2021 River Basin Management Plan

The climate crisis **Published: October 2019**

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1. Summary

Climate change is the biggest threat we face. It will become even more challenging as our population continues to increase and more pressure is applied on our land and resources. These challenges are having an increasingly dramatic effect on our environment and consequently our lives and livelihoods.

The water environment (rivers, lakes, groundwater, wetlands, estuaries and coast), its ecology and the essential services it provides society, will be radically affected by these emerging challenges. How we respond to these challenges will determine how successful we are in protecting and enhancing the water environment.

2. The challenge

2.1 What we can expect

The biggest threat is from human-induced greenhouse gas emissions which are causing global heating. Global average temperatures have increased over the 20th century, and are now over 1ºC warmer than the pre-industrial average[i]. This is resulting in sea level rise and extreme weather related events such as storms, floods, heat waves, droughts and wildfires.

These climatic extremes are being felt in the UK with the top ten warmest years occurring since 2002, and the last decade being warmer than the previous 3[ii]. Average annual rainfall has not changed since records began, but in the last 50 years more intense winter rainfall has fallen. Sea level around the UK has also risen by about 16 centimetres on average since the start of the twentieth century. These changes will continue, with some projections of global temperature indicating a potential rise of over 4ºC by 2100. The UK Climate Change Risk Assessment Evidence Report[iii], along with the Environment Agency's Climate Change and Impacts and Adaptation report[iv] summarise these risks and impacts.

As well as climate challenges, global population growth will add to the increasing pressure, with the world's population having doubled in the last 50 years from 3.7 to 7.6 billion[v]. This increasing population is likely to have a negative impact on the quality of the environment as more land is needed for agriculture, living space, resources and leisure.

To tackle these challenges will require a fundamental rethink in how we use water, land and other resources. Whilst making these changes will be challenging, it will provide opportunities for new ways of working, and developing multiple benefits for communities and businesses (e.g. improved resource efficiency).

2.2 What we must plan for

In November 2018 Defra, in association with the Met Office, launched new climate change projections for the UK (UKCP18)[vi]. These new projections provide the most up to date and authoritative assessment of climate change. They confirm that the UK's climate will shift towards "warmer, wetter winters and hotter, drier summers":

- All areas of the UK will be warmer in future, with more warming in summer than in winter. Hot summers are expected to become more common.
- Summers are expected to become drier, particularly in southeast England; winters are projected to become wetter, particularly in northern UK.
- Sea level will rise by between 0.4 and 1 metre by 2100, and by up to 4 metres by 2300, even with large reductions in greenhouse gas emissions[vii]. Increasing sea level will increase the risk from storm surges.

The population of England is also projected to increase by about 12%, from 55.3 million in 2016 to about 62 million in 2041[viii]. There will be regional variation in this growth with London and the south east likely to see the biggest increase. Alongside

population growth, increasing consumption of materials and resources means greater pressure from extractive industries and waste management.

Population pressures and changes to our climate will inevitably lead to changes in land use. It is anticipated that the number of households will increase by 23% by 2041. Such change will result in greater pressure for homes, work places, transport, energy, drainage and water infrastructure, increasing the spread and density of urban land use.

Agricultural land use is also likely to change with an increased need to feed a larger population, not to mention changes in which crops and animals can be produced in our changing climate. Evidence from the UK Climate Change Risk Assessment (2017)[ix] suggests the majority of agricultural land in the eastern side of the UK is projected to become less suitable for farming due to reduced water availability, increased soil aridity and the continued loss of soil organic matter. Heat stress may also impact negatively on livestock, increasing water demand.

Land productivity is expected to reduce with global temperature rise under all emission scenarios[x]:

- At +1.5°C of global warming water scarcity increases in dry areas and there will be more wildfires, thawing of permafrost and food supply instabilities. These risks increase in severity at +2°C with serious effects on global food production.
- Risks from droughts, water stress, heatwaves and habitat degradation all increase between +1.5°C and +3°C warming.
- Food security will decrease as food chains become disrupted and cereal prices are projected to increase by up to 23% by 2050 due to climate change.

Living With Environmental Change (LWEC) developed a series of report cards[xi] on how climate change affects different aspects of our environment, economy and society. They are designed for decision-makers at any level, but in particular for use by policy advisors, ministers and local authorities. The cards set out impacts on: Agriculture and Forestry, Biodiversity, Water, Infrastructure, and Health.

2.3 The stark consequences of not acting

The consequences of not tackling these challenges are alarming. Drought, flooding, and other natural hazards are likely to increase, along with the decline in biodiversity, which will all impact on our lives and our economy.

2.3.1 Impacts on water quality and quantity

As summers become warmer and drier, prolonged periods of dry weather, drought and heat waves will become more common. Reduced water quantity and increasing demand for water from larger populations will place a huge strain on limited water supplies resulting in water shortages in some places.

A growing population will increase the risk of pollution from waste water treatment and coupled with more intense rainfall events, more contaminants and soil will be washed into rivers, lakes and the sea from rural and urban areas. Low water levels

also impact water quality, through increasing the pollution concentration in the remaining water. This will have implications for drinking water supply but also other uses such as bathing, commercial fisheries, angling, navigation and our enjoyment of the natural environment.

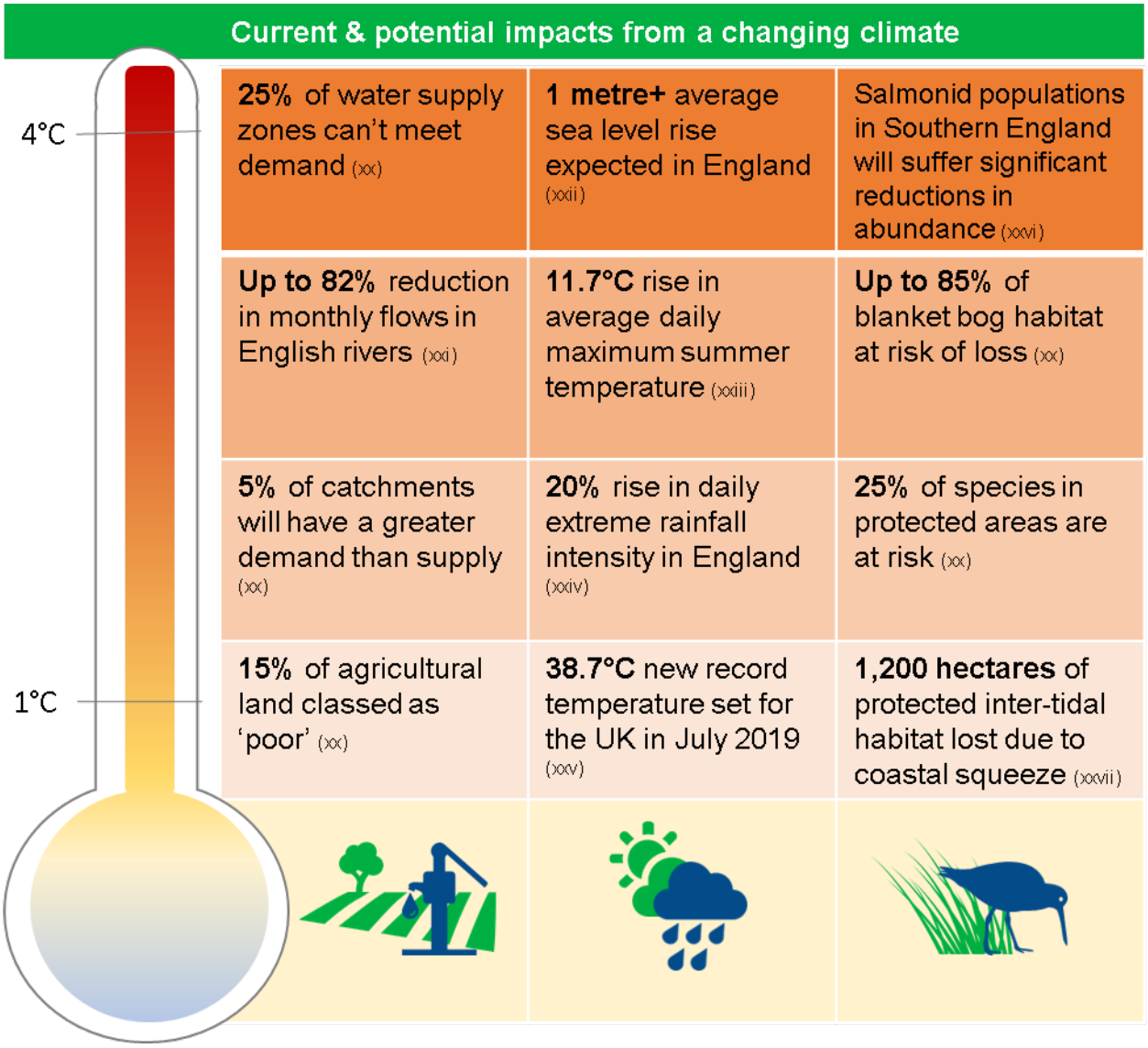
2.3.2 Impacts on habitats and species

Wildlife will suffer too. Warmer water temperatures will directly impact plants and animals that live in and around water. Some types of animal that have evolved to live in our cooler climate may not be able to tolerate these warmer temperatures, potentially changing the balance of species in our waters. Changing water flow patterns as a result of extremes of flood and drought will change habitats, such as altering the supply of sediment, and therefore the types of wildlife living in them. Conditions may better suit non-native species, many of which may be invasive and threaten yet further our indigenous plants and animals.

These changes will lead to very significant changes in our water environment, with some iconic wildlife we cherish declining or being displaced completely.

The United Nation's Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), chaired by Defra's Chief Scientist has highlighted "Nature's Dangerous Decline" globally as unprecedented[xii]. The report highlights nature is declining globally at rates unprecedented in human history, and the rates of species extinction is accelerating. The health of ecosystem services on which we and wildlife depend is deteriorating more rapidly than ever. This has direct consequences for our economies, livelihoods, food security, health and quality of life. In many instances these declines are a result of climate change and human population growth.

Figure 1. Current and potential impacts from a changing climate on: water demand and land use, the physical environment, and species and habitats, as the average global temperature rises. Current impacts are those of around 1°C.



2.3.3 Impacts on health and wellbeing

All of the above impacts are likely to affect the health and wellbeing of the human population. Furthermore, increasing floods due to heavy rainfall and sea level rise, will directly impact people's lives and livelihoods. Apart from deaths due to drowning, the most significant health impact from flooding is on mental health, the trauma of being a victim of flooding persisting into the long-term due to household disruption and displacement[xiii].

Deaths and illness due to very hot weather are also likely to increase, with more vulnerable members of society such as this with chronic health issues, and our ageing population, means more people will be at risk from hot weather. Climate change may also facilitate the introduction of new diseases to the UK, and worsen air pollution as the temperature rises.

2.4 The scale of the task

In our changing world, just maintaining current levels of environmental quality will become increasingly difficult, let alone improving degraded environments. In addition to considering current failure of environmental standards, such as good ecological status, we will need to increasingly consider risks from future population growth and further climate change. We will need to ensure we are building resilience in our water environments to cope with these emerging future challenges. We might need to recognise that for some environments, change is inevitable, and evolve our approach as necessary.

Different river basin districts will face different degrees of challenge. For example Anglian River Basin District is both one of the driest regions and therefore at significant risk from drier conditions, and also one of the fastest growing in terms of population.

The pressure stories in this consultation (for example, phosphorus; water levels and flow) highlight the key implications of emerging challenges on different water management issues. These documents sign-post to more detailed information where available.

3. Choices - our opportunities for change

Whilst the consequences of these challenges are alarming, it's not too late to act. We are responding to the climate emergency, but we must significantly ramp up our efforts now to avoid the worst effects.

For instance, the United Nation's IPBES have highlighted that whilst nature is declining globally, it is not too late to make a difference, if we act now. They suggest transformative changes to fundamentally re-organise technological, economic and social factors are needed to ensue nature is conserved, restored and used sustainably.

Similarly, the United Nation's Intergovernmental Panel on Climate Change (IPCC)[xiv] highlighted the need for urgent action, suggesting at the time of publication (2018) we have around 12 years to act to keep global temperature rise below 1.5^{o}C and therefore minimise the worst impacts of global warming.

The Committee on Climate Change (CCC), which provides independent advice to government, has indicated it is possible for the UK to end its contribution to global heating (net-zero emissions) within 30 years (by 2050)[xv]. Net-zero emissions is a legally binding target in the UK[xvi]. The CCC suggests many of the foundations to achieve net zero-emissions are already in place. However, the CCC highlights that policies will have to significantly ramp up if we are to transition to a net-zero economy, but the overall costs should be manageable.

The Government's 25 Year Environment Plan[xvii] commits to 'making sure that all policies, programmes and investment decisions take into account the possible extent of climate change this century'. This includes river basin management plans (RBMPs). In the second National Adaptation Programme[xviii], RBMPs and catchment management are identified as key opportunities to help tackle climate change.

Update of the RBMPs in 2021 will cover the period 2022 to 2027. This is an excellent opportunity to facilitate short term action to tackle emerging challenges on the water environment. This action needs to focus in two areas:

- Preventing the worst impacts of global heating by reducing greenhouse gas emissions as fast as practicable to achieve net-zero emissions. This will require behavioural change as well as innovation in new technology, going beyond traditional approaches and regulation. Extracting carbon from the atmosphere, such as increasing tree cover, and improving soil health will also be key.
- Building greater resilience within and around the water environment so it is better able to adapt with changes. Whilst work is already being carried out to help our environment adapt, the pace and range of adaptation needs to significantly increase, whilst ensuring we achieve multiple benefits for people and the environment. And whilst we pursue efforts to keep the global temperature rise to well below 2 °C, we need to prepare our adaptation plans for worse climate scenarios, such as a 4°C rise in global mean temperature by end of century'.

To do this we need to:

- **Encourage transformative change:** We need to work with Government and public bodies to help set the policy landscape that we need to protect the water environment from these emerging challenges. This may require a new way of thinking, such as aligning water management with complementary action on land use, air, waste, and growth strategies.
- **Take a collaborative place-based approach:** We need to work together across sectors (business and industry) and in partnership at national, area and local level (e.g. Catchment Based Approach partnerships) to make sure emerging challenges are integral to how we plan and manage water. No one organisation or business can tackle these issues alone.
- **Make our catchments climate resilient:** To do this, we need to identify future climate risks and impacts to each of our catchments. Once the risks are identified, we need a clear and proportionate action against each of the potential risks so it can be managed at the appropriate timescale.
- **Plan for a range of possible outcomes:** We need to plan for a range of future scenarios, including a 2°C rise and a potential 4°C rise by 2100. We also need to embed a consistent approach to risk management into water management decision making across multiple partners and planning processes. The Environment Agency has developed a Climate Impacts Tool to help inform its approach[xix].
- **Adopt an adaptive management approach:** The way we manage water and plan our catchment infrastructure should be flexible (e.g. adaptive pathways approach) so can be adjusted as climate change and other environmental circumstances unfold.
- **Work with natural processes:** This includes using nature-based solutions and natural flood management techniques to help build resilience at a catchment and landscape scale and reduce greenhouse gas emissions. This may involve de-intensification of land use and re-connecting fragmented parts of the water environment (e.g. reconnecting flood plains with river systems), and joining up water management with land use planning (including soil management and tree planting).
- **Reduce our carbon footprint:** We must continue to do what we can to reduce our carbon footprint at a sector and on an individual scale. Business and industry need to consider the carbon footprint through the full supply chain. Individuals can follow sound advice from reputable sources such as the Committee on Climate Change. We need to work together, and consider how each and every one of us can help make England become a net zero emitter of Green House Gases.

4. References

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