Natural Flood Management

Policy Position Statement

CIWEM Chartered Institution of Water and Environmental Management

Flooding can have devastating impacts and, with Met Office climate change predictions of heavier winter rainfall and less but more extreme summer rainfall, the risk of flooding is increasing. A range of approaches and measures are necessary to manage flood risk, including avoiding development of high-risk areas, property flood resilience, hard engineered flood defences and natural flood management (NFM).

This policy position statement sets out CIWEM's stance on the deployment of NFM – also known as 'working with natural processes' – in the UK. It presents the case for NFM and the potential barriers for implementation, and the steps needed to deliver widescale benefits to nature in light of recent legislation.

Streambank and floodplain restoration to slow the flow and reduce erosion and flooding

CIWEM is the leading independent Chartered professional body for water and environmental professionals, promoting excellence within the sector.

Contents

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Note: CIWEM Policy Position Statements (PPS) represent the Institution's views on issues at a point in time. It is accepted that situations change as research provides new evidence. It should be understood, therefore, that CIWEM PPSs are under constant review and that previously held views may alter and lead to revised PPSs. PPSs are produced as a consensus report and do not represent the view of individual members of CIWEM.

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Summary of CIWEM's policy position

NFM techniques should be deployed wherever appropriate, and alongside hard engineering solutions where needed, to deliver flood resilience alongside environmental co-benefits which help to address the climate and ecological emergencies.

To ensure that NFM can be used to its full potential, CIWEM calls for:

- NFM to be supported through the Environmental Land Management schemes, in addition to through other more established funding routes for flood and coastal erosion risk management (e.g. flood defence grant-in-aid) in order to enhance the water-carrying capacity particularly (but not exclusively) of upper river catchments and helping to 'slow the flow'.
- More research on the effectiveness of NFM approaches in contributing to flood risk management when implemented in large numbers across large catchments (over 100km2) and in extreme weather events.
- Organisations involved with coordination and delivery of schemes across catchments to reflect sector good practice on NFM, as set out in the CIRIA Natural Flood Management Manual. This provides guidance on problem identification through conception, funding, design, construction, inspection, maintenance, adaptive management to end-of-life considerations.
- Research into liability-sharing mechanisms whereby a proportion of liability relating to performance and potential failure is underwritten by third parties or shared among a wider set of stakeholders. Many NFM schemes will be delivered by local community and land management groups in a small-scale and distributed way. Such groups will not have the capacity to carry out detailed assessment of the broader implications of their individual interventions despite their reflecting good and beneficial land management practice.
- Research into long-term management agreement formats which will help to ensure that NFM interventions are maintained such that their beneficial functionality to downstream communities endures.
- Remapping of NFM opportunities to take into account changes in the policy context including the introduction of a Nature Recovery Network, Local Nature Recovery Strategies, and the Nature Recovery Action Plan for Wales.
- A clear assessment of the benefits of different NFM approaches for flood risk reduction, water quality and biodiversity metrics and integrated water management.

Context

NFM has been described as "an approach to managing flood risk that aims to create, restore or alter landscape features to reduce flooding"[1].

NFM can be categorised into the following:

1. Large-scale land-use changes, which can be sub-categorised into those requiring engineering solutions and not, to create large-scale storage or reduce erosion;
2. Small-scale topography changes to slow water flows, and
3. Changes to farming practices to increase infiltration and reduce erosion.

NFM measures increase infiltration of water into the ground and slow and store water entering water courses, reducing the peak flows that cause flooding. Interventions are diverse and include upland peat restoration and woodland creation, soil aeration, leaky barriers and dams, offline storage ponds and channel restoration.

These interventions can deliver an equally wide range of benefits, from the primary intention of water infiltration and attenuation, to improved water quality, increased habitat diversity and species richness, and carbon sequestration.

In contrast to large traditional engineering solutions, NFM approaches often require multiple interventions distributed throughout a catchment to achieve the desired level of performance downstream. For this reason, NFM projects require collaboration from multiple stakeholders including communities and landowners, in potentially greater numbers than those required for more conventional approaches.

NFM approaches have been identified as an important flood mitigation strategy in both the 2018 National Infrastructure Assessment, the National Flood and Coastal Erosion Risk Management Strategy for England, and the National Strategy for Flood and Coastal Erosion Risk Management in Wales, both published in 2020. Some NFM approaches are long-established, however the evidence base is still being developed which can limit willingness to use NFM techniques, particularly where funding requirements demand extensive evidence on performance to unlock the resource to deliver schemes.

In 2017, a joint team from Defra, the Environment Agency, Welsh Government and Natural Resources Wales produced an evidence directory on natural flood management which drew together findings from a literature review and more than 60 case studies.

As part of this project, they also published a summary of 14 NFM measures including floodplain restoration, woodland in different settings, and soil and land management. Overarching findings from the project were that NFM:

- is best suited to smaller magnitude floods in small to medium catchments
- complements rather than replaces traditional engineering solutions

[1] Parliamentary Office of Science and Technology. Research Briefing: Natural mitigation of flood risk. May 2020

- achieves multiple environmental benefits, such as carbon storage, biodiversity enhancement and water quality improvements.

Areas for further research were identified as:

- design standards
- the role of NFM in climate change adaptation, and
- ecosystem service benefits.

In 2018, expanding NFM was set out as one of the ambitions of the 25-year environment plan and allocated £15m funding up to 2021 for 60 projects through the Natural Flood Management Programme, the initial findings of which were published in 2021. The Natural Environment Research Council (NERC) has been using information from these projects, as well as three of their own, to improve NFM understanding in research published in Summer 2022.

In addition to Environment Agency data there are a number of other organisations working to make information and evidence available, for example Slow The Flow. CIRIA's Natural Flood Management Manual (2022), as well as detailing good delivery practice, also provides guidance on collaborative delivery and the role of local communities, landowners, regulators, utility companies and local authorities within this.

To provide the greatest environmental benefits from NFM there is a need for joined-up delivery across a range of mechanisms and parties, including new environmental land management schemes, the statutory flood and coastal erosion risk management risk management authorities and the land-use planning system. Mechanisms including local nature recovery strategies and biodiversity net gain offer potentially complementary ways to drive forward NFM interventions which also achieve strong wider benefits for biodiversity, linking together improved flood resilience for new developments with wider environmental ambition.

Native tree-planting

Discussion

Strengths and weaknesses

The main strengths of natural flood management are that it is typically cheaper to deliver than hard-engineered measures, is low in embodied carbon, provides environmental co-benefits and contributes to climate adaptation. NFM can complement existing hard-engineered solutions and mitigate the need for them to be expanded in future.

NFM also has weaknesses that need to be managed; the main one being that there is less certainty in their effectiveness and performance than hard engineering. NFM effectiveness is reliant on a cumulative effect across the catchment which depends on correct placement, construction, and maintenance of measures. Measures which include planting, such as upland woodland creation, will also take time to mature, with their performance not reaching its full potential for many years.

This variability makes modelling and understanding actual performance complex. Both modelling and local knowledge must be considered when designing NFM schemes to ensure that they act to decrease flood risk. It is also important for projects to embrace adaptive management of NFM to help combat uncertainty.

Currently there is a lack of evidence surrounding the effectiveness of NFM solutions over large catchments of over 100km2, as collecting observational evidence over large areas presents challenges, and in extreme events, because they are infrequent. CIWEM calls for more research in these areas if NFM solutions are to be used to their full potential.

More broadly however, good land management approaches such as upper catchment woodland creation, soil aeration and channel restoration can achieve benefits as part of improved catchment management practice driven by mechanisms such as ELMs without the need for extensive modelling and monitoring.

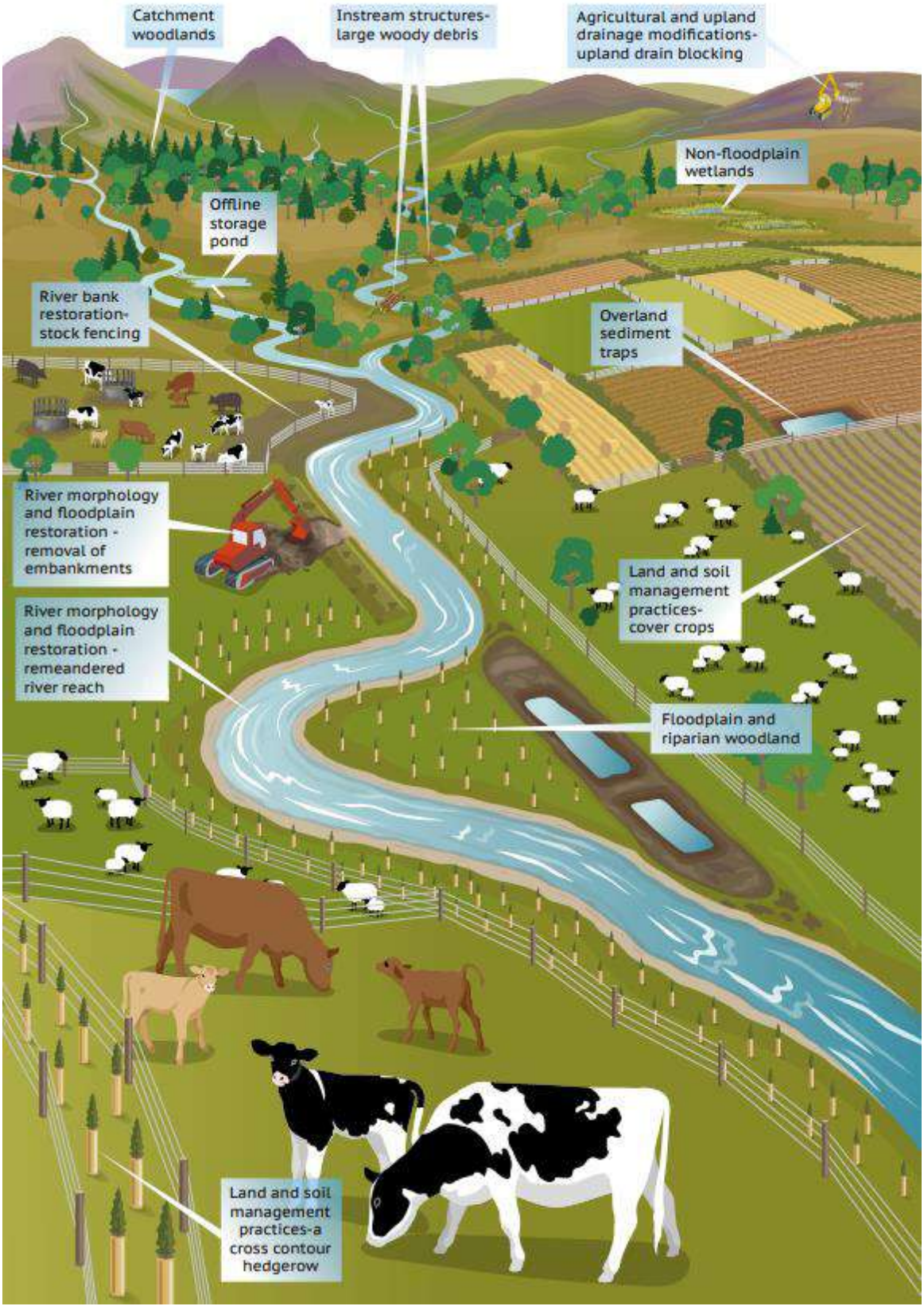
Installing the right solutions in the right places

To gain most benefit from NFM installations its important the right measures are installed in the right place, identified as part of a flood risk management plan, and that wherever possible they link with wider initiatives for environmental and ecological benefit. Under Welsh legislation, NFM must be designed for enhanced ecosystem resilience and the benefit of society overall.

As part of the multi-agency NFM evidence directory project, the Environment Agency and Natural Resources Wales carried out a strategic mapping exercise for NFM in 2017. The open data maps identify potential areas for floodplain reconnection, run-off attenuation feature and gully blocking and woodland planting.

Since 2017, tree planting targets have been set as part of the England Trees Action Plan 2021, a nature recovery network in England has been announced and the Nature Recovery Action Plan for Wales published. There may also be relevant local changes, for example there are currently five Local Nature Recovery Strategy pilots.

CIWEM therefore calls for remapping of NFM opportunities to take into account changes in the policy context including the introduction of a Nature Recovery Network.



Source: Scottish Environment Protection Agency. Natural Flood Management Handbook, 2015.

Implementation challenges

Challenges in implementing NFM solutions include time to mature (where schemes include woodland planting), administrative barriers, feature maintenance, liability and, perhaps as a result of some of these uncertainties, landowner engagement.

Benefits assessment

The contribution of NFM interventions to ecology and habitat resilience are multifaceted - for example, aside from flood resilience, NFM features that retain not only flood water, will increase moisture level in temporary channels and surrounding substrate, thus supporting species locally. Soil aeration not only reduces flood peak through improved water storage but also improves grass production.

There needs to be a clearer benefits assessment of NFM, which encompasses more widely the benefits beyond flood risk, water quality and nature recovery, and towards the benefit of water management more holistically. This should be aimed at farmers, landowners, local community groups, water companies, nature reserves and other managing organisations. This would enable bolder approaches to NFM, and make it easier to access funding.

Administrative barriers

The relative lack of certainty in modelling compared to hard engineering solutions means there can be difficulty in successfully bidding for funding. Much of the work in implementing NFM solutions is going to be done by local community and land management groups, which may not be able to carry out the broader assessment of the implications of their individual interventions, and therefore have limited access to funding.

Additionally, NFM projects require collaboration from multiple stakeholders including communities and landowners. This can be one of the barriers to NFM as it adds complexity to scheme development.

CIWEM calls for one organisation to take on the role of coordinating action within catchments. Our report on implementation of the 25-year environment plan suggests that Catchment Based Approach (CaBA) could be appropriate, if properly funded.

Feature maintenance

Long term feature maintenance is vital for the success of NFM installations, and there is much adaptive management and maintenance required. Therefore, funding routes for OpEx work required beyond any initial CapEx must clearly be identified at the outset of any scheme development.

Currently, only beach management schemes are eligible for inclusion of maintenance costs within an FDGiA grant application. If NFM is going to be widely adopted, they should be treated in a similar manner.

CIWEM believes that research into long term management agreement formats must be undertaken, to understand the extent of issue, the potential impacts, how they should be best implemented, and who is ultimately responsible for them.

Liability

Liability is an aspect of NFM which is of potential significant concern to those communities and organisations delivering them – particularly when schemes are delivered outside of centrally-funded FCERM programmes.

Guidance prepared by the Catchment Based Approach notes that legal liabilities associated with NFM projects may arise in three circumstances: Where unintended damage occurs to property from NFM measures being put in place; in the event of failure of an NFM structure, and if landowner permissions are not obtained prior to construction. It also notes that responsibility in the event of a failure depends on the cause of failure and the entity responsible for that part of the installation. This might commonly be the designer, or the party responsible for maintenance (potentially a specifically appointed party or in the absence of this, the landowner who would be expected to take reasonable steps to ensure that features on their property do not pose risks to third parties).

The NFM Handbook offers advice regarding how partners in NFM schemes may manage their liabilities through well assessed and considered scheme planning and delivery.

- Research into liability sharing mechanisms whereby a proportion of liability is underwritten by third parties or shared among a wider set of stakeholders.
- liability for NFM either (a) not delivering the desired flood risk reduction or (b) failing unexpectedly. (The two are, of course, related.)

Landowner engagement

Given the catchment approach necessary for effective implementation of NFM, engagement with landowners is essential for success. However, some landowners may be reluctant to engage for several reasons that require careful consideration. These include:

- current use of the area and its economic potential. We often think of uplands with limited productivity potential when visualising NFM installations, but NFM includes large scale land use changes which could, for example, affect highly productive lowland peatland
- who owns the freehold of the land and gaining their permission for change of use
- funding of the installation and maintenance
- ownership of the installation
- timeframe of the installation. It may be intended that the feature is permanent or that it has a set lifespan. If it has a set intended lifespan, a plan for decommissioning is needed.

- landowner exposure to liability. If having a feature exposes landowners to a level of liability that outweighs the financial return they are unlikely to be willing to take on the risk. Innovation on risk sharing models is needed.
- there is also a potential cultural barrier to NFM in that some landowners' sense of identity is attached to how the land is managed and using land in a different way can alter this, which may particularly be the case if a large area is needed.

Following the UK's Exit from the European Union, agricultural support policy is now an area for each of the devolved nations to design and implement themselves. In England, the Agriculture Act 2020 allows the Secretary of State to provide financial support to those "managing land or water in a way that prevents, reduces or protects from environmental hazards". This could be implemented through the new Environmental Land Management scheme (ELMs) such as the Sustainable Farming Incentive (the Sustainable Farming Scheme in Wales) or Local Nature Recovery scheme, in a way that incentivises natural flood management installation through capital grants and maintenance through annual payments.

Historically, there has been widespread engagement with agricultural support schemes. This has especially been the case with the direct payment support provided through the Basic Payment Scheme. With direct payments being phased out over a seven-year transition period, farmers will be looking to replace this income which may lead to good participation in ELMs. This is likely to be dependent on the scheme design. In the past poor Countryside Stewardship uptake has been attributed to administrative burden.

Once the initial pilot phase has been completed, there is uncertainty about where funding for NFM is going to come from. CIWEM calls for NFM to be supported in the new Environmental Land Management schemes to not only reduce flood risk but to protect and restore the environment.

Flooding on the Somerset levels, 2014