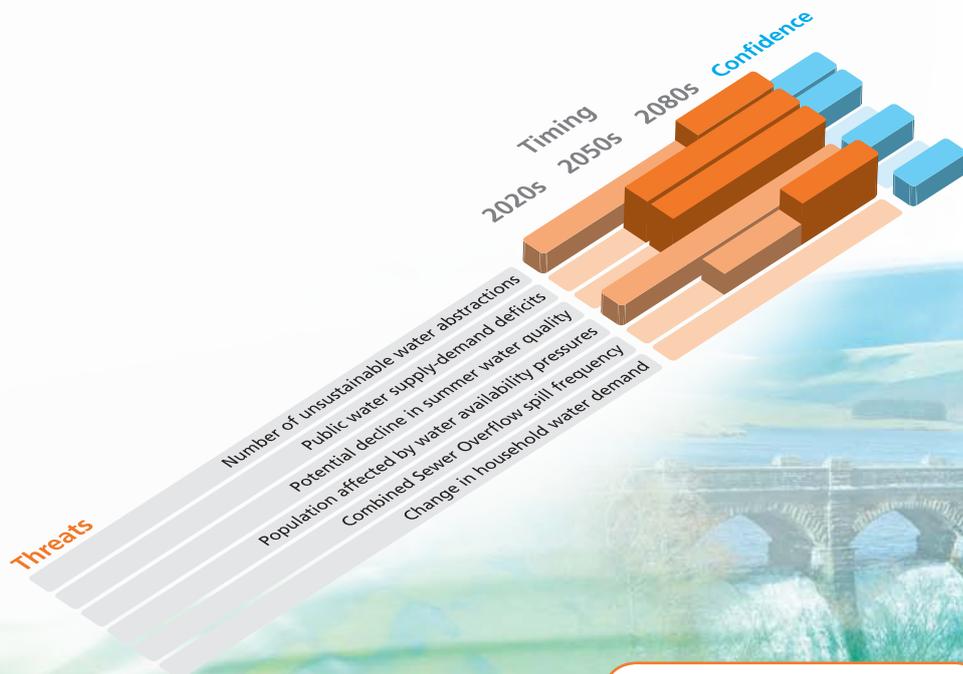
Reduction in average summer river flows by the 2050s (examples): between 7% and 54% in the driest part of England (the Anglian river basin region) and between 2% and 25% in Scotland's wetter river basins (in Shetland and the Orkneys).

Focus on... Water Supplies

Average household demand for water is projected to increase over the coming decades at the same time as the amount of water available for public supply decreases, with the largest deficits in the Thames river basin region. However, depending on which emissions scenario is considered, some river basin regions in Northern Ireland and Scotland are not projected to experience a deficit.

Although there is little significant risk to water supplies in the near future, by the 2080s almost the whole UK population may be living in areas affected by a supply-demand deficit² unless significant action is taken. Maintaining supplies may become particularly challenging in south-east England and the Midlands, unless further action is taken both to reduce the demand for water and to increase supplies.

By the 2050s, there may be a significant decrease in the number of rivers where sustainable water abstraction³ is possible and this situation may grow more severe by the 2080s.



- High consequences (positive) ■
- Medium consequences (positive) ■
- Low consequences (positive) ■
- Low consequences (negative) ■
- Medium consequences (negative) ■
- High consequences (negative) ■
- High confidence ■
- Medium confidence ■
- Low confidence ■
- Too uncertain to assess ■

Consequences - highlights the scale of the consequences for each time slice

Confidence - highlights how confident we are that these consequences will occur

Confidence

- M** Decrease in water available for public water supply: between 0% and 30% by the 2050s and between 4% and 35% by the 2080s.
- M** Shift from surplus to deficit: the current water supply surplus of around 1200 Ml/day is projected to turn into a water supply deficit of between 2200 and 8700 Ml/day (10% to 45% of current supply) by the 2050s.⁴
- M** Number of people living in areas affected by water supply-demand deficits: between 27 million and 59 million by the 2050s.
- M** Reduction in number of sites with sustainable abstraction (based on water availability in the local catchment only): between 19% and 52% by the 2050s.

Focus on... Water Quality and Environment

Water quality depends to a large extent on water volume and is therefore influenced by river flows. For example, pollutants are less likely to be diluted by lower summer flows. Higher water temperatures may also contribute to changes in water quality. However, population pressures and land-use changes could potentially have a greater influence than climate change in determining future water quality.

Any changes in water quality may increase water treatment costs and undermine the healthy functioning of ecosystems, with many different species and habitats affected. Without action this could lead to non-compliance with the requirements of the European Water Framework Directive and the European Habitats Directive. By the 2020s, the number of water bodies meeting their current Environmental Flow Indicator⁵ thresholds may decrease significantly.

Although the analysis summarised here focused on rivers, other water bodies (e.g. groundwater, wetlands, ponds and lakes) also play a key role in sustaining biodiversity in the natural environment.

Confidence

- L** Proportion of rivers in England and Wales potentially affected by a decline in water quality due to concentration of pollutants: up to 10% by the 2020s (based on experts' views, not CCRA projections).
- L** Change in number of water bodies meeting their current Environmental Flow Indicator thresholds in south-west England, for example: between an 8% increase and an 83% decrease by the 2020s.

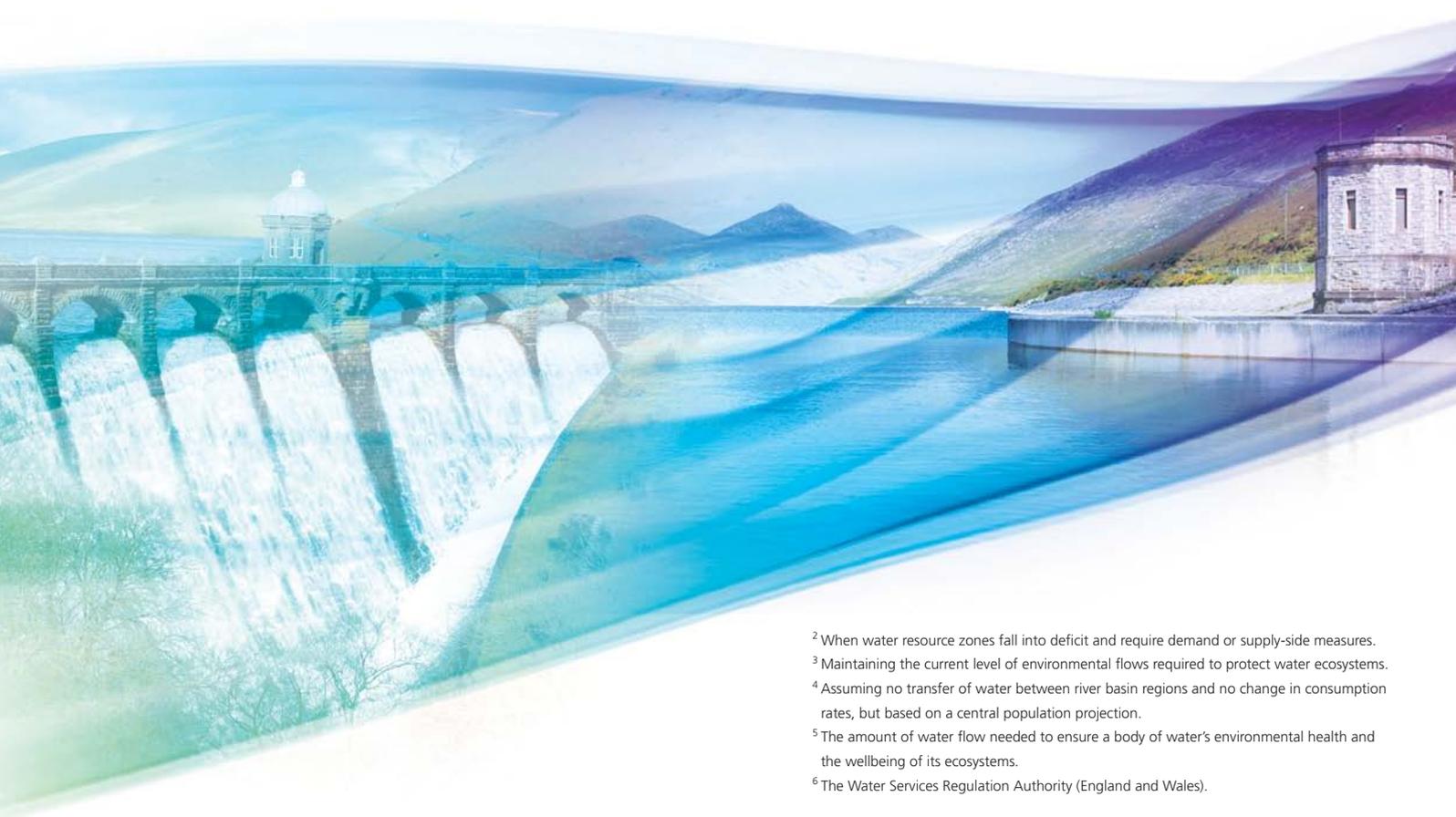
Focus on... Assets and Infrastructure

Many sewers in the UK are part of combined systems (i.e. the sewers carry both sewage and surface water runoff). When their carrying capacity is exceeded by heavy rainfall, or they become blocked, they overflow or 'spill'. Although heavily influenced by socio-economic factors (e.g. population change), significant increases in spill frequency may result from climate change due to changes in rainfall patterns (e.g. more heavy winter downpours). In extreme cases, sewers can also flood, which can have significant consequences for those affected.

Other types of flooding can also affect water industry assets. During the 2007 summer floods, for example, 40 of the 204 sewage pumping stations and 11 of the 53 sewage treatment works in Gloucestershire sustained damage, including instances of complete inundation, damage to operating equipment and flooding of site roads, which limited access to the treatment works.

Confidence

- L** Increase in sewer flooding due to climate change: 27% by mid-century (estimate from a 2011 Ofwat⁶ study).



² When water resource zones fall into deficit and require demand or supply-side measures.
³ Maintaining the current level of environmental flows required to protect water ecosystems.
⁴ Assuming no transfer of water between river basin regions and no change in consumption rates, but based on a central population projection.
⁵ The amount of water flow needed to ensure a body of water's environmental health and the wellbeing of its ecosystems.
⁶ The Water Services Regulation Authority (England and Wales).

The Challenge of Adaptation

The water industry and its regulators have a high level of understanding of potential climate change impacts on water availability and a good understanding of the implications of climate change for the sector's flood resilience. For example:

- In England and Wales, for over 15 years, the potential risks of climate change have been considered in water companies' Water Resources Management Plans. The planning horizon on 'security of supply' is currently 25 years and this has played a key role in increasing the sector's ability to adapt to climate change. However, only a limited number of water companies have a strong understanding of resource issues beyond a 25-year horizon.
- As part of the five-year planning process in England and Wales, regulators have provided advice and guidance on appropriate ways of including climate change within the Plans, which also consider other factors impacting the provision of water services, such as changes in demand, population growth and environmental legislation.
- Water companies in England are 'reporting authorities' appointed in response to the Climate Change Act 2008 and have been required to prepare reports detailing assessments of current and future climate risks that they have undertaken on their assets, as well as potential adaptation options. Water companies in Wales prepared reports voluntarily.
- In Scotland, the Water Environment and Resource Sector Action Plan identifies key climate change impacts on the water sector, as well as ways in which these are already being managed and appropriate actions to improve resilience. A new Environment Strategy for Northern Ireland is currently being developed by the Department of Environment. This will set out priorities for protecting and enhancing the environment for the next 10 to 15 years.

If the UK water sector as a whole is to further increase its ability to adapt to climate change, the following have been identified by the CCRA as particular priorities:

- Developing a better understanding of water quality and asset deterioration issues.
- Developing a better understanding of biodiversity issues.
- Ensuring that more decisions about water take account of water security beyond a 25-year time horizon.
- Developing a more flexible and responsive abstraction management regime.

A key challenge with respect to adaptation is the lack of clear evidence regarding water quality changes resulting from complex interactions between land-use changes, aquatic ecosystems and climate change. Areas where the CCRA has identified a need for further investigation also include:

- The environmental impacts of drought.
- Incentives and mechanisms to encourage water trading between water companies and between water companies and other water users.
- Mechanisms to encourage increased efficiency in water use.
- The impacts of changes in water demand on river flows

Where to Get Further Information

For copies of the CCRA Water Sector Report, the CCRA Evidence Report and Devolved Administration Reports, please visit www.defra.gov.uk/environment/climate/government/

How the CCRA was conducted

The CCRA reviewed the evidence for more than 700 potential climate impacts on the UK economy, society and environment. Over 100 of these impacts across 11 sectors were taken forward for more detailed analysis, having been selected on the basis of likelihood, potential consequences and how urgently adaptation action may be needed to address them.

A plausible range of climate change scenarios was used in the analysis. Some aspects of socio-economic change (e.g. population growth) were also taken into consideration. Adaptation policies that are planned for the future were not considered, so that the underlying level of risk could first be compared across sectors.

The results presented here are based on the UKCP09 Medium emissions scenario for the 2020s (2010-2039) and the Low, Medium and High

emissions scenarios for the 2050s (2040-2069) and the 2080s (2070-2099). A range of climate projections representing lower, central and upper estimates were considered within each emissions scenario.

Risks are categorised as low, medium or high based on their economic, social and environmental consequences.

The CCRA findings are also categorised as having low, medium or high confidence. The level of confidence is the degree to which the findings are considered valid, based on the type, amount, quality and consistency of the evidence studied.

Further information on how the CCRA results should be interpreted is presented in the CCRA Evidence Report. www.defra.gov.uk/environment/climate/government/