

Flood and Coastal Erosion Risk Management Research Programme

Impact of climate change on asset deterioration

Project Summary SC120005

Climate change is a huge challenge for flood risk management. This report sets out new information and methods to understand the possible impacts of a changing climate on deterioration of the flood defence assets which play a central role in protecting people and properties.

Why have we done this research?

The Environment Agency together with local authorities, internal drainage boards and various private landowners maintains £35 billion of FCERM assets in England alone. Over time these assets deteriorate and require maintenance to retain their standard of service and avoid failure. This research increases our understanding of how climate change factors may alter the vulnerability to deterioration of those assets, and therefore where additional maintenance effort might be required in the future.

What was the approach to the study?

The project has looked at deterioration processes for 47 different asset types (both natural and man-made), across fluvial, estuary and coastal environments. The project concentrates on how changes such as increased sea levels and river flows may affect the process of asset deterioration to see which types are most vulnerable.

Figure 1 illustrates how the climate change factors are translated into potential loadings, and from that deterioration processes and consequences are assessed.

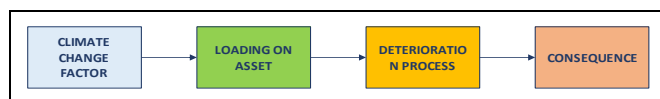


Figure 1: Translation from climate change factor to consequence

These qualitative assessments identify the key elements and deterioration processes likely to affect vulnerability. The quantitative assessments also enable a relative categorisation of the potential vulnerability of each asset. From this, it is possible to prioritise which assets are likely to be most vulnerable to climate change.

What has the research produced?

The outputs from this research include:

- assessments, information and examples of how the deterioration of different asset types could be affected by climate change
- understanding of the potential impact that various climate change factors could have upon asset maintenance and replacement activities
- identification of which asset types are likely to be most vulnerable to deterioration due to climate change, and tools to enable asset-specific assessments to be carried out
- approaches to target expenditure to address deterioration of those assets with greatest vulnerability to the effects of climate change

Here are some of other important findings

The study concludes with an initial high level estimate of the overall total impact of climate change upon FCERM asset deterioration, in terms of the possible level of additional investment required to address the issue. Based upon available data at the time of writing, it is estimated that current budgets for maintenance and repairs may need to increase annually by between 30% and 80%, some £30 to £75 million per year, to address the greater potential for deterioration. In addition, upgrading and improvements will be needed for the most affected assets, which could require investment of a further £2.5 to £4.5 billion over and above currently estimated rebuild or refurbishment costs. These figures are compared to a baseline estimated from understanding our asset types, their rate of deterioration and estimated costs of repair or replacement.

Flood embankments, walls and bank protection make up most of the increased cost requirement. This is due to their specific vulnerability to the effects of climate change, the unit costs to maintain and repair these asset types, and the sheer number of those assets.

What does this mean for flood risk management?

Depending upon our ability to respond to the levels of extra maintenance required, other measures may also become appropriate or necessary to consider: for example, futureproofing new and replacement schemes (e.g. by reinforcing assets so that they can cope with more aggressive conditions such as overtopping during extreme events), so that they are resilient to these increases.

Other examples include proactively embarking on a major upgrading and improvement programme, or even considering changes to FCERM strategy in the long term.

How are the Environment Agency using these results?

The results are helping us with our national strategic planning, in particular they have informed our latest Long-term Investment Scenarios (LTIS) released in 2019, which has in turn been used to inform government spending reviews. The information from this research will also help our decisions about where future efforts may need to be targeted.

This summary relates to information from project SC120005/R, reported in detail in the following output(s):

Report: SC120005

Title: Impact of climate change on asset deterioration

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