



The following submission is provided in the form of background information on policy aspects of coastal flooding and outlines how Defra is managing flood risk at the coast

Topic
Coastal flooding (policy)
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Executive summary
<p>Increased flood risk, from both rivers and the sea, is one of the most significant predicted impacts of climate change in the UK. In England, we have increased spending significantly to some £590 million (on both flood and coastal erosion risk management) in 2006-07 compared to £307 million in 1996-97. These funds are prioritised to address the most pressing flood and erosion problems first. Recently, there has been a commitment for spending to increase to £800m by 2010-11¹.</p> <p>For several years, Defra has issued guidance to the operating authorities (Environment Agency, local authorities and internal drainage boards) on allowances to be made for future climate change and in particular sea level rise in the design of present-day defences. Defra recently reviewed this guidance, which is published on the Defra website², and is also working to ensure effective management of flood and coastal erosion risk. This includes taking account of the likely impacts of climate change through the <i>Making space for water</i> programme, which is bringing the Government and other stakeholders together in developing a broad range of measures to respond to the challenge.</p>

¹ <http://www.defra.gov.uk/news/latest/2007/flood-0703.htm>

An ongoing programme of research managed jointly between Defra and the Environment Agency is considering climate change impacts associated with Flood and Coastal Erosion Risk Management (FCERM). In addition, Defra is working closely with UK Climate Impacts Programme (UKCIP) and Met Office Hadley Centre to develop the next package of climate change information. Updates of this work are given below.

Defra Supplementary Guidance on Climate Change Impacts

In October 2006, Defra published revised supplementary guidance² to advise the flood and coastal erosion risk management community to plan for the long term, and consider climate change impacts based on the latest information available at the time. The advice reflects the assumption that sea levels will rise as a result of the climate change already locked into the global system, in addition to further rises from future emissions.

This new guidance, building on previous climate change guidance issued by the Department, and supporting DCLG's Planning Policy Statement 25, will assist authorities in calculating when and how best to build allowances for climate change and sea level rise into their flood and coastal erosion risk management plans, and offers examples of how to adapt to climate change.

Extending the timescale to be considered from 50 to over 100 years will help operating authorities examine the appropriate response necessary to adapt to the risks and uncertainties of climate change. Authorities will consider whether it is necessary for currently planned flood defences to take account of future anticipated sea level rise, or alternatively whether to build defences now that are easily adaptable in the future. In many cases, this will result in spending on projects in a phased approach over the lifetime of the project, rather than paying for protection from the largest estimates of sea level rise too early.

As well as higher sea levels, climate change could lead to an increase in the severity and frequency, and a change in the path of storms that result in sea level extremes and large rainfall events affecting river catchments and urban surface water flooding. The new guidance also includes updated allowances for these events.

The new guidance does not make provision for additional sea level rise due to an enhanced contribution from Greenland ice melt³ or other factors, beyond those considered by the IPCC Third Assessment report, or for any potential change in sea surge. At present there is still significant uncertainty associated with these impacts and further evidence is needed before making changes to guidance that would have a significant impact on how we invest now, particularly since the most significant changes would not take effect until well into the latter part of the century

² <http://www.defra.gov.uk/environ/fcd/pubs/pagn/default.htm>

³ Ridley, J., P. Huybrechts, J.M. Gregory, J. Lowe (2005). Elimination of the Greenland ice sheet in a high-CO2 climate, *Journal of Climate*, 18(17), 3409-3427.

In April 2007 the Intergovernmental Panel on Climate Change Fourth Assessment 'Summary for Policymakers'⁴ presented a review of sea level rise predictions with a narrower quantitative range of model-based estimates of future sea-level rise, compared to the Third Assessment, but with some less quantified caveats about the possible rise, especially at the high end. The report considers the global effects of climate change on sea levels and related uncertainties, whilst there are further uncertainties in considering regional ocean level changes such as the NW Atlantic Ocean that are relevant to the UK. Work is currently ongoing on these regional impacts. In line with advice from the UK Climate Impacts Programme (UKCIP), the supplementary guidance still represents a reasonable approach for coastal planning. It will be reviewed and revised as necessary following the publication of new climate change scenarios for the UK by UKCIP in late 2008.

UKCIP08 and Flood and Coastal Erosion Risk Management

In 2008, UKCIP will publish the next set of climate change scenarios for the UK, titled 'UK 21st Century Climate Change Scenarios', (or UKCIP08 for short). These new scenarios will replace the scenarios published in 2002 (known as UKCIP02) and represent a significant advance in the science base to explore climate change impacts and appropriate responses.

The UKCIP08 deliverables will provide FCERM users with:

- Increased resolution of climate change scenario data in space and time
- Information presented in probabilistic terms
- Indication (not a prediction) of differences in conditions at regional and local levels.

However, it is important to understand how FCERM practitioners and decision makers may use these new results and whether an improved quantification of the uncertainty can be used to improve future, major long-term capital investments. Clearly, such an assessment must also acknowledge remaining unknowns and attempt to avoid less than optimum decision-making and its associated costs.

It is also necessary to consider whether any gains in certainty would be worthwhile set against the potential risks and implications for Defra / EA policy and programming of inappropriate decision making and the costs of analysis associated with use of the UKCIP08 package by operating authorities and consultants for individual projects or programmes.

⁴ http://www.ipcc.ch/WG1_SPM_17Apr07.pdf

Two particular areas of FCERM interest exist in the UKCIP08 package that can benefit the marine environment.

- Coastal and estuarial flooding
Issues to consider in the UKCIP08 development include: frequency, intensity and track of winter storm systems and their resulting surges;
- Incidence of coastal erosion
Issues to consider in the UKCIP08 development include: frequency, intensity and track of winter storm systems; sequencing of wet/dry and freeze/thaw periods for soil stability.

Currently, research into future surge and extreme water levels is under development for UKCIP08 through work on the Thames Estuary 2100 project⁵, where Environment Agency, Proudman Oceanographic Laboratory, and Met Office Hadley Centre are developing a model that attempts to reflect the evolution of extreme water levels over time, including any climate-related changes in surge parameters.

⁵ http://www.thamesweb.com/page.php?page_id=60&topic_id=9