Flood and Coastal Erosion Risk Management R&D

FCERM Research News

Issue 31

Research News is the annual newsletter from the Joint Flood and Coastal Erosion Risk Management (FCERM) Research and Development Programme. Our programme is jointly run by the Environment Agency, Defra, Welsh Government and Natural Resources Wales, and aims to serve the needs of all flood and coastal risk management authorities in England and Wales.

We conduct, manage and promote flood and coastal erosion risk management research and development. We provide the evidence to help inform more sustainable and efficient ways to manage flood risk.

If you would like further information on the programme please visit our website: https://www.gov.uk/government/organisations/flood-and-coastal-erosion-risk-management-research-and-development-programme
or Defra's research project page: http://randd.defra.gov.uk.

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Hello and welcome to Research News

Programme update: Research in a changing world

Welcome to Issue 31 of Research News.
The Flood and Coastal Erosion Risk Management (FCERM) Research and Development Programme is a partnership project run by the Environment Agency, Defra, the Welsh Government and Natural Resources Wales.

It produces up-to-date research on flood and coastal erosion management. Flood and coastal risk management authorities in England and Wales use its findings to better prepare, protect and survive in a changing climate.

In our last programme update, Andy Moores Programme Manager, wrote that "our programme has always been characterised by change". 2019/20 has proved to be no different. Particular areas of challenge and change for 2019 to 2020 have been:

- climate change and flooding
- draft FCERM strategy and Defra policy statement for England
- National Strategy for Flood and Coastal Erosion Risk Management for Wales
- the Environment Agency's aspiration for net zero
- widespread flooding over an extended period leading to many homes being inundated
- Global Covid-19 pandemic impacts.

Climate change
Climate change is a threat to the economy, the environment, people's health and their way of life (Figure 1 and 2). As a nation, we need to take immediate action to become a climate resilient country.

In June 2019, the government announced a target for the UK to become a net zero carbon emissions economy by 2050. A month later, the Committee on Climate Change (CCC) published its first assessment of the UK's progress to tackle and prepare for climate change.

Figure 1. Climate strike, September 2019

In 2021, the UK will host the postponed 26th Conference of Parties (COP26) in Glasgow. Around 30,000 climate experts, campaigners, entrepreneurs and world leaders will attend. Their aim will be to agree bold coordinated actions to tackle climate change, and flooding and coastal erosion are likely be on the agenda.

Flooding
A Europe-wide study found that climate change is causing more frequent and intense flooding in northern parts of Europe. This adds to the growing evidence that the extent and frequency of flooding in the UK has increased over the past five decades. This means that the floods that have devastated communities in recent years will become more common.

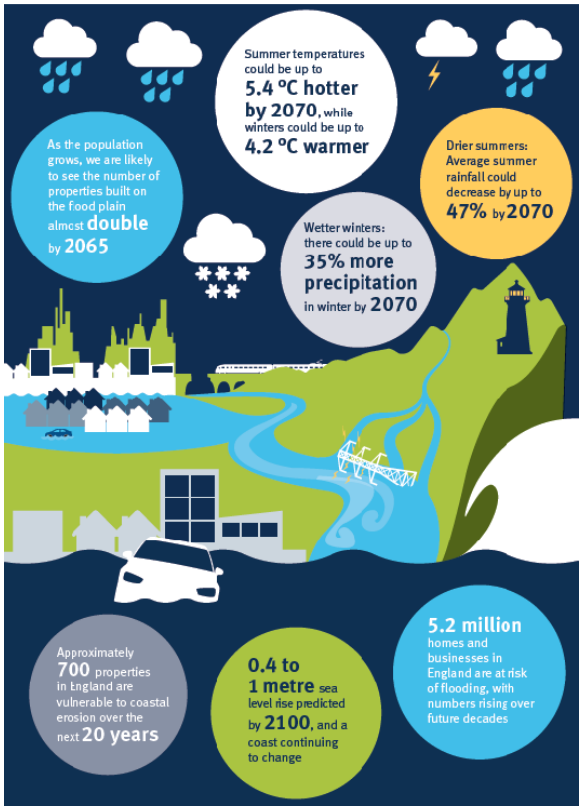

Figure 2. Current and future flood and coastal change risks (sources, Environment Agency, 2019 & Met Office, 2018, UKCP18 Headline Findings)

In 2019 and the early part of 2020, there were several floods and emergencies, including the partial collapse of Toddbrook Reservoir in Whaley Bridge. Defra commissioned an independent review into Whaley Bridge. We work closely with the Reservoir Safety Research Advisory Group and has produced research over many years to help manage the UK's reservoirs safely and effectively. The Environment Agency and Defra are reviewing lessons learned from the emergency response to the November 2019 and spring 2020 flooding.

The Joint Programme is using the UK Climate Projections 2018 to explore UK sea level projections to 2300 (SC150009) and coastal cliff erosion recession (SC120017). This will help manage the risk of flooding and coastal erosion associated with climate change.
The Joint Programme has also carried out an evidence review looking at community engagement for long-term adaption to climate change driven flood and coastal erosion risk (FRS17192). These projects will ensure action on climate change is suitable and effective.

National FCERM Strategy and Defra policy statement

In May 2019, the Environment Agency launched its draft national FCERM strategy to create "a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100."

The draft strategy sets out a long-term plan for tackling, preparing for, and adapting to climate change, split into three ambitions:

- climate resilient places
- today's growth and infrastructure resilient to tomorrow's climate
- a nation of climate champions.

The Environment Agency held a public consultation on the draft strategy in summer 2019. This focused on what the nation can do over the next 10 to 30 years to support the changes needed to respond to climate change by 2100.

The elements of the national flood and coastal erosion risk management strategy

The government plans to publish the FCERM strategy, its Policy Statement and next 5-year action plan in 2020. This will better prepare the nation for flood and coastal risk.

We lead projects that contribute to the FCERM strategy and Policy Statement. A review of resilience concepts and definitions will clarify what we mean by resilience and how we may measure it. This research links with work by the National Infrastructure Commission scoping resilience of the UK's infrastructure.

National FCERM Strategy for Wales

In June 2019, the Welsh Government launched a consultation on the Draft National Strategy for FCERM for Wales. The aim of the strategy is to effectively manage the risks to people and communities from flooding and coastal erosion. The Joint Programme's work has fed into the draft National Strategy for Flood and Coastal Erosion Risk Management for Wales. For example,

'Working with natural processes to reduce flood risk' (SC150005) will be drawn upon to inform future best practice and aid investment decisions in Natural Flood Management. It also highlights the importance of research in future policy development and decision making.

Environment Agency net zero

The Environment Agency plans to be at the forefront of tackling the climate emergency. In October 2019, the organisation set itself the goal to become net carbon zero by 2030. By 2050 it aims to become an absolute carbon zero organisation.

There will be a 45% reduction in supply chain carbon emissions. This includes the carbon released when building and operating flood schemes. Habitat creation and restoration will provide carbon offsetting for the remaining carbon emissions.

The Environment Agency has a successful track record in carbon reduction. In 2018, it reduced its operational carbon emissions by 48% from levels in 2006/07. It will also aim to influence those organisations it works with to reduce their own carbon emissions.

Our FCERM research and development joint programme has completed research that helps lower carbon emissions, for example, the pump station efficiency tool. Defra has developed sustainability guidance looking at where and how we, and other industries, can make ICT and procurement activities more sustainable.

To further support these ambitions, we have a notable project examining carbon across FCERM delivery (FRS19212).

Covid-19

The current global corona virus pandemic has understandably dominated recent headlines. It has caused many thousands of deaths worldwide and brought widespread social and economic disruption.

Many conferences, face-to-face activities and events have been postponed or altered to online. A number of our projects have slowed, or methodologies adapted to accommodate safe working practices. Please be patient with us!

Members of our programme team have incident roles and are playing a part in protecting the environment and people during a difficult time. You can find out more about this is the Environment Agency blog.

As thoughts begin to turn towards what recovery could look like, there are opportunities to undertake a paradigm shift in the way that society, economy and the environment interact. There will undoubtedly be lessons to be learnt but also hope that we emerge into a more sustainable future.

Summary

This article provides an overview of some of our broader activities. For more information, you can download our reports from our website, on .Gov.uk, or get in touch via the email below.

For the day-to-day updates of our activities follow us on Twitter @FCRMResearchEA.

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To net zero and beyond

Achieving sustainable FCERM

Background

Climate change is a threat to economies, environments and human health across the world. It is partly caused by increases in atmospheric CO_2 from burning fossil fuels. In 2008, the government published the Climate Change Act. This created a UK net carbon account, which should be at least 80% lower than the 1990 baseline by 2050.

There is a growing awareness of the climate emergency and appetite for action across the public sector, industry and society. In 2019, the Scottish, Welsh and UK parliaments declared a climate change emergency. Many local authorities also did the same.

The UK has set out in law the target of achieving Net Zero by 2050. Net zero means that total Green House Gas (GHG) emissions to the atmosphere are equal to, or less than emissions removed from the environment. To achieve Net Zero, GHG emissions have to be reduced as much as possible. Once this has been achieved then it is necessary to balance the residual GHG emissions by implementing measures such as carbon sequestration.

Achieving net zero

At the Environment Agency we want to lead the response to the climate emergency. In October 2019, we set our self the goal to become net carbon zero by 2030. Our total CO_2 emissions are 180,000 tonnes:

- 25% from our direct activities
- 75% from our supply chain's activities

To achieve net zero we will need to make a 45% reduction in both our operational and supply chain CO_2 emissions, this includes the carbon released from running our buildings, our fleet, construction, operations and maintenance activities.
We will also need to balance the remaining residual CO_2 emissions by investing in the most cost-efficient mix of approaches that meet the Net Zero carbon target. This could include creating and restoring habitat to provide carbon offsetting for the remaining carbon emissions.

We are developing a research project to understand how we can balance our residual carbon emissions (the carbon that is left once all steps have been taken to reduce emissions) to achieve Net Zero.

Delivering FCERM sustainably

Our past, current and planned research helps us deliver FCERM more sustainably (Table 1).

Project name	Status
Aquatic and riparian plant management (SC120008)	Complete
Assessment of lesser known hardwood timber species (SC070083)	
Beach management manual (SC060077)	
Channel management handbook (SC110002)	
Natural flood management evidence base (SC150005)	
SUDS manual (SC120084)	
Benefits of SUDS (SC100003)	
Eel and elver passes (SC150001)	Soon to be complete
Defining coastal squeeze (FRS17187)	
Discontinuance of redundant reservoirs (FRS18197)	
Natural flood management design guide (FRS18203)	
Carbon offsetting (FRS19212)	Just starting
Sustainability R&D Framework	

Table 1. Past, current and future sustainability research can be accessed here

For example, past research has led to the development of a pumping station efficiency tool, reducing the amount of carbon emitted from our pumping stations. Our research on hardwood timbers resulted in a sustainable timber policy. Our natural flood management (NFM) evidence base is helping to provide soft engineered solutions. NFM such as salt marsh creation (Figure 1) and moorland restoration (Figure 2) can also sequester (remove) carbon and help us meet our Net Zero targets.

Figure 1. Medmerry Managed Realignment, West Sussex. Source: Lydia Burgess-Gamble

Figure 2. Moorland restoration, Peak District. Source: Lydia Burgess-Gamble

Our sustainability strategy 'E:mission 2030' will help us respond to this emergency and will also help us implement FCERM sustainably (Figure 3).

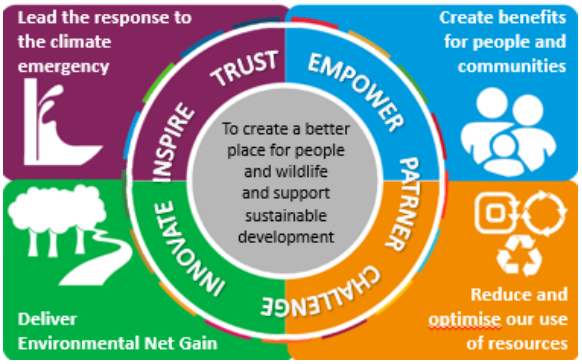

Figure 3. The 4 themes of Emission 2030 sustainability strategy

We are starting to develop a sustainability research framework. This will set out what future research we need across the 4 themes set-out in our sustainability strategy 'Emissions 2030':

- Lead the response to the climate emergency
- Deliver environmental net gain
- Create benefits for people and communities
- Reduce and optimise our use of resources

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Project reference FRS19212

Blue-green is the new grey

Transforming urban flood resilience

Climate change, urbanisation and an ageing water infrastructure are expected to increase flood risk. This means we must change how we manage water in urban environments.

We will need to move from flood protection to flood resilience. Cities need to invest in more sustainable approaches alongside traditional grey infrastructure such as flood walls, barriers, and underground pipes. Blue-green infrastructure (BGI), which includes swales, wetlands, green roofs and restored river channels provides a range of benefits to the environment, society and the economy.

Urban flood resilience research project

Urban Flood Resilience (2016-2020) is a research body of 9 UK universities, funded by the Engineering and Physical Sciences Research Council. The Joint Programme has had a key role in supporting and steering its work.

Our project investigated how to achieve resilience to flooding caused by extreme rainfall (pluvial flooding). Case studies from cities such as Newcastle and Ebbsfleet Garden City have identified barriers to introducing more BGI. Techniques that increase urban flood resilience include:

- engineering design that reduces flood risk under a range of future climates
- valuing water as a resource, instead of a hazard, to mitigate flooding and drought
- placing flood risk management at the heart of urban planning and development.

Adaptive urban drainage infrastructure

Urban drainage infrastructure is reaching the limits of its capacity. Extreme storm events and urbanisation mean that systems need updating. Adaptive planning allows a range of infrastructure options to be considered. This is a cost effective approach that considers future climate and levels of development.

We designed a way of assessing adaptation of long-term planning and infrastructure design. We used this to develop a roadmap of adaptive pathways in Carshalton (London Borough of Sutton) over the next 40 years.

Community perceptions and engagement

BGI's many benefits are easier to achieve when the public give their support. We gained new understanding of public perceptions and attitudes. Our sample population in Newcastle liked BGI, but had complex views on tidiness and safety. BGI design could be improved by working with local user and interest groups. This could encourage interest in voluntary stewardship and help reduce ongoing maintenance costs.

Water as a resource

Retaining and reusing rainwater will become more important as the climate changes. We can use grey water more efficiently alongside natural processes in the short and long term (Figure 1).

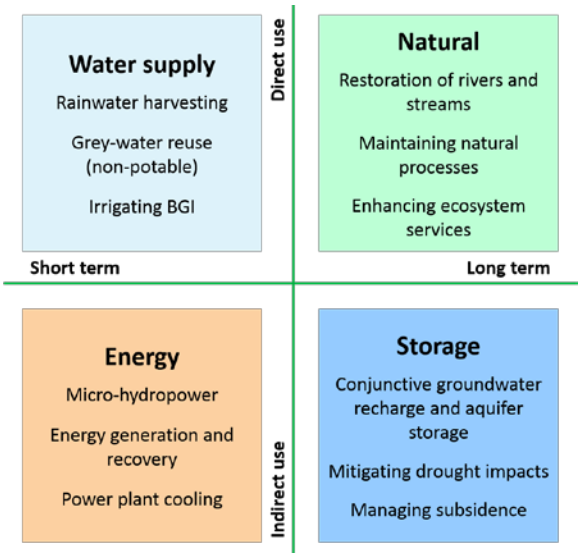

Figure 1. Options for rainwater reuse

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Living better with water

Approaches to resilience from flooding and coastal erosion

Strategies to manage flood risk and coastal erosion are unlikely to be successful if they depend solely on holding back water. Flood risk managers are now looking at how people can become resilient to these risks. In particular, how does the idea of resilience fit into a framework for flood and coastal erosion risk management in England and Wales?

In 2019 Defra commissioned research to look at approaches on resilience to natural hazards. Defra also wanted to know how these approaches measured resilience.

Our project combined four strands of research:

- a literature review to explore international ideas of resilience to natural hazards
- an analysis of responses to Defra's Call for Evidence on Flood Resilience (July - August 2019 (www.gov.uk/government/consultations/flood-and-coastal-erosion-call-for-evidence)
- expert interviews
- two stakeholder workshops.

We found examples in the literature of frameworks measuring resilience in other countries of frameworks for measuring resilience. An example is the Australian National Disaster Resilience Index (ANDRI). The Index maps resilience to natural hazards across Australia. It identifies two types of resilience capacities: coping and adaptive capacity (Figure 1). Resilience is measured using 90 indicators grouped into eight themes. ANDRI draws data from existing, mainly quantitative sources.

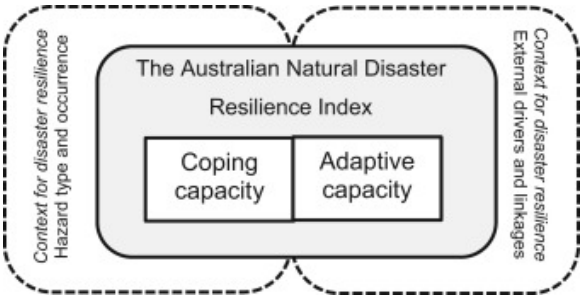

Figure 1 the Australian Natural Disaster Resilience Index's two resilience capacities

Stakeholder input

At our stakeholder workshops we discussed shifting focus from resisting flooding to resilience. Attendees felt this might lead to policy makers using different measures for managing flood and coastal erosion risks. They highlighted that this might change investment decisions.

The results of our project will be published by Defra. It will inform the government's forthcoming policy statement on flood resilience as well as the Environment Agency's National Strategy for Flood and Coastal Erosion Risk Management.

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We love it when a plan comes together

Growth through sustainable planning

Effective planning is essential in getting the right kind of sustainable growth in the right places. This includes avoiding development in flood risk areas and creating places that are resilient to flooding.

Strategic flood risk assessments (SFRAs) in England and Strategic Flood Consequences Assessments (SFCAs) in Wales are tools that underpin spatial planning decisions. They steer development away from areas at risk, and inform both spatial and development policies.

We reviewed over 150 spatial and development planning documents, including SFRAs and SFCAs to determine how flood risk information, on all flood sources, supports sustainable spatial planning and development decisions.

Research findings

Our research showed that SFRAs and SFCAs consistently and comprehensively assess flood risk from rivers and coasts. Other sources of flood risk from surface water, groundwater and reservoirs are not assessed to the same level. This is due to limited data and guidance on applying planning policy.

We believe that SFRAs and SFCAs have a greater potential to identify how flood risk, from all sources, can be reduced, not just managed.

Developing good practice to achieve outcomes for flood risk management

We used this research to create good practice standards for SFRAs and SFCAs that meet planning policy and consider all sources of flooding effectively. When developing and using an SFRA/SFCA, following these standards will help:

- locate development in areas of lowest risk from all sources of flooding
- avoid inappropriate development in areas that will become unsustainable in the future
- safeguard land for current and future flood risk management
- identify and assess cumulative impacts of development and land-use change on flood risk
- take opportunities to reduce existing levels of flood risk
- inform growth plans and development policy with flood risk evidence
- manage residual risk of flooding.

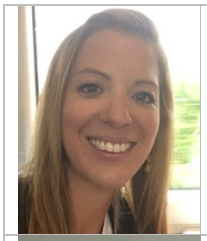
Using the research

We have used the findings to update the SFRA guidance on .Gov.uk (August 2019). This explains what should be included in an SFRA so that it meets planning policy. Our findings have also informed comments made by the Environment Agency on planning policy guidance being updated by the Ministry for Housing, Communities and Local Government.

Our research project has developed a good practice guide on how to scope, produce and use SFRAs/SFCAs that consider all sources of flooding, using real examples.

We hope that local planning authorities will use recommendations from our research, consider all sources of flood risk and make decisions that encourage long-term sustainable development and growth. Project outputs will be available in 2020.

For further information contact:



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Coasts on the edge

Modelling the impacts of sea level rise on cliff recession

Our coasts are on the frontline of climate change. Over the next 50 years around 2,700 properties in England will be vulnerable to coastal erosion due to increased storms, rainfall and accelerated sea level rise. In Wales, 400 properties will be at risk over the next 100 years.

Despite the actions in shoreline management plans, designed to manage the threat of coastal change, little is still known about how cliffed shores could respond in the future.
We are carrying out a project to try and address this.

Morphological modelling helps understand how the shape of the coast changes over time. By combining this with climate projections, it's possible to estimate increases in cliff erosion caused by future sea level rise.

Our project will provide vital information for practitioners and an important pilot study to apply the UK climate projections 2018 (UKCP18) sea level rise projections. It will allow coastal managers to make sound, evidence-based decisions locally, regionally and nationally. It will also inform future updates of the National Coastal Erosion Risk Maps.

Modelling approach

We developed a modelling approach using a tool called Soft Cliff and Platform Erosion (SCAPE). This captures the effects of regional variations in tide level, wave climate and historic sea level rise.
We successfully tested the approach at 4 locations around England and Wales:

- Nash shore, Glamorgan – large tidal range and heavy wave attack
- Carl Crag, Cumbria – no or slow relative sea level rise
- Birling Gap shore, Sussex – chalk cliffs
- Happisburgh, Norfolk (Figure 1) – soft cliffs where coastal defence structures failed and were decommissioned.

Initial results

Historic sea level rise and tidal range influence coastal sensitivity to future sea level rise. Early results suggested that shores may be less sensitive than previously thought.

We also found that erosion rates accelerated when coastal defence structures were removed or failed, in a process known as 'coastal catch-up'. Accelerated lowering of the shore due the presence of hard defences appears to contribute to this erosion. This requires further study.

Figure 1. Eroding cliff, Happisburgh, Norfolk

Ongoing work and next steps

The Environment Agency will apply the methods it has developed so far, and the latest sea level rise projections, to produce coastal erosion sensitivity indices. It will provide these for 80 locations around the coast of England and Wales for a range of climate change scenarios over the next 100 years and beyond.

Project outputs, including a user guide for coastal managers, will be available during autumn 2020.

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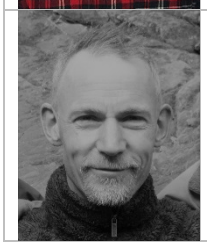

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Building back better than new

Supporting resilient repair in recovery

There's no doubt that it's more cost effective to make properties resilient to flooding than paying to repair flood damage. Property flood resilience (PFR) measures can reduce the impact of flooding on individual properties. These measures can also reduce the cost of flooding by allowing people back into their homes as soon as possible after floods recede. Types of PFR measures include flood gates, air vent covers, raised sockets and non-return valves (Figure 1).

Completing adaptations during the recovery work from flooding is known as 'resilient reinstatement'. Despite the growing number of PFR techniques, uptake of resilient repair remains low.

Figure 1. Air vent covers to prevent floodwater entering property

The Joint Programme carried out a study to understand the challenges to PFR uptake and identify steps to overcome them. The aims of the study were to understand:

- the processes involved in recovery and reinstatement
- the barriers/facilitators to resilience in this process
- how to improve this process to include resilient repair.

Main findings

There are a number of barriers that prevent householders making their homes resilient to flooding, and professionals promoting resilience measures. These include a lack of:

- evidence of the benefits
- communication and trust between those involved
- coordination in providing resilience measures, leading to higher costs and delays in people returning to their homes.

Actions

The study resulted in 5 suggested actions:

1. include resilient repairs in the recovery process and streamline delivery
2. make delivery accessible and easy to understand
3. encourage resilient repair through evidence, regulation and funding
4. include resilient repair in terms and conditions of insurance
5. inform all parts of the supply chain about resilience.

Using our research

This research stems from £2.9 million of government funding to support 3 pathway projects across Yorkshire, Cornwall and central England. The Environment Agency will use the recommendations from this study to increase uptake of property-level measures within these pathway projects. This will protect more homes and businesses from flooding in England and Wales.

The Environment Agency is also funding demonstration centres to teach the benefits of property flood resilience, and support project implementation and evaluation. It will use successes and lessons learned to encourage better engagement in PFR measures across the country.

The report is available on Defra's Science and Research web page. It is also available on the Environment Agency's research portal.

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Back to nature

Barriers and enablers of natural flood management

In 2018, the Joint Programme commissioned JBA to investigate how natural flood management (NFM) projects are successfully implemented.

NFM manages the sources and pathways of flood waters using techniques that work with natural hydrological and morphological processes, features and characteristics. These techniques include restoring, enhancing and altering natural features and characteristics of our river catchments (Figure 1).

Figure 1. Restoration of tidal inundation, Devon

Our project asked 4 main questions:

1. Who are the main groups carrying out NFM projects, what engagement do they have and need?
2. What social, regulatory and/or institutional barriers are experienced in carrying out NFM projects?
3. What social, regulatory and/or institutional enablers are experienced in carrying out NFM projects?
4. What are the main enablers and barriers associated with different sources of funding used to carry out NFM projects?

Literature review

A comprehensive literature review found that many articles focus on the barriers to NFM, with little reference to possible solutions. There were 6 common factors in carrying out NFM projects. These helped to shape the focus of our research and allowed us to consider them in more detail. These were:

- landowners, agriculture and agri-environment schemes
- local communities
- partnership working
- funding
- policy and regulation
- availability of evidence and best practice guidance

Stakeholder interviews and focus groups

We carried out interviews with a wide range of interested groups involved in NFM. This allowed for unconstrained responses and avoided repetition of previous NFM surveys.

We also held focus groups with landowners and farmers. These stakeholders play an important role in NFM delivery, this enabled us to explore their perspective in detail.

We carried out a detailed analysis of the opinions and attitudes of the landowners and farmers interviewed. Participants requested an improved evidence base, with examples of successful partnerships and scheme implementation. They also asked for improved guidance surrounding NFM maintenance costs and liability issues. There was a request for 'red tape' (e.g. form filling and the planning and consents processes) tailored to NFM. There was also a recognition that NFM projects require ongoing maintenance and must be resourced appropriately for their whole life.

Legal analysis

We found that 'legal issues' were often seen as a barrier to NFM projects by respondents. We looked at these in more detail to improve our understanding of these concerns.

Case studies

The project found that funding can be a barrier and an enabler, and significantly influences the outcome of NFM projects. The team considered 6 case studies, each using a different funding arrangement.

They identified the barriers and enablers under each of the following sources and mechanisms of funding:

1. Countryside Stewardship (CS)
2. Defra £15 million
3. payments per outcome
4. Calderdale NFM grant
5. Somerset NFM auction
6. EnTrade.

Conclusion

The report identified the wide range of interested groups involved in providing natural flood management and explored their roles.

The team was able to highlight **key barriers** to providing natural flood management (see Table 1). Identifying these barriers can help identify solutions. In particular, future policy development and effectiveness may be able to overcome or reduce these barriers.

The team also highlighted **key enablers** in providing natural flood management (Table 1). The research found that that advice, guidance, good stakeholder relationships and appropriate funding are vital for effectively implementing natural flood management.

The report recommends 3 areas of further work:

- develop an information 'hub' for interested groups to use when implementing natural flood management
- create a national framework to help interested groups identify the steps and decisions they need to take to successfully implement NFM projects
- a thorough policy review to support the national framework so that NFM measures are routinely considered as an option with more straightforward implementation.

The report will support Defra in reviewing its policy on natural flood management. The full report is available at http://randd.defra.gov.uk.

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Key NFM barriers	Key NFM enablers
• NFM maintenance costs • Legal liability of maintenance responsibilities and ownership of features • Managing expectations of the effectiveness of NFM • Limited current NFM policy and regulation • Differing governance between local authorities preventing straightforward NFM delivery • Limited access to modelling due to high costs or limited skills	• Appropriate 'on the ground' expert advice • 1-to-1 on-farm advice with consideration of the farming business • Utilising the farming network to share information and positive experiences • Positive relationships between stakeholders through a collaborative working approach • Engagement of the right people at the right time • Innovative new funding mechanisms that are accessible to single feature or small-scale NFM and more flexible to address any funding barriers • UK NFM policy and legislation improvement

Table 1. key barriers and enablers of NFM

It’s only natural

CIRIA’s natural flood management guide

Natural flood management (NFM) measures (Figure 1) can help to reduce and manage flood risk. However, there has been a lack of guidance on how to design, construct and maintain NFM measures.

A Construction Industry Research and Information Association (CIRIA) research project (RP1094) is developing guidance to address this knowledge gap.

The aims of the project for NFM measures are to:

- understand design principles, criteria and design life of different NFM measures
- understand how to construct different NFM measures
- identify likely costs of NFM measures, including whole-life costs
- specify design requirements of NFM to contractors
- understand potential maintenance and operation requirements of NFM.
- identify and manage project risks associated with construction and management of NFM (such as health and safety, consents and liabilities)
- understand legal framework and permitting requirements of NFM.

We want to contact those delivering NFM measures to understand their guidance requirements, as well as successes and challenges.

The new guide will help those working on NFM projects develop design ideas and construct their NFM measures.

Figure 1. NFM measure: a leaky wooden barrier in Scotland. Source: Lydia Burgess-Gamble

The project is funded by: Anglian Water, Defra, Environment Agency, Department for Infrastructure, Northern Ireland, Highways England, JBA Trust, Network Rail, SEPA, Severn Trent Water and United Utilities.

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Getting by with a little help from my friends

Benefits and challenges of partnership funding

In May 2011, Defra introduced a partnership funding approach for capital flood and coastal erosion risk management (FCERM) projects in England. The aim of these funding arrangements is to encourage financial contributions from local beneficiaries. This allows government funding to stretch further and better protect more communities from flooding.

We evaluated to what extent this partnership funding policy has met its objectives. We looked at:

- increasing partnership investment
- enabling local choice and engagement
- promoting cost-effective solutions
- directing government funding to high risk and other target groups, for example households in deprivation categories

The good news is that the funding has provided more schemes and more benefits.

Evaluation approach

Risk and policy analysts in association with Royal Haskoning DHV carried out the evaluation. A total of 123 practitioners completed an online survey. These were followed up with detailed interviews and case studies.

We modelled outcomes of partnership funding. We also built a baseline to project outcomes such as economic benefits, number of properties protected and environmental improvements based on the pre-2011 funding continuing. We compared the outcomes with this baseline.

Research findings

Our modelling suggests that partnership funding has led to around 420 extra schemes in the current 6-year programme (2015 to 2021), with estimated economic benefits increasing by £1.1 billion.

61% of those surveyed felt there was an increase in wider benefits such as improvements to the environment and regeneration.

The survey and interviews flagged some areas of concern however, including the need to:

- increase clarity and consistency of different risk management authority processes
- promote and increase clarity of processes for 'green' schemes and coastal adaptation
- streamline legal agreements for contributions
- build more capacity among practitioners

Next steps

Our research has provided evidence to policymakers and programme managers at Defra and the Environment Agency on how the policy is working on the ground. This work will inform development of future funding approaches. The full report is available at http://randd.defra.gov.uk.

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Project reference FD2702

Smart pumps

Condition-based monitoring for pumping station maintenance

We are starting a new and ambitious programme to improve the maintenance of FCERM pumping stations and other motor-driven flood risk management assets.

We will develop and pilot a condition-based monitoring system (CBMS). The project will use a proof of concept system at 2 pumping stations in Kent.

This CBMS will enable 'just in time maintenance' reducing the risk of costly failures of FCERM assets.

Figure 1. Pumping station maintenance

Research aims

The Environment Agency spends approximately £12 million a year on maintaining Mechanical Electrical Instrumented Control and Automated (MEICA) systems (Figure 1). With 1,200 breakdowns a year, important assets require regular repair. Equipment failures could lead to flooding, affecting people and property.

Advances in sensor technology and predictive analytics mean that maintenance budgets can be spent more efficiently, avoiding costly failures. Our ultimate aim is to make MEICA assets more reliable. This will reduce the risk of flooding to people, their homes and businesses.

The case for this research is even more compelling when you consider the potential for carbon savings. Over 30% of the Environment Agency's operational carbon emissions come from 340 pumping stations (Figure 2). Small efficiencies across all pumping stations operations could potentially yield large carbon savings.

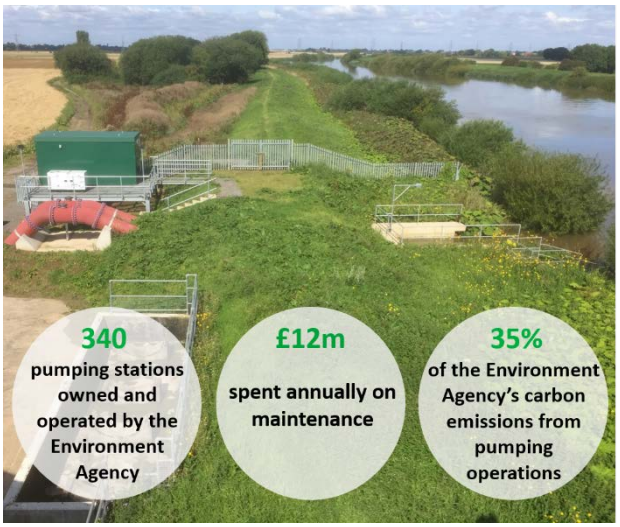

Figure 2. Environment Agency's pumping stations

Objectives

The aim of this research project is to support the use of new sensing technologies and predictive analytical techniques in developing maintenance strategies.

These objectives have 4 stages:

1. review and proof of concept of CBMS
2. prototype design and specification of CBMS
3. deployment and pilot testing of prototype
4. development of deployment strategy.

Developing a proof of concept

Starting in March 2020, the project's first task will be to review sensing instruments, looking at whether existing and new instruments are suitable.

We will carry out a full failure mode effect and criticality analysis (FMECA). This will guide the market testing, design and specification of the CBMS. Historical failure data will be used to understand frequency and cause of component failure in pumping stations.

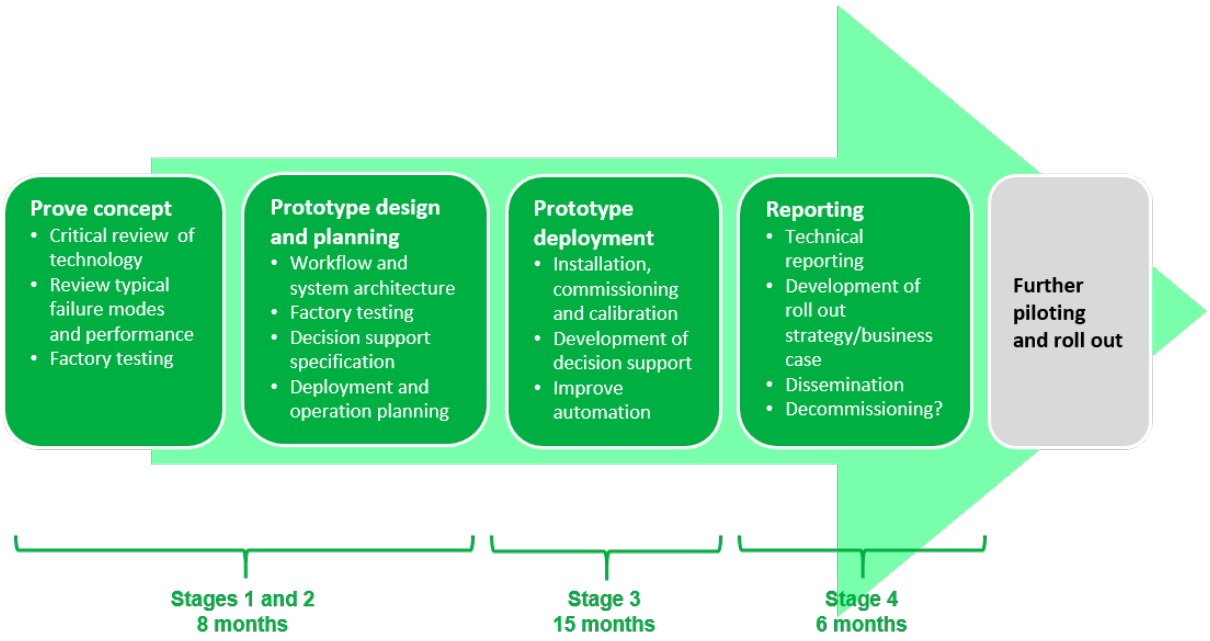

Figure 3. The expected programme and tasks within each stage

We will use the results of the FMECA to prioritise the design of the concept CBMS and then factory testing will be carried out (Figure 3).

The low utilisation challenge

Lack of data is the main challenge in effectively managing water-level and flood risk infrastructure. Floods are rare and so flood risk management infrastructure is only used for short periods. This lack of data makes it difficult to predict future performance. Collecting detailed data during real operations is critical if this project is to realise its ambition.

The research team will be seeking to use pragmatic changes to operational rules to generate performance data, together with new advances in predictive analytical techniques and sensors.

We are also looking for opportunities to work with the research community, and encourage interested individuals and organisations to get in touch.

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All the fun of the FAIR

Adapting infrastructure assets in practice - key findings from the EU Interreg FAIR project

EU member states invest an average of €3 billion a year on flood protection infrastructure. The annual average damage caused by flooding is increasing due to climate and socio-economic changes. Difficult decisions will need to be taken in response to these threats, especially in coastal regions.

Significant new FCERM ideas and methods are being developed, but their alignment with socio-economic policies and governance systems is often neglected. The Environment Agency and Sayers and Partners (SPL) are part of an EU programme to address this issue.

FAIR[1] recognises these challenges. It involves sharing practical experience, engineering know-how and scientific knowledge on flood infrastructure across Europe's North Sea Region[2]. The priority recommendations and some good practice examples from international partners within FAIR are introduced below.

Recommendation 1: Break free of the silo
The institutional context for asset management is often fragmented with different organisations and regulatory processes involved in flood management. Multiple planning processes must be aligned within, and beyond, flood management.

Figure 1. Belgium coast redevelopment – Courtesy Vlaanderen is maritiem

In Middelkerke, Belgium, a multi-functional and adaptive dyke reinforcement is being built (Figure 1). An existing dyke wall is being augmented with a dune system to provide natural habitat and recreational opportunities. The dune also provides a natural adaptive capacity and can be widened or heightened to cope with sea level rise.

Recommendation 2: Mind the gap
Strategic planning and operational processes are often misaligned. They must be linked through a tactical handshake that bridges gap between the two and ensures each is informed by the other (Figure 2).

Figure 2. Linking perspectives Source: FAIR

Hamburg, Germany is protected from flooding by a complex arrangement of automated flood protection gates (Figure 3). Understanding the trade-off between the benefits of a highly-automated approach and the potential increased chance of error is a challenge. LSBG Hamburg is developing a new georeferenced asset information system. The system also records operational permits, as-built details, and the consequences of failure. Analysing this data helps to understand system behaviour and to target maintenance resources effectively.

[1] Flood infrastructure asset management and investment in renovation, adaptation and maintenance

[2] https://northsearegion.eu/

Figure 3. Flood gates. Source: FAIR

Recommendation 3: Prepare for change
The future is uncertain, but decisions taken today have long-term implications. Flexible strategies and asset designs that can be adapted to meet changing requirements in future must be developed.

In the Netherlands and England, new guidance and tools are being used to assess adaptive approaches. The guidance includes advice at different stages in appraisal and how to value the adaptive capacity. Software tools visualise and explore alternative pathways together with stakeholders. This provides insights into the adaptation options available, the sequencing of options over time, potential lock-ins and path dependencies.

Recommendation 4: Make space for innovation
Innovation is not consistently embedded in standard practice. It is important to embrace and manage risk to support the development of innovative solutions.

Helsingborg Municipality award annual prizes to innovative projects initiated during the year. By rewarding projects that challenge conventional approaches, stakeholders are encouraged to embrace innovative solutions across all aspects of their work, from conception to implementation, and from public engagement to funding.

The national Dutch Flood Protection Programme provides support funding for developing and testing innovative dyke reinforcement techniques. Asset owners are also encouraged to use new sensor technologies to gain insight into dyke strength and performance (often in real-time and at a low cost) to maximise safety and optimise maintenance activities (Figure 4).

Figure 4. Sensors within a dyke – Courtesy the Rijkswaterstaat

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Project lead
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Interreg North Sea Region FAIR
European Regional Development Fund
EUROPEAN UNION

On board with Internal Drainage Board governance

First evaluation of the published research

In March 2017 the National Audit Office published a report on Internal Drainage Boards (IDB). This raised concerns about IDB governance and accountability. IDBs submit annual reports to Defra. Analysis of annual returns (2016/17) identified vacancies in local authority (LA) appointed members on the boards and extensive board member vacancies.

In October 2019 we published research into IDB board membership. Our research considered how IDBs could be better supported in establishing and maintaining a wide board membership that includes specialist expertise. How to encourage and support active engagement by members in board meetings. It also considered the factors which influence IDB governance.

Collecting information

We undertook scoping interviews with strategic partners and reviewed of key documents. We invited all 102 IDBs in England to complete a 15 minute online survey about IDB governance. We carried out semi-structured interviews with four board members from 15 different IDBs. This produced case studies of the make-up of IDB boards. Responses from surveys and interviews were anonymous. Finally, we invited all IDB clerks in England to join a dissemination event at Defra's offices in London on 3 June 2019. This enabled us to further refine our recommendations.

What did we find?

We found evidence of some tensions between the role of LA appointed members on IDB boards and their responsibilities as councillors. LA appointed members facilitate information exchange between IDBs and their authorities, but many interviewees reported that this was not effective.

IDBs face a challenge to fill both appointed member and elected member board seats. Some LAs and IDBs are adopting a range of approaches and alternative ad-hoc arrangements. Average board meeting attendance rates at 60% but a significant number of IDBs report lower attendance.

Board members provide IDBs with access to a wide range of skills, expertise, local knowledge and experience. Board members commonly specialise in business, industry and land management.

The key recommendations of our research are to:

- raise the profile of IDBs among councillors
- ensure LAs are aware that they have the option to appoint non-councillor appointed members to fill vacancies
- clarify the role of appointed members
- induct all appointed members' and provide ongoing training
- strengthen the role of Appointed Members as facilitators of engagement between LA and IDB
- schedule meetings to maximise participation
- report on attendance at meetings
- support IDBs to identify responses to recruitment and retention challenges through consideration of consortia or reducing board size
- provide support in dealing with regulatory requirements.

What next?

Our research will help strengthen IDB governance and accountability. The Association of Drainage Authorities (ADA) ADA is working with Defra, the Environment Agency (EA), the Local Government Association (LGA) and others, to implement and report on progress made by IDBs towards the recommended actions. The full report is available at http://randd.defra.gov.uk.

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Project reference FD2712

Regulating ageing reservoirs

Current and future research

The Environment Agency regulates 2,062 reservoirs in England (2020). A reservoir is a body of water over 25,000m^3, as defined in the 1975 Reservoir Act.

There are almost 760 different reservoir owners. It is a challenge to make sure that new research developments reach everyone involved, and in the best way possible. A water company or the Environment Agency (the largest single owner) might need different information to a charity or farm owner.

England has an ageing portfolio of reservoirs, which impacts reservoir safety. The average reservoir is 125 years old, and the oldest is around 800 years old. It has never been more important to target research where it can maximise benefits. A focus on usable tools, guidance and information for end-users and maximising research uptake has been a priority for the Reservoir Safety Research Advisory Group (ReSRAG).

Over the past year, the ReSRAG has looked towards flood defence levee research where there are many common issues (Figure 1). 83% (1,715) of regulated reservoirs are soil-based structures. Of the estimated 8,440 km of linear raised flood defences in England, around 80% are soil-based embankments. This overlap is also recognised by the International Commission on Large Dams (ICOLD) who has initiated a levee working group as part of its ongoing developments.

Soil-based reservoirs and levees

In 2019 we received many requests to carry out research into reducing the risk of failure for soil-based reservoirs and levees. A study by HR Wallingford and Stillwater Associates, considering all aspects of 'breach' (FRS17072) and future reservoir priorities, has allowed us to focus research in areas detailed in Table 1.

Benefits to the environment and community when reservoirs are decommissioned

A reservoir owner must follow certain procedures to 'discontinue' or 'repurpose' a reservoir to achieve environmental and community focused improvements. These might include an improved biodiversity, opportunities for tourism, fisheries and recreation.

In 2020, HR Wallingford will lead a research project (FRS18197) to provide an overview of these benefits, using lessons learned from discontinued schemes.

Figure 1. 3 types of erosion processes in dams and levees (photos USDA ARS, RHDHV, D Bowles / USBR/ USACE / URS / UNSW)

	Research already carried out	Research in the pipeline
Inspection and investigation	Improvements to Environment Agency Condition Assessment Manual. Tiered inspection-investigation framework Asset Performance Tools (APT). Real-time monitoring (UrbanFlood). Surveillance of embankments with LIDAR. Real-time geophysical imaging (British Geological Society). Sediment Impact in reservoirs (ICOLD, Bulletin).	Improved guidance for inspection of transitions. Methods for structural health monitoring for levee performance.
Performance assessment	Development of national fragility and deterioration curves. Review of grass and soil performance. Scoping research to support breach prediction.	Erodibility characteristics of UK soils. Indexing parameters for grass characterisation. New methods for deterioration modelling. Reliability of defences with transitions. Leakage and seepage of reservoirs – review and best practice guidance. Dam/levee erosion research programme (lab and large field tests in Spain, EDF).
Risk analysis	MDSF2 (SC120062). RAFT and RAFT+. Input to NaFRA2 specifications. Reviewed modes of failure of dams and monitoring and measuring methods for embankment dams (SC080048). Risk assessment for reservoirs (SC090001).	Improved risk analysis methods for transitions. Tolerable limits for wave over topping. Risk to life from levee failure. Flood extremes – improving hydrology estimates used in dam engineering.
Lifecycle planning	Deterioration and whole-life costs (SC060078). Asset performance tools (APT) whole-life cost modelling tool (SC090038).	Improved risk analysis methods for transitions. Tolerable limits for wave over topping. Risk to life from levee failure.
Repair, improve, transfer or decommission	International Levee Handbook (SC100001). EC7 complementary guidance. Retaining walls (SC130038). Emergency repair techniques. Drawdown capacity for reservoirs (SC130001). Breach scoping study – identifying priority R&D.	Update of emergency repair techniques including closure. Benefits and approaches to the discontinuance of dams.
Retrofitting to improve resilience	Manufacturer testing of own products.	Review of the use of plastics – *Environment Agency.* Soil stabilisation polymers (for example, guar gum) *EU commission.* Yet to be considered: Future inspection ability. Is retrofitting the key to solving weakness? How easy is it to retrofit? How green is the solution? What is the likely cost to retrofit to a higher standard? What is the risk post exceedance? Anti-vermin/damage capability. Usability on spillways.
Emergency Response	Environment Agency incident reviews (both flood/levees and dams).	A review of the Bresdefender (Dutch floating platform to plug breach) - *Living Lab Interreg.* Use of detonation to breach when and where required - *Living Lab Interreg.* International joint exercises to promote best practice in response. Leading to a multi nation incident toolbox – *Living Lab Interreg.*

Table 1. Overview of research for soil-based levees and dams

Improving the reliability of gates and valves
The Construction Industry Research and Information Association (CIRIA) has published a guide on pipework, valves and associated equipment used in dams.

The research defines good practice. By gathering experience, issues that affect the hydraulic control equipment operating reliably can be identified. The research includes:

- selecting correct gates, valves and other hydraulic control structures
- maintaining gate and valve equipment in good condition
- considering external factors in reliable operation of control structures, including access and staff training
- using surveys to evaluate likely residual life
- identifying problems and trends in gates and valve performance
- developing criteria to assess when formal safety integrity level (SIL) assessment and specification is appropriate for hydraulic control structures
- guidance on how to assess and improve operational reliability.

Improving estimates of extremes
This year we will be assessing existing methods for estimating the probable maximum flood (PMF) and the probable maximum precipitation (PMP). It will also develop new methods and guidelines to ensure that the highest risk reservoirs are resilient to extreme flood events.

The Environment Agency uses the PMF to check the safety of 'Category A' dams. These are dams where a breach could endanger lives of people living downstream. Under current guidance, Category A dam spillways must be large enough to discharge the flow of a PMF event. The management and design of spillways relies on these methods. Refining these estimation methods may not only lead to improved safety, but potentially lead to cost savings.

Prioritising future needs
Events have been planned to support the future direction of research under the ReSRAG. For further information please contact: fcerm.evidence@environment-agency.gov.uk or see https://britishdams.org.

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Surface and sewer

Updating the integrated urban drainage modelling guide

The drainage of urban environments is frequently complex and notoriously difficult to accurately model. The interface of watercourses, overland flow and below ground drainage and sewer systems makes establishing flood risk a challenge (Figure 1).

Figure 1. Surface water flooding

In 2009, the Chartered Institution of Water and Environmental Management's (CIWEM) Urban Drainage Group (UDG); previously known as WaPUG, published an Integrated Urban Drainage Modelling Guide (IUDMG). The guide informed practitioners on technologies for advanced flood modelling in urban areas. This includes the use of linked 1D-2D models and the integration of sewer, watercourse and urban surface models.

The guide was targeted at those commissioning or carrying out flood analysis projects in the UK, including water companies, local councils and bodies such as the Scottish Environment Protection Agency or the Environment Agency. It is particularly important for assessing flood risk when developing surface water management plans.

Since 2009, technologies and good practice have moved on. New drainage and wastewater management plans (DWMP) work with partners to develop programmes for improved urban resilience.

It's now time to refresh the IUDMG for the challenges and opportunities of the 2020s, particularly as new drainage and wastewater management plans (DWMP) are being developed. These will be developed by Water and Sewerage Companies and partners to develop programmes for resilient drainage.

Collaborative working

The project to update the IUDMG is truly collaborative. CIWEM and the Environment Agency are leading the project. Richard Allitt Associates are updating the guide, working with AECOM, Maltby Surveys, Bluesky and Onsite. CIWEM chair the project steering group. This includes representatives from the Environment Agency, UDG, water companies, lead local flood authorities (LLFA), and the project delivery team at RAA Ltd and AECOM.

We used a number of approaches to determine which sections of the guide needed targeting for updates. For example, we held a series of roadshows across the UK and ran a workshop at the annual UDG conference. These events helped to understand the problems that LLFA experience in jointly funded integrated modelling projects, and to make sure that the guidance addresses them.

This kind of collaborative approach allows us to draw on expertise from across the industry. It makes sure guidance is relevant to, and inclusive of, the widest range of users and experiences.

Next steps

We expect to publish the updated guide during 2020. This will be available on CIWEM's website www.ciwem.org.

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Project reference FRS18207

Trash talk

Two new guidance documents released using online webinars

The Environment Agency's blockage management guide and CIRIA's culvert, screen and outfall manual were published in December 2019 (Figure 1).

Figure 1. The two new guides

The blockage management guide is a new guide on managing flood risk due to watercourses or structures being blocked by debris (Figure 2 and 3). This can result in impacts equivalent to a much more severe flood than the actual water levels may suggest. Increased impacts include more wide scale or severe flooding or structural damage to other flood risk management assets, such as increased scour or structural failure.

Figure 2. Large debris blockage under a bridge

The guide draws on the latest research and international good practice. It provides advice on screening for blockage risk, quantifying the risk of blockage and choosing management approaches.

It presents:

- the overall blockage management process
- how to choose the most appropriate management options
- an initial appraisal (high-level) of the risk of flooding from blockage, potential impacts and prioritisation of any interventions
- detailed assessment of the flood risk, design and economic appraisal of options.

Users are guided through a consistent evidence-based approach to choosing appropriate interventions (or doing nothing).

Industry feedback showed a lack of consistency in risk assessment, prioritisation and management of flood risk from blockages. To help resolve this, the guide steers users through this process, relating their objectives to each stage of the overall blockage management process as well as considering key points of uncertainty.

The culvert, screen and outfall manual was produced through a successful collaboration between the Environment Agency, CIRIA, Network Rail, Highways England and Transport Scotland.

This manual combines and updates the Environment Agency's trash and security screen guide (2009) and CIRIA's culvert design and operation guide (2010) and associated revisions.

Figure 3. Clearing a trash screen during a flood

Using the latest research and development, the new manual provides a one-stop document for the entire industry's needs.

It recommends against building screens or culverts unless there are no viable alternatives. Key sections of the manual include:

- design process and good practices
- legal framework
- hydrology and hydraulics
- health and safety
- environment and natural processes
- repair, renovation and removal.

The 2 new guides complement each other and, in the majority of cases, both should be consulted and used.

Communicating research

We launched both projects through webinars. This allowed participants to see the contents of the guide, hear from authors and ask live Q&A without incurring the usual costs, carbon and time associated with travelling to a launch presentation.

Using webinars to launch these projects also gave us significant reach across geographical and organisational boundaries. The blockage management guide webinar attracted over 400 registrations from over 75 organisations. Ciria's culvert, screen and outfall manual webinar received over 350 registrations.

Around 50% of those registering for the webinars attended (Figure 4). We recorded the webinars and this has given us an invaluable record of the authors and experts describing their work.

You can access the blockage management guide recording from our research website or on YouTube: https://youtu.be/C_g9lQtVte0.

Find the culvert, screen and outfall manual on CIRIA's website.

You can find the reports on the Environment Agency's Flood and Coastal Erosion Risk Management Research and Development Programme webpage

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Project reference FRS17188 / SC110005

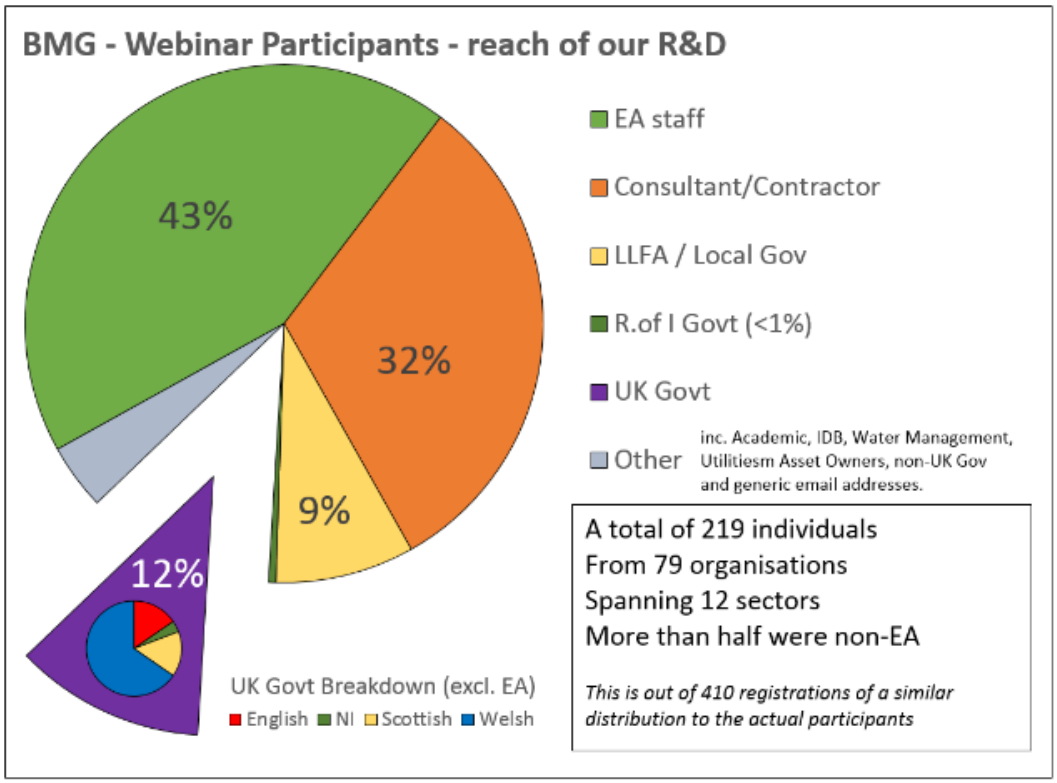

Figure 4. Summary of participants

Groundwater flooding

Who's managing it, where and when?

The latest climate models predict hotter drier summers with more severe droughts and warmer wetter winters with more severe floods. This could mean periods of very low or very high groundwater levels.

Groundwater flooding occurs where groundwater levels rise and emerge on the surface. In winter 2013, southern England suffered the most severe groundwater flooding for 100 years (Figure 1). Coupled with fluvial flooding, this event caused £190 million of damage to homes and £110 million to roads[3].

Groundwater flooding can occur for days or even weeks after heavy rain, and may last several weeks. The water can emerge in unexpected places (such as on hillsides) and it can also rise up through a property's floor. Therefore, the nature, and management of groundwater flooding, can be very different to flooding from rivers and the sea.

Flood studies in England have traditionally focused on the most immediate risk to life, and on communities at risk from rivers or rising sea levels. In comparison, understanding of groundwater flood risk, and how people are adapting to it, is limited.

Figure 1. Groundwater flooding in 2013, Great Shefford, West Berkshire

Supporting groundwater flood management
For the first time, we have gathered and reviewed the information and processes used for groundwater flood risk management in England.

We have collected evidence on:

- roles and responsibilities for groundwater flood risk management
- records of groundwater flooding
- risk information like maps and models
- groundwater flood forecasting and warning systems and services
- groundwater flood mitigation measures (risk reduction, resistance, resilience and adaptation).

We are using this information to produce a comprehensive resource on current practice used to predict, manage and respond to groundwater flooding in England. This information will support the Environment Agency and other Risk Management Authorities in managing groundwater floods.

The information will support the Environment Agency's strategic overview role for managing flooding from all sources. Specifically, it will inform how it implements the flood and coastal risk management strategy for groundwater flood management in England. It will also help support Nafra2's ambition to include groundwater in the future.

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Project reference FRS19217_LT

[3] https://www.gov.uk/government/publications/the-costs-and-impacts-of-the-winter-2013-to-2014-floods

News bites

Are our FCERM assets releasing micro plastics?

Plastic is durable, and often lower cost and lower carbon than alternatives. Our FCERM structures often use or incorporate plastic as a building material.

Figure 1. Plastics collected on a beach clean-up.

There is an increased awareness of the effect of plastics on the water environment (Figure 1). Plastic construction materials could release micro plastics or chemical pollutants into the environment (Figure 2).

We need to understand what impacts degradation of our existing plastic-containing structures have. As part of our FCERM project appraisal process we also need to find the most suitable and sustainable building materials for future structures.

Our project will:

- develop a list of FCERM structures and products that contain plastic
- develop a list of high risk asset types and products that have the greatest potential to impact the water environment
- find alternative products and construction methods or identify
- where new alternatives need developed
- suggest future research needs.

Figure 2. Plastics found in the geotextile matting around a heritage structure on the foreshore of an estuary. Source: Carol Peirce

For further information contact Jenny Broomby jenny.broomby@jbaconsulting.com or Carol Peirce carol.peirce@environment-agency.gov.uk.

New FCERM research website

In May 2020, the FCERM R&D programme and DDTS (Digital, Data and Technical Services) will start scoping options for a new FCERM research website.

The preferred option will be informed by results from the user survey and 1:1 interviews conducted in 2019. During delivery, the team will be in touch with users to test the sites functionality before it's available to the public in 2021.

For further information contact Paul Weller paul.weller@environment-agency.gov.uk

Delivering nature based solutions

In May 2019 an international symposium brought together international experts to discuss delivering nature-based FCERM solutions (Figure 3). The event facilitated knowledge exchange and sharing best practice between international researchers, practitioners and policymakers. Outputs from this event are now available in the symposium report.

Figure 3. Eddleston Water and example of an NFM project in Scotland. Source: Lydia Burgess-Gamble

For further information contact Lydia Burgess-Gamble Lydia.Burgess-Gamble@environment-agency.gov.uk.

Property insurance review following November 2019 flooding

Amanda Blanc (former chair of the Association of British Insurers and former Chair of the Insurance Fraud Bureau) has been appointed to conduct an independent review into flood insurance following the November 2019 flooding in the Doncaster area (Figure 4).

The review will answer the following questions:

- What does the evidence tell us about the level of insurance cover held by those most recently affected by floods and the barriers they faced?
- Does this evidence point to any systemic issues in the provision of flood insurance?
- Does this evidence suggest any other issues regarding availability, affordability, barriers, or dissatisfaction with coverage?

To answer these questions, BMG (an independent market research company) is conducting surveys with household and businesses in the Doncaster area, and undertaking stakeholder interviews.

Figure 4. A flooded home.

For further information contact Jess Phoenix jess.phoenix@defra.gov.uk.

Ongoing projects in the programme

The table below shows some of our ongoing programme of projects, divided up into our 3 themes. For more information on Environment Agency projects visit our Programme website and select the search option from the menu on the left - type the project reference (beginning SC or FRS) into the search box and select the 'research projects' option. For Defra projects, type the project code (beginning FD or WT) into the search function on the Defra Science website.

Project ref	Project title	Project Manager	Anticipated completion date
Asset Management Theme			
SC120005	Impact of climate change on asset deterioration	Louise Whatley	Spring 2020/21
SC130038	Embedding retaining wall CIRIA C580	Louise Whatley	Spring 2020/21
SC160017	Grouting for reservoir dams – a guide to good practice	Louise Whatley	Spring 2020/21
FRS17194_LT	CIRIA archaeology guidance	Olivia Merritt	Summer 2020/21
FRS18072_LT	Gates and valves	Chrissy Mitchell	Summer 2020/21
SC150001	Fish and eel passage: guidance for flood risk management authorities	Chrissy Mitchell	Summer 2020/21
FRS17071_LT	Scoping research to improve dam and levee breach prediction	Chrissy Mitchell	Autumn 2020/21
FRS17183	Sensitivity of morphological response of channels to future flood flows	Hayley Bowman	Autumn 2020/21
FRS17188	Culvert, screen and outfall manual summary	Mark Whitling	Autumn 2020/21
SC140003	Extension of EurOtop calculation tool	Lee Swift	Autumn 2020/21
FRS17181	Identifying and managing risks arising from defence structure transitions	Bob Kinnear	Winter 2020/21
SC140006	The performance of grass and soil in resisting erosion (Phase 1)	Chrissy Mitchell	Winter 2020/21
SC160016	Groyne maintenance	Sue Manson	Winter 2020/21
FRS18197	Benefits in removing redundant reservoirs (discontinuance)	Chrissy Mitchell	Spring 2021/22
SC140004	Practical approaches to transfer or decommissioning of uneconomic FCERM assets	Bob Kinnear	Spring 2021/22
FRS18203	Natural Flood Management – a guide to the design, construction and management	Lydia Burgess-Gamble	Summer 2021/22
Incident Management and Modelling			
FRS18204	Using flood risk Information in spatial planning	Hayley Bowman	Summer 2020/21
SC150009	Making use of the latest evidence on FCRM and climate change (inland and coastal)	Stuart Allen	Summer 2020/21
FRS17184	Coastal flood models for FCRM purposes	Chrissy Mitchell	Autumn 2020/21
FRS18196	Hydrology framework	Mike Vaughan	Autumn 2020/21
FRS19217_LT	Groundwater flood management (REA)	Hayley Bowman	Winter 2020/21
SC090031	Review of methodology for estimating flood peaks and hydrographs for small catchments (PHASE 2)	Mark Whitling	Winter 2020/21
SC110003	Evaluating grid-to-grid in rapid response catchments	Sue Manson	Winter 2020/21
FRS19218_LT	Nafra 2 (REA)	Sue Manson	Spring 2021/22
FRS19219_LT	The value of engagement in FCRM	Matt Georges	Autumn 2021/22
FRS17182	MEICA monitoring	Yayha Ugradar	Winter 2021/22
FRS18207	CIWEM integrated modelling guide update	Mark Whitling	Winter 2021/22
FRS18199	Joint probability of waves and sea levels	Lee Swift	Winter 2021/22

Policy Strategy and Investment Theme			
SC150007	Benefits of recreation, tourism and health	Carolann Mitchell	Spring 2020/21
FD2718	Review of flood insurance in Doncaster	Jess Phoenix	Summer 2020/21
FD2716	Evidence review of the concept of flood resilience	Jess Phoenix	Summer 2020/21
FRS17187	What is coastal squeeze?	Chrissy Mitchell	Summer 2020/21
FRS17191	Applying behavioural insights to property flood resilience	Louise Whatley	Summer 2020/21
FRS18201	Strengthening local investment decisions - R&D	Hayley Bowman	Summer 2020/21
SC120016	Improved science for long-term investment planning	Jacqui Cotton / Hayley Bowman	Summer 2020/21
SC150013	Communicating impacts in flood warnings and forecasting	Jacqui Cotton / Hayley Bowman	Summer 2020/21
FRS18087	Non-stationary evidence assessment	Sean Longfield	Autumn 2020/21
FRS19221_LT	Adaptive pathways literature review	Andy Eden	Autumn 2020/21
FRS17186	Understanding effective flood risk governance	Kate Kipling	Winter 2020/21
FRS17192	Working together to adapt to a changing climate: flood and coast	Kate Kipling	Winter 2020/21
SC120017	Cliff and shore erosion under accelerating sea level rise	Lee Swift	Winter 2020/21
FRS19209	Communities framework	Lydia Burgess-Gamble	Spring 2021/22
FRS18208	Evidence on the cost of floods	Hayley Bowman	Autumn 2021/22

Research outputs published in the last year

- **May 2020**: Applying a risk-based approach and improving the evidence base related to small raised reservoirs (FD2701)
- **April 2020**: The enablers and barriers to the delivery of natural flood management (FD2713)
- **Nov 2019**: Investigating the needs, feasibility and benefits of real-time inundation mapping for flood incident management (SC120023)
- **Nov 2019**: Blockage management guide (SC110005)
- **Nov 2019**: Valuing the benefits of blue-green infrastructure (FRS18071)
- **Nov 2019**: Decision support for coastal and estuarine planning (SC090036)
- **Aug 2019**: Internal Drainage Boards: Research into the factors affecting IDB board membership and their impact on board governance (FD2712)
- **Aug 2019**: Exploratory sea level projections for the UK to 2300 - part of the project 'making use of the latest evidence on FCRM and climate change (inland and coastal)' (SC150009)
- **Aug 2019**: Evidence review: Working together to adapt to the changing climate: flood and coast (FRS17192)
- **July 2019**: Supporting the uptake of resilient repair in the recovery process (FD2706)
- **Jun 2019**: Short review-flood appraisal modelling practice - using EA economics framework (FD2711)

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Flood and Coastal Erosion Risk Management Research News is published by Defra, the Environment Agency, Natural Resources Wales and the Welsh Government. It is circulated free to anyone with professional interests in flood risk management and coastal protection. We are happy to answer queries of a general nature but advise readers to address specific technical queries directly to the relevant institution.

This newsletter was edited by Liz Etheridge on behalf of the FCERM Research programme. If you would like to receive news of future issues of this newsletter, please register via our web pages. For any other information please contact the Environment Agency FCERM Research programme team.

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