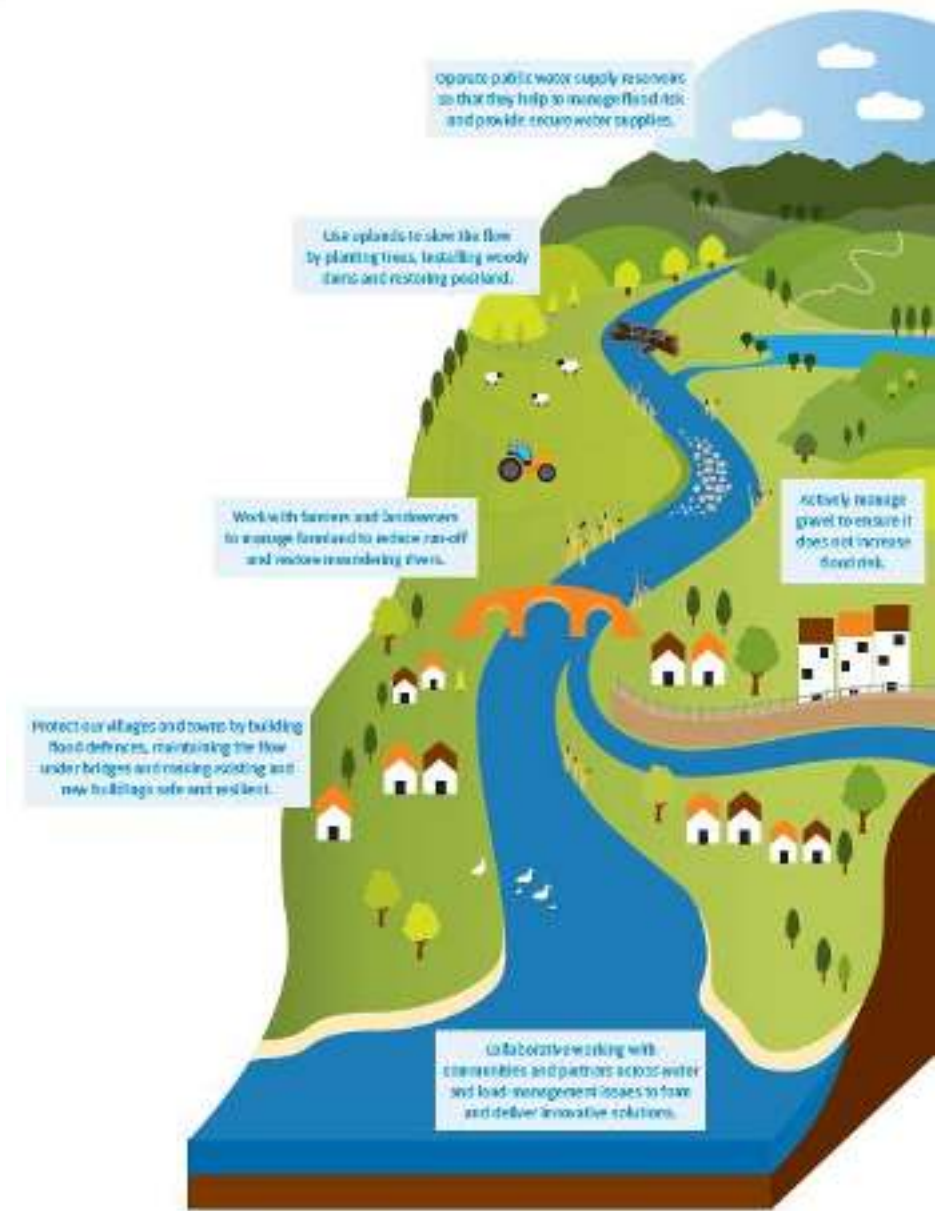


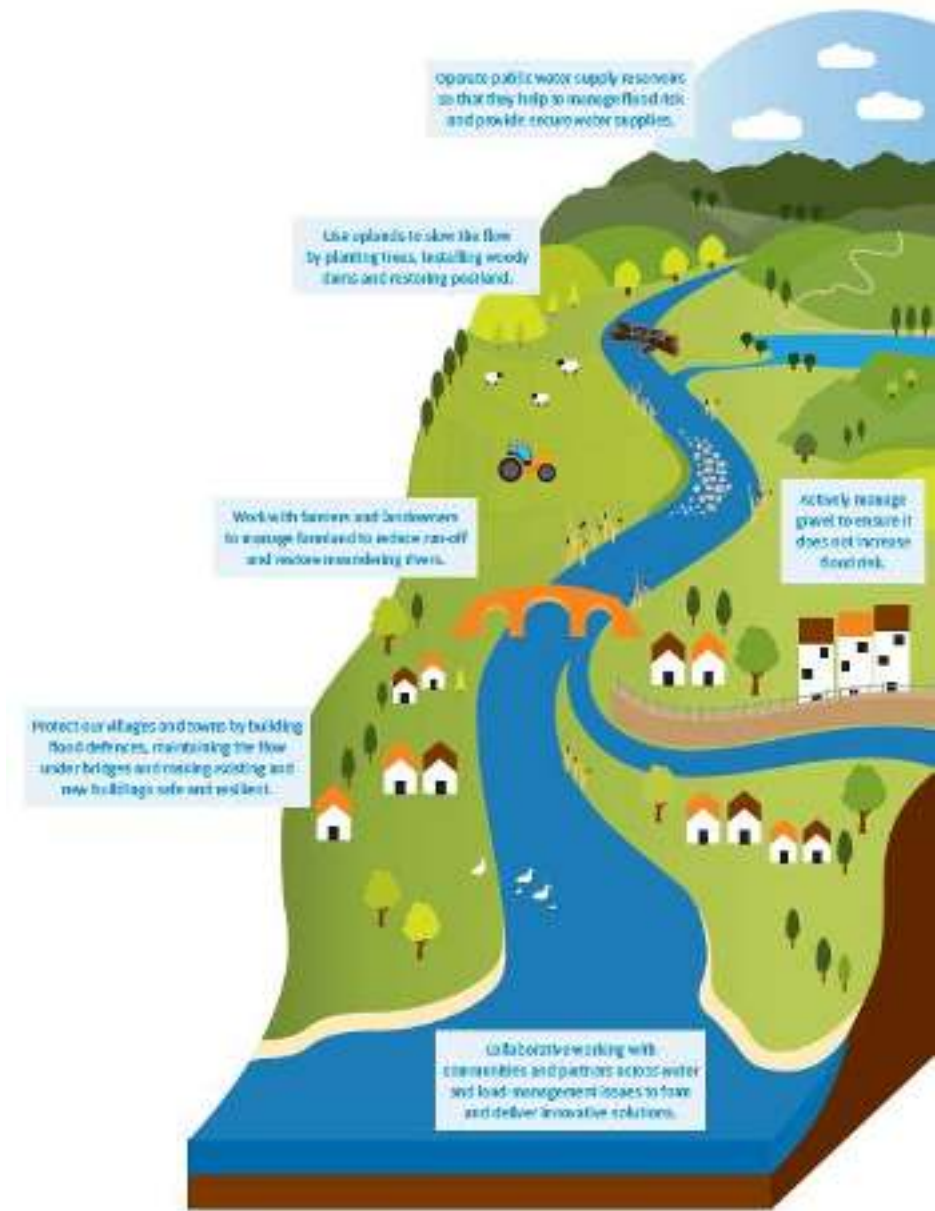
Creating Flood Resilient Catchments

Tom Dauben
Flood & Coastal Risk Management Senior
Advisor
9th July 2021



Content

- Language
- Overview of the approach (film)
- Developing the science
- Why use these techniques?
- Downsides?
- Local case study (Dartmoor)
- Fitting it in to other solutions
- What can you do?
- Discussion



Language

“...taking action to manage flood and coastal erosion risk by protecting, restoring and emulating the natural regulating function of catchments, rivers, floodplains and coasts”

Upland Management ?
Catchment Management?
Catchment Based Approach?
Working with Natural Processes?
Natural Flood Management?
Environmental Land Management?
Natural & nature based features(USA)?
Natural water retention measures (EU)?

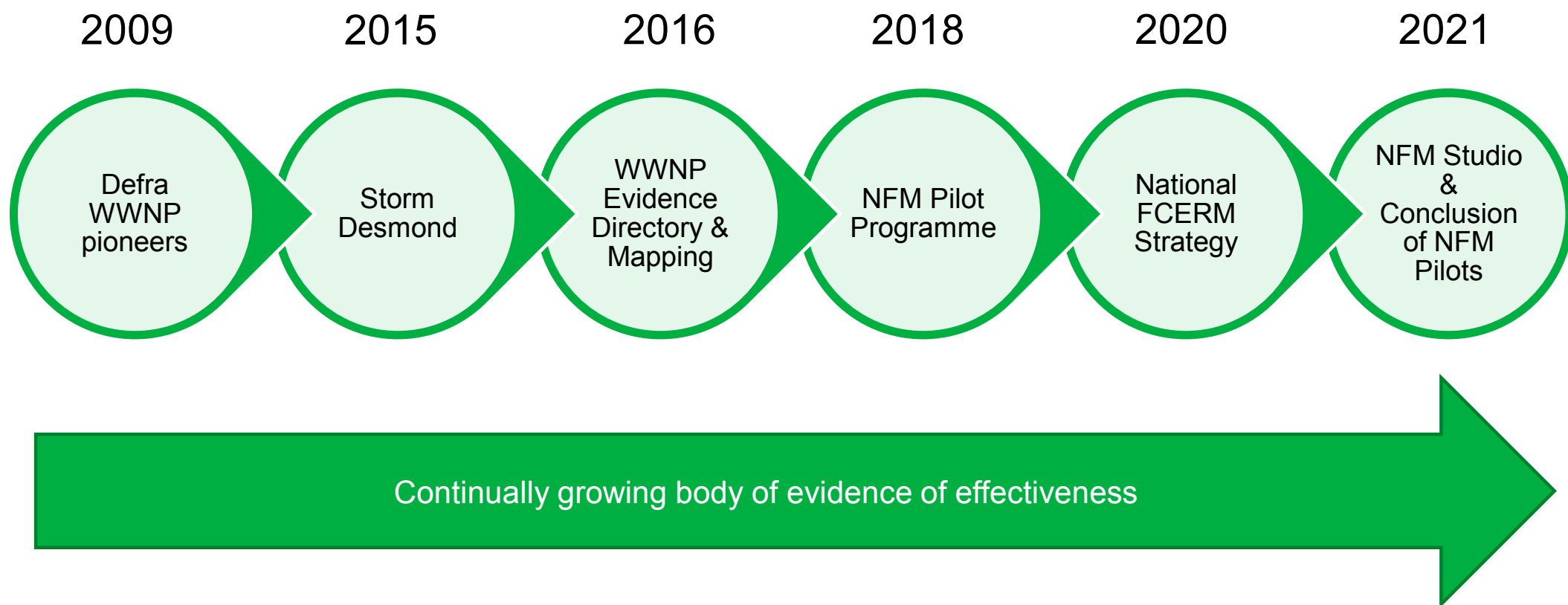
Language



Overview of the approach



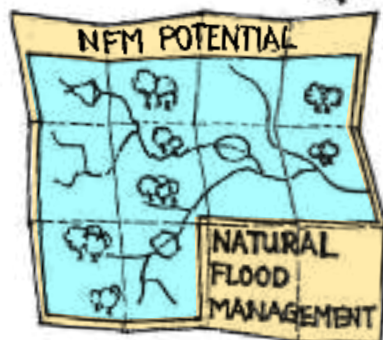
Developing the science



Evidence directory overview



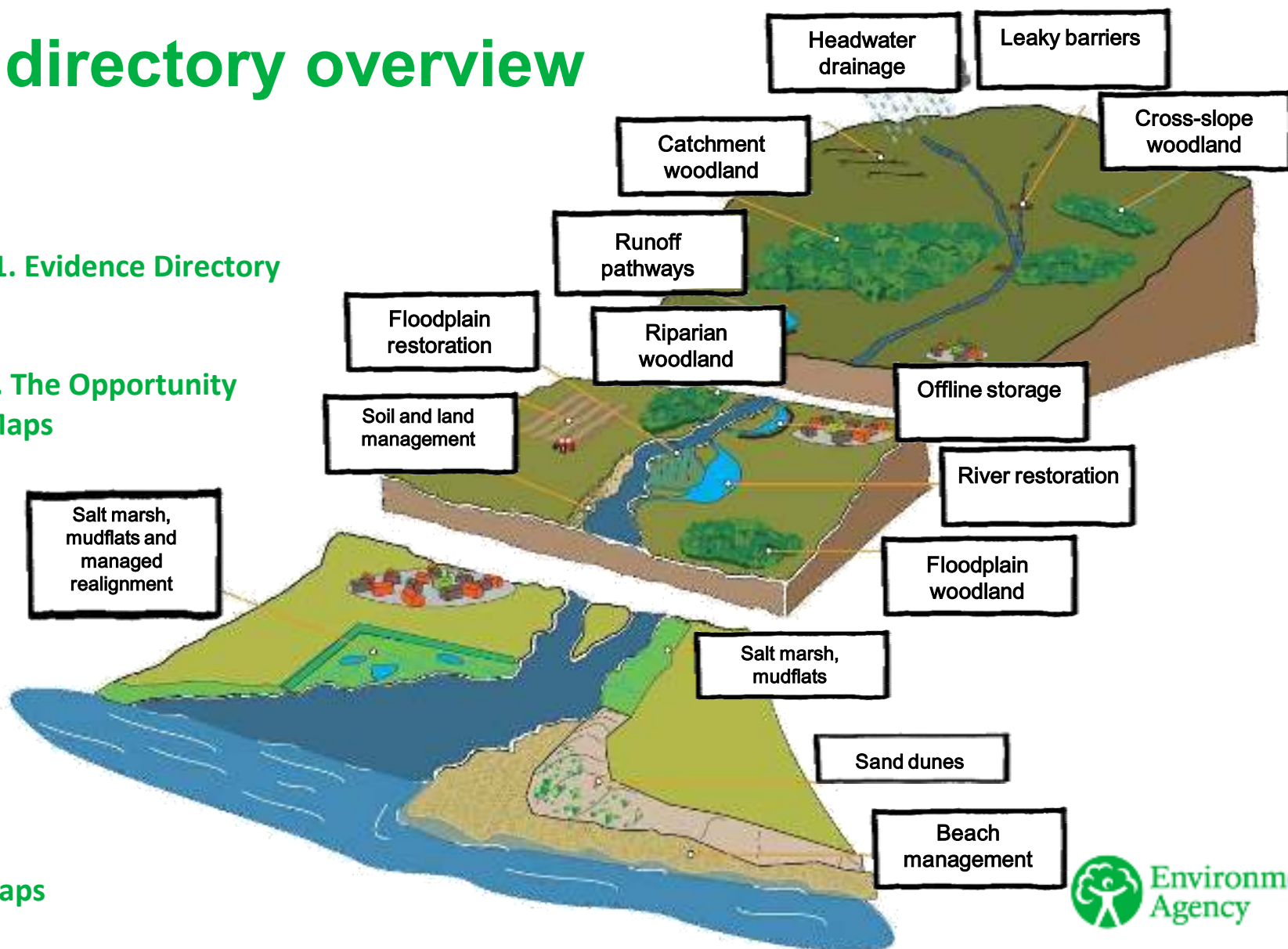
1. Evidence Directory



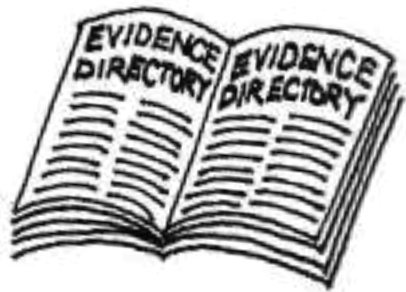
2. The Opportunity Maps



3. The Evidence Gaps



Evidence directory overview



1. Evidence Directory

- Summary
- Key facts
- Contact details
- Hydrology
- Catchment context
- Design rationale
- Effectiveness
- Construction methods
- Funding
- **Multiple benefits**
- Maintenance
- Lessons learnt
- References

Case study 27. Investigating the impacts of Upland Land Use Management on Flood Risk at Pontbren, Wales

Author: Tom Hildes

Main driver: Flood risk management

Project stage: Multi-scale experimental and modelling project



Photo 1.4 View of the Pontbren catchment (Source: Forest Research)

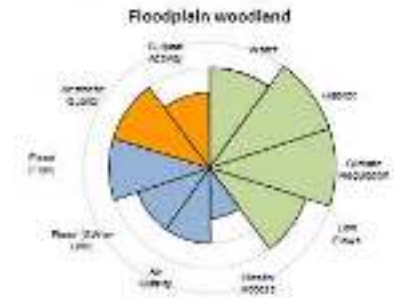
Project summary:

The Pontbren research project on the Pontbren catchment in north Wales (Photo 1.4) aims to improve understanding of the changes in upland land management impact on flood risk at the catchment scale. Experimental plots were established to measure the effects of various grazing and tree planting on soil structure and the generation of flood runoff. The data from these plots were used to derive parameter values and empirical formulae for a rainfall-runoff modelling methodology. The model was applied to the Pontbren catchment to predict the impact of afforestation and also to assess on flood flows. Results showed that land management can have a major effect on flood peaks, peaking times and flood volumes, and that afforestation can significantly reduce flood risk. Forest can help to reduce flood risk.

3.4.3 Multiple benefits

The benefits wheel shows that floodplain woodlands benefit all ecosystem services.

Multiple benefits of floodplain woodland



Multiple benefits summary

Environmental benefits

Water quality

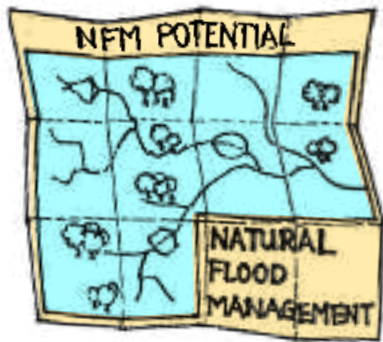
Floodplain woodland reduces diffuse pollution by enhancing sediment deposition (Jedrej et al. 2005), removing phosphorus and nitrates, and using bankside vegetation (Burdock 1999). Environment Agency (1999) measured reductions in sediment and nitrate concentrations in water flowing through the riparian forest.

Habitat provision

Wild woodlands are listed as a priority habitat in both the NERC Act and the EU Habitats Directive. Riparian forests have high biological diversity, high productivity and high habitat dynamism (Gill et al. 2003). Features created by woodland such as woody debris, bank stabilisation, braided channels and linear connectivity enhance the biodiversity of floodplains (Philly and Dobson 2004). They support a range of

35. Riparian Forest Initiative - East Sussex
Project stage: In progress (2010 onwards)
WYMF measures: Floodplain woodland, hedgerows, shelter belts, flood storage ponds, wetland areas, woodland creation
Cost: £220,000
Key facts: This project has planted over 20,000 trees incorporating 5km of new woodland and over 5km of new hedgerows, all designed to slow the passage of water, and absorb any river discharge. It is to help the watercourse adapt to the impacts of climate change.

Evidence Directory NFM Potential Maps



2. The Opportunity Maps



**Runoff
attenuation
+ Gully
blocking**

Riparian Woodland

Floodplain Woodland

Catchment Woodland



Floodplain reconnection

Evidence Directory NFM Potential Maps



3. The Evidence Gaps

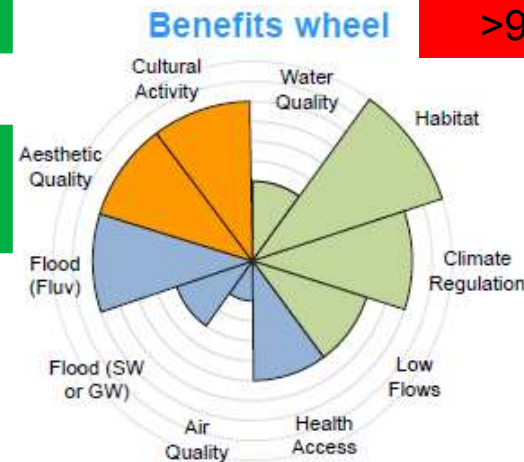
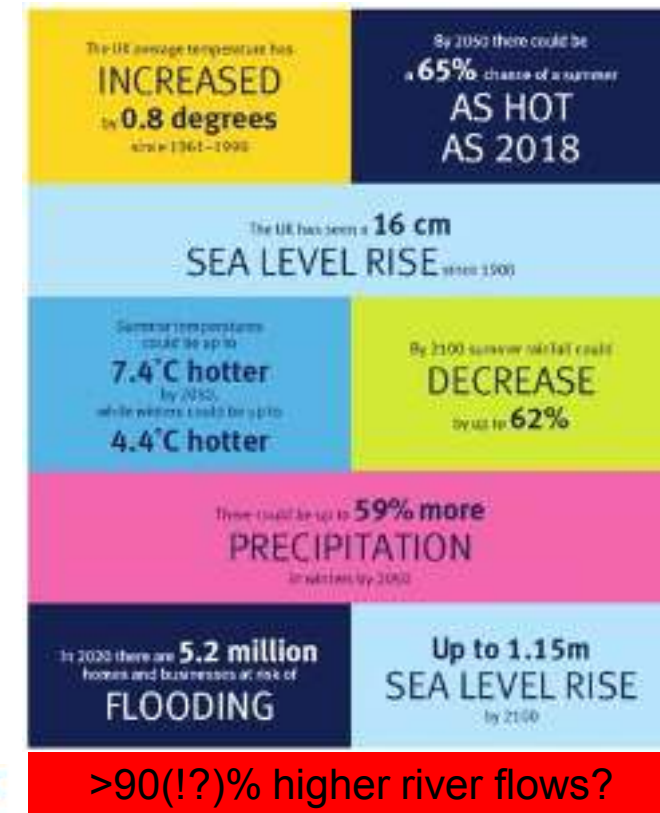
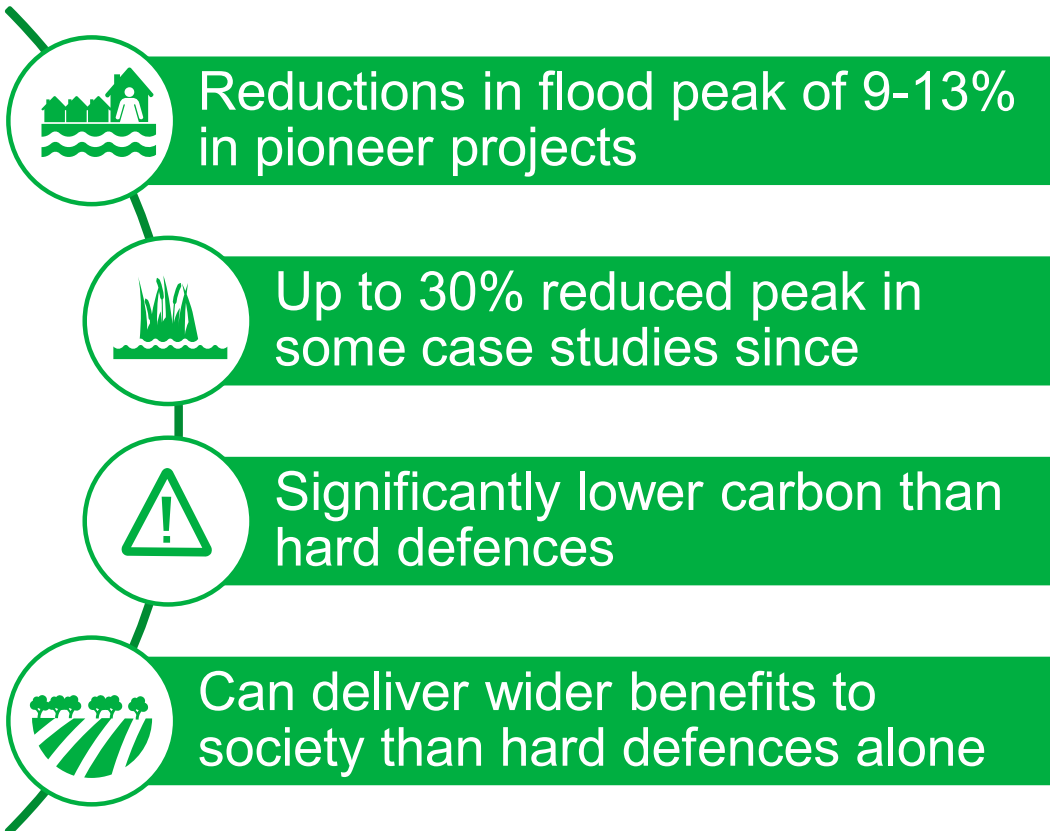
Maintenance requirements

M

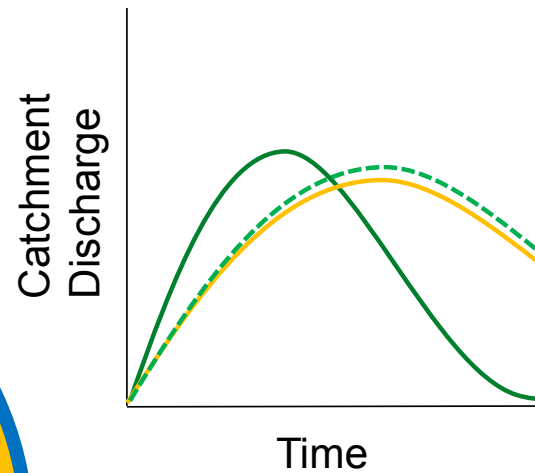
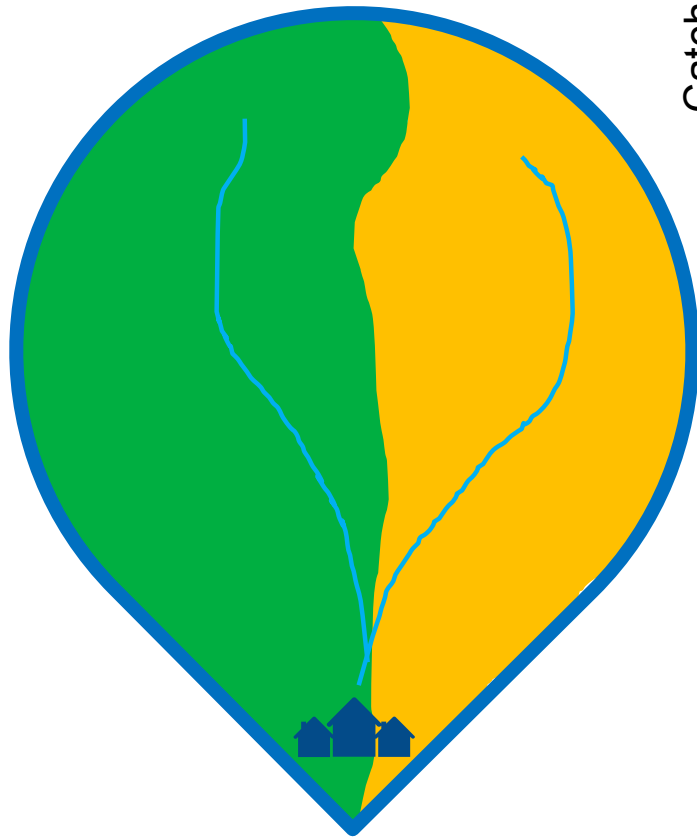
Summary of the literature

- Leaky barriers may need maintenance if there is insufficient natural wood supply, or if sedimentation occurs upstream of the barrier.
- Naturally occurring wood in rivers can have a number of benefits and in most cases should be left in the channel.
- Engineered leaky barriers – and to an extent naturally occurring wood in rivers – can be complex to manage because:
 - the wood will decay in the long term
 - wood structures may induce sediment erosion and deposition, and so engineered leaky barriers need to be placed where these processes will not create problems
 - they could have an impact on migratory fish (see Dodd et al. 2016)
- Leaky barriers should be inspected frequently and after flood events (Quinn et al. 2013, Dodd et al. 2016) to check for:

Why use these techniques?



Downsides?



Peak
synchronicity

Scale, scale,
scale

Agricultural
payments
changes

Works
negotiated by
agreement

Natural Flood Management Pilot Programme



Reduce flood risk, or coastal erosion, to homes

Improve habitats and increase biodiversity

Contribute to R&D to fill NFM knowledge gaps

Support, and develop, partnerships with communities

Catchment Programme

Dartmoor Headwaters £1.2m

Marine Pioneer Intertidal £100k

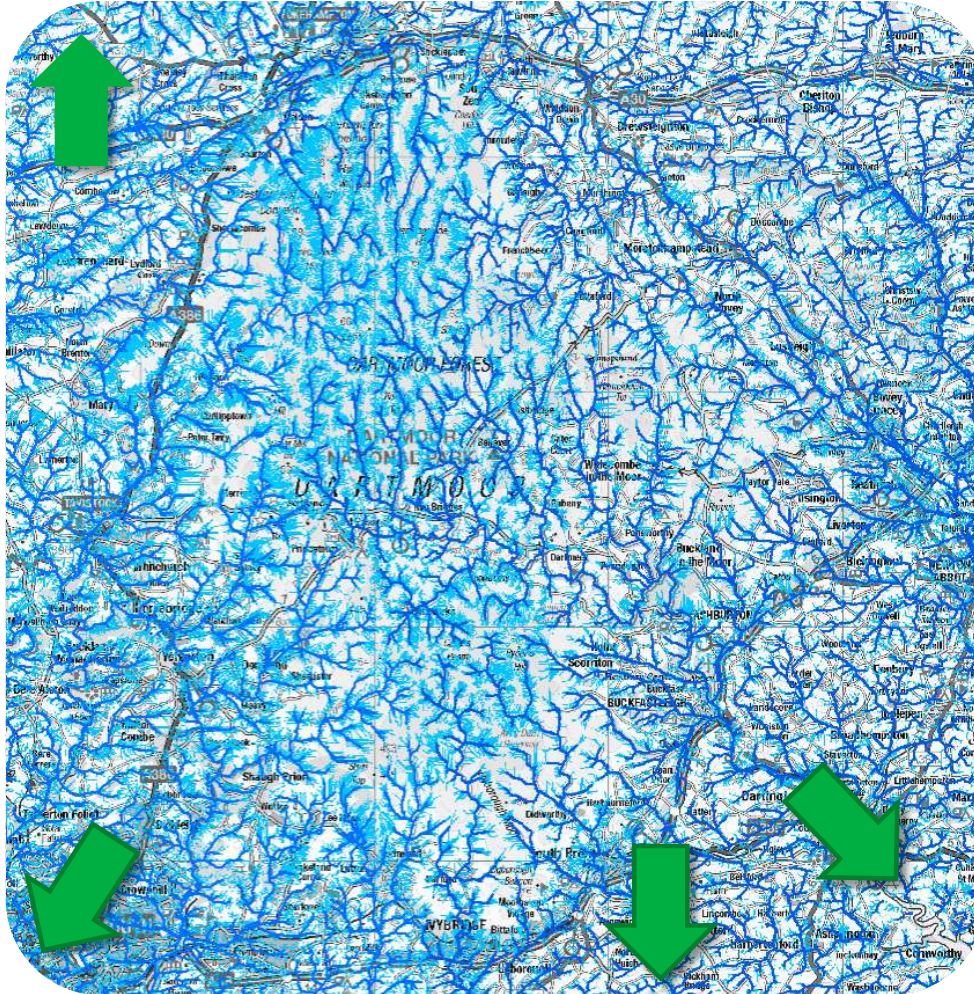
Community Programme

Ottery St Mary £165k

Kenwith £110k

Dartmoor Headwaters Pilot

Barnstaple



Plymouth

Totnes

Logged events causing property flooding on Dartmoor by year:

1638, 1784, 1823, 1826 x2, 1838, 1839, 1840, 1841, 1844, 1845, 1846, 1848 x3, 1855, 1858, 1859 x4, 1866 x2, 1867, 1869, 1872, 1873, 1878, 1880, 1883, 1890, 1892, 1893, 1894 x3, 1898, 1900 x2, 1900 x2, 1905 x3, 1909, 1910, 1912, 1915 x3, 1917, 1922, 1923 x2, 1925, 1927 x3, 1929 x4, 1930, 1931 x2, 1932 x2, 1933, 1934, 1935, 1938 x3, 1939 x2, 1940, 1944, 1946 x3, 1949, 1954 x2, 1958, 1959 x2, 1960 x3, 1962, 1963, 1965, 1967, 1968, 1970 x2, 1971 x3, 1972 x3, 1973, 1974 x5, 1975 x2, 1978 x2, 1979 x5, 1980, 1981 x4, 1982, 1983 x2, 1984 x2, 1986 x3, 1987, 1989 x3, 1990, 1991 x2, 1992 x6, 1993 x2, 1994 x4, 1995 x5, 1996 x6, 1997, 1998, 1999 x6, 2000 x6, 2001, 2002 x3, 2004 x2, 2005 x4, 2006 x3, 2007 x3, 2008 x4, 2009, 2010, 2012 x12, 2013 x8, 2014 x5, 2015 x3, 2016 x3, 2017 x2, 2020

Newton Abbot

Dartmoor Headwaters Pilot



NFM Pilot Programme Outcomes



15,000
homes*



£15 million
government
funding



£6 million
contribution



2 lessons
learnt reports



85
partners



610 km
river
improved



takes time



gov.uk
page



working
together



4000 ha
habitat
improved

Fitting into other solutions

Blog

Creating a better place

Organisations: Environment Agency

Engineers and the Environment – natural allies in our fight for a more flood resilient nation

John Curtin, 10 April 2018 • Climate change, Flood

What is new is a better understanding of how we can work collaboratively to bring all of these elements of flood management together. Too often the conversation has been about a false choice between hard or soft engineering – as if there is a conflict or competition between them. The approach we need is one where these elements complement each other - one where we work more closely with place builders, infrastructure providers and of course communities to achieve this.

Time to deploy
PFR
measures

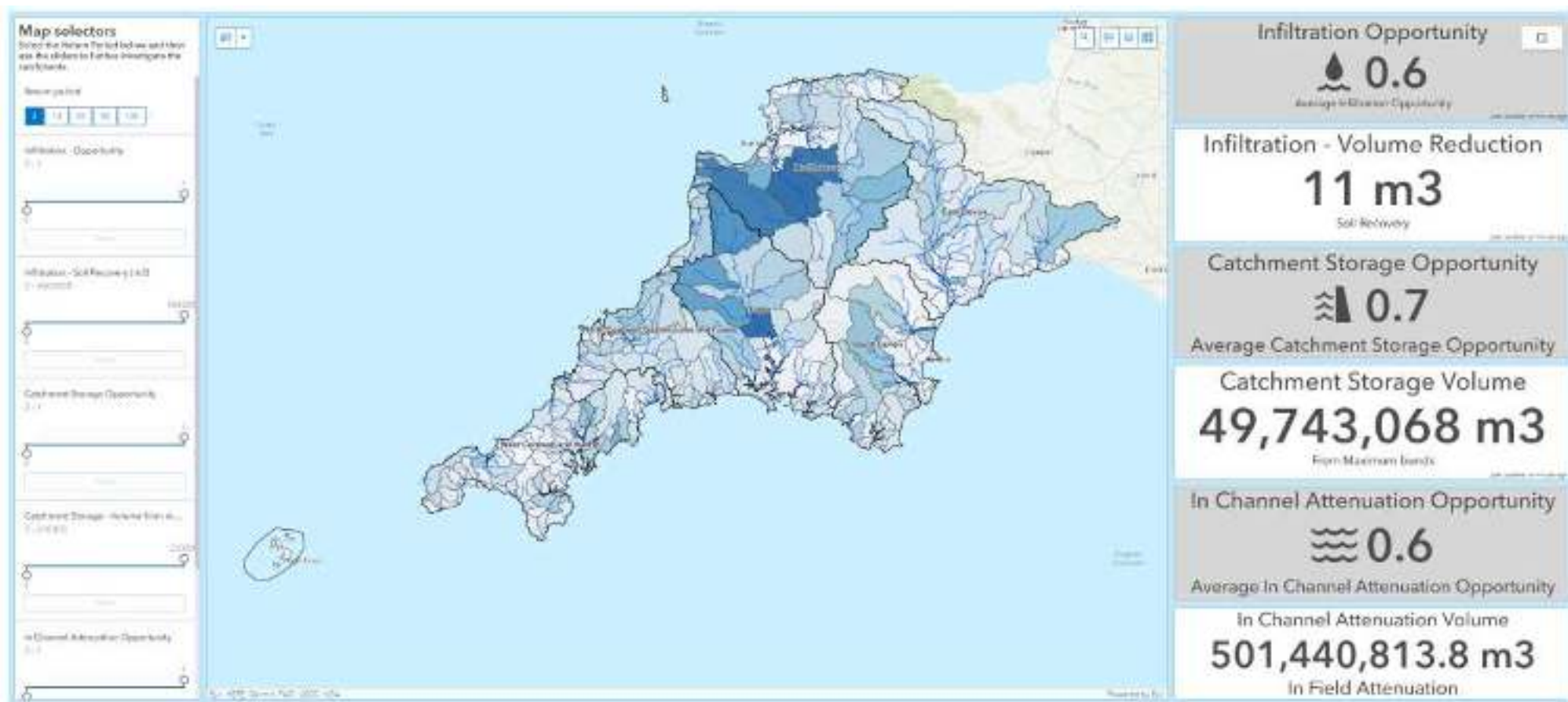
Prolong life of
existing
defences

Reduce need
for works in-
town

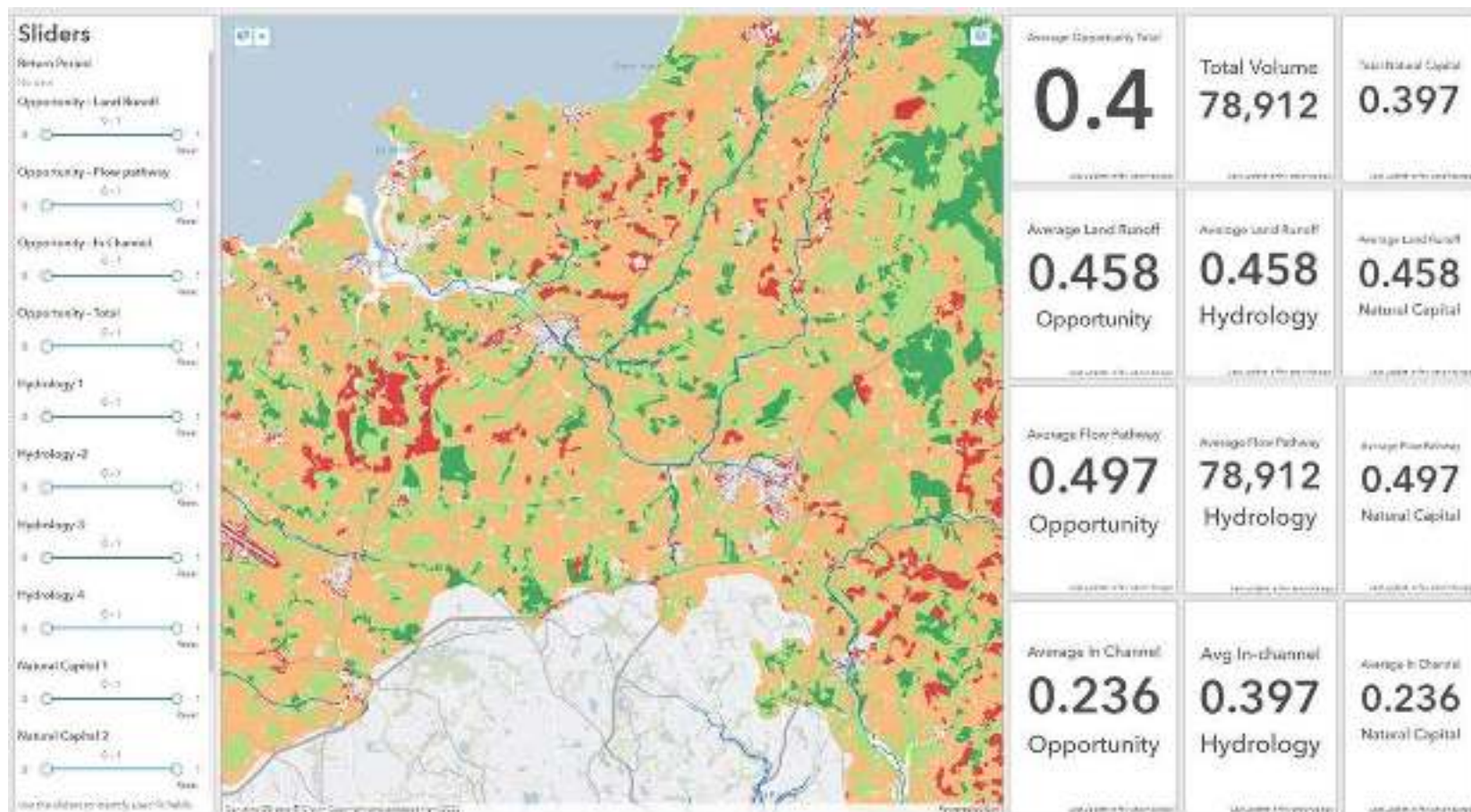
Align with farm
business
models

Delivery
through non-
flood initiatives

Fitting into other solutions – where?



Fitting into other solutions – what?



NFM Strategic Group



What can you do?

DEVON CLIMATE DECLARATION

On the 22nd May 2018, members of the Devon Climate Emergency Response Group endorsed the underlying principles of the Devon Climate Declaration.



What can you do?



Engagement

Help seek funding



Volunteer to help deliver

Help
design &
decide
solutions

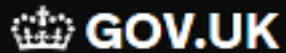


Take on a formal role?

Maintenance Task	Landowner	Community Group	Environmental NGO	Other	N/A
Inspection	45%	20%	28%	8%	0%
Repair	42%	15%	25%	17%	2%
Replacement	39%	11%	26%	15%	9%

What's in it for you?

Information for community groups



Search on GOV.UK



Departments Worldwide How government works Get involved
Consultations Statistics News and communications

→ [Coronavirus \(COVID-19\)](#) | Rules, guidance and support

[Home](#) > [Environment](#) > [River maintenance, flooding and coastal erosion](#)

Guidance

Use nature-based solutions to reduce flooding in your area

Find out how you can use natural options to reduce flooding in your area, who to contact for advice, and if you can get funding.

Contents

- [Examples of nature-based solutions](#)
- [Benefits of nature-based solutions](#)
- [Who to contact to get started](#)
- [Get permission for works](#)
- [Manage your nature-based solution](#)
- [Apply for funding](#)

<https://www.gov.uk/guidance/use-nature-based-solutions-to-reduce-flooding-in-your-area>

Questions?

“ To continue to focus only on traditional approaches to flood risk management, such as flood walls, will not be sustainable and therefore our approach to managing flood risk has to change. It needs to be more integrated, managing land and water throughout the river system...” ”

SEPA 2016

tom.dauben@environment-agency.gov.uk

