Natural Flood Management Pumped Catchments R&D gaps

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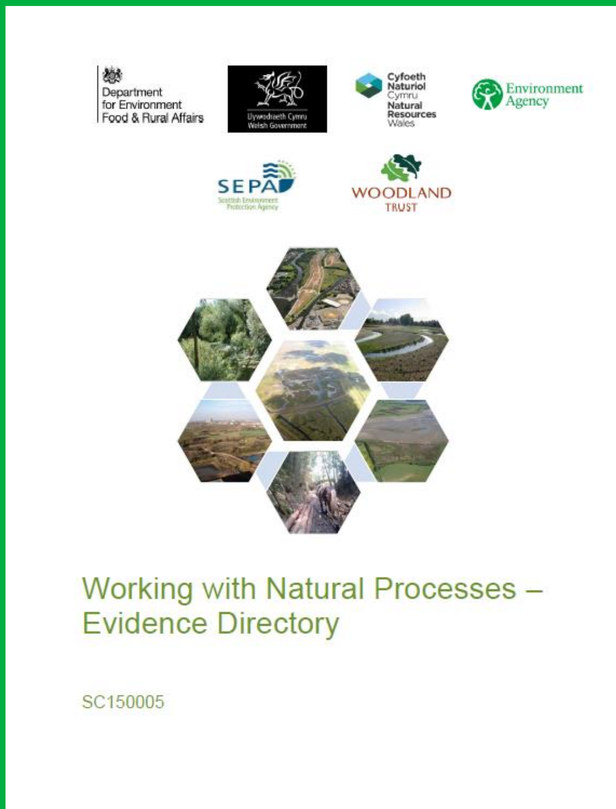
The Evidence

The Evidence Base



Working with Natural Processes – Evidence Directory

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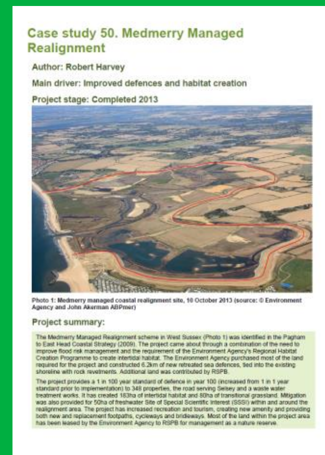


Case study 50. Medmerry Managed Realignment

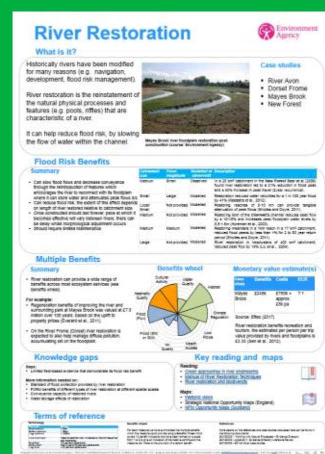
Author: Robert Harvey

Main driver: Improved defences and habitat creation

Project stage: Completed 2013

Photo 1: Medmerry managed coastal realignment site, 10 October 2013 (source: © Environment Agency and John Akerman ABPmer)

Project summary:



River Restoration

What is it?

Flood Risk Benefits

Multiple Benefits

Knowledge gaps

Key reading and maps

Terms of reference

Docs
https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk

Roadshow outputs
https://www.therrc.co.uk/nfm-roadshow-outputs

Maps
http://naturalprocesses.jbahosting.com

Contacts:

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It’s not new

Case study 6. Chelmer Valley Local Nature Reserve

Author: Trevor Bond

Main driver: Habitat improvement

Project stage: Completed spring 2016

Photo 1: River Chelmer, Chelmer Valley Local Nature Reserve (source: Chelmsford City Council)

Project summary:

The Chelmer Valley Local Nature Reserve (LNR) is a much loved open space situated to the north of Chelmsford city centre (Map 1). Approximately 2.5km long, the Chelmer Valley LNR consists of parkland, green spaces, unimproved grassland, ponds, wet margins, riparian woodland and the River Chelmer itself (Photo 1).

As part of this project, informal embankments created through years of dredging were lowered and the won material was used within the river to construct earth berms. This improved floodplain connectivity, created marginal habitat for plants and restricted the width of the active river channel, encouraging geomorphic processes. In addition, flood risk modelling of the scheme has shown flood risk benefits emerging from the project during particular flood frequencies.

Key facts:

Flood risk modelling indicated that the scheme would lead to a small, net decrease in lateral flood extent during both 10% and 1% annual exceedance probability (AEP) events. Modelling also suggests reduced flood depths of up to 0.3m in some locations during a 10% AEP event and reduced flood depths of 0.15m in some locations during a 1% AEP. The reduced flood risk is believed to be due to the improved connectivity between the main river channel and the floodplain, which means water evacuates onto the floodplain earlier and the flood peak is marginally reduced.

Case study 16. Belford Natural Flood Management Scheme, Northumberland

Authors: Alex Nicholson (Arup), Paul Quinn (Newcastle University), Mark Wilkinson (James Hutton Institute)

Main driver: Flood risk management – repeated flooding in the community of Belford

Project stage: Completed 2015

Photo 1: Belford Natural Flood Management project with pictures of some of its interventions (source: Newcastle University)

Project summary:

The Belford Burn is a small stream that runs through the centre of Belford village, hard up against garden boundaries and walls. The 6km² catchment is predominantly rural upstream of the village and is privately owned by 3 main landowners. Prior to the scheme, the burn presented a risk of flooding to 54 properties and a caravan park from a 1 in 100 year event. However, 25 properties were at risk from a 1 in 2 year event.

Belford village flooded 10 times between 1997 and 2007. The flood in 1997, which inundated the East Coast mainline railway, is estimated to have a return period of between 10 and 20 years. Traditional flood defences were not adopted owing to a lack of space between properties and the watercourse, and an unfavourable cost–benefit assessment at the project appraisal phase.

Case study 11. Low Stanger Floodplain Reconnection Project

Author: Ian Creighton

Main driver: Flood alleviation

Project stage: Completed 2015

Photo 1: Downstream breach, Low Stranger Farm (source: West Cumbria Rivers Trust)

Project summary:

There have been significant flooding issues in the town of Cockermouth in recent years. A new flood defence scheme was constructed in 2014, which was overtopped by Storm Desmond in December 2015. There is no single solution and it will need multiple and varied solutions working with landowners to help flatten the flood peak in order to reduce future flood risk. At Low Stanger Farm (see Map 1), the existing flood embankment was breached along 4 sections to increase flood storage when the River Cocker is out of channel (Photo 1).

Key fact:

Survived Storm Desmond intact! An additional flood storage area of 5ha was created.

Case study 17. Blackbrook Slow the Flow, St Helens

Authors: Mike Norbury, Rick Rogers, David Brown

Main driver: Flood risk management – repeated flooding in the Blackbrook area of St Helens (October 2000, September 2012 and 26 December 2016)

Project stage: Seeking funding opportunities to implement a catchment-scale Natural Flood Management Plan

Photo1: Engineered dam 2 – attenuation and suspended sediment settlement during flood flows

Project summary:

Blackbrook in St Helens, Merseyside, experiences repeat flooding from a combination of main river and surface water sources. There are 18 properties at flood risk, 3 of which are businesses; a major truck A-road is also at risk. The current flood risk is high.

Blackbrook has a 5% chance of flooding in any given year and sits in a low-lying bowl at the confluence of 5 rapid response catchments whose upstream area is 21km². The property level protection put in place has had limited success, partly due to a failure in its operation at the time of the last flood (26 December 2016). Flooding also occurred on 28–29 October 2000 and 24–26 September 2012.

Capital solutions to reduce the flood risk are prohibitively expensive, as culvert enlarging would be required to reduce the flow constriction. Such considerable capital interventions do not qualify for full funding under HM Treasury rules on cost–benefitratios. Significant additional funding would therefore be required.

Case study 47. North Norfolk Coast

Authors: Sue Rees and Oli Burns

Main driver: Habitat creation, improved and more sustainable defences

Project stage: Constructed – several schemes in different years: Brancaster 2002; Holme Dunes 2004; River Glaven 2006; Cley to Salthouse 2007; Titchwell RSPB 2011 (Photo 1); Blakeney Freshes 2014

Photo 1. Titchwell (source: Mike Page RSPB)

Case study 50. Medmerry Managed Realignment

Author: Robert Harvey

Main driver: Improved defences and habitat creation

Project stage: Completed 2013

Photo 1: Medmerry managed coastal realignment site, 10 October 2013 (source: © Environment Agency and John Akerman ABPmer)

Project summary:

The Medmerry Managed Realignment scheme in West Sussex (Photo 1) was identified in the Pagham to East Head Coastal Strategy (2009). The project came about through a combination of the need to improve flood risk management and the requirement of the Environment Agency's Regional Habitat Creation Programme to create intertidal habitat. The Environment Agency purchased most of the land required for the project and constructed 6.2km of new retreated sea defences, tied into the existing shoreline with rock revetments. Additional land was contributed by RSPB.

The project provides a 1 in 100 year standard of defence in year 100 (increased from 1 in 1 year standard prior to implementation) to 348 properties, the road serving Selsey and a waste water treatment works. It has created 183ha of intertidal habitat and 80ha of transitional grassland. Mitigation was also provided for 50ha of freshwater Site of Special Scientific Interest (SSSI) within and around the realignment area. The project has increased recreation and tourism, creating new amenity and providing both new and replacement footpaths, cycleways and bridleways. Most of the land within the project area has been leased by the Environment Agency to RSPB for management as a nature reserve.

https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk

We know

It’s not new

It works

Typically reduces flood risk for smaller floods in small to medium sized catchment

Small catchment	~ 10km2
Medium catchment	~ 100km2
Large catchment	~ 1,000km2
Local scale impact	Impact not catchment wide, it is localised to where the measure has been implemented

Small flood	<10 year return period events
Medium flood	From 10 year to 100 year return period events
Large flood	>100 year return period events

It complements rather than replaces traditional engineering

It almost always achieves multiple benefits for people and wildlife

We don’t know

How effective NFM is in pumped catchments – would there be a demonstrable flood risk benefit?

What NFM looks like in a pumped catchment?

Which measures are applicable?

Can NFM help enhance longevity of existing FCRM infrastructure/assets?

Can NFM help reduce need for dredging/desilting?

Can NFM help us reduce reliance on pumps and save carbon?

Are other countries already doing this?

Who can we learn from?

Practical Challenges

- River corridors in pumped catchments can be quite constrained for space
- Landowner buy-in in locations where land has a high agricultural value – payments for public goods
- Change in perception from getting water away fast to storing it and holding it back

Policy Drivers

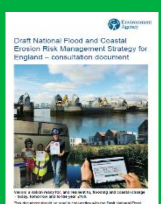
25 Year Environment Plan says:

- We will strengthen domestic carbon offset mechanisms to encourage private sector investment and develop markets for domestic carbon reduction
- We want to reduce our carbon emission by at least 80% from 1990 levels and achieve this by 2050

Climate Change Act says:
UK carbon account for the year 2050 should be at least 80% lower than the 1990 baseline

Climate Change Risk Assessment says:

- More action needed to restore carbon stores particularly peatlands
- Deliver wider uptake of NFM in high risk catchments where there are likely to be carbon storage, water quality and biodiversity benefits



National FCRM Strategy for England (DRAFT) says:
Strategic objective 1.3 - Between now and 2030 all those involved in managing water will embrace and embed adaptive approaches to enhance the resilience of our environment to future flooding and drought

UN Sustainable Development Goals says:

- Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy
- Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss