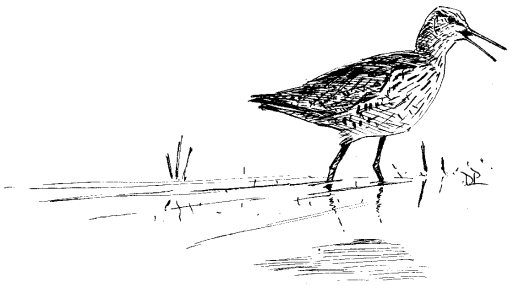
Time for a change

Policy changes required to achieve sustainable flood management in Scotland



A report by RSPB Scotland

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April 2007

Time for a change - Policy changes required to achieve sustainable flood management in Scotland

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RSPB Scotland is part of the RSPB, the UK-wide charity working to secure a healthy environment for birds and wildlife, helping to create a better world for us all.

Registered Charity England and Wales Number 207076, Scotland Number SC037654

Deputy Minister for the Environment and Rural Development, Allan Wilson MSP

During Stage 3 debate on Water Environment and Water Services (Scotland) Bill, 29th January 2003

"The Water Environment and Water Services (Scotland) Bill represents a significant step forward in the co-ordination of sustainable flood prevention measures in Scotland. The river basin management planning process will provide a forum for the discussion of flood-related issues at the catchment level – the most appropriate level at which to consider these issues… Local authorities will be required to promote sustainable flood management when exercising their function under town and country planning legislation…development of an area that is exposed to frequent or extensive flooding, for example, the functional floodplain is likely to be unsustainable and should be avoided. If development is essential the threat of flooding should be managed in an environmentally sensitive way that recognises the role of soft engineering techniques – such as natural flood meadows and washlands – in attenuating flooding; where practical the use of existing floodplains should be maximised…In due course the construction of flood defence schemes will require consent in terms of the new control regime on engineering works in and around bodies of water…. that is yet another means by which a sustainable approach to flood management is assured…….I hope it is clear to all members that significant steps have been taken, are being taken and will be taken towards addressing flood risk in Scotland in a more sustainable manner".

Table of contents

1. Summary

The rigorous and forward thinking approach of then the Parliament's Transport and Environment Committee in its consideration of the Water Environment and Water Services Bill promised to change the way we deal with flooding in Scotland. This new policy introduced a duty on Scottish Ministers, SEPA and responsible authorities to promote sustainable flood management (SFM). We are now four years into the implementation of the Water Environment and Water Services (Scotland) Act 2003 (the 'WEWS Act'), which introduced this new duty. However, the Scottish Executive has made little progress in implementing SFM. The new policy does not appear to have influenced the development of flood solutions, despite the clear direction from the Parliament during the passage of the WEWS Act. The design of flood defence schemes is still dominated by the traditional approach and hard engineering. Land managers, engineers and local authorities alike do not understand what SFM means in practice and the Scottish Executive has been slow in adopting recommendations to take this policy forward. A strategic, catchment based approach, and the role of wetlands and natural processes have been recognised as means of achieving a more sustainable approach to flood management. However, there still appears to be a large number of policy, funding and other obstacles, which hinder the progress towards achieving SFM in practice. This report looks at the current legal structure for flood management and flood responsibilities in Scotland and identifies key barriers to change. A legislative opportunity to address these issues may arise through the transposition of the forthcoming EU Floods Directive. RSPB Scotland recommends that in order to achieve SFM in Scotland, the following five key steps must be taken:

- Flood management policies need to be brought in line with the requirements of SFM under the WEWS Act. **The Scottish Executive needs to review and where necessary amend the provisions within the Flood Prevention (Scotland) Act 1961, Coast Protection Act 1949 and the Land Drainage (Scotland) Acts 1930 and 1958.**

- The responsibility for flood management is highly fragmented, with no single organisation responsible for co-ordinating action on the ground. **The Scottish Executive needs to establish clear lines of responsibility for co-ordinating flooding, both inland and at coasts.**

- There is currently no mechanism in place to ensure a catchment based approach to addressing flooding. Integrating River Basin Management Planning (RBMP) and flooding would ensure that full river basins are considered when addressing flooding problems. **The Scottish Executive should deliver fully integrated RBMP and flood management.**

- Statutory land use planning affects the location and surface water run-off of new developments. The Scottish Executive needs to **implement a better statutory land-use planning system, which promotes SFM inland and at coasts, supports Sustainable Urban Drainage Schemes (SUDS) and prevents further development on floodplains and in vulnerable coastal areas.**

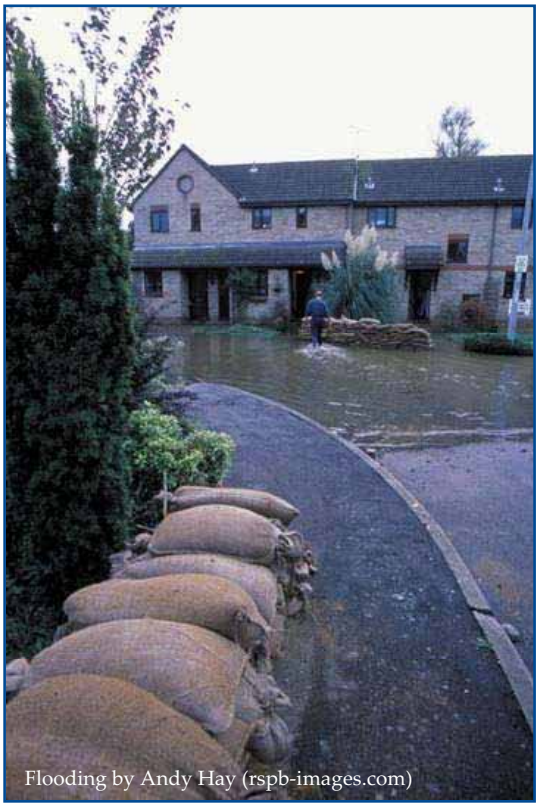
- SFM will not be achieved without a full integration with rural land use and other government policies and funding. **There is an urgent need to integrate flooding with the wider rural land-use management framework so that land managers are encouraged to adopt practices that reduce the risk of flooding and protect the environment. This should be encouraged across a range of government policies.**

2. Introduction and background information

2.1 Introduction

Flooding is a natural phenomenon, but one that is also exacerbated by human mismanagement of the environment. The problem of flooding has been made worse by the way we construct and defend ourselves against floods, and the way we manage catchments. Rivers throughout Scotland have been straightened and floodplains drained to allow for farming, urban development and transport. The result of these activities is that rivers flow faster and over smaller, more restricted areas than they would under natural conditions. Land use practices and development planning also have a major impact on the way rainwater drains from our land and into rivers and streams. In the uplands, important peatland habitats, and natural forests which help regulate water flows and maintain water quality, have been drained and damaged. Agricultural practices and other land use activities can result in land compaction, overgrazing and erosion, all of which can increase flood risk.

2.1.1 Traditional approach to flooding



Flooding by Andy Hay (rspb-images.com)

Our approach to flooding has been very reactive and most floods have resulted in the construction of floodwalls or embankments to move water downstream. Traditionally, engineers tried to get rid of water fast, draining it off the land and into the sea in re-engineered rivers. However, no matter how much deeper and straighter rivers get, floods just keep on coming back, and are getting worse. Hard engineering solutions may be perceived as tried and tested, cheaper, easier and quicker to construct than undertaking large scale floodplain management. However, such an approach is known to exacerbate the problem – by moving large quantities of water downstream and causing flooding elsewhere. The current approach to flooding does not serve the public well, and on most occasions increases the flood risk elsewhere. Climate change will certainly make the situation worse and should be a further driver for change that is needed to achieve a more sustainable approach to flooding.

2.1.2 The current flood risk

Milnathort, Perthshire, Hawick, Elgin, Edinburgh, Dumfries, Kilmarnock, Kirkintilloch and Selkirk have all suffered serious flooding in recent years with millions of pounds worth of damage to business and residential properties, and a serious risk posed to human life. Recent flood risk maps published by SEPA indicate that extensive built-up areas are at risk. Currently around 160,000 Scottish homes and 13,000 businesses are vulnerable to inland and coastal

flooding[1]. Many settlements are located on low-lying floodplains alongside rivers and flat land on the coast. Estimates of annual average damage from flooding are around £20 million – this could rise by 115% by 2080[2]. Scottish ministers have recognised the need to invest more to protect communities from flooding and have more than doubled the resources to support local authorities' flood prevention schemes and coast protection to £89m over 2005-2008. Furthermore, the percentage grant aid has also increased from 50% to 80%, if certain criteria in the design of flood defence schemes are met.

2.2 Flooding and climate change

Flooding is a real problem in Scotland and likely to get worse due to climate change. A recent report published by SNIFFER reviews climate trends in Scotland from 1961 to 2004[3], and indicates that we are already experiencing changes in our climate. For example, there has been a significant increase in winter precipitation, with North Scotland experiencing an increase in winter rain of almost 70%, East Scotland 37%, and West Scotland 61%. Increasing trends were also noted in heavy rainfall, particularly in North and West Scotland, and an increase in rainfall intensity in both East and West of Scotland. Floods in December 2006 and January 2007 affected many towns and villages in Scotland, causing millions of pounds worth of damage and posing a serious risk to human life. These floods were caused by heavy rainfall. Such events are becoming more frequent and in future will become more common and more intense.

2.2.1 Climate change predictions

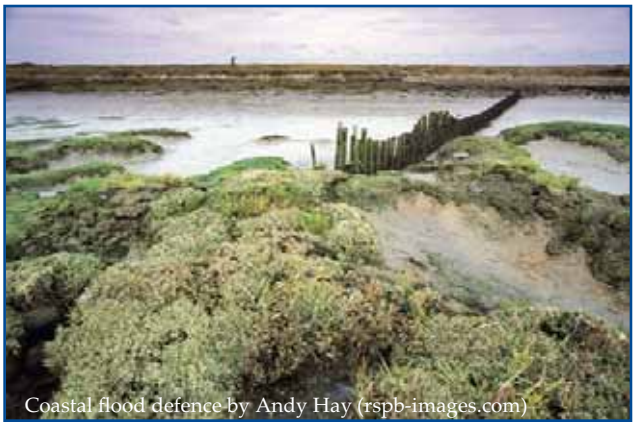
The UK Climate Impacts Programme (CIP) briefing[4] concludes that winters will become wetter, with increases in rainfall intensity and frequency, while summers may become drier. Therefore floods, which are currently considered 'extreme', will become more common in future. The report states that by 2080, winter precipitation in the west of Scotland could increase by 20%, and in parts of the east of Scotland the increase could be as much as 30%. Simultaneously, summer precipitation is projected to reduce by 30% - increasing the risk of flash flooding as water runs off dry ground more quickly. The Scottish Executive's Climate Change Programme[5] emphasises the increased threat of flooding as a result of climate change and identifies sustainable flood management as an important response. This is against a background of work to reduce carbon emissions in an effort to keep climate change within manageable limits.

A medium-emission climate change scenario predicts that a 1 in 100 chance flood in any year is expected to become a 1 in 70 chance flood in any year by the 2020s, and to a 1 in 40-60 chance flood in any year by the 2080s[6]. Rising sea levels are also one of the impacts of climate change and will lead to increased breaches of sea defences, loss of important estuarine and coastal habitats and damage to property. The UK CIP predictions for sea level rise suggest 0 – 10cm for low emission scenarios, and 50 – 70cm for high emission scenarios by 2080[7]. The 'Future

[1] www.sepa.org.uk
[2] Climate Change: Flooding Occurrences Review, Scottish Executive Research, 2002
[3] A handbook of climate trends across Scotland, SNIFFER report, 2006
[4] Climate Change Scenarios for the UK, Tyndall Centre for Climate Change Research, 2002
[5] http://www.scotland.gov.uk/Topics/Environment/Climate-Change/16327/4825
[6] Turning the tide on flooding, WWF report, 2002
[7] Updates to regional net sea-level change estimates for Great Britain, August 2006, www.ukcip.org.uk

Flooding in Scotland'[8] report also points out that there will be more frequent events, where wave heights will breach structural and natural sea defences. Under the worst case high emission scenario, where greenhouse gas emissions continue to rise, it is predicted that by 2080 the risk of a 1 in 50 year severe flooding event could rise to 1 in 5 years or less.

2.2.2 Coastal squeeze


Coastal flood defence by Andy Hay (rspb-images.com)

One of the consequences of coastal flooding and sea level rise is coastal squeeze, which places mounting pressure on sea defences and the land they protect. Every year 100ha of saltmarsh and mudflats are lost in the UK to rising sea levels[9], and erosion due to increased storminess. These are key habitats for birds, invertebrates and fish, and many such areas in Scotland are internationally and nationally recognised for their importance for wildlife. Under the Habitats Regulations, there is a duty to maintain the integrity of these designated sites. The same principle applies to Sites of Special Scientific Interest, which have to be maintained in favourable condition. The qualifying conservation interests must be protected against erosion and encroaching sea levels and habitats allowed to migrate landwards where this may be possible through coastal realignment. This also applies to flood defences carried out on land owned by individual landowners, where the control for these works is not as rigorous as under the statutory planning system.

2.3 The new approach to flooding

There is now a duty on Scottish Ministers, SEPA and responsible authorities to promote sustainable flood management. A more sustainable, catchment based approach is needed which allocates public funding towards management of floodplains, restoration of the natural environment, and sympathetic management of land that together aim to reduce the rate at which water reaches our watercourses and vulnerable communities.

The protection, and maintenance of natural habitats such as peatlands and wetlands can help in reducing the impacts of flooding and is an important element of SFM. Further work to expand and restore these habitats inland and at the coast can help provide alternatives to hard engineering, alleviate flooding and help meet the obligations of the UK BAP. Such an approach can deliver social, economic and environmental benefits and thereby contribute to a sustainable Scotland. It is a cost-effective means of tackling flooding - protecting homes and businesses whilst benefiting environment and biodiversity.

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[8]http://www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/Reports_and_Publications/Scotland/Scotland.html

[9] Seas of Change: The potential area for intertidal habitat creation around the coast of mainland Britain: Pilcher, Burston, Kindleysides and Davies, 2002

3. Sustainable flood management under the WEWS Act

Water Environment and Water Services (Scotland) Bill,
Extract from Transport and Environment Committee Stage 1 report

…the Committee considers that one of the most obvious ways in which it will be possible to judge whether the WFD has made a difference will be in relation to Scotland's ability to reduce the incidence of flooding over the coming years. The Committee has taken evidence on – and some of its members have seen for themselves the importance that natural wetland systems can have in filtering pollution and controlling flooding. Some witnesses have called for the Bill to explicitly state the importance that should be given to wetlands in meeting these objectives. The Committee agrees with this position and, in recognition of this considers that good and adequately funded agri-environment schemes are necessary.

The Committee considers that river basin management planning will only be judged to have been a success if the number of floods and the amount of damage caused by flooding is reduced over the next two decades. That will be a real challenge given the changes in the global climate. At a practical level, the Committee considers it vital for effective flood avoidance strategies to be adopted (rather than concentrating resources on dealing with the consequences of flooding events).

3.1 The new duty and what it means in practice

With climate change now recognised as increasing the threat of flooding inland and at the coast, there is an urgency to adapt to this threat in a sustainable manner. The Water Framework Directive redresses the balance in flood management and encourages a more sustainable approach to water and land management. It introduces a completely new way of managing water – through integrated river basin management, which aims to achieve good ecological status. It requires Member States to achieve ecological standards for waters and to "*mitigate the effects of floods*". The issue of flooding was subject to much debate during the passage of the Bill through Parliament. Careful consideration of this issue gave the impetus to change the way we manage flooding in a way that enhances the environment and at the same time protects people from the damage caused by floods. In Scotland, the link between flooding and the WFD was made clear during the transposition into Scots law. The WEWS Act grasps this opportunity and introduces a new duty on Scottish Ministers, SEPA and responsible authorities to promote sustainable flood management:

'The Scottish Ministers, SEPA and the responsible authorities must –
so far as is consistent with the purposes of the relevant enactment or designated function in question –

(i) promote sustainable flood management
and,
c) so far as practicable, adopt an integrated approach by co-operating with each other with a view to co-ordinating the exercise of their respective functions. '

Water Environment and Water Services (Scotland) Act 2003, section 2 (4) (b) (i)

In practice, this means that:

- Scottish Ministers will be required to promote sustainable flood management when considering grant applications for flood defence schemes, Improvement Orders under the Land Drainage Act; when planning and determining priorities for agriculture/forestry funding, and in other policy development;
- Ministers can stipulate that the River Basin Management Plan (RBMP) and sub-basin plans address flood management issues;
- Local authorities will be required to promote and implement this sustainable flood management provision when exercising their function under the town and country planning legislation;
- SEPA will be required to have regard for SFM when granting licences for engineering activities under the Controlled Activities Regulations (CAR);
- The RBMP and associated sub-basin plans will provide a strategic forum within which flood prevention measures can be considered, bringing together all those with an interest in flood management at a strategic scale – including SEPA, local authorities and NGOs;
- A catchment-based, source-to-sea approach will be the basis of sustainable flood management.

This new primary legislation, which transposes the WFD into Scots law, promotes the sustainable management and protection of the water environment in Scotland. It lays foundations for a new, sustainable approach to flooding. An important link between the role of wetland habitats in tackling flooding problems and helping to achieve the environmental objectives required by the WFD was also established. The role of soft-engineering and restoration of natural floodplains was recognised as the new and cost-effective means of achieving flood protection that would serve future generations. The Committee made an important link between RBMP and flooding. However, the WEWS Act is enabling legislation, written in general terms with much of the specific policy to be implemented via subordinate legislation, or administratively. This also applies to the provision for sustainable flood management. **Full implementation of this duty will require changes to the current policy provisions that deal with flood management.**

3.2 What is sustainable flood management?

The term SFM means different things to different people. The definition of SFM was considered in detail in RSPB Scotland's report '*Go with the Flow: Natural approach to sustainable flood management in Scotland*'[10]. RSPB Scotland suggests it embodies a shift from our predominantly piecemeal and reactive approach to flood management towards a catchment-based approach, which uses natural processes and natural systems to slow down and store water:

'***Sustainable flood management*** is achieved by adopting the following elements to manage the risk of flooding:

- a strategic, catchment based approach (the whole river basin, from source to the sea)
- protecting and using natural systems and habitats
- promoting soft engineering techniques'

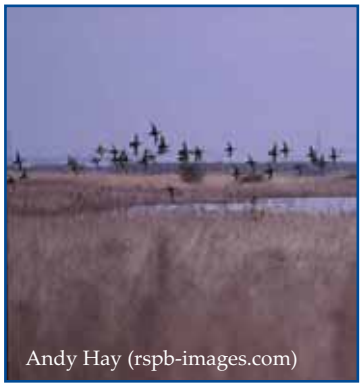
[10] Go with the Flow - the natural approach to sustainable flood management: C. Davies, RSPB Scotland report, 2004


Andy Hay (rspb-images.com)

Soft-engineered solutions are designed to hold floodwater. Natural floodplains and coasts are allowed to flood and wetland habitats such as wet grassland, peatlands, bogs, fens and saltmarsh soak up excess water, then release it slowly back into the river. This approach is rapidly gaining popularity in the profession and is seen as an important tool to adapt to the impacts of climate change. It is a cost-effective means of achieving many objectives, including biodiversity obligations, the aims and objectives of the Water Framework Directive, as well as improving recreational opportunities. Such approaches can deliver social, economic, and environmental benefits. They offer a long term, sustainable solution to flooding in the face of changing climate and weather patterns. There will, of course, still be a place for hard defences – sometimes there may be no alternative, but hard defences should be built 'around' soft engineering measures. Many cities and settlements in Scotland are located directly on floodplains alongside rivers and the coast, which makes them vulnerable to flooding. However, even in such situations, soft engineering may reduce the need for building ever-higher flood defences to protect these vulnerable communities. This approach is also being recommended at the European level as part of the Common Implementation Strategy Guidance on Water Framework Directive[11]. The Scottish Executive's *Climate Change Programme*[12] recognises the increased threat of flooding as a result of climate change and identifies sustainable flood management as an important response. This includes considering alternatives to 'hard engineering' and integrating key policy areas with the aim of achieving a more sustainable approach to flooding. This is against a background of work to reduce carbon emissions in an effort to keep climate change within manageable limits.

3.3 Protecting designated sites

Addressing the impacts of coastal flooding in a sustainable manner can also help us protect designated sites against erosion and encroaching sea levels, and adapt to the predicted effects of climate change on the coast. Recent research has shown that there is potential for 'coastal realignment' (reversion of suitable land back to intertidal habitat such as that carried out by RSPB Scotland in Nigg Bay in 2003) around the coasts of Scotland, particularly in the firths. RSPB Scotland's recent *Seas of Change*[13] report identifies 61 sites totalling 3200 ha in Scotland with potential for realignment.


Andy Hay (rspb-images.com)

[11] Common Implementation Strategy for the WFD: WFD and Hydro-morphological pressures, Policy Paper
[12] Changing our ways: Scotland's climate change programme, Scottish Executive publication, 2006
[13] Seas of Change - The potential area for intertidal habitat creation around the coast of mainland Britain: Pilcher, Burston, Kindleysides and Davies, 2002

4. Current arrangements for the management of flooding in Scotland

Bruce Crawford MSP, during *Water Environment and Water Services (Scotland) Bill, Stage 1 debate, 30th October 2002*

"This winter we will again witness major flooding events across the country being tackled with sandbags and canoes. In effect, we are asking people to fight a losing battle. We are tackling the symptoms and doing nothing to prevent future flooding events.

I have seen at first hand in Perth the utter havoc and hardship that flooding can bring to ordinary people's lives. In retrospect, it is incredible that we allowed sprawling housing estates such as exist to the north of Perth to be built on natural floodplains. Had agricultural practices further upstream not interfered even further with the natural floodplains, the scale of the flood defence work for Perth could have been much reduced".

4.1 The current situation

Degraded coastal flood defences at Nigg Bay

Flood management in Scotland is largely piece-meal and very reactive – based on flood warning systems and hard engineering. Development is still allowed to take place on floodplains, and there have only been a handful of attempts to plan on a catchment basis. Traditional flood defences often damage the physical and morphological structure of a river channel and its floodplain through modification, which result in changes in flow regime and sediment deposition, leading to ecological change. Flood defences in coastal areas and estuaries can also have damaging ecological effects through land claim and direct habitat loss as well as through the effects of coastal squeeze. Furthermore, rivers are still separated from floodplains by embankments that are designed to protect agricultural land. Certain agricultural and other land use practices together with widespread land drainage exacerbate the problem of water run-off and erosion. These factors affect the capacity of the natural environment to hold and absorb water during a flood event, and release it into the catchment more slowly. This situation also reflects the fragmented responsibilities for flood management in Scotland, lack of integration between Scottish Executive policies and land management, which tends to exacerbate the problem rather than contribute to its solutions. In contrast to other countries, such as England, there is no single organisation responsible for the management or co-ordination of flooding in Scotland. Current responsibilities for flooding are discussed in more detail below.

4.2 Responsibilities for flood management

- The **primary responsibility** for flooding lies with ***individual landowners***. Individual landowners and groups of landowners are able to carry out drainage works on agricultural land to prevent erosion and flooding under the Land Drainage (Scotland) Act 1958.

Furthermore, the Land Drainage (Scotland) Act 1930 places legal requirements on individual landowners to maintain flood banks, prevent flooding and erosion on agricultural land by carrying out drainage, cleansing or scouring works.

- ***Local authorities*** have duties and powers under the Flood Prevention (Scotland) Act 1961 and Land Drainage (Scotland) Act 1997 to address flood risk to non-agricultural land, and further responsibilities to assess watercourses in non-agricultural areas for flood risk, maintain watercourses and produce biannual reports. Local Authorities are also responsible for the protection of the coastline against erosion from the sea. This enables Local Authorities to respond to protect any land in their area from coastal erosion.

- ***The Scottish Executive*** is responsible for National Policies and Advice, including the production of National Policy and Guidance/Advice on flooding and flood warning, the Town and Country Planning system and applications, but only where flooding as an issue is brought before Scottish Ministers. The Scottish Executive also provides local authorities with grants of up to 80% to address flooding through flood prevention and mitigation. As an outcome of the 2005 spending review, Ministers have increased the resources available for flood prevention schemes to £89 million over a three-year period. It is for local authorities to come forward with suitable schemes to take up these resources.

- ***Scottish Environment Protection Agency*** **(SEPA)** is the lead authority on implementing the Water Framework Directive in Scotland, and for preparing the river basin management plans for river basin districts. SEPA is also responsible for operating the new engineering regime under the Controlled Activities Regulations (CAR) and for consenting engineering proposals for flood defence schemes. SEPA operates flood warning schemes, and provides advice to local authorities on flood risk for planning purpose and flood prevention.

- Finally, ***Scottish Water*** manages discharge of surface water into SW owned drainage system, maintains water and sewerage infrastructure and addresses issues with regards to sewer flooding.

4.3 Flooding policies


Drainage ditch by Andy Hay (rspb-images.com)

There are currently two relevant pieces of primary legislation in place which have contradictory objectives for flood management. These are the i) Flood Prevention (Scotland) Act 1961 (the '1961 Act') and ii) the duty to promote sustainable flood management under the WEWS (Scotland) Act 2003. The main objective of the '1961 Act' is the promotion of flood defence work by local authorities, based on hard engineering measures to prevent or mitigate flooding of non-agricultural land in their area. Flood defence under the 1961 Act only deals with localised incidents, and gives a misleading impression that floods can be 'prevented'. In contrast, the WEWS Act promotes sustainable flood management, based on a strategic,

catchment approach and soft-engineering techniques. These contradictory provisions in flooding policy create problems for local authorities, engineers and practitioners in carrying out their flood protection roles. Furthermore, land is still allowed to be drained on a large scale under the Land Drainage (Scotland) Act 1958. This practice should be brought in line with the requirements of SFM and land allowed to flood more naturally.

The current set-up for flood management is given below.

- ***The Water Environment & Water Services Act 2003*** (the 'WEWS Act') (Section 2, subsections (3) and (4)) requires ''Scottish Ministers, SEPA and the 'responsible authorities' to work in an integrated fashion and co-operate with each other to promote sustainable flood management. The requirements of the WEWS Act were discussed in a previous chapter.

- ***The Water Environment (Controlled Activities) Regulations 2005 (CAR)*** bring into effect the requirements of section 20 of the WEWS Act for control over building, engineering or other works: in inland water other than groundwater, or wetlands; or in the vicinity of inland water or wetlands, and likely to have a significant adverse effect on the water environment. Flood defence schemes fall under these regulations, including those carried out by individual landowners as well as local authorities. However, land drainage works on agricultural land, such as those likely to be authorised under Land Drainage Acts, do not fall under the remit of SEPA.

- ***Flood Prevention (Scotland) Act 1961*** gives local authorities powers to carry out measures to prevent or mitigate flooding of non-agricultural land in their areas, which include cleansing, repairing and maintaining any watercourse or embankment. The main purpose of the Act is to allow engineering works to be carried out for the defence of non-agricultural land against flooding.

- These powers were permissive and discretionary only. However, the ***Flood Prevention and Land Drainage (Scotland) Act 1997*** amended the Flood Prevention (Scotland) Act 1961 by placing statutory duties on local authorities to maintain watercourses within their area. This means that duties under the 1961 Act are no longer discretionary, but a legal requirement. The 1997 Act also requires local authorities to assess flood risk from watercourses, to carry out works to reduce the likelihood of flooding of non-agricultural land as well as to liaise with adjacent authorities. Flood prevention schemes are confirmed by Scottish Ministers and financially supported by the Scottish Executive if they comply with the approved cost/benefit ratio. This Act also repealed parts of Land Drainage (Scotland) Act 1930 and fully repealed Land Drainage (Scotland) Act 1941. However, parts of Land Drainage Acts are still in place, as described below.

- ***The Land Drainage (Scotland) Act 1958*** makes provisions to approval of works to carry out and improve drainage of agricultural land to prevent erosion or flooding. This is mostly aimed at groups of landowners who wish to co-operate in works that affect more than one holding. Therefore, these improvement schemes often involve larger scale works. Landowners must apply to ministers for an Improvement Order.

- ***The Land Drainage (Scotland) Act 1930*** makes further provisions for the drainage of agricultural land by individual landowners. This Act introduces a legal requirement on individual landowners to maintain banks, cleanse or scour channels of watercourses, where neighbouring land may be in danger or is being 'injured' by a lack of such maintenance works. Where such 'danger' exists, the Act also allows for mains drainage, scouring or cleansing of watercourses or drains in agricultural fields to be ordered.

- ***The Coast Protection Act 1949*** sets out the legislative framework for the protection of the coastline against erosion from the sea. Local authorities have permissive powers to carry out works under the terms of this Act and to take appropriate measures as necessary or expedient for the protection of any land in their area.

- ***The new Planning etc. (Scotland) Act 2006*** modifies the current legislative provisions in relation to structure and local plans. The 2006 Act introduces a new development plan regime, with the National Planning Framework, Strategic Development Plans and Local Development Plans each having a role in the development management framework. Local development plans will continue to apply to local planning authority regions in Scotland. Action programmes will set out how the planning authority intends to implement the aims and objectives of local and strategic development plans. One of the amendments to the existing system include SEPA becoming a 'Key Agency' with specific obligations requiring it to engage more fully in the preparation process for development plans. The Plan Development process is guided by a set of planning policies and planning advisory notes.

- With regard to flooding***, Scottish Planning Policy (SPP) 7 Planning and Flooding*** sets the policy for preparing development plans and determining applications. It contains advice on preventing further development of areas which would have a significant probability of being affected by flooding, or which would increase the probability of flooding elsewhere. This includes coastal and watercourse flooding.

- The SPP is supported by ***Planning Advice Note (PAN) 69 Planning and Building Standards Advice on Flooding***. Secondary legislation requires planning authorities to consult SEPA where there is a flood risk and for the case to be notified to Scottish Ministers if the planning authority intends to grant permission contrary to the advice of SEPA.

- ***The Environment Act 1995*** places duties on SEPA to assess, as far as it considers it appropriate, the risk of flooding in any area of Scotland. Where requested by a planning authority, SEPA provides advice on the risk of flooding in any part of the authority's area.

- ***Water Industry (Scotland) Act 2002 and Sewerage (Scotland) Act 1968*** place duties on Scottish Water to manage discharge of surface water that enters its drainage systems. It requires Scottish Water to work in partnership with the local authority and emergency services to alleviate any flooding of foul sewers and the impact of this flooding, to maintain drainage infrastructure and manage water supply reservoirs.

- ***National Flooding Framework and Statement of Commitments*** was agreed in February 2003, the Scottish Executive Cabinet agreed, on advice from the Ad Hoc Committee of Ministers, a

Statement of Commitments[14] to reduce the risks and impacts of flooding and an action plan in the form of the National Flooding Framework. This resulted in the establishment of an Advisory Group on flooding, currently known as the Flooding Issues Advisory Committee (FIAC).

Other relevant policies

- ***Nature Conservation (Scotland) Act 2003*** places duties on local authorities and other public bodies to further the conservation of biodiversity. Restoring wetlands as part of flood management schemes can help to deliver this obligation and contribute towards meeting Biodiversity Action Plans for vulnerable species and habitats.

- ***The draft Scottish Rural Development Programme*** prioritises rural land management that delivers multiple objectives and value for public money, including measures to tackle climate change and water issues, and specifically sustainable flood management[15].

4.4 The forthcoming EU Floods Directive

The European Commission recognises that flooding is an increasing problem in Europe. There have been more than 100 damaging floods in Europe since 1998, including the catastrophic floods on the Danube and Elbe in 2002. The need for a common approach to identifying and managing flooding across Europe was identified and the Commission proposed action to address this issue. The objective of the proposed Directive is to reduce and manage the risk that floods pose to human health, the environment, infrastructure and property.

The key proposals in the Directive include a mandatory flood risk assessment for river basin and coastal zones by all Member States. The Floods Directive will require flood mapping in areas of significant risk and the production of flood risk management plans through a broad participatory process. Implementation of the Directive and the measures taken should be closely linked to the implementation of the Water Framework Directive, and action should be co-ordinated across international borders. The Commission proposes to fully align the institutional and organisational aspects and timing with the WFD. One of the objectives is to reduce environmental impacts, including avoiding damage to valuable habitats and biodiversity. The common position is due to be submitted to the European Parliament for its second reading in June 2007.

The transposition of the EU Floods Directive, should the European Parliament approve it, will provide an **unprecedented opportunity to introduce a new, more sustainable approach to flood management in Scotland. The Directive should be transposed into Scots law through primary legislation and address inadequacies in the current provisions for flood management.**

[14] http://www.scotland.gov.uk/Resource/Doc/1223/0007090.pdf
[15] The Strategic Plan for Scotland outlined in the draft Scotland Rural development Programme, 2007

5. Key recommendations

RSPB Scotland recommends that in order to achieve SFM, the following five key steps must be taken. Each of these recommendations is discussed further in the following chapters.

Address contradictions in flood management legislation

The Scottish Executive needs to review and where necessary amend the provisions within the Flood Prevention (Scotland) Act 1961, Land Drainage Acts and Coast Protection Act 1949 to take into account the new duty on SFM. Currently, there are two pieces of primary legislation in place that deal with flooding, with contradictory aims and objectives. Land drainage can still take place under the Land Drainage Acts 1958 and 1930. This situation is causing many problems for local authorities and land managers alike, and limits the scope for SFM in practice.

Establish clear lines of responsibility for co-ordinating flood management

The responsibility for flooding in Scotland is highly fragmented with no single organisation responsible for co-ordinating action on the ground. SEPA, the lead organisation for the implementation of WFD has all the tools that would enable it to oversee and co-ordinate flood management. SEPA should therefore be given the responsibility to co-ordinate flooding in Scotland.

Deliver fully integrated RBMP and flood management

The Scottish Executive needs to bring together RBMP and flooding, and ensure that entire river basin is considered when addressing flooding problems. Such an approach could deliver many benefits, including better integration at national, regional and local scale, long-term planning, catchment-based solutions to flood risk, and a better use of public funds to deliver multiple objectives. The role of existing groups, such as the Flood Liaison Advice Groups should be clarified and strengthened.

Implement a better statutory land-use planning system, which promotes Sustainable Flood Management, SUDS and prevents further development on floodplains

Many residential and other developments and infrastructure are located on floodplains. Further development shrinks the land available to naturally flood and increases the area of impermeable surface. All of this increases the rate of surface water run-off during rain. Current estimates of yearly damage from flooding in town and cities are around £20 million – which could rise by 115% by 2080. New policy guidance on the impacts of the WEWS Act on the planning system is needed as a matter of urgency. Further revisions of all relevant Scottish Planning Policies and Planning Advisory Notes are needed to ensure full integration with sustainable flood management requirements.

Better integration of flooding with the wider rural land use management framework and other government policies which encourage floodplain restoration and coastal realignment

The Scottish Executive needs to deliver a properly integrated land management framework, which encourages land managers to adopt practices that reduce the risk of flooding and protect the environment. This includes incorporating flood management into all aspects of rural land management, and offering well funded land management schemes, which encourage wetland and floodplain restoration. The Scottish Executive and land managers should recognise the value of natural floodplains and upland habitats. Support payments and other funds should be re-directed towards alternatives to hard flood defences. New techniques such as coastal realignment need to be accepted as feasible options for flood defences and appropriate funding mechanisms need to be put in place to enable sustainable adaptation to climate change and increased flood risk.

5.1 Address contradictions in flood management legislation

The Scottish Executive needs to review and where necessary amend the provisions within the Flood Prevention (Scotland) Act 1961, Land Drainage Acts and Coast Protection Act 1949 to take into account the new duty on SFM. Currently, there are two pieces of primary legislation in place that deal with flooding, with contradictory aims and objectives. Land drainage can still take place under the Land Drainage Acts 1958 and 1930. This situation is causing many problems for local authorities and land managers alike, and limits the scope for SFM in practice.

5.1.1 Background information

There are currently 2 pieces of primary legislation in place with contradictory objectives for flood management. These are the Flood Protection (Scotland) Act 1961 (the '1961 Act') and the duty under the WEWS Act to promote sustainable flood management. The current approach to flooding is driven by the provisions of the '1961' Act, which encourages a piece-meal and reactive approach, based on hard engineering and flood warning. The '1961 Act' does not recognise the benefits of a catchment approach to assessing and managing flood risk, or the role of non-structural measures in flood mitigation. However, it has been increasingly recognised that the causes of flooding can be better understood and managed by considering the whole catchment. Non-structural measures such as the restoration of wetlands, floodplains, and uplands have an increasingly important role in flood mitigation, especially for small to medium scale flooding[16].

5.1.2 Flood Prevention (Scotland) Act 1961

Flood Prevention (Scotland) Act 1961 as amended by the Flood Prevention and Land Drainage (Scotland) Act 1997 places statutory duties on local authorities to maintain watercourses within their area. The main purpose of the Act is to allow engineering works to be carried out for the defence of non-agricultural land against flooding. Under the current system, local authorities are therefore given statutory powers to prevent or mitigate flooding of non-agricultural land in their area, by cleansing, repairing and maintaining any watercourse or embankment. These powers are limited to the specified types of work which include:

- Cleansing, repairing and otherwise maintaining watercourse, barrier, embankment or other flood defence work, including apparatus and equipment, and with it associated:
  - Management or operation of these work or apparatus
  - The removal of such work or apparatus
  - The construction or provision of any new watercourse of apparatus
  - The reinstatement of land damaged by these operations

The Act does not encourage the assessment of catchment flood dynamics, the effects of land management on water run-off, cumulative effects of engineering works, or partnership working. Flood prevention under the 1961 Act only deals with localised incidents, and gives a misleading impression that floods can be 'prevented'. Structural measures, such as those currently and traditionally used to deal with flooding, are likely to result in the deterioration of

[16] How to use floodplains for flood risk reduction, Ecoflood Guidance, European Commission, 2007

ecological quality, and are therefore likely to jeopardise the achievement of Water Framework Directive objectives. These measures also contribute to, and sometimes exacerbate the problem of flooding. **These provisions are currently limiting the scope for sustainable flood management in Scotland, and need to be revised.**

The main recommendations for the revision of the 1961 Act include:

Purpose of the Act
The Act enables local authorities to take measures to prevent or mitigate flooding of non-agricultural land. However, sustainable flood management aims to manage flooding along the whole catchment, and look at solutions which will often involve the use of agricultural land. The purpose of the Act needs to be based on an agreed definition of sustainable flood management. It must encourage soft-engineering solutions, and concentrate on managing flooding on the whole catchment rather than trying to prevent it.

Section 1: Flood prevention operations
The main weakness of the 1961 Act is that it only provides for the use of traditional, hard-engineered solutions to flood risk. It needs to expand the scope of its provisions to include soft-engineering solutions and natural flood management as a means of achieving reduction in flood risk.

There is a need to establish a lead authority to co-ordinate flood management at catchment scale. In Section 5.2 of this report, we propose that SEPA, as the lead organisation for the implementation of RBMP, has all the tools that would enable it to oversee and co-ordinate flood management in Scotland. This co-ordination work, and that of the individual agencies must be consistent with the WEWS Act duty to promote sustainable flood management.

Section 4A: Duty of local authorities to assess watercourses
Currently, local authorities must prepare reports every two years, which specify the occurrence of flooding and measures they must take to prevent or mitigate flooding of land in their area. The purpose of these reports should be expanded to include a provision for a compulsory catchment-based assessment of flood risk, from 'source to sea', and which includes the assessment of land management activities and existing floodplain function. This will require a co-ordination of reporting between the relevant authorities at catchment scale.

Section 5: Combinations of local authorities
The 1961 Act specifies that local authorities when exercising their powers may combine with any other local authority to carry out flood prevention operations. For the purpose of sustainable flood management, such co-operation will be necessary and should be made compulsory, to ensure the taking of a strategic, catchment-based approach.

Sections 11 and 13: Compensation and Financial provisions
Flood prevention schemes are confirmed by Scottish Ministers and financially supported by the Scottish Executive if they comply with the approved cost/benefit ratio. Local Authorities are also able to pay out compensation to any person whose land has depreciated in value or whose interest has been affected by the flood prevention scheme. However, this limits the scope of local authorities for sustainable flood management in that it only allows for one-off payment for the loss of land. It does not allow for the long-term use and management of

agricultural land for the purpose of flood management and flood mitigation. There is a need to establish clear links between land management payments under other policies, such as the Rural Development Policy, to enable longer-term management of land for flooding. The financial support to local authorities by the Scottish Executive currently provides 80% of the cost of the scheme. This funding needs to be clearly linked to the objectives of sustainable flood management. The Scottish Executive's 'flood prevention' budget and its agricultural support payments must be better integrated to support the implementation of a sustainable approach to flooding. The mix of both revenues is necessary to deliver a catchment-based approach to flood management.

5.1.3 Coast protection Act 1949

Coast Protection Act 1949 sets out the legislative framework for the protection of the coastline against erosion from the sea. Local authorities have permissive powers to carry out works under the terms of this Act and take appropriate measures as necessary or expedient for the protection of any land in their area.


Coast protection by Andy Hay (rspb-images.com)

One of the predicted impacts of climate change is a rise in sea levels. The medium-high emissions scenario predicts a rise in sea level on the east coast of Scotland of 23cm by 2050. This, together with increased storminess, will increase the pressure on our existing coastal defences, increasing the risk of coastal erosion and flooding. The rising seas also threaten coastal habitats and wildlife. The loss of important saltmarsh and mudflat habitats through 'coastal squeeze' is already happening at a rate of 100 hectares a year. There is currently a lack of innovative schemes and policies to address this issue and recreate such habitats in Scotland, through processes, such as 'coastal realignment' and 'tidal exchange'. Such 'soft-engineering' techniques carry a number of social and environmental advantages to conventional hard-engineering schemes. Sustainable flood management and the provisions of the WEWS Act apply to the management of coastal as well as inland areas, and therefore to the provisions of the 1949 Coast Protection Act. **It is therefore recommended that the provisions of the 1949 Act be revised to include these recommendations.**

5.1.4 Land Drainage (Scotland) Acts 1958 and 1930

Land Drainage (Scotland) Act 1958 makes provision to approval of works to improve drainage of agricultural land to prevent erosion or flooding. The schemes often involve a group of landowners and are therefore carried out at a larger scale than individual holdings. Landowners apply to ministers for an Improvement Order, which authorises the works and subsequent maintenance of such works. These Improvement orders sometimes result in large-scale drainage of inland and coastal wetlands, impairing the natural ability of wetlands to absorb water. Individual landowners also have legal duties to maintain / carry our drainage on their land, or cleansing and scouring of watercourses in accordance with the Land drainage Act 1930. **The provisions of the Land Drainage Acts need to be brought in line with SFM requirements.**

5.2 Establish clear lines of responsibility for co-ordinating flood management

The responsibility for flooding in Scotland is highly fragmented with no single organisation responsible for co-ordinating action on the ground. SEPA, the lead organisation for the implementation of WFD has all the tools that would enable it to oversee and co-ordinate flood management. Scottish Environment Protection Agency (SEPA) should therefore be given the responsibility to co-ordinate flooding in Scotland.

5.2.1 Background information


Andy Hay (rspb-images.com)

There is no single organisation currently responsible for the management or co-ordination of flooding in Scotland. As discussed in Chapter 4, the primary responsibility for flooding lies with individual landowners. This often results in small-scale flood defences being put in place by individual landowners to protect agricultural land. Local authorities address flooding on non-agricultural land and erosion in coastal areas, and further responsibilities are given to the Scottish Executive, SEPA and Scottish Water in dealing with other aspects of flooding, such as flood policies, advice and sewerage infrastructure. **The lack of co-ordination by a single organisation makes it extremely difficult to take an integrated approach to flooding.**

5.2.2 The role of SEPA

SEPA is the competent authority for ensuring implementation of the WFD. Its role now is wide ranging and well beyond that of its founding legislation. SEPA is instrumental in determining the degree to which sustainable flood management occurs, particularly through the way it exercises its new duties and powers contained in the following sections of the WEWS Act:

i. **Duty to promote sustainable flood management**
   This report discusses how this can be delivered.

ii. **Responsibility for River Basin and sub basin plans and Area Advisory Groups**
   SEPA is in the process of preparing River Basin Management Plans (RBMPs), which must include a summary of the significant water management issues within the river basin district, environmental objectives relating to water bodies, and a Programme of Measures to achieve these objectives. This process provides an opportunity to recognise the impact of damaged and mismanaged floodplains and wetland habitats; to ensure that environmental objectives embrace wetlands associated with water bodies; and to ensure

that measures which deliver sustainable flood management are adopted. SEPA has recently established Area Advisory Groups, which will ensure public participation in this process. An important aspect of this is the involvement of 'responsible authorities', which include local authorities that are currently responsible for flood management on non-agricultural land, and the farming industry, which has a major role to play in sustainable flood management. This is an opportunity to co-ordinate sustainable flood management and identify measures that can be taken to reduce the risk of flooding at catchment scale.

iii. **Operating the new control regime (the Controlled Activities Regulations) for building or engineering works in, or in the vicinity of, any inland surface water and wetlands**
SEPA has a major influential role in determining whether proposed flood defence schemes protect the water environment under this new consent regime. Clearly, many traditional flood defences and land drainage activities have a direct and significant impact on ecological status, and many of these impacts relate to the riparian and intertidal zones, which are controlled under the CAR. Traditional approaches to flooding, including those undertaken by individual landowners as well as local authorities, are often not compatible with WFD aims and objectives. Where such modification of the water environment is necessary, SEPA must be satisfied that the damaging proposal meets derogation criteria set out in the Directive. However, RSPB Scotland believes that sustainable flood management, if implemented properly, provides an opportunity to contribute towards meeting the objectives of the WFD, rather than be seen as a barrier to its implementation.


Andy Hay (rspb-images.com)

iv. **Ensuring cost-effective solutions**
SEPA must have regard to the social and economic impacts of complying with the requirements of the WFD. Restoring wetlands and floodplains provides a cost-effective means of meeting WFD hydro-morphological objectives at the same time as an opportunity to provide cost-effective flood alleviation, which will benefit people and wildlife

v. **Restoration powers**
Scottish Ministers can make regulations which allow SEPA to undertake active restoration works in order to meet the environmental objectives for water bodies. These regulations provide an opportunity to restore hydro-morphological features of water bodies in areas where flooding is a problem.

SEPA has all the tools to enable it to be the co-ordinator for flood management in Scotland. Through river basin management planning it can further the catchment approach to flooding and ensure better co-ordination with the land use sector and local authorities. **SEPA should be given an overall responsibility for co-ordinating catchment-based approach to flood management.**

5.2.3 The role for Flood Liaison and Advice Groups (FLAGs)

Scottish Planning Policies (SPP7 and PAN) establish the regional Flood Liaison and Advice Groups (FLAGs). The creation of FLAGs was a positive step, but their role in delivering sustainable flood management is currently limited and needs to be better supported. They provide a forum for communication between interest groups and for information exchange. However, the status of FLAGs is currently weak, and its membership is limited to flood issues on non-agricultural land. If reinforced, these groups have the potential to significantly contribute to delivering sustainable flood management on the ground and provide an important link between RBMP and flooding. The WEWS Act allows for the establishment of advisory fora to deal with a specific catchment issue, such as flooding. This provides an opportunity for FLAGs to become a formal advisor to Area Advisory Groups, specialising on a whole catchment approach to flooding under RBMPs. The membership should be extended by involving landowners and farmers with flooding interest on their land.


Andy Hay (rspb-images.com)

FLAGs also have the potential to influence and guide the development of good local flood policies and advice on national policies on flooding. They can provide for a more independent decision-making process and give support to the Planning Authority and SEPA in reaching decisions on specific developments. They could also provide forum for awareness raising and training, and advice on the management of wetland habitats, grant schemes and other financial resources to aid the implementation of SFM in Scotland. **These groups are an important existing resource and it would make sense to make the best use of them. However, in order to achieve this, the membership, roles and remits of these groups need to be revised and strengthened. This can be achieved through a revision of the PAN and SPP7.**

5.2.4 The role for a national Flooding Issues Advisory Committee (FIAC)

The National Flooding Framework and Statement of Commitments agreed in February 2003 resulted in the formation of an Advisory Group on flooding, currently known as the Flooding Issues Advisory Committee (FIAC). Whilst the group has made good progress in improving the understanding of, and defining sustainable flood management, the Scottish Executive has been slow to implement these changes on the ground. The current FIAC has membership of specialists in the field of flooding and flood policy. We recommend that the group continues its activities to oversee, inform and advise on the implementation of sustainable flood management. **However, the group would benefit from a direct Ministerial involvement and a revision of its membership to include the wider farming and rural interests.**

5.3 Deliver fully integrated RBMP and flood management

The Scottish Executive needs to bring together RBMP and flooding, and ensure that entire river basins are considered when addressing flooding problems. Such an approach could deliver many benefits, including better integration at national, regional and local scale, long-term planning, catchment-based solutions to flood risk, and a better use of public funding that delivers multiple objectives.

5.3.1 Background information

WFD sets out a new approach to water management through integrated river basin planning. Although WFD does not require plans to be drawn up to specifically address flooding, it provides an unprecedented opportunity to incorporate flooding within its scope and to usher in a new sustainable approach to flooding. Currently, there is no system in place, which allows for the investigation or appraisal of flood risk management at a catchment scale. Most flood defence projects are still investigated at a local scale and in urban areas which are at direct risk of flooding[17]. This reactive approach to flood protection has led to millions of pounds being spent on the construction of embankments, flood walls and culverts. These structures only move large volumes of water downstream faster, causing flooding elsewhere. In the long term, this makes our approach to flooding unsustainable.

5.3.2 Opportunities provided by RBMPs

WFD provides for integrated river basin management by looking at the bigger picture – the whole river basin. It takes into consideration the cumulative impact of various land management activities and considers interactions between them: agriculture, engineering and land development, transport, rural land use and forest management. All of these activities can cumulatively contribute to the problem of flooding, but on the other hand, are also an important part of its solution.

Integrating RBMP and flood management would deliver an inter-disciplinary approach, which would consider flooding at catchment or sub catchment level. This would deliver:

- Long-term planning
- Integration at all levels of government (national, and regional and local), with key responsible authorities and agencies, such as those responsible for environmental protection, land use planning, water infrastructure and forestry
- Integration with key land use interests and stakeholders, such as local communities, farmers and environmental/conservation interests
- Strategic forum within which flood prevention measures can be considered
- Better targeting of available funding to deliver multiple objectives and best value for public money
- Opportunities to raise awareness of flooding problems
- Links between WFD economic appraisal and flooding

[17] Broad scale ecosystem assessment (BSEA) Scotland report, SNIFFER, June 2006

Article 13.5 of the Directive allows for the RBMP **to be supplemented by the production of more detailed programmes and management plans for sub-basins, sectors, or issues in order to deal with particular aspects of water management.** The WEWS Act also gives Scottish Ministers the powers to make regulation under section 10 to specify any matters that must be covered by the RBMPs. **Ministers therefore can, and should, stipulate that plans must address flooding management issues.**

Minister for the Environment and Rural Development, Ross Finnie MSP
During the Water Environment and Water Services (Bill) Stage 3 debate, 2003:
"One of the planning instruments that local authorities have not had access to is river basin planning. Certain local authorities could be asked what it is that they want to do and whether they are aware of the implications of flooding. They could be asked whether they are simply moving the problem from one place to another. In the past local authorities have been criticised for doing that and the criticism has been well founded. The problem arose largely as the result of the absence of proper river basin management. That system can act as a driver for the problem of flooding to be considered as a whole. Under that system flooding cannot be said to be a local problem"

5.3.3 Linking Economic Appraisal to sustainable flood management

Economic appraisal features prominently in the WFD and will be an important part of the implementation process. The economic analysis required under Article 5 and Annex III is designed to help Member States choose the most cost-effective combination of measures to achieve the Directive's objectives. Analysis must contain enough information and sufficient detail to make considered judgements about cost-effectiveness. For instance, it should compare the costs and benefits – including environmental costs and benefits – of measures involving the creation and restoration of wetlands with other options for achieving the WFD's environmental objectives.


Chris Gomersal (rspb-images.com)

There is currently a major problem in promoting schemes which deliver multi-functional benefits when there may appear to be a cheaper option delivering the same flood defence standard, but at the lower level of social and environmental gain. This approach is likely to be short sighted and unsustainable: economic efficiency is achieved when the total of all forms of benefit is maximised. Getting value for money means that schemes should not simply be selected on the basis of priced costs and benefits. Unpriced benefits must be built into the equation – for example, meeting national objectives for biodiversity and sustainability, contributing towards the obligations of the WFD, as well as health and recreational benefits. In other words, decision makers should opt for 'best value' in the widest sense – and not simply the lowest price. This approach is already widely understood in the Scottish public sector. For instance, the Local Government

(Scotland) Act 2002 defines 'best value' as that which contributes to the delivery of aspects of sustainable development.

Whilst there is widespread consensus that wetlands play a crucial role in a range of functions within catchments, there is a dearth of practical tools to assist with their evaluation. The net effect is that the functional benefits provided by wetlands are not properly recognised in the formal process of decision making for flood risk management. Moreover, environmental assets are commonly described as a liability and are often viewed as a constraint upon economic development opportunities rather than as an asset or resource providing multiple benefits for minimal cost to society. WFD economic tools provide for a proper assessment of costs and benefits, and these economic tools would be advantageous to the assessment of the real cost-effectiveness of flood defence measures. Example of an economic value of a natural floodplain is given in Table 1.

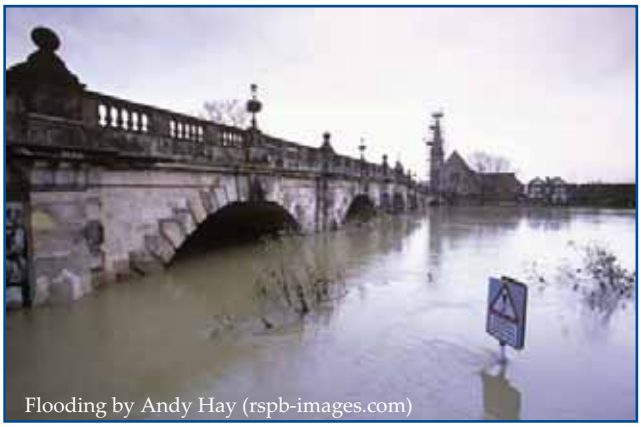
Table 1: Multiple Functions of the Insh Marshes floodplain and the economic value (Dickie, 2001)

Use	Information	Economic value
Flood defence	Insh marshes hold a substantial amount of water and reduce flood risk to settlements such as Aviemore.	Insh marshes provide the equivalent of 7km of flood defences in Aviemore, representing a substantial value.
Visitors	Insh marshes nature reserve is important for local economy, and visitor attractions.	There were 12,7000 visitors in 2000/01, contributing app £140,000 to local economy.
Farming	Livestock grazing at appropriate densities maintains higher biodiversity. Over half of the reserve is in ESA scheme and agri-environment.	Agri-env schemes provide valuable income to the reserve and graziers, estimated at £100/ha.
Fishing	Floodplain helps maintaining the natural condition and water quality, which are vital to the Spey's fish stocks.	Fishing rights are leased to Badenoch Angling Association, producing revenue of over £3,500 p.a.
Water quality	Floodplain can improve water quality by storing pollutants in the sediment and vegetation	This function helps to achieve the water quality objectives under WFD and benefit salmonid populations.
Conservation management	RSPB endeavours to spend the majority of conservation management within the local economy, and employs 2 permanent and 3 contracted staff and volunteers.	In 2000/01 RSPB spent £28,000 on reserve management, of which 2/3 with local businesses, including contractors.
Education and Training	Insh Marshes provide valuable recreational and educational resource.	(Unquantified)
Enterprises link to the floodplain	Loch Insh Watersports centre, which benefits from the high water and scenic qualities of the floodplain.	(Unquantified)
Biodiversity and Conservation	Insh Marshes contains important wetland habitat and is renowned for its biodiversity, including breeding waders, hen harriers, wintering whooper swans and rich diversity of other plants and invertebrates.	(Unquantified)

5.4 Implement a better statutory planning system that promotes Sustainable Flood Management, SUDS and prevents further development on floodplains.

Many residential and other developments and infrastructure are located on floodplains. Further development shrinks the land available to naturally flood and increases the area of impermeable surface. All of this increases the rate of surface water run-off during rain. Current estimates of yearly damage from flooding in town and cities are around £20 million – which could rise by 115% by 2080. New policy guidance on the impacts of the WEWS Act on the planning system is needed as a matter of urgency. Further revisions of all relevant Scottish Planning Policies and Planning Advisory Notes are needed to ensure full integration with sustainable flood management requirements.

5.4.1 Background information


Flooding by Andy Hay (rspb-images.com)

Many settlements, towns and cities are located on low-lying floodplains alongside rivers and flat land on the coast. Further expansion of these settlements reduces the amount of land available to flood. Recent flood risk maps published by SEPA indicate that extensive built-up areas are at risk from flooding - around 160,000 Scottish homes and 13,000 businesses are vulnerable to inland and coastal flooding[18]. Estimates of annual average damage from flooding are around £20 million – this could rise by 115% by 2080[19]. Further development and transport links associated with these developments continue to increase the area of impermeable surface, which increases the rate of surface water run-off during rain. Our drainage systems in built up areas are under pressure during heavy rain, often discharging directly into watercourses, further raising the water levels and increasing the risk of flooding.

5.4.2 Land use planning and development control (management)

Local authorities, and particularly planners and engineers, have an influential role in the design, promotion and approval of catchment-based and soft-engineered flood alleviation schemes. Under the WEWS Act, local authorities are required to promote and implement the provisions of sustainable flood management when exercising their functions under the planning legislation. The Scottish Executive needs to ensure that sustainable flood management and the requirements of the WEWS Act are fully embedded into the statutory land use planning system. Whilst the revision of Scottish Planning Policy (SPP) 7: Planning and Flooding in 2003 broadened the previous provisions under National Planning Policy

[18] www.sepa.org.uk

[19] Climate Change: Flooding Occurrences Review, Scottish Executive Research, 2002

Guidance (NPPG) 7, we believe that there are still issues that need to be addressed. We therefore recommend that further revisions of Scottish Planning Policies (SSP7 and PAN 69) are necessary to strengthen the link between sustainable flood management and planning policies.

The land use planning system needs to respond to the new requirements under the WEWS Act at various levels, including national planning policies and guidance as well as development plans and development controls, now called development management.

5.4.3 National Planning Policies


Flooding by Andy Hay (rspb-images.com)

National Policies are important in shaping development plans for a particular area. They come in the form of the National Planning Framework, Scottish Planning Policies (SPPs) and Planning Advisory Notes (PANs). The status and function of the National Planning Framework was recently advanced by the passage of the Planning Act. Work to produce the second National Planning Framework is now underway and must tackle the obligations arising from the WEWS Act, in particular the requirements to deliver sustainable flood management. Further revision of the relevant Scottish Planning policies (especially SPP7 and PAN on flooding) is necessary to strengthen the link between sustainable flood management and planning policies, in particular:

- More explicit reference to, and support for, catchment flood planning, and coastal planning
- Better partnership working between agencies and across local authority boundaries
- Promotion of non-structural flood management options, such as the restoration of floodplain wetlands, better use of existing floodplains and managed realignment
- Better links with ecological quality and the WFD programme of measures through integration with RBMPs
- Strongly discourage further development or re-development on floodplains, and the use of land raising techniques which can have impacts on flooding elsewhere
- Better and more sustainable planning for climate change
- Better use of Flood Liaison and Advice Groups (FLAGs)

5.4.4 Strategic and Local Development Plans

Strategic and Local Development Plans are tools, which guide the future development of an area. To be effective these plans must ensure full understanding of how areas function, and provide a sustainable vision of the area's future. Policies included in Development Plans cover key land use issues and help to secure sustainable development. To date there has been no clear indication how development will incorporate the requirements of the WEWS Act –

and there is an urgent need to clarify the relationship between RBMPs and development plans.

We recommend that strategic development plans can contribute to flood management by incorporating the following:

- Appropriate assessment of hydrology and drainage of river catchments
- Establishing links with the RBMP's Programme of measures
- Identifying inland and coastal areas which are at risk of flooding, taking into account the impacts of climate change and avoiding further development of these sites
- Protecting existing floodplain and washland areas
- Identifying sites of potential floodplain restoration that could be used for flood management
- Promoting changes in land use to enable floodplains to function more naturally or flood more extensively
- Promoting soft-engineering techniques

5.4.5 Development Control (Development Management)


Andy Hay (rspb-images.com)

Development control is a key function of the planning system and in relation to flooding it therefore must be ensured that:

- There is no further development on floodplains
- Controls discourage engineering activities that have the potential to increase erosion elsewhere or compromise floodplain functions, such as land raising
- There are clear links between planning decisions and RBMP's Programme of Measures; and
- SUDS and soft-engineering techniques are promoted at all scales of development.

RSPB Scotland recommends that **further guidance is needed to incorporate the relevant aspects of the WEWS Act and SFM. This should be delivered through a separate SPP/PAN on the WEWS Act to complement the relevant SPPs. Alternatively, this could be achieved by expanding the current remit of SPP /PAN on Flooding to include WEWS Act requirements.**

5.5 Better Integration of flooding with rural land-use management framework and other government policies

The Scottish Executive needs to deliver a properly integrated land management framework, which encourages land managers to adopt practices that reduce the risk of flooding and protect the environment. This includes incorporating flood management into all aspects of rural land management, and offering well funded land management schemes, which encourage wetland and floodplain restoration. The Scottish Executive and land managers should recognise the value of natural floodplains and upland habitats. Support payments and other funds should be re-directed towards alternatives to hard flood defences. New techniques such as coastal realignment need to be accepted as feasible options for flood defences and appropriate funding mechanisms need to be put in place to enable sustainable adaptation to climate change and increased flood risk.

5.5.1 Background information

The way land is managed can have significant effects on surface water run-off, drainage and the natural capacity of the catchment to absorb water. Defences that protect farmland from flooding have been one result of agricultural policy. Many rivers have been canalised and embanked; drainage and grazing regimes associated with intensive farming have contributed to the loss of floodplain wetlands and resulted in long-term damage and drying out of habitats such as lowland raised bogs. Integration of flood management into land use management and agricultural policies is essential to deliver an integrated land use management framework, which offers well funded land management schemes and recognises the value of naturally functioning floodplains and upland habitats, redirecting support payment towards alternatives to hard flood defences. This includes promoting land management techniques that are sympathetic to flooding through existing programmes and initiatives, such as the Scottish Rural Development Programme (SRDP).

5.5.2 Flooding – an objective for land managers

Flood defence and the drainage of farmlands has been inadvertently encouraged by the EU Common Agricultural Policy (CAP) since World War II, with the aim of increasing and securing food production. Drainage of fertile grounds and floodplains today play a major role in preventing the natural sponge-like functioning of floodplains throughout Scotland. Applications for major drainage schemes can still be made today under the Land Drainage Act (Scotland) 1958 and 1930.

However, agricultural policy is changing and the emphasis is increasingly on diversifying, the delivery of public benefits and environmental enhancement. Where flood banks are protecting marginally viable farmland - and even higher quality land - decisions need to be made on whether current farming practices are genuinely providing the widest benefits from that land or whether the public interest would be better served by a change in land management. The CAP has the potential to benefit sustainable flood management; by funding and prioritising measures through its Pillar 2, which increase the natural capacity of

floodplains to store water and slow the water flow by maximising natural vegetation cover, restoring natural morphology and reconnecting floodplains. Recent reforms of the CAP have seen this sort of environmental objective increase in prominence, with a move away from payments that simply support agricultural production. It is important to note that collaborative applications along catchments may be needed to bring the desired benefits, and the Scottish Executive's intention to encourage collaborative approaches of this sort through the new delivery vehicle for support payments, Land Management Contracts, is to be welcomed.

The views of farmers and other land managers are obviously critical to implementing sustainable flood management. To encourage a positive approach, there is a pressing need for appropriate and targeted incentives to encourage a reversion to more sympathetic, less intensive, agricultural management on floodplains. The Rural Stewardship Scheme (RSS), Scotland's main agri-environment scheme until 2006, provided certain measures, which had secondary local benefits to flood management, such as the creation and management of wetlands and floodplains. However, the effectiveness and overall benefits of these prescriptions were not optimal, uptake was poor and farmers were not required to undertake any additional management to support the natural floodplain function. Furthermore, a recent research by RSPB Scotland and FWAG[20] suggests that in the last year of the RSS (2006), at least 735 applicants for wetlands measures were refused because of insufficient funding for agri-environment schemes. This number only applies to applications processed by FWAG and SAC advisors, and if all applications were considered, the number could have tripled. This means that the area brought into wetland and floodplain management in 2006 could have doubled. **It must be recognised that the historic and current budget for agri-environment schemes is limited and may not provide the necessary funding to implement SFM. Management for flooding may require additional funding from separate sources.**

5.5.3 Ensuring an integrated approach

The duty to adopt an "integrated approach"[21][3] across land use policy is critical. It is reflected in the aspirational words of numerous recent government documents and initiatives, but key

[20] Agri-environment in Crisis, RSPB and FWAG report, 2006

changes to policy and funding are required if sustainable flood management is to become a reality. Of all the tools of the CAP, cross-compliance[22] and agri-environment are potentially the most useful for helping implement the WFD and sustainable flood management, as identified by an *EC WFD/CAP paper*[25]. Funding for agri-environment under the new SRDP is an area of huge concern, as Scotland receives a very low contribution of EU funding for rural development, and our agri-environment programme is historically very poorly funded. In order to deliver many of the Scottish Executive's environmental objectives, including those encompassed by the WEWS Act, **increased funding for the SRDP must be secured**. A key way to achieve this would be to employ an adequate level of 'voluntary modulation'. This would transfer parts of the budget that are currently directed to Single Farm Payments, towards rural development measures that deliver public benefits in return, and go some way to achieving Scotland's environmental objectives and commitments. In addition to potentially severe limits on funding, very few specific flood management measures have been proposed as part of the proposals for Land Management Contracts, under the new SRDP. Should adequate funding be secured, the Scottish Executive should allocate, as part of the SRDP, sufficient funding for specific agri-environmental measures that:


Developing saltmarsh at Nigg Bay

- target protection/restoration of wetlands and floodplains in priority catchments
- re-instate good hydro morphological and ecological status of surface waters

Should funding for the SRDP prove to be inadequate to support widespread adoption of these measures, **alternative funding sources must be found.**

The historic under-funding of Scotland's agri-environment programme, and the prospect of limited funding in the new SRDP, make it even more important that **the baseline environmental conditions contained in cross-compliance adequately support the implementation of both flooding and wider WFD objectives**. Until such time as the WFD becomes recognised as one of the Statutory Management Requirements (SMRs) that form part of cross-compliance across Europe, the link between the WEWS Act, in terms of flood management, and agricultural support payments will **need to be strengthened and clarified.**

5.5.4 Coastal realignment

Climate change and the resulting sea level rise is likely to have significant effects on coastal defences around Scotland, increasing the risk of flooding and resulting in 'coastal squeeze'.

[22] Since 2005, all direct payments to farmers (in Scotland, these are called Single Farm Payments) are dependent upon adherence to basic environmental and animal health and welfare conditions, in a process known as 'cross-compliance'

The loss of important saltmarsh habitat and mudflats is already being seen around the coast of Scotland. The loss of saltmarsh now totals over 100 hectares a year in Britain[23]. Intertidal habitats play an important role in absorbing wave energy and reducing the pressure on coastal defences and coastal flooding in vulnerable areas. It has been estimated that an 80m wide strip of saltmarsh and 3-metre high seawall (costing £400/metre) will provide the same defence as a 12-meter sea wall (costing £5000/metre), significantly reducing the maintenance and building costs as well as the height of the seawall by 9 metres[24]. Coastal realignment is also the only tool for offsetting the losses of intertidal habitats to coastal squeeze. Saltmarsh and mudflats are identified as BAP priority habitats, and many are recognised under national and international designations. However, there is currently no funding mechanism in place in Scotland, which will enable the creation of saltmarsh habitat through coastal realignment. These new management techniques can provide a cost-effective means of protecting Scotland's coasts against the impacts of climate and contribute to achieving other government targets. **Coastal realignment needs to be accepted as a feasible option for flood defences and appropriate funding mechanism needs to be put in place to enable sustainable adaptation to climate change at coasts.**

5.5.5 The role for woodlands

Appropriately located, designed and managed woodlands – including native woods as well as plantation forestry, may have a beneficial role in flood management. This has to be within the context of sustainable forest management, and not to the detriment of important open-ground wetland habitats or species. We welcome the Scottish Executive's restated commitment to sustainable forest management in the revised Scottish Forestry Strategy[25], and the updated UK Forestry Standard[26]. This includes water management according to the UK Forests & Water Guidelines[27]. Woodland creation and management for flood prevention, in all parts of catchments, must meet the UK Forestry Standard, and maximise biodiversity opportunities. For example ensuring that woodlands are not created on important open wetland habitats, and that opportunities are pursued to improve the quality of existing riparian woods, as well as new woods, to meet the UK Biodiversity Action plan 'wet woodland' habitat targets. There is an important task ahead to increase the rate and extent of the restoration of open-ground habitats, particularly raised and blanket bogs, by the removal of inappropriate non-native plantation forestry.

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[23] Seas of change: The potential area for intertidal habitat creation around the coasts of mainland Britain, 2002, RSPB report

[24] Nature Conservation and Flood and Coastal Erosion Risk Management: Report for the Zero Base Review 2006,

[25] Scottish Executive (2006) The Scottish Forestry Strategy. 2nd Edition. Forestry Commission Scotland, Edinburgh. http://www.forestry.gov.uk/forestry/INFD-6AGGZW

[26] Forestry Commission & DARD (2004) The UK Forestry Standard – the government's approach to sustainable forest management. 2nd Edition. Forestry Commission, Edinburgh & Department of Agriculture & Rural Development Northern Ireland, Belfast. http://www.forestry.gov.uk/pdf/fcfc001.pdf/$FILE/fcfc001.pdf

[27] Forestry Commission & DARD (2004) Forests & Water Guidelines. 4th Edition. Forestry Commission, Edinburgh & Department of Agriculture & Rural Development Northern Ireland

5.5.6 Integration with the delivery of the Scottish Biodiversity Strategy

The Scottish Biodiversity Strategy was launched in 2004 and sets out a 25 year vision for the conservation and enhancement of biodiversity in Scotland. The Biodiversity Action Plans (BAPs) contain targets and commitments for the expansion and maintenance of Scotland's declining and threatened habitats and species. Seeking opportunities for habitat enhancement and delivering biodiversity targets through sustainable flood management is important for achieving the government commitments to halt the loss of biodiversity by 2010. This will also help to deliver the vision of the Scottish Biodiversity Strategy to become the world leader in biodiversity conservation.

A number of important wetland habitats may be created as part of SFM schemes. These include coastal and floodplain grazing marsh, blanket bogs, species rich grasslands, and wet woodland, all of which feature in Biodiversity Action Plans (BAPs). Blanket bogs in Scotland represent perhaps 1/7th of the world resource, supporting a rich diversity of invertebrates and breeding waders such as greenshank, dunlin and golden plover, and Scotland retains one of the richest surviving European concentrations of raised bog. However, apart from the Insh marshes in Strathspey, Scotland's wetlands are generally relatively small remnant habitats compared with our rivers and lochs.


Andy Hay (rspb-images.com)


Davis Kjaer (rspb-images.com)

The restoration of riverine floodplains will provide habitat for farmland waders and wildfowl including redshank, curlew, snipe, wigeon, teal, mallard and pintail. There may sometimes be conflict between flood storage and biodiversity benefits, but given appropriate management, both objectives can be achieved[28]. Restoration of natural morphology by re-connecting rivers and floodplains can have wider benefits than creating engineered flood storage areas along catchments. Engineered flood storage areas are potentially costly in the long term, and offer only limited opportunities for biodiversity. On the contrary, restoration of natural floodplains and vegetation offers multiple benefits - increase in floodplain roughness and storage capacity, contribution towards achieving WFD objectives, and minimising the costs of long-term management. As mentioned previously, adequate financial support for the management of some of these habitats should be made available through Land Management Contracts.

[28] Integrating washland management for flood defence and biodiversity, Morris *at al,* 2003, Report to Defra

6. Conclusions

Following the recent devastating floods in Scotland, it is becoming increasingly evident that a new approach to flooding is needed. The current approach does not work - the way we manage catchments and defend ourselves against floods has made the problem worse. Rivers throughout Scotland have been straightened and floodplains drained to allow for farming, urban development and transport. The result of these activities is that rivers flow faster and over smaller, more restricted areas than they would under natural conditions. Land use practices and development planning also have major impacts on the way rainwater drains from our land and into rivers and streams. In the uplands, important peatland habitats, and natural forests which help regulate water flows and maintain water quality, have been drained and damaged. Agricultural practices and other land use activities can result in land compaction, overgrazing and erosion, all of which can increase flood risk. The fragmented nature of responsibilities for flood management makes the situation worse. There is no single organisation responsible for the management or co-ordination of flooding in Scotland. The responsibilities are divided between individual landowners, local authorities, the Scottish Executive, SEPA and Scottish Water. Under current arrangements, there is very limited scope for a more co-ordinated, catchment-based approach.

A new opportunity has arisen to change the way we deal with flooding through the implementation of the Water Environment and Water Services (Scotland) Act 2003 and the duty under section 2 (4) to *promote sustainable flood management.* The new duty means that those responsible for flooding now have to carry out their duties so as to comply with the requirements of sustainable flood management. However, to date, little progress has been made to implement SFM duty on the ground. **Full implementation of this duty will require changes to legislation that deals with flood management, and better integration with existing plans and policies**. This means changing both the way we defend ourselves against floods, and better co-ordination to achieve catchment scale approaches to flood management. This will involve changes in flooding policies, such as the '1961' Flood Prevention Act, the '1949' Coast Protection Act and the '1958' Land Drainage Act. Furthermore, statutory planning policies must prevent further development of floodplains, promote SUDS and a sustainable approach to flooding. The land use management framework and other land use policies must encourage wetland and floodplain restoration and land management that is sympathetic towards flooding rather than working against it. The role of farmers and land managers must be recognised and appropriately rewarded. There is an urgent need to integrate flooding within the wider rural land use management framework so that land managers can adopt practices that reduce the risk of flooding and protect the environment. This should be encouraged across the full range of government plans and policies. Sustainable flood management can deliver social, economic and environmental benefits and thereby contribute to a sustainable Scotland. It is a cost-effective means of tackling flooding - protecting homes and businesses whilst benefiting environment and biodiversity. **A legislative opportunity to address these issues may arise through the transposition of the forthcoming EU Floods Directive.**

7. Case studies

7.1 The benefits of natural floodplains: Insh Marshes, RSPB nature reserve

Insh marshes by Andy Hay (rspb-images.com)

The Insh Marshes floodplain in Strathspey extends from Kingussie downstream to the Spey/Feshie confluence near Kincraig Bridge. This RSPB reserve is the largest, and most naturally functioning floodplain mire in Britain, extending to 8 km long and nearly 3 km wide in places. The River Spey meanders through the floodplain and is joined by the fast flowing and dynamic River Feshie. The floodplain regularly floods during winter and spring, holding water after heavy rainfall and from snow melt. It acts as a natural flood defence system with floodwater covering some 1000ha at a depth of 2m. This natural sponge prevents extensive flooding to properties and farmland downstream. Flood risk is reduced to neighbouring settlements including parts of Aviemore, which is an important base for the local tourism economy. The equivalent engineered flood control measures would be very expensive and result in the loss of important wildlife habitat. A rough examination of maps suggests that 7km of flood defence banks might be needed to defend Aviemore in the absence of Insh Marshes. The floodplain has massive conservation value, with numerous internationally and nationally important designations, including Special Protection Area and National Nature Reserve. It is renowned for the number and variety of breeding waders (over 1,000 pairs), wildfowl (over 50% of the UK goldeneye population), spotted crakes, populations of wintering whooper swans and hen harriers and a rich diversity of plants and invertebrates. The management of Insh Marshes RSPB reserve helps deliver many of the national and local Biodiversity Action Plan targets. As well as its value for flood defence and for wildlife, Insh Marshes contributes significantly to the local economy. It attracts many visitors who contribute to tourism and supports visitor attractions such as the RSPB reserve and the Loch Insh Watersports centre as well as recreational pursuits such as fishing, walking and cycling.

7.2 RSPB Scotland's Nigg Bay realignment project


Nigg Bay RSPB realignment site

Nigg Bay lies in the Cromarty Firth in the north of Scotland. RSPB Scotland has owned land within the Bay since 1990, and now own or lease 1,593ha, most of which is intertidal. In 2001, RSPB purchased land behind the sea wall of the Bay for the first time. This included the 25ha field that became the coastal realignment site, Meddat. The Meddat field was the last area of the Bay to be claimed from intertidal, in the 1950's, and was used for stock grazing. However, subsequent erosion of the sea defences had made it difficult to maintain the desired standard of flood defence. Therefore, following purchase of the Meddat field, the RSPB implemented a managed realignment project.

The realignment area at Nigg adjoins RSPB owned land in the Cromarty Firth SSSI/SPA/Ramsar site. The newly created area is helping to support the wildlife features behind these designations (wintering waders and wildfowl, and breeding waders on saltmarsh). Scottish Natural Heritage carried out the appropriate assessment for the planned realignment (required by the Habitats Regulations) and has supported the project. The RSPB project demonstrated the use of natural habitat as a buffer zone to protect the coastline and communities from the threat of coastal erosion and flooding.

Hard-engineering sea defence structures are expensive to construct and maintain, and coastal realignment provides a cost effective method of protection against flooding. The cost of creating the intertidal habitat at Nigg Bay was estimated at £3,600. The cost of constructing hard defences to protect the area would have cost a minimum of £15,000.

7.3 The partnership approach: River Teviot catchment initiative

Craik Forest demonstration site by Richard Johnston

In 2006, the Scottish Borders Council commissioned Mountain Environment to investigate the possibility of implementing a sustainable flood management project in the Teviot catchment, with the aim of reducing flooding in Hawick. The investigation concluded that there are significant opportunities for the implementation of a range of land management techniques to help flood management, such as restoration of wetlands, re-forestation in uplands, floodplain restoration including the planting of riparian woodlands and management of river channels to reduce erosion. To help understand how the restoration of natural processes can help to reduce flooding, a demonstration project is now being planned to test the SFM techniques in the upper Borthwick catchment.

A number of organisations are involved in the project, including Scottish Borders Council, Scottish Environment Protection Agency, Scottish Natural Heritage, Environment Agency, Forestry Commission Scotland, WWF Scotland, Tweed Forum and the Scottish Executive. The demonstration site will include several kilometres of the river channel, adjacent floodplain and the valley slopes. The work will include a number of restoration of meanders, riparian woodland, tributaries, and wetlands; erosion control, and removal of artificial drainage systems. The effectiveness of the work will be monitored over a number of years.

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