FARMING FLOODPLAINS for the FUTURE

FINAL REPORT

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Report written and produced by

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EXECUTIVE SUMMARY

- Farming Floodplains for the Future is an important national pilot project. Its aim has been to understand, through delivery, how the farmed landscape can be viably managed in ways that reduce flood risk downstream, whilst enhancing the natural environment. A partnership project hosted by Staffordshire Wildlife Trust, it has been funded by Defra through its Flood and Coastal Erosion Risk Management Innovation Fund.

- Through successful delivery (including eight demonstration sites featured in a series of case studies), the project has shown that farmers and landowners can be engaged in flood risk management and, with the right incentives, can be encouraged to implement flood-alleviation measures on the ground.

- The key to success is taking a catchment-wide approach, focussing in headwaters and on tributaries, delivering cumulative gain through the storing of water much closer to source and slowing its flow downstream. The project has shown that this can be achieved through simple, natural, low-tech solutions, resulting in schemes that are sustainable, cost effective, require minimal maintenance and fit comfortably alongside existing farm enterprises.

- In the 'right' catchments, the approach advocated by Farming Floodplains for the Future can be a cost-effective means of achieving positive flood management whilst providing wider environmental benefits. Based on the work of the project in west Staffordshire, the cost benefit analysis ratio for Stafford alone exceeds 6.0:1.

- In order for the benefits of this approach to flood-alleviation to be widely delivered, the challenge facing policy and decision makers can be summarised in the following questions:
    - How and where can the Farming Floodplains for the Future approach be best replicated?
    - Can delivery be satisfactorily incentivised, and then can the benefits be effectively secured for the long term?
    - From where can adequate budgetary resources be made available to permit successful implementation?

1) INTRODUCTION

As part of the Government’s Making Space for Water Strategy, in 2006 Defra launched the Flood & Coastal Erosion Risk Management Innovation Fund. This one-off pot of money sought to fund projects that would help to “improve future delivery of flood and coastal erosion risk management, by bringing in ideas from a wider range of stakeholders, and promoting innovative approaches to delivery that contribute towards the development of more holistic and sustainable policy making in the future”[1] . One of the six successful bids to the Fund was for the Farming Floodplains for the Future project.

A partnership project, driven and hosted by Staffordshire Wildlife Trust, Farming Floodplains for the Future secured funding for 3 years from April 2007. In addition to the Wildlife Trust, the project partners (who are represented on its steering group) comprise the Environment Agency, Natural England, the Sow and Penk Internal Drainage Board, Staffordshire County Council and Staffordshire FWAG.

The key aim of the project has been :

To determine whether the farmed landscape can be viably managed in ways that effectively reduce flood risk downstream, while at the same time enhancing the natural environment.

Geographically, the project has targeted the Sow and Penk river catchments in west Staffordshire (see Figure 1). From the outset its focus has been the implementation of practical solutions on the ground, the project developing into a key national pilot investigating the realities of utilising land use change to manage flood risk at a catchment scale.

Intended to inform future policy and provide a template for similar projects elsewhere, this report and associated documents (comprising 9 case studies, 4 technical ‘issue studies’ and 2 toolkits) summarise the results, findings and recommendations arising from the Farming Floodplains for the Future project.

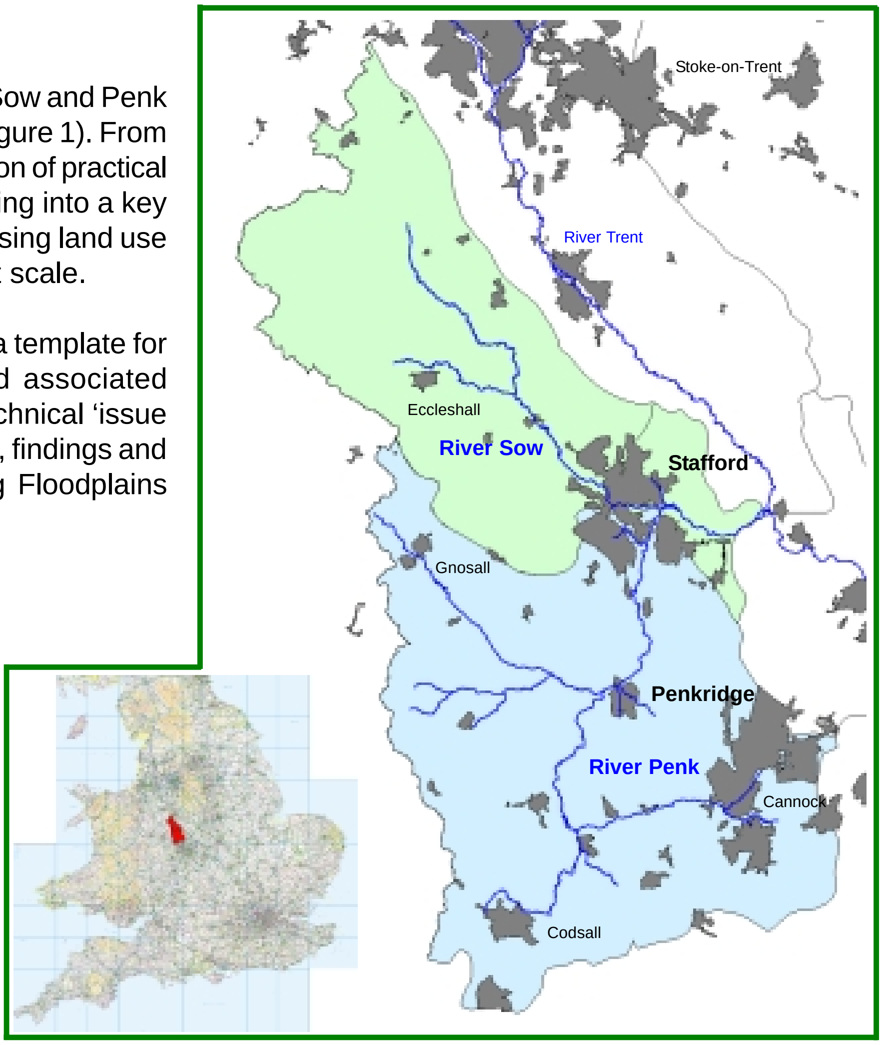


Figure 1: Location maps of Sow and Penk catchments

[1] www.defra.gov.uk/environment/flooding/risk/innovation/index.htm

2) CONTEXT

Flooding can be dramatic and devastating, as witnessed during the UK wide events of summer 2007, and more recently in Cumbria. During the former 13 people lost their lives, some 55,000 properties were flooded and there was widespread disruption of essential services and the transport network – the insurance cost exceeded £3 billion[1]. Current UK climate projections imply that such events could occur increasingly frequently over coming decades – while it is predicted that there will be little change in total annual precipitation, it is likely that there will be a greater bias towards winter rainfall and an increase in 'heavy rain days' (where rainfall exceeds 25mm)[2]. Flooding is an issue that is not going away.

Serious flooding in 1998 and 2000, and the subsequent publication of the *Future Flooding* report[3] highlighted the need for Government to develop a "comprehensive, integrated and forward-thinking strategy for managing future flood and coastal erosion risks in England"[4]. Making Space for Water was born, a cross-Government programme taking forward a developing strategy for flood risk management, promoting a more holistic approach in response to Defra's sustainable development aims and, then emerging, drivers such as climate change. This represented a significant turning of the tide, moving away from traditional flood defence to the management of flood risk using a portfolio of approaches.

A fundamental element of this portfolio is making space for water through appropriate land management and the increased use of rural land use change. This theme has subsequently been widely adopted at a strategic level: for example it is a key opportunity identified in the Environment Agency's Catchment Flood Management Plans (CFMPs), while the Pitt Review[2] recommends "greater working with natural processes".

The envisaged creation of wetlands and washlands and the restoration of rivers and their corridors offer benefits beyond flood mitigation alone – increases in wildlife habitats and associated species, improvements in water quality, recreational and social benefits and reductions in carbon emissions are all possible. Such multi-benefit approaches are likely to be key in achieving a wide range of targets, notably obligations under the EC Water Framework Directive[5], which include mitigating the effects of flooding as part of requirements to bring inland and coastal waters up to 'good status'.

Flooding on the outskirts of Stafford - June 2007

[1] Learning lessons from the 2007 floods – an independent review by Sir Michael Pitt – June 2008
[2] UK Climate Projections – see http://ukcp09.defra.gov.uk
[3] See www.foresight.gov.uk/OurWork/CompletedProjects/Flood/Index.asp
[4] Making Space for Water – first Government response to the autumn 2004 consultation exercise – March 2005
[5] For more information see www.euwfd.com

3) TAKING A CATCHMENT APPROACH

The River Sow is a major right bank tributary of the River Trent, rising close to the Shropshire border and flowing south-east through Stafford to join the Trent to the east of the county town. The River Penk, which flows north from its source in the outskirts of Wolverhampton, is the main right bank tributary of the River Sow, with their confluence located in the eastern outskirts of Stafford (see Figure 1, page 2). The catchments are largely rural in nature, with urbanisation accounting for less than 15% of the total catchment area. The key characteristics of the catchments are summarised in Table 1.

Table 1: Sow and Penk Catchment Characteristics

	Sow	Penk
Size	251 Km^2	350 Km^2
Topography	Moderate relief	
Catchment Slope	39 m/Km	25 m/Km
Geology	Predominantly Triassic mudstones, with areas of more permeable sandstone particularly in the upper reaches	
Soils	Predominantly silty loam soils (slowly permeable and subject to seasonal waterlogging and therefore potentially high run-off), with better-drained loamy sands in the upper reaches of the Penk.	
Agricultural Land Classification	Predominantly Grade 3 (good to moderate) with some Grade 2 (good) in both catchments.	
Land Use	Mixed agriculture – arable and livestock rearing (including dairy)	
Average Rainfall	740 mm/year	697 mm/year

While every catchment has its peculiarities, overall it is considered that the Sow and Penk are typical of lowland river systems in the UK. Consequently, it is anticipated that the approach and findings of the Farming Floodplains for the Future project could be applied across large parts of the country.

From the outset it was appreciated that Stafford itself was the main settlement in the catchments at risk of flooding. Thus, in putting together the funding bid, the partners expected that the focus of the project would be the more extensive and obvious areas of floodplain around Stafford itself.

Around the time of the project's inception, the consultants JBA Consulting were involved in a review of the flood model for the Sow and Penk. On the back of this work, Farming Floodplains for the Future requested that the consultants undertake an assessment of hydrology and flood risk within the two catchments, and thus inform where works might most effectively be targeted. The flood outlines generated by the hydraulic model confirmed Stafford as the key priority, but also identified Penkridge, a market town in the middle reaches of the Penk, as having a number of properties at risk from flooding. It is noted that the flood model only relates to the main Sow and Penk corridors and, while the two named settlements are those at greatest risk of flooding, during the course of the project villages and other properties associated with the tributary watercourses have been identified as having their own flooding issues (e.g. Church Eaton). However, while the work of JBA Consulting confirmed the main areas at risk, its key finding radically altered the focus of the Farming Floodplains for the Future project.

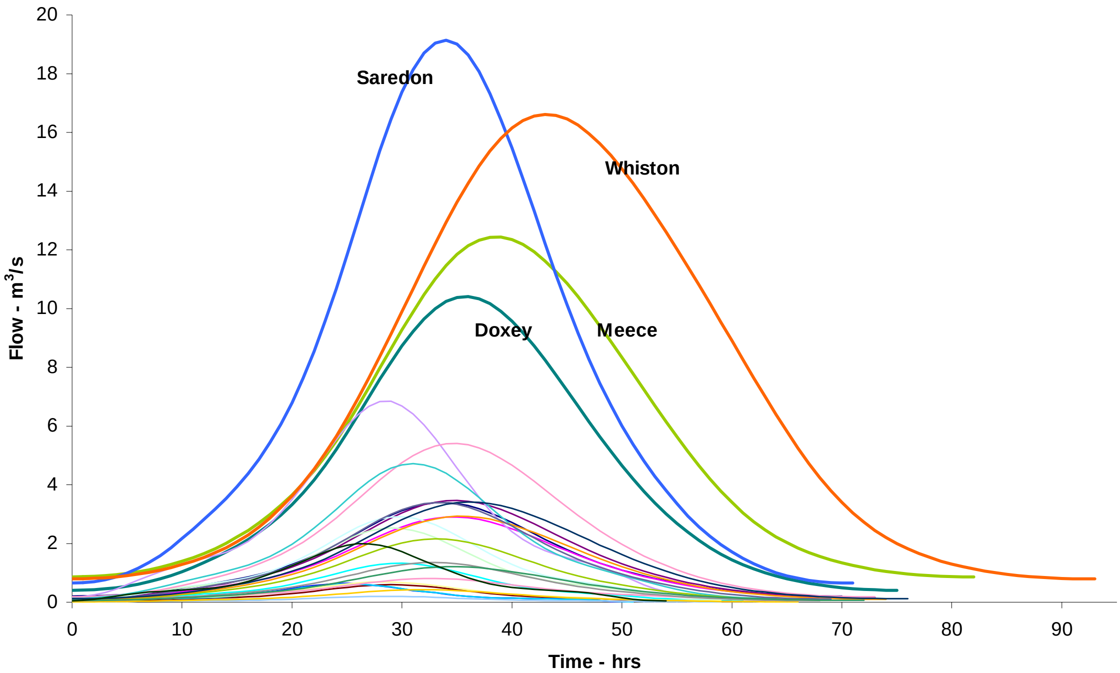
Much of the floodplain of the main Sow and Penk is 'functional', flooding frequently during low return period events. But while such areas are able to attenuate considerable volumes of water during higher return period events, they present very limited opportunities to create the additional new storage that would be of most value during such flooding. Instead the greatest scope for effective land use change lies in areas beyond the functional floodplain. This finding had a major impact on the project, requiring a fundamental shift in approach: the functionality of the main floodplains meant that beneficial results would only be achieved by working at a whole catchment scale, focussing upstream in headwaters and on tributaries, storing and attenuating flood flows much closer to their source.

Three other outputs of the JBA Consulting report helped steer the work of the project:-

- Although the Penk joins the Sow downstream of Stafford, the former's quicker response to rainfall events and domination of flow downstream of the rivers' confluence suggested that it may affect flood risk in Stafford through a 'backwater effect'. However, changes made to the model show any such effect to be insignificant. Thus action to reduce flood risk in Stafford needs to focus on the Sow catchment, with action on the Penk only benefiting Penkridge.

- Analysis of the tributaries to the main rivers allowed identification of those that are dominant in terms of contribution to flood flows and volumes. Four tributaries stand out (see Figure 2), namely the Meece and Doxey Brooks in the Sow catchment, and the Saredon and Whiston Brooks in the Penk, with these therefore highlighted as the sub-catchments offering the best potential to secure flood management benefits.

Figure 2: Computer-generated hydrographs of all the tributaries in the Sow and Penk catchments, highlighting the key priorities



- The final key output was a quantification of the task in hand and, therefore, a 'target' for the project. Comparing modelled hydrographs for different flood magnitudes, it is possible to estimate the volume of water that needs to be stored upstream in order to reduce the downstream flood risk. Thus for Stafford, to reduce a 1-in-100 year flood event to a 1-in-75 year event, it was initially estimated that 232,823m^3 would need to be held back (the equivalent figure for Penkridge being 226,995m^3). However, following the major floods of 2007, the model for the Sow and Penk was reviewed, during which an error in the original modelling was highlighted that had resulted in a significant under-estimation of flood risk in the catchments. The above analysis was therefore repeated to give more accurate figures. The revised flood outlines generated by the models were also overlain on the National Property Database (NPD), to give an indication of the number of properties (focussing on residential) at risk of flooding[1]. The results for Stafford are given in Table 2 (overleaf). Although this review resulted in a substantial increase in the 'target' for the project, with the revised figure being 435,958m^3, it is still considered that with sufficient time and resources this represents a realistic target for flood storage creation. This volume equates to 43.60ha flooded to a depth of 1 metre, or 145.30ha flooded to 0.3 metres. Clearly not all land in the catchment is suitable for the attenuation of water, but even at the latter flood depth this equates to only 0.58% of the total Sow catchment area. For comparison, the equivalent analysis for Penkridge is given in Table 3 (overleaf).

[1] Environment Agency Analysis of Stafford and Penkridge Property Flood Risk 2009

Table 2: Flood volumes and number of residential properties at risk - Stafford

Return Period	Total Hydrograph Volume (m^3)	Increase (over previous period) (m^3)	Total residential properties flooded	Increase (over previous period)
20 year	4,305,627	-	52	16
50 year	5,386,178	1,080,551	86	34
75 year	5,935,152	548,974	132	46
100 year	6,371,110	435,958	446	314
100 year +20% (climate change)	7,612,201	1,241,091	516	70

Table 3: Flood volumes and number of residential properties at risk - Penkridge

Return Period	Total Hydrograph Volume (m^3)	Increase (over previous period) (m^3)	Total residential properties flooded	Increase (over previous period)
20 year	5,925,406	-	2	1
50 year	7,005,890	1,080,484	2	0
75 year	7,505,382	499,492	10	8
100 year	7,914,098	408,716	10	0
100 year +20% (climate change)	9,483,113	1,569,015	64	54

4) SUSTAINABLE FLOOD RISK MANAGEMENT INTO PRACTICE

The magnitude and duration of flooding at a particular location is determined by the rate at which water is conveyed downstream. This is affected by the characteristics of the catchment in terms of resistances to flow and the amount of storage available. The 'traditional' response to flood issues has been largely reactionary, involving the engineering of watercourses to promote conveyance and construction of flood defences to directly protect people and property at risk. The sustainable approach, as advocated by Making Space for Water, Catchment Flood Management Plans etc., involves an alternative and more proactive approach. The desired effect is to flatten the flood hydrograph by managing rural land upstream of locations at risk (generally urban centres) so as to reduce flood peaks travelling downstream. In a nutshell, this is achieved by slowing the flow and increasing storage.

The tools available to achieve these goals are many and varied but can basically be divided into two types:

- **Land management** – referring to the day-to-day and season-to-season management of land and associated features e.g. cropping decisions, cultivation techniques employed, livestock management, implementation of buffer strips, and maintenance of watercourses.
- **Land use change** – referring to more fundamental alterations in the way land is managed e.g. re-creation of wetland habitats, creation of washland/flood storage facilities, planting of strategically located woodland, and restoration and manipulation of watercourses.

As a pilot project starting from scratch, Farming Floodplains for the Future has, almost by default, focussed on land use change – this providing the best opportunity to show positive gains at a catchment scale within the limited timeframe available for project delivery and reporting. The exception to this has been work with the Sow and Penk Internal Drainage Board, reviewing its programme of watercourse maintenance (see Case Study 9).

Whilst it can be argued that the main focus for Farming Floodplains for the Future has been flood risk management, the project has strived to deliver multiple benefits wherever possible. In particular it has sought to reduce flood risk alongside provision of meaningful biodiversity gain, particularly in terms of wetland habitat and associated species. However, other potential opportunities include improvements in water quality, enhancing water supply, and contributing to the climate change adaptation agenda.

The pursuance of multi-functional schemes does however raise potential conflicts of interest. For example, from a flood management perspective, additional storage is most beneficial when it floods relatively infrequently and water is subsequently able to drain away quickly (ensuring capacity is maximised for any ensuing flood event). However greatest biodiversity gain occurs where there is a regular input of water that is retained on site to some extent (as open water features or in the form of high soil wetness). The achievement of both objectives on a single site is possible but compromise is likely, either in the nature of the habitat created or the capacity of flood storage available[1]. Similarly the scale of a scheme may be toned down to avoid negative landscape impacts; or a design altered to ensure that the scheme fits appropriately with the wider farm business with which it is associated.

Marsh marigolds at Seighford Moor (see Case Study 9)

[1] See Morris et al (2004) *Integrated Washland Management for Flood Defence & Biodiversity* (Report to Defra & English Nature) Cranfield University

In seeking to deliver sustainable approaches to flood risk management, Farming Floodplains for the Future has been guided by key principles such that implemented projects should be:

- **Hydrologically robust** – contributing to the reduction of downstream flood impacts.
- **Natural** – taking advantage of natural topography, utilising natural processes and the predictable behaviour of water.
- **Simple** – employing 'low tech' solutions and avoiding complex structures requiring high management input or a need for automation.
- **Cost effective** – both in terms of initial capital outlay and lifetime costs.
- **Manageable** – requiring minimal ongoing maintenance and easily adopted by the associated (farm) business.
- **Environmentally appropriate** – suited to the location both practically and aesthetically, and looking to minimise wider environmental impacts e.g. through the choice of any required materials.
- **Multi-functional** – incorporating appropriate wider benefits wherever possible.

Although the combination of opportunities and constraints on any given site will be unique, the above principles can be translated into a series of land use change techniques that can be delivered on the ground. Figure 3 gives an overview of the techniques utilised by Farming Floodplains for the Future (although other options are available[1]). The specific schemes implemented by the project are described in detail in a collection of 9 case studies that accompany this report.

Figure 3: Land Use Change Techniques Employed by Farming Floodplains for the Future

[1] See *Working with natural processes to manage flood and coastal erosion risk* (Environment Agency, 2010) [downloadable from the EA website]

Engaging With Landowners

Project engagement with the farming community has been achieved through two methods: specific events and media coverage (through local radio and press). The former has included a lunchtime meeting with key farmers invited by the NFU, and two ‘Forums’ (the first bringing together attendees invited via a mailing sent on behalf of the project by Natural England to all existing agri-environment agreement holders in the catchments; the second organised in conjunction with the CLA).

From the outset it was decided to take a ‘soft’ approach to promoting involvement with the project. This included educating landowners as to the role of rural run-off in flood generation (it is not just an urban problem resulting from inappropriate development and inadequate drainage, as some farmers have suggested); and explaining what Farming Floodplains for the Future is trying to achieve, how this might look on the ground (trying to dispel immediate visions of fields covered in feet of water), and what the implications might be for individual farm businesses. The approach paid off – virtually all the schemes implemented are the result of landowners approaching the project, with them often bringing their own ideas of potential opportunities to the table. The positive response of landowners has generated more than enough schemes for the project to deliver in its 3-year life, and it is considered likely that further awareness raising (which will be enhanced by the availability of demonstration sites) will add to the potential projects already proposed.

Project Officer discussing issues on site

5) RESULTS

The main focus for Farming Floodplains for the Future has been practical – to investigate whether the farming community can be engaged in flood risk management at the farm scale, and what mechanisms are available (or required) to support their endeavours. In the simplest terms the project has been a success – through the implementation of schemes on the ground it has been demonstrated that landowners can be encouraged to deliver multi-benefit sustainable flood management at a catchment scale – see Table 4 and refer to the 9 case studies that accompany this report. It is noted that in addition to the schemes completed, a further five are already in the pipeline, and a number of other potentially co-operative landowners have shown an interest in the project.

Table 4: Farming Floodplains for the Future – Summary Case Study Results

Site	Catchment	Techniques[1]	Scheme size (ha)	Volume stored (m^3)	BAP Habitat	Cost (Total)	Cost (Storage only)	Cost (per m^3 storage)
Church House Farm	Sow	1, 2	5.0	4050	3.0ha floodplain grazing marsh created + 2.0ha restored 3 ponds created 335m river channel enhanced	£10,893	£10,893	£ 2.69
Little Horsley Farm	Sow	2, 3	1.0	275	0.8ha lowland meadow restored 2 ponds created	£ 7993	£ 6153	£ 22.37
Old Hattons Farm	Penk	4	0.07	240	2 ponds restored	£ 4261	£ 261	£ 1.09
Fieldhouse Farm (The Dingle)	Sow	4, 5, 6, 7	4.33	1450	4.25ha floodplain grazing marsh restored 1 pond created	£ 4379	£ 4379	£ 3.02
Izaak Walton Golf Course	Sow	1, 4, 6	0.6	2050	0.21ha floodplain grazing marsh restored 2 ponds created	£ 2453	£ 2453	£ 1.20
Bellfields Farm	Penk	2, 3	4.2	6150	2 ponds created	£ 5652	£ 5652	£ 0.92
Deepmore Farm	Penk	2, 3	4.5	6750	4.5ha lowland meadow restored 2 ponds created	£18,069	£14,320	£ 2.12
Fieldhouse Farm (Woodland)	Sow	8	0.87	1125	0.87ha broadleaved woodland restored	£ 5670	£ 5670	£ 5.04
IDB - Seighford Moor Radford Meadows	Sow / Penk	5	28.0 31.0	Negligible	59ha floodplain grazing marsh restored	£ 2240 £ 1650	-- --	-- --

[1] 1 - Re-connection of floodplain; 2 - Habitat restoration / creation; 3 - Flood storage; 4 - Pond alterations; 5 - Water control structures; 6 - Woody debris; 7 - Watercourse diversion; 8 - Floodplain woodland

As noted previously (see page 5), hydrological analysis has allowed the setting of a ‘target’ for the project in terms of reducing a 1-in-100 year flood event to a 1-in-75 year event, with a consequent reduction in the number of residential properties at risk of flooding. Given the project’s successful delivery of a number of schemes, basic analysis has been undertaken to quantify the beneficial impact of this implementation and the general approach adopted by Farming Floodplains for the Future.

Benefits for Stafford

Focussing on Stafford, the storage volume ‘target’ is 435,958m^3. There are five schemes that have been implemented in the Sow catchment that deliver measurable new flood storage. This has been estimated to total 8950m^3 of water, equivalent to 2.05% of this ‘target’. The capital cost of delivering these 5 schemes is £31,388. Given, based on ABI (Association of British Insurers) figures, that the average insurance claim for a flood damaged property is £20,000, then even if this 2.05% relates to only 2 properties, there is a positive cost benefit.

Looking at costs versus benefits in another way however, really demonstrates the potential of the Farming Floodplains for the Future approach. Based on analysis of the flood model (see Table 2, page 6) it is predicted that 314 additional residential properties are at risk of flooding in a 1-in-100 year event compared to a 1-in-75 year event. Given the ABI figure relating to flood damaged properties, this equates to a potential increase in the insurance bill of £6,280,000. Further, the model indicates that to prevent these 314 properties from flooding, flood volume needs to be reduced by 435,958m^3. Based on all the case studies delivered by the project to date, the average cost per cubic metre of new storage created is £4.81. Therefore, the potential cost of creating the required flood storage is £2,096,958. Comparing this figure with the insurance saving (£6,280,000), the cost benefit ratio is 3.0:1. The case studies delivered by Farming Floodplains for the Future are a small sample, which is skewed by the relatively high cost of the scheme at Little Horsley Farm (see Table 4 above). The median cost per cubic metre of new storage created (which reduces the impact of the skew) is £2.41. Using this figure, the potential cost of creating the required storage drops to £1,050,659, increasing the cost benefit to 6.0:1. This analysis is based solely on damage to residential properties, not taking into account damage to commercial properties (due to difficulties in extracting the relevant data from the National Property Database) or the wider business and social costs of flooding. Consequently, it is likely that the real cost benefit ratio will be considerably (even two to three times) higher.

Benefits for Penkridge

The equivalent analysis for Penkridge shows a greater volume of water stored (13,140m^3) and consequently a greater percentage contribution (3.21%) to the relevant 'target' (408,716m^3). However, based on the modelling work, between a 1-in-75 and a 1-in-100 year flood event no additional residential properties are at risk in the town. Even if some form of insurable damage is assumed to occur (say £20,000) then the cost benefit likely is only 0.02:1.

Comments

- It is accepted that the above analysis only includes the capital costs of the schemes delivered, and does not take account of the costs of running the project with a dedicated project officer. However, it is considered that such 'overhead' costs would also be a factor associated with a more 'traditional' engineered flood defence solution.
- It is noted that the above is based solely on volumes, the parameter that the project could most readily quantify (see Issue Study 1: Data and Modelling). However the other major benefit anticipated from the delivered schemes is the extent to which they will slow downstream flows and therefore help to delay flood peaks. The consequent increase in time available to, for example, issue and respond to flood warnings, will potentially help to increase overall flood resilience, reduce flood damage and also help to limit the social impacts of flooding.
- The difference between Stafford and Penkridge in the potential cost benefit of the project's approach demonstrates the need for careful targeting, ensuring that resources are deployed in the catchments where they will be most beneficial.

Farming Floodplains for the Future demonstrates that a small number of schemes delivered by a single dedicated project officer in a relatively short period of time can have a quantifiable impact on flood risk. With adequate resources available over an appropriate period of time, a catchment-wide, sustainable approach to flood risk management could deliver significant multiple benefits.

Flood storage scheme in operation at Bellfields Farm (see Case Study 6)

6) FINDINGS & CONCLUSIONS

Three years of work by the Farming Floodplains for the Future project has culminated in the successful delivery of flood management orientated land use change at a number of sites. Distilled from the work of the project are the key findings and conclusions outlined below.

The Role of Sustainable Flood Risk Management

- Land use change at a catchment scale can have a positive impact in terms of flood risk - through reductions in flood volumes and flows in the right catchments, substantial benefits can be accrued.
- Farmers and landowners can be engaged in flood management and, with the right incentives, can be encouraged to deliver schemes on the ground that are compatible with their agricultural businesses.
- There is a need to be realistic as to what land use change for flood management might achieve – it will not stop flooding but it is a practical and potentially cost effective tool capable of reducing risks, increasing flood warning lead times or, for example, protecting existing defences against climate change impacts.
- The typicality of the catchments targeted by the project, and the simplicity of the techniques employed mean that the Farming Floodplains for the Future approach is potentially applicable in large parts of the UK.

Catchment Approach

- Projects must be carefully targetted to those catchments where rural land management and land use change will have the greatest benefit (thus making the best use of finite resources).
- The key to success is to take a catchment-wide approach, focussing in headwaters and on tributaries, slowing and storing water much closer to source. While some techniques, such as the planting of floodplain woodland, may be suited to frequently inundated ‘functional’ floodplain, generally the scope for beneficial land use change is greatest outside these areas, in more upstream locations.
- The Farming Floodplains for the Future approach relies on cumulative benefit arising from a number of schemes, rather than seeking a single solution to a problem. Arguably this approach is easier to ‘sell’ to farmers since the impact on any one holding and its associated business is relatively limited.
- The project shows that appropriately designed schemes can deliver not only flood management benefits, but also gains in terms of biodiversity and wider ecosystem services (e.g. consistent supply of clean water). Replication and connectivity across catchments are key to such benefits being maximised.

Project Management

- Farming Floodplains for the Future demonstrates the obvious benefit of having a dedicated project officer. Based on feedback from case study landowners, it seems clear that having an experienced project officer able to engage and advise the farming community, drive schemes forward, and provide links to partners to secure funding, obtain consents and supervise contracts, has been fundamental to the project’s successful delivery on the ground.
- Having a local focus, whereby landowners can appreciate a link between what happens on their land and the potential impact on a place at risk downstream that they are likely to know (in the Farming Floodplains for the Future context, the county town of Stafford), is deemed important in engendering co-operation.
- The hosting of the project by the Wildlife Trust has been beneficial. Most important is the perception of independence, particularly from the statutory agencies. One landowner particularly commented that he was “more comfortable” dealing with the Wildlife Trust than he would have been were the project run by Natural England or the Environment Agency.
- The time required to achieve effective delivery and maximise potential cumulative benefits should not be under-estimated. Firstly it takes time to establish a project – not only gaining an understanding of the issues, geography and aims and objectives, but also then communicating these to and engaging with relevant partners and stakeholders. With a project officer new to both the post and the area, and it was a good six to nine months before Farming Floodplains for the Future could be considered really ‘up and running’. Secondly it is important to develop good working relationships with landowners, and building the required trust takes time. Based on Farming Floodplains for the Future, the time from initial contact to machinery moving onto site to deliver averages around 12 months.

- The relevant partners for any project, and how and when they are best engaged needs careful consideration. In terms of Farming Floodplains for the Future for example, the Environment Agency may have been better represented on the project steering group by a specialist from flood risk or development control rather than biodiversity; and better links could perhaps have been forged with organisations representing the farming community, notably the NFU and CLA.

Project Delivery

- Effectively communicating what a project is trying to achieve to all partners (whether funders, those issuing consents or the contractor who will bring design into reality) is key to affecting delivery on the ground. Most important, however, is the way in which the farming community is engaged, with Farming Floodplains for the Future successfully adopting a relatively 'soft' approach – see box, page 9.
- Agri-environment schemes have played an important role in the project's delivery of schemes on the ground, contributing to all but one of the case study sites – see Issue Study 3: The Role of Agri-Environment Schemes in Flood Risk Management. It appears that, as a result of the minimal maintenance requirements and limited impact on farm businesses of schemes implemented by Farming Floodplains for the Future, the existing or new annual payments available through Countryside Stewardship or Higher Level Stewardship (HLS) have been sufficient to satisfy landowners. However, due to shortfalls associated with the currently applicable scheme (HLS), particularly relating to the importance of flood risk management as an objective and the suitability of options available, capital payments do not adequately cover initial outlay costs for them to act as an incentive. In all cases, monies available from the Farming Floodplains for the Future budget were required to bridge the gap between the capital funding available via agri-environment schemes and the actual cost of delivery. It is clear from the landowners associated with the case studies that, for the majority, this was essential in securing engagement. It is concluded that amendments to the existing scheme, appropriately targeted and supported by an adequate budget, may be enough to make HLS the 'right' tool for the job. Otherwise an alternative incentive mechanism will need to be devised to promote multi-functional wetland and land use change for flood management benefit (discussed further in Issue Studies 3 and 4).
- Flood risk management is a long term strategic undertaking, and a key question raised in relation to the Farming Floodplains for the Future approach (especially by the Environment Agency) is how the benefits are retained into the future – see Issue Study 4: Securing the Benefits of Land Use Change Long Term. This is particularly pertinent given that the maintenance of most schemes is tied into agri-environment agreements with a maximum life span of 10 years and, while it is hoped that these agreements will be renewed, there is a risk that any cumulative gains may be eroded over time. A mechanism included in the Flood and Water Management Bill for the designation of flood management assets (imposing a requirement for consent for subsequent alteration/removal) may provide part of the solution, but it will only work alongside effective incentive (see above) if the involvement of farming communities in relevant catchments is to be maximised.
- Attempting to monitor its impact has been a key element of the Farming Floodplains for the Future project – see Issue Study 2: Monitoring. While it is important that monitoring of schemes is undertaken to ensure efficacy and quantify their contribution, thus building the body of evidence to support a sustainable approach to flood risk management (see also below), this must be at a scale appropriate to the time and financial resources available (both short term and into the future).

Works in progress at Church House Farm
(see Case Study 1)

Individual Scheme Design

- Farming Floodplains for the Future advocates the use of simple, natural and low-tech solutions, resulting in schemes that are sustainable, cost effective, require minimal maintenance and fit comfortably alongside farm enterprises.
- The design of such schemes should be kept straightforward, drawing on site visits, basic topographical data, the knowledge and observations of the landowner and the skills and experience of the project officer. Where pre-existing data and computer models exist, these should be utilised if appropriate, but the commissioning of new or site specific models should be carefully considered – see Issue Study 1: Data & Modelling. It is accepted that taking an 'informed' rather than 'detailed design' approach may mean that schemes are not necessarily 'right' first time (e.g. a spillway may overtop more or less frequently than intended), but by the same juncture the resolution of such issues is easy and cost effective.
- It should be accepted that not all sites are suitable – what may initially appear ideal on the ground may not work in practice.
- Farming Floodplains for the Future has shown that individual schemes can deliver multiple benefits (e.g. flood risk management and wildlife habitat). Such opportunities must, however, be incorporated into designs from the outset, accepting that elements of compromise may be required to achieve the best overall result.

Aerial view of scheme at Little Horsley Farm (see Case Study 2)

Attitudes

- There seems to be a general acceptance that rural land use (and land management) has a part to play in managing flood risk at a catchment scale. It has been suggested to the project that its approach is 'common sense' and that sufficient replication across a catchment is logically beneficial and relatively low risk. Yet questions continue to be raised as to whether there is any proof that the approach works at a catchment scale. It is argued that this should not be a barrier to wider implementation – while the results of Farming Floodplains for the Future hopefully go some way to addressing this question, there is not time to wait for short term pilot projects to build an exhaustive body of evidence. Based on strategies (notably CFMPs), extensive data, and considerable experience and knowledge, there is a good understanding of where flooding is an issue, sufficient to be able to justify the prioritisation of catchments where risk might realistically be reduced through land management / land use change. Therefore, a precautionary approach should be taken and more opportunities progressed (note that the project has already been contacted by a number of people across the country initiating similar programmes and looking to learn from Farming Floodplains for the Future). By undertaking relevant monitoring and evaluation of these projects, so the sought body of evidence for their success will grow and implementation can be refined.
- Individual schemes implemented through Farming Floodplains for the Future and considered in isolation are unlikely to register as effective using 'traditional' cost benefit equations designed to find the single best-fit solution to a problem. Alternative methods need to be utilised to fairly assess not only cumulative reductions in flood risk, but also the additional benefits delivered.
- Sustainable approaches to flood management may have wider application than some decision makers may currently acknowledge. For example in relation to CFMPs, the applicability of land use change in Policy 6 areas (*Take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment*) is clear. Yet the same approach has been used to good effect in the Sow and Penk catchments, which fall within a Policy 4 area (*Take further action to sustain current scale of flood risk into the future (responding to the potential increases in flood risk from urban development, land use change, and climate change*)).

7) RECOMMENDATIONS

1. Accelerate Delivery

Strategically land management and land use change generally seem to be accepted as key tools in the reduction of flood risk at a catchment scale. Now is the time for informed yet imaginative implementation, utilising the ‘common sense’ and cost effective approach advocated by Farming Floodplains for the Future to accrue cumulative gains through catchment-wide delivery of simple solutions.

2. Provide Resources

Farming Floodplains for the Future has shown that appropriately focussed projects can produce results, but they must be adequately resourced and given sufficient time to deliver effectively. This applies not only to new projects, but also to existing projects where the continuation of work and associated monitoring will show the full impacts of concerted catchment scale working.

3. Develop Incentives

While important in the delivery of Farming Floodplains for the Future, it is considered that agri-environment schemes (particularly HLS) in their current form do not adequately incentivise rural land use change for flood management benefit. Effective, widespread adoption of such change requires the alteration of existing or the development of new mechanisms capable of providing long term support to co-operating farmers.

4. Secure the Benefits

Flood risk management is a long term undertaking. While powers proposed in the Flood and Water Management Bill may present neat tools for securing into the future the cumulative benefits of a Farming Floodplains for the Future approach, adoption of any such measures must be carefully balanced with incentive to ensure they do not act as a deterrent to landowner engagement.

5. Join-Up Approaches

Appropriate land management and the development of multi-functional wetlands at a catchment scale can deliver reduced flood risk, biodiversity targets, and improvements in water quality and security of supply. With multi-disciplinary joined-up thinking resources may be more effectively used to meet obligations under the Water Framework Directive and the challenges of climate change adaptation.

A number of other documents have been produced to accompany this report:-

Case Studies giving details of the principle schemes delivered by the project:

- Case Study 1: Church House Farm
- Case Study 2: Little Horsley Farm
- Case Study 3: Old Hattons Farm
- Case Study 4: Fieldhouse Farm - The Dingle
- Case Study 5: Izaak Walton Golf Course
- Case Study 6: Bellfields Farm
- Case Study 7: Deepmore Farm
- Case Study 8: Fieldhouse Farm - Floodplain Woodland
- Case Study 9: Sow & Penk Internal Drainage Board

Issue Studies discussing some of the technical elements relating to the project:

- Issue Study 1: Data & Modelling
- Issue Study 2: Monitoring
- Issue Study 3: The Role of Agri-Environment Schemes in Flood Risk Management
- Issue Study 4: Securing the Benefits of Land Use Change Long Term

Toolkits devised to guide the establishment and implementation of other projects using Farming Floodplains for the Future as a template:

- Toolkit 1: Targeting & Establishing a Project
- Toolkit 2: Designing & Delivering a Scheme

All of the above documents can be accessed via the following link:
www.ontrent.org.uk/youcando/farmingfloodplains

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