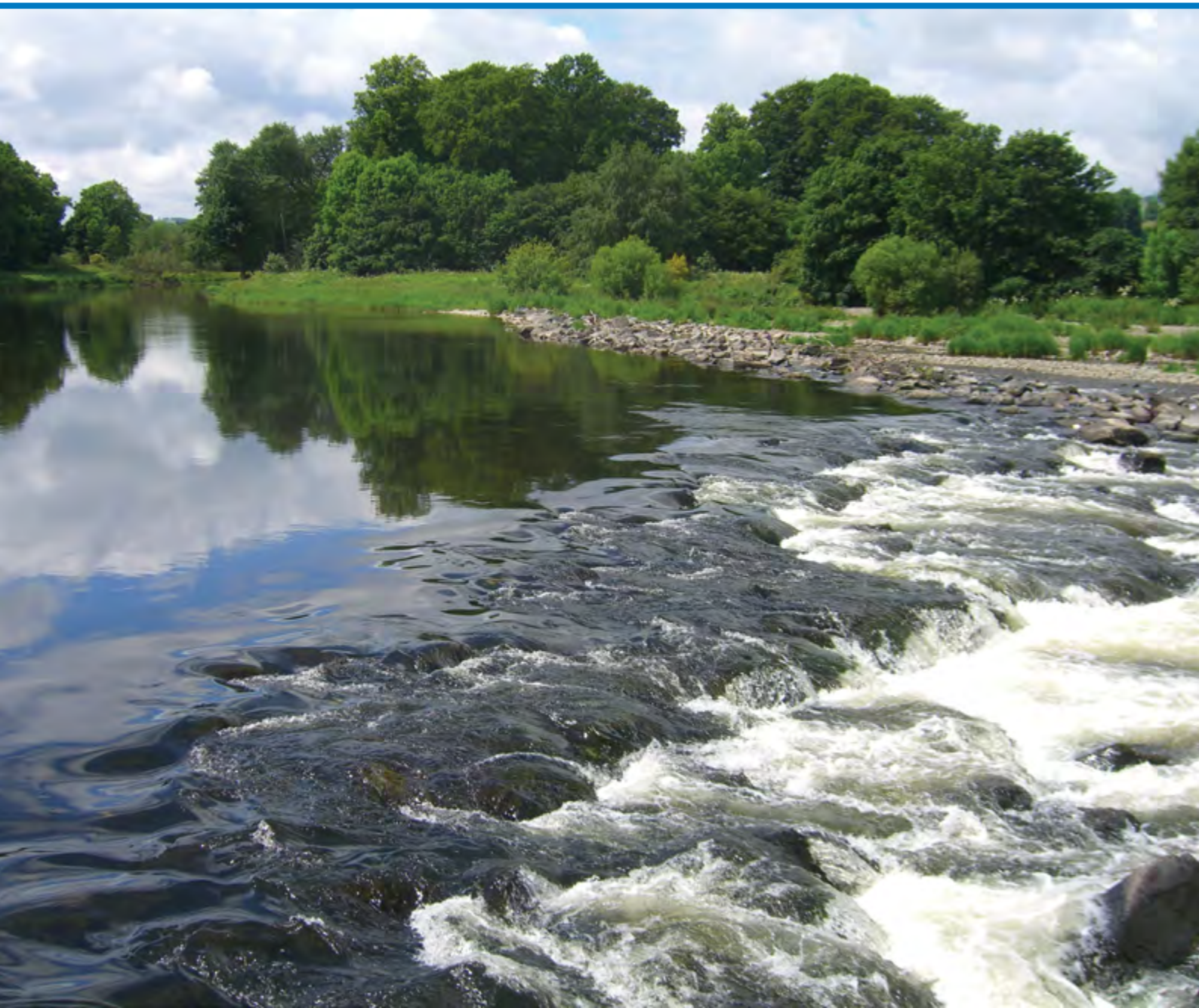


Improving the physical condition of Scotland's water environment

A consultation on a supplementary plan
for the River Basin Management Plans



Consultation foreword

This draft plan underpins our vision of delivering catchment wide management of Scotland's water environment, so that it can deliver a wider range of services to support people's health and enjoyment, sustainable economic growth and wildlife.

The focus of this draft plan is on delivering improvements in the physical condition of Scotland's water environment. By doing so, this plan also aims to deliver biodiversity, amenity and scenic benefits which will enhance the wellbeing of the people of Scotland. The plan also aims to increase the resilience of our natural flood defences and thereby reduce flood risks. In addition, it will reduce river management costs for landowners and create opportunities for economic development.

Scotland aims to deliver improvements in the condition of the water environment through the River Basin Management Plans produced for Scotland and the Solway Tweed. These plans define objectives for the organisations and people who have an interest in the water environment.

This document is a draft supplementary plan which focuses specifically on how Scotland can deliver improvements in the physical condition of the water environment. It highlights the work needed, and the bodies responsible, for delivering a better water environment for Scotland. The plan has been developed using the principles set out in the land-use strategy and will contribute to sustainable development within rural and urban areas.

Having produced this draft supplementary plan, SEPA is now consulting with you and others who manage the water environment or who have an interest in its condition. We would welcome comments and views on how this plan can be improved so that we can all contribute to delivering environmental, economic and social benefits linked to an improved water environment. We have placed a number of questions throughout this document to help guide your response, but we are interested in any of your views at this stage.

How you can comment on this draft plan

You can respond by:

- completing the online response form on the SEPA website;
- sending a response by email to rbmp@sepa.org.uk;
- sending a written response to:

River basin planning - consultation response

SEPA

7 Whitefriars Crescent

Perth

PH2 0PA

If you wish your comments to remain confidential, please state this clearly as part of your response. Consultation responses should be returned by **27 February 2013**.

Contents

Consultation foreword.....	1
Executive summary.....	3
1. Introduction	4
2. Vision	5
3. How should we take action?.....	8
4. Where should we focus our efforts?	11
5. Barriers to fish migration.....	15
6. Improving the condition of rural rivers and lochs.....	19
7. Improving the condition of rivers and lochs in towns and cities	28
8. Improving the condition of estuaries and coasts.....	33
9. Restoration and flood risk management.....	38
10. Implementing this plan	41

Executive summary

The aim of this draft plan is to identify the work needed to deliver an improvement in the physical condition of Scotland's water environment¹ as well as a wide range of wider environmental, social and economic benefits. Repairing the damage to the physical condition of the water environment will improve ecology and enhance the value of the resource for others, such as landowners and fishermen as well as the general public. Such improvements also have significant benefits for the wider environment, especially climate change adaptation and flood risk management.

Four principles were used to help define this plan's approach to restoration:

- planning at the catchment scale;
- allowing nature to do the work;
- working in partnership;
- supporting sustainable development.

Where improvements are considered proportionate, the following hierarchy of measures will be applied as appropriate:

- provide support and encouragement for voluntary initiatives;
- use regulatory powers under Controlled Activities Regulations (CAR) to deliver improvements to licensed structures;
- develop potential notice provisions to deliver improvements to non-licensed structures such as bridges, culverts and fords.

A combination of support, funding and regulatory actions are needed to deliver significant improvements in the following key areas:

- removing barriers to fish migration (led by the Rivers and Fisheries Trusts of Scotland and the Scottish Environment Protection Agency [SEPA]);
- improving rural rivers (led by SEPA in consultation with advisory group partners);
- improving rivers in our towns and cities (led by local authorities with support from SEPA);
- improving our estuaries and coasts (led by Marine Scotland and SEPA);
- addressing flood risk in a way that delivers environmental benefits (led by local authorities with support from SEPA).

A number of organisations will have responsibility for delivering these actions, and oversight of this delivery will be provided at a national level by the river basin management planning National Advisory Group and at a local level by the Area Advisory Groups. Successful delivery of the actions will bring many benefits for Scotland, but can only be achieved through partnership working.

¹The water environment includes all rivers, lochs, wetlands and groundwater, as well as estuaries and adjacent coastal waters. For more information on these terms, see the River Basin Management Plans for Scotland at www.sepa.org.uk/water/river_basin_planning.aspx

1. Introduction

The water environment is one of Scotland's great natural assets. It is part of our iconic landscape and it supports a rich and diverse wildlife. These environmental benefits are important in their own right, but the quality of our water environment also has important social and economic consequences. Many recognise the amenity and recreational value of rivers, lochs, estuaries and coastal waters, and the important contribution they make to attracting tourists to Scotland. Perhaps more important, however, is the contribution that the quality of the environment makes to health and wellbeing. Economically, water is essential for industries such as food, drink and agriculture, and a wide range of sectors are dependent upon Scotland's natural resources and the high quality reputation of Scotland's water environment.

Although much of Scotland's water environment is in a good condition, over a third of it does not currently meet the 'Good Ecological Status' (or Good Ecological Potential) objective² of the European Water Framework Directive. This is partly a result of changes to the physical condition of coastal areas, rivers and lochs.

Scotland has a statutory obligation to deliver improvements in the condition of the water environment. This requires us to develop plans which will move the water environment towards good ecological status (or potential) and ensure that the water environment can deliver a full range of environmental and socio-economical benefits. In 2009, Scotland published River Basin Management Plans³ for the Scotland and Solway Tweed river basin districts. These plans set out objectives to improve the water environment, along with a programme of actions to deliver these improvements. Since then, the organisations involved in managing the water environment have developed supporting supplementary plans covering some of the more difficult areas of work. For example, a partnership approach has been essential in developing and delivering the rural diffuse pollution plan for Scotland (see [Diffuse pollution management advisory group website](#)).

Scotland needs to address the physical condition of its water environment, in order to provide good habitats and a sustainable water environment, and deliver the RBMP objectives. This plan is intended to help the Scottish Environment Protection Agency (SEPA), responsible authorities⁴, land managers and other stakeholders take forward restoration measures which deliver a wide range of benefits in a proportionate and cost-effective way.

Changes to the physical condition of the beds, banks and shores of rivers, lochs and coastal waters have historically been caused by engineering for urban development and rural land management. These include changes such as straightening, culverting, impoundment and alteration of bankside vegetation. Overall, around a quarter of Scotland's water bodies are affected by these changes. The consequences are poor habitat for wildlife and fisheries, increased flood risk, and additional maintenance work for land managers to control erosion and sedimentation.

Cross-border issues

This plan has been written to support and enable improvement of the physical condition of water bodies in Scotland. However, there are a number of rivers and coastal waters which cross the border between Scotland and England. There is already effective cross-border working between agencies on these water bodies. It is intended that the ideas in this plan will support discussions on how to deliver cross-border improvements in the condition of water environment. To take this forward, SEPA and the Environment Agency will work in partnership to examine these issues on a catchment basis. The role of RBMP Area Advisory Groups in the Tweed and Solway will be particularly important in making these links.

² See Ministers' policy statement '[Principles for setting objectives for the River Basin Management Plan](#)'.

³ The Solway Tweed plan covers the border catchments (including those parts in England) and the Scotland Plan covers the remainder of the country.

⁴ Scottish Ministers have identified a number of responsible authorities to work alongside SEPA. They are Scottish Natural Heritage, Scottish Water, Forestry Commission Scotland, British Waterways Board, local authorities, district salmon fisheries boards and national park authorities.

2. Vision

Aim

The aim of this plan is to provide details of the work needed to deliver improvements to the physical condition of Scotland's water environment, in order to meet our river basin management plan objectives. It discusses the key restoration challenges, and describes a phased and prioritised approach to achieve the environmental objectives set out in the river basin management plans in a cost-effective way.

Principles

The sustainable land-use principles defined by the Scottish Government's Land Use Strategy have been used to develop the plan, in particular:

- promoting the delivery of multiple benefits;
- working upon an understanding of ecosystem services⁵;
- defining a partnership approach to managing the water environment whilst underpinning this by a backstop of regulation to protect public interests;
- recognising the significance of the primary use of some land (for example food production, flood management);
- looking for opportunities to deliver climate change adaptation and mitigation;
- enhancing Scotland's rural landscape and providing opportunities to encourage access to the countryside;
- supporting the regeneration of urban derelict land.

⁵ Defined by the Land Use Strategy as 'the natural services that we need: goods such as food, timber, energy; services such as the purification of water and the regulation of the climate; and less tangible benefits such as opportunities for recreation, exercise, inspiration and reflection'.

There are some other principles which are important when considering how to deliver improvements to the water environment.

- **Plan at the catchment scale.** Work to deliver improvements needs to be undertaken at a catchment scale, so that we think broadly and develop actions which connect and work across whole river catchments and landscapes. We must avoid addressing problems in one place and creating them somewhere else. There are large-scale processes at work in a catchment. Sediment, in particular, moves at a catchment-scale or along coastal zones. Thinking on a catchment-scale enables decision-makers to avoid, for example, reducing flood risk in one site but increasing it downstream, or protecting a site from erosion whilst damaging it downstream. Only by taking a catchment view can potential multiple benefits be realised.
- **Support nature to do the work.** In many cases the environment will improve by itself if the pressures causing harm are removed. A good example is the condition of eroding river banks which can stabilise if grazing pressure is reduced.

Objectives

Improving the physical condition of the water environment should deliver a wide range of environmental, social and economic benefits, as follows:

- Progressively achieve the objectives and measures set out in the river basin management plans. Phased implementation will develop our understanding of priorities, constraints and techniques. This will allow us to refine the objectives for physical condition in future river basin management plans.
- Improve the biodiversity of the water environment and associated habitats (for example wetlands and woodlands) by promoting networks for wildlife along rivers, lochs, estuaries and coastal waters. This would contribute to the restoration and protection of aquatic sites designated for nature conservation, deliver the Scottish Biodiversity Strategy and link with Local Biodiversity Action Plans.
- Improve the fisheries of rivers and lochs by ensuring that habitats required for migratory fish species are protected and enhanced. Removing and modifying obstructions to fish migration caused by man-made barriers will be especially important.
- Reduce diffuse pollution from land use activities, such as farming and forestry, by improving the condition of riparian and coastal zones so that they effectively intercept pollution.
- Contribute to climate change adaptation and mitigation by promoting habitat networks and promoting measures that absorb carbon. Make the water environment more resilient to the consequences of climate change (e.g. increased flooding and droughts).
- Reduce flood risk, particularly by contributing to natural flood risk management approaches identified by the national flood risk management planning process. Contribute to identifying and mitigating local flood risks affecting individual farmers and land owners.
- Contribute to improving the rural landscape and regenerating urban areas by improving the accessibility and quality of the water environment. Enhancing these green networks can increase people's quality of life, boost their physical activity and bring health benefits. This will link with approaches such as the Central Scotland Green Network and the Glasgow and Clyde Valley Green Network.
- Support sustainable economic growth, in particular the development of rural businesses, by improving the condition of environmental resources upon which these businesses depend. More widely, improved physical condition will have benefits for water quality, and could keep water treatment costs down.
- Promote the sustainable management of the water environment. Some rivers and coastal waters require ongoing maintenance by landowners because historic engineering or land use has led to exaggerated rates of erosion or sediment accumulation. A wider catchment-scale approach to sediment management can identify and remedy the underlying causes.

Policy integration

This plan is focused on achieving the objectives to improve the water environment set by the first river basin management plans in 2009. It intends to facilitate the development of a common understanding of the actions required to improve the water environment. An integrated approach will be essential to ensure the most cost-effective solutions are adopted which can collectively and consistently deliver Scotland's objectives for:

- the water environment, through the RBMP;
- managing flood risk through the Flood Risk Management Strategies and Local Flood Risk Management Plans;
- decision-making in the marine environment through a national marine plan and regional marine plans;
- sustainable development through Local Authority strategic development plans and local development plans;
- conserving biodiversity through the refreshed Biodiversity Strategy.

The improvement of Scotland's water environment can also help to deliver against a wider range of national policy objectives including those for regeneration, sustainable development, and climate change. At a local authority level, there are clear links with Single Outcome Agreements, biodiversity duties and work on economic development, placemaking, access and green networks.

Consultation question:

1. The draft plan emphasises that multiple benefits can be achieved through restoring the physical condition of the water environment. Can you identify ways in which we can deliver a wider range of benefits?

3. How should we take action?

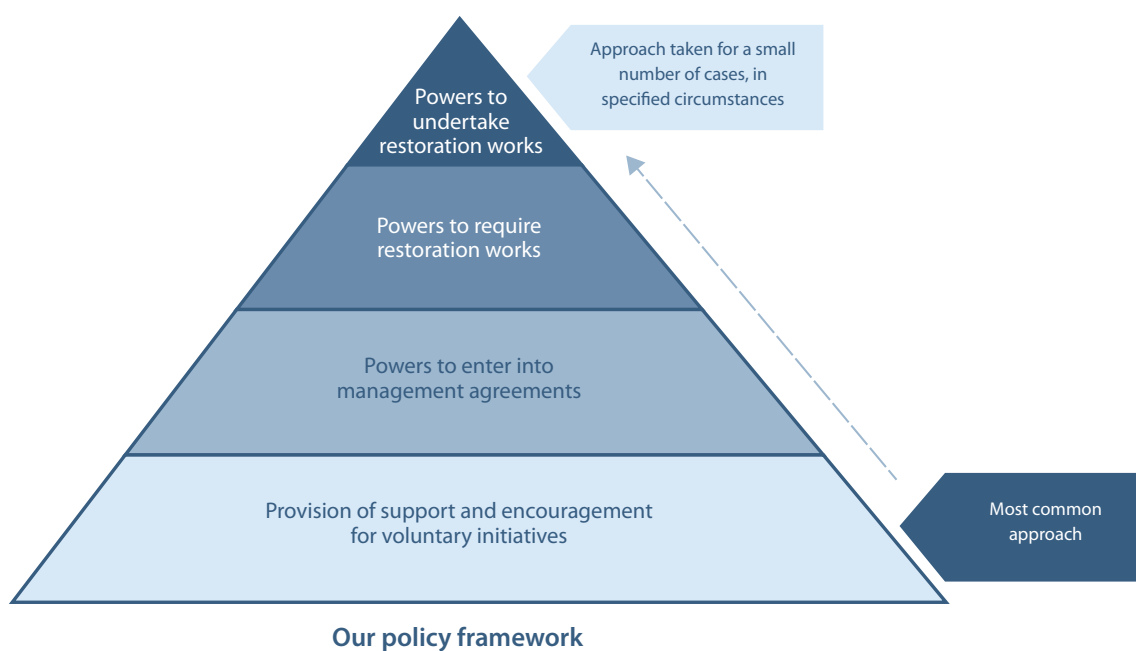
This section considers the actions needed to achieve RBMP objectives for the restoration of Scotland's water environment. In the later sections (5 to 9), we consider in more detail actions to deliver targeted improvements to the water environment.

The policy framework created to implement the RBMPs⁶ provides a series of checks and balances for any action to deliver environmental improvements. The framework sets out a technically feasible, proportionate and cost-effective approach to prioritising improvements in the water environment. It would not be appropriate to seek to restore all water bodies to good ecological status (or potential) as that could have adverse social or economic consequences. The policy also notes that certain uses, such as hydropower or traditional flood alleviation schemes, may depend upon substantial physical alterations and that these water bodies can be designated as heavily modified. It is an important principle that objectives set for such water bodies should not result in a significant impact on their uses.

Before restoring a water body, there must be good reasons for doing so and all the consequences should be considered. Important benefits to society can be delivered whilst avoiding disproportionate adverse impacts upon landowners or operators. In certain situations additional action may be required if, for example, improvements are required in respect of Natura protected areas⁷ or for flood risk management.

The Scottish Government 2009 consultation on 'Restoration of the water environment'⁸ set out the policy framework which underpins our approach for delivering improvements to the physical condition of the water environment (see Figure 1). This framework aims to ensure that action taken to deliver improvements is proportionate and risk-based.

Figure 1 - Policy framework from Scottish Government's 2009 consultation on Restoration of the water environment (adapted 2012)



⁶ See www.scotland.gov.uk/Resource/Doc/173709/0048450.pdf

⁷ See www.snh.gov.uk for more detail of these protected areas.

⁸ A Consultation on Implementing the Water Environment and Water Services (Scotland) Act 2003: Restoration of the water environment - www.scotland.gov.uk/Publications/2008/12/18145403/0

Provision of support and encouragement for voluntary initiatives

Help will be given to those who have a role in managing the water environment, by identifying actions that will deliver improvements and bring wider benefits. The area advisory groups set up as part of the river basin management planning process will make an important contribution to facilitating this process, and wider awareness raising may also be needed.

In addition SEPA may contribute (via the Water Environment Fund⁹) by funding catchment-scale studies to identify where action can be taken to restore natural processes which can lead to reduced intervention for managing flooding or erosion. This information will help land managers reduce the work required to manage rivers while improving the environment.

There are a range of grants (including the Scotland Rural Development Programme (SRDP) and Water Environment Fund) which can help landowners undertake work to deliver environmental and other benefits, and these have already delivered improvements to the water environment. Partner organisations will need to work together to ensure that their grant applications are aligned with the objectives of this plan. All partner organisations will also work together to apply for additional sources of funding, such as European funding, to deliver major improvement programmes.

Powers to enter into management agreements

The development of management agreements between interested parties to formalise action to deliver improvements to the way the water environment is managed will be promoted. Where appropriate, SEPA will formalise these management agreements under the Water Environment (Controlled Activities) (Scotland) Regulations (known as CAR 2011)¹⁰.

Powers to require restoration works

Regulatory action will be used where appropriate, to ensure that action is taken to deliver prioritised improvements. For example, SEPA will use the CAR regulatory regime to review existing authorisations covering impoundments and engineering work to seek removal or modification of barriers to fish migration. This will improve the morphological condition of the water environment.

Local authorities and SEPA will also deliver improvements in the water environment through planning policies. There may also be scope to set conditions associated with planning permissions. This form of environmental 'planning gain' or 'developer contributions' may be a mechanism for delivering improvements in urban areas. This is discussed further in Section 7.

CAR cannot normally be used to address the ongoing impacts of many historic or abandoned engineering structures in the water environment. This means that current powers under CAR cannot be used to deliver environmental improvements in situations where structures such as bridges and culverts pose a barrier to fish migration¹¹. Usually these crossings are assets owned by transport organisations, local authorities and individual landowners.

To address this, Scottish Ministers are considering the development of restoration powers¹² which would enable SEPA to require action where there are clear environmental benefits. These powers would typically be used in circumstances where existing CAR licence powers do not apply, and where voluntary approaches fail to deliver improvements in the management of these assets. These powers are expected to be used to require modification of physical structures (such as bridges and culverts) which are causing an adverse impact on the water environment.

Powers to undertake restoration work

There is a range of possible situations where action has to be taken by SEPA in order to deliver environmental improvements and mitigate harm to third parties. Typically this would include remedial work where the responsible person could not be identified, or where SEPA considers it unreasonable or impracticable for the appropriate person to undertake the restoration works. Under these situations, SEPA could undertake the work.

⁹ See www.sepa.org.uk/water/restoration_fund.aspx for details of this fund, established by SEPA and Scottish Government.

¹⁰ See [CAR Practical Guide](#) for further information.

¹¹ Other barriers to migration such as dams and weirs should be licensed under CAR, and as a consequence SEPA can require mitigation measures via conditions of these licences.

¹² Under Section 22 of the Water Environment and Water Services (Scotland) Act 2003.

Consultation question:

The draft plan proposes a framework of actions to deliver improvements in high priority areas for restoration.

2. Do you have any comments on the proposed framework of actions?
3. How can we encourage the adoption of voluntary measures?

4. Where should we focus our efforts?

Overall scale of the restoration task

In Scotland, around 25% of surface water bodies are affected by changes to their physical condition, resulting in failure to reach the river basin management plans' objective of 'good ecological status / potential'. Alterations to beds and banks, such as straightening, culverting or embankments, affect 17% of water bodies, while 12% of them are affected by barriers to migratory fish. Table 1 shows the proportion of surface waters in Scotland affected by physical alterations.

Table 1 – Summary of pressures affecting Scotland's surface water bodies (2008 classification, as published in 2009 River Basin Management Plans)¹³

	Total number of surface water bodies	Percentage of number of surface water bodies
Total number of surface water bodies in Scotland (excluding groundwater)	3233	100%
Surface water bodies at less than good ecological status / potential	1261	39%
Total number of water bodies at less than good ecological status / potential because of physical changes (including changes to beds and banks, and fish barriers)	830	25%
Total number of water bodies at less than good ecological status / potential because of changes to physical condition of beds and banks	546	17%
Total number of water bodies at less than good ecological status / potential because of barriers to fish migration.	375	12%

¹³ Table 1 refers to surface water bodies, comprising rivers, lochs, estuarine and coastal water bodies. Some water bodies are affected by both changes to beds, banks and shores, and barriers to fish migration, so percentages and totals in these rows will not add up to the total number of water bodies affected by physical changes.

Figure 2a – Water bodies at less than good ecological status / potential because of morphology pressures (excluding fish barrier pressures)

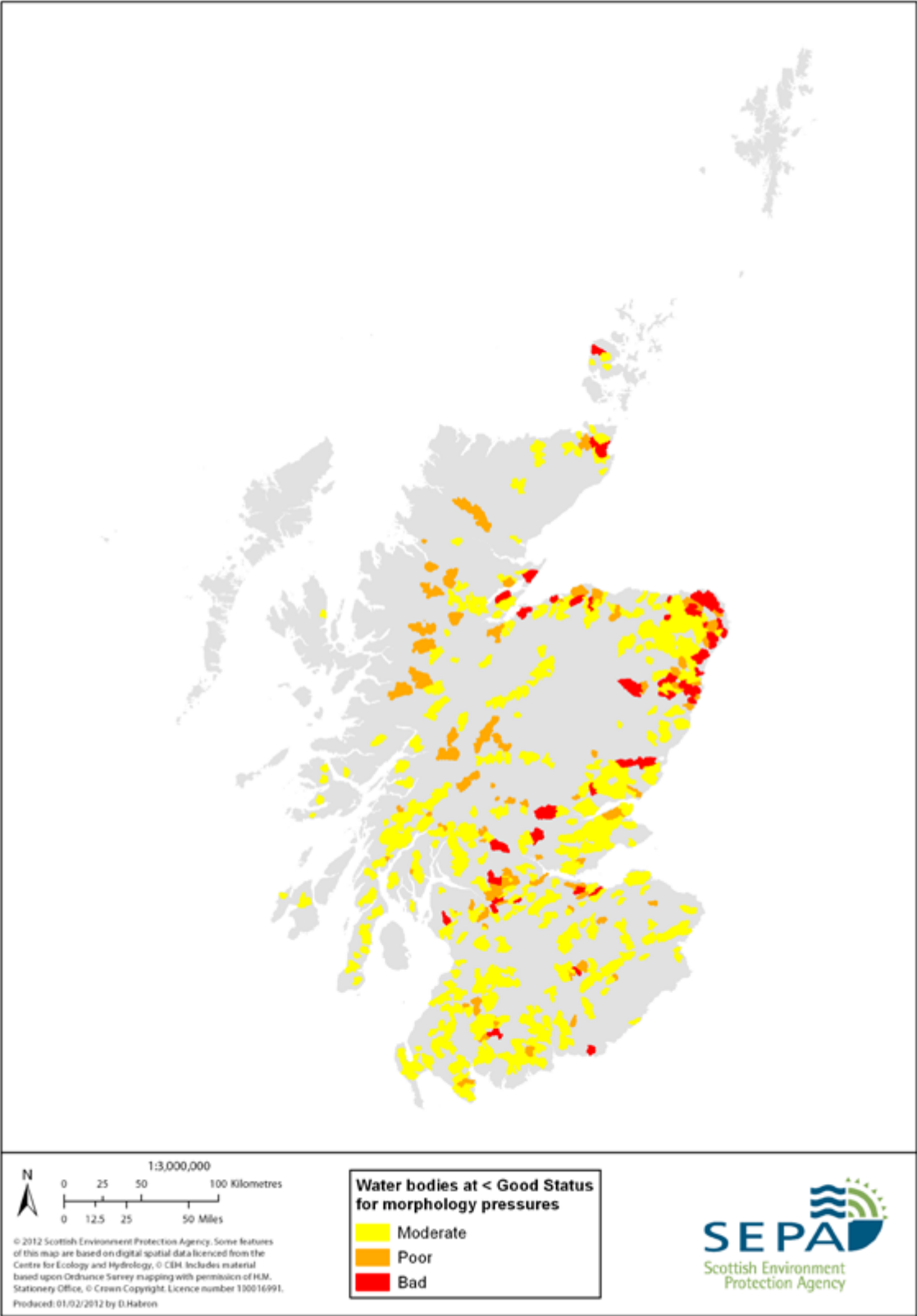
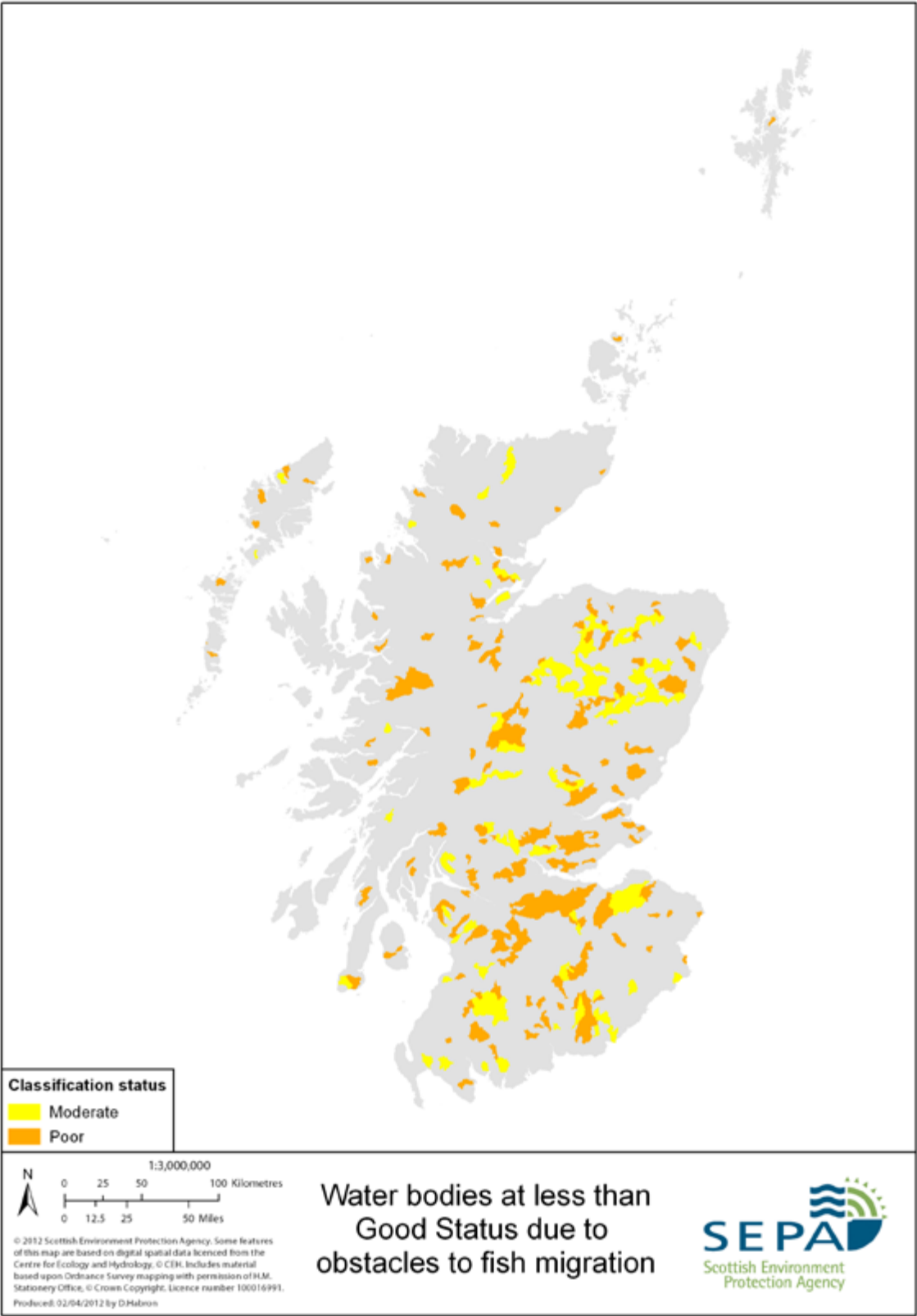


Figure 2b – Water bodies at less than good ecological status / potential because of fish barrier pressures



Key morphological pressures upon the water environment

As the above table and maps show, morphological impacts affect a significant proportion of Scotland's water bodies. Tackling these could bring a range of benefits. This plan sets out the approach for delivering improvements in the following key areas:

- **Barriers to fish migration.** Barriers have a large impact upon the environment and have social and economic consequences. These issues are discussed in Section 5.
- **Rural rivers and lochs.** Agricultural and forestry land management result in straightening and dredging of rivers and damage to riparian vegetation. These issues are discussed in Section 6.
- **Rivers in our towns and cities.** In urban areas, development of residential and industrial areas, resulting in culverting and hard engineering alterations to river banks. These issues are discussed in Section 7.
- **Estuaries and coastal waters.** Land reclamation and infrastructure for navigation and ports have affected morphology. These issues are discussed in Section 8.
- **Addressing flood risks in a way that delivers environmental benefits.** Pressures that contribute to flooding can often be closely associated with pressures which affect the status of rivers. Consequently, it is especially important that this plan considers how to deliver morphological restoration which links as closely as possible with flood risk priorities. This is discussed further in Section 9.

5. Barriers to fish migration

Introduction

Scotland's freshwater fisheries have an international reputation for salmon and sea trout fishing. There are also a number of other migratory fish, including eels and lamprey, which have important nature conservation value and potential economic value. The numbers of migratory fish have fallen over the past 200 years. This decline has been caused by a combination of factors within freshwater and at sea. A contribution to reversing this decline can be made by addressing physical barriers to migration and restoring spawning, and nursery habitat lost through morphological impacts.

Our approach to delivering improvements

The removal of barriers to fish migration (either through complete removal or modification to enable fish passage) can be straightforward and cost effective, and has an immediate benefit for fisheries. This is demonstrated by our programme of work to improve fish passage which has addressed problems at around 24 barriers to date¹⁴. When considering options to enable fish passage, it is important to recognise that these structures may be of natural or built heritage value. Any proposals should be developed in consultation with Historic Scotland, Scottish Natural Heritage and local authorities as appropriate.

There are three types of barrier to fish migration:

- dams and weirs in use;
- dams and weirs not in use;
- barriers associated with culverts and bridges.

Dams and weirs in use

Many impoundments serve a particular purpose and are assets delivering a social or economic function. For example, there are a large number of dams and weirs that are used to store water or facilitate abstraction for purposes such as hydroelectricity generation, public water supply or drinks manufacture.

These assets are covered by a CAR licence and have a responsible person defined. SEPA's register of licensed structures lists over 800 dams and weirs in use in Scotland. Ongoing partnership work is identifying which of these structures pose a barrier to fish passage and prioritising action as required.

SEPA will work with the responsible person to develop options for allowing fish migration. The benefits delivered by options will then be compared against the costs of undertaking the work. There will be situations where it will not be proportionate to retrofit fish passes to major dams.

Any necessary remedial action will be progressed through SEPA's programme of CAR licence reviews, scheduled between now and the end of the third RBMP cycle in 2027. This process of CAR reviews will include some dams not currently in use but which remain assets of Scottish Water, distilleries or hydropower generating companies.

Dams and weirs not in use

These are normally structures which no longer serve an economic or social function: for example, weirs created for industrial processes which no longer exist. Under these circumstances, the ownership of the weir often rests with the adjacent landowners. Many of these "abandoned" structures are not licensed under CAR and SEPA currently estimates that there may be around 1800 unlicensed dams and weirs.

This category of barrier will be progressed by a partnership between the Scottish Fishery Boards and Trusts, co-ordinated by Rivers and Fisheries Trusts of Scotland (RAFTS) and SEPA. The Boards and Trusts will identify the landowner(s) responsible for a barrier and initiate a dialogue about how the problem could be addressed. This will lead to initiation of a scoping study which will identify costed options for allowing fish passage. An application for funding to support scoping studies and any necessary work can be made to the Water Environment Fund. This process will ensure that landowners can deliver the necessary environmental improvements.

¹⁴ See 'Review of Progress, October 2011' report at www.sepa.org.uk/water/restoration_fund.aspx

Barriers associated with culverts and bridges

The footings of some bridges consist of concrete aprons on the river bed. These can be difficult for fish to negotiate, especially at low flows. Culverts can also be problematic, as these structures often have a step between their entrance and the river downstream. Where this is the case, fish may be unable to enter and swim through the culvert. Some culverts also conduct water through pipes which are too small, too lengthy, or have too shallow a depth of water for most of the time, for migrating fish to use.

Initial work to ascertain the extent of this problem has identified almost 14,000 bridges, and 130 km of culverts. However, only a small proportion of these represent barriers to fish. SEPA has also estimated that there are at least 130 barriers associated with roads, and around 10 associated with rail crossings in Scotland. These are likely to be underestimates, and further discussion is needed with Transport Scotland, Network Rail and local authorities.

These barriers are normally assets which deliver a particular social or economic function and are typically owned by local authorities, Transport Scotland, Network Rail or private landowners. Asset owners are expected to include any mitigation measures in their asset replacement and maintenance programme. However Scottish Ministers are considering the introduction of new legislation that would give SEPA powers to require improvements where asset owners do not take the necessary improvement action.

How we will prioritise where improvements are delivered

The Rivers and Fisheries Trusts of Scotland (RAFTS) is coordinating work to identify and assess barriers to fish migration. This desk-based exercise will provide the basis upon which work to address these barriers can be prioritised. Two priority lists will be created:

- A priority list of individual barriers will be produced which will allow action to be directed towards barriers which individually have a large impact upon migration.
- A list of key catchments where catchment-scale action is required to tackle multiple barriers.

Prioritisation will take account of the:

- improvement in ecological status of water bodies which would be achieved if the barrier was addressed;
- area of habitat which would become accessible;
- quality of that habitat for fish production;
- likely importance of the fish population concerned in environmental, social and economic terms.

SEPA is coordinating the development of improved methods for assessing the extent to which in-stream engineering structures individually and cumulatively impede fish migration¹⁵. Among other things, this work will help identify at a catchment scale how to secure effective fish passage.

These priority lists will be further developed by wider consultation and will form the basis of an updated list of priorities which will be set out in the second river basin management plans for Scotland.

¹⁵ See research report produced by SNIFFER for SEPA at www.sniffer.org.uk

What action will be taken to deliver improvements?

The key actions are summarised in the table below. The primary responsibility for managing in-stream structures lies with owners and operators, who should manage them in a way which is environmentally sensitive and in compliance with legislation. SEPA, with the Fishery Boards and Trusts, will be responsible for driving many of the actions described below.

Table 2 – Summary of action to improve fish passage

Issue	Action	Responsibility
All barriers	Identification and prioritisation of barriers to fish migration and identification of proportionate mitigation options.	SEPA/Fishery Boards/Trusts
Weirs and dams in use	Develop asset to allow fish passage in line with CAR authorisation.	Owner or operator
Weirs and dams not in use	Discussions with landowners about how barriers to fish migration can be addressed. Support landowner with application for CAR licence and applications for funding.	Boards/Trusts
	Provision of funding to support scoping studies and engineering works required to provide for fish passage.	SEPA
	Where voluntary approach has not been successful, restoration notice issued under proposed new restoration powers requiring the provision for fish passage.	SEPA
Bridges and culverts	Prioritised asset investment by business or organisation responsible for the asset.	Asset owner
	Where voluntary approach has not been successful, SEPA will require the provision of fish passage using restoration notices or licences as appropriate.	SEPA

The potential for delivering improvements by the removal of barriers to fish migration is illustrated in Figures 3a and 3b. In the first picture, several impassable weirs prevent fish access, with economic consequences in the upper reaches of the river. In the second picture, two weirs have been removed, and a fish pass has been added to a historic mill weir, allowing fish access to the whole river.

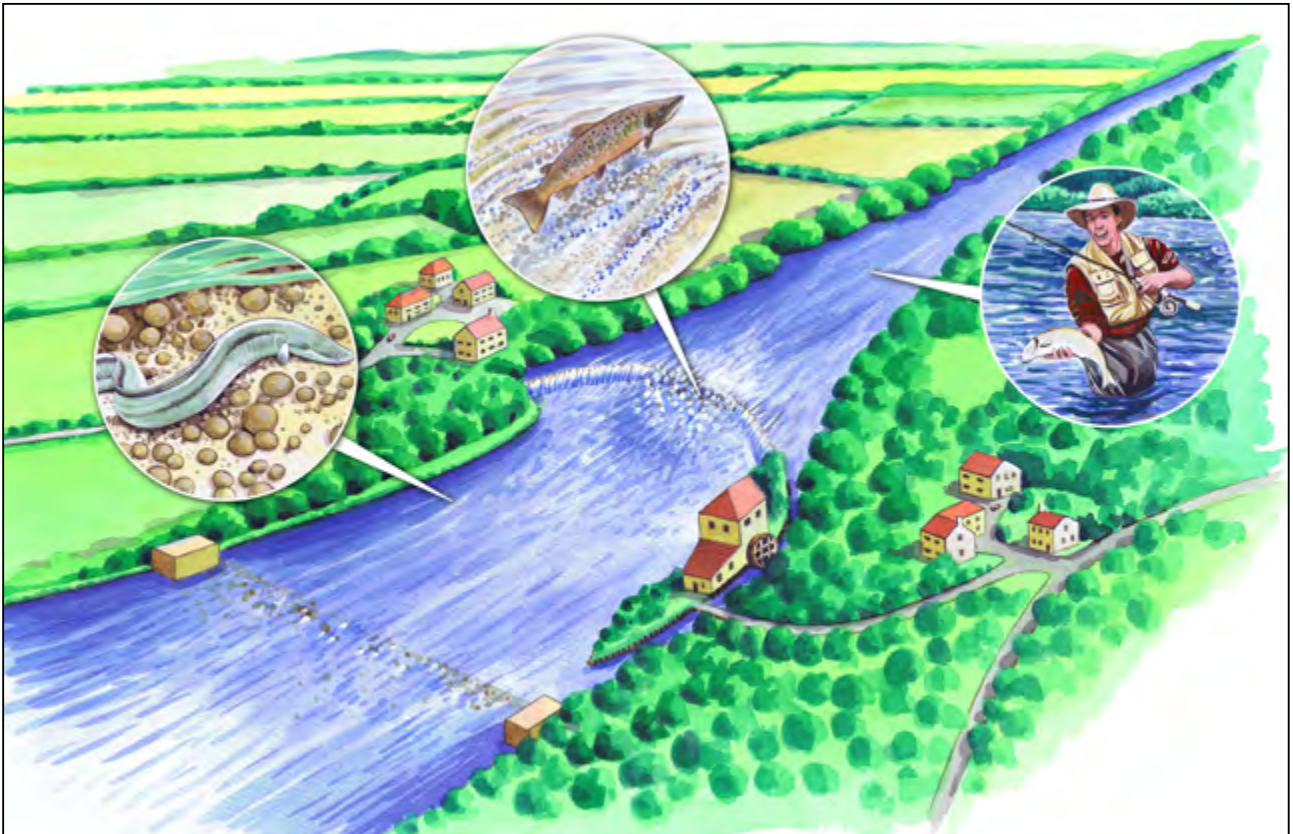
Consultation question:

4. Do you agree with the approach we are proposing for prioritising barriers to migratory fish? If not, why?
5. Can you suggest any improvements to the actions and responsibilities suggested to tackle fish barriers on rivers?

Figure 3a – River with barriers to migratory fish, before restoration



Figure 3b – Restored river, with fish barriers removed or modified.



6. Improving the condition of rural rivers and lochs

Introduction

This section describes how to improve river and loch habitats¹⁶ affected by rural land management. Maximising the area of productive land has led to huge improvements in the quality and quantity of food and timber production. In some situations this has led to the use of land up to the edge of rivers and lochs with adverse consequences for the wider environment and society. We need to get the balance right between maximising the area of productive land and ensuring that rivers can deliver a full range of services to the environment and society.

Agriculture

Farmers have straightened rivers to make them easier to manage, deepened them to drain land more efficiently, and constructed embankments to reduce the frequency of flooding. In turn this means that on-going maintenance such as dredging and bank reinforcement is needed. This historical practice can have implications for the habitat quality of rivers and lochs, as it reduces fish numbers and damages the wildlife value. It can also lead to problems of siltation and flooding for downstream landowners.

Forestry

The first phase of forestry expansion (1960's to 1990's) led to the planting of trees right up to the banks of rivers and lochs. Once the tree canopy closed, shading prevented the growth of bankside vegetation. Forestry drainage channels together with unprotected and therefore unstable banks led to high levels of erosion. This reduced the value of rivers and lochs for wildlife and caused problems to downstream land managers because of increase siltation and flooding.

Supporting improvements

SEPA will work with rural land managers and other stakeholders (such as local authorities) to consider the costs of improvements and the range of benefits which can be achieved, and identify ways forward which are feasible and proportionate.

Many actions will provide direct benefits to individual land managers. However a range of financial support is available to help farmers manage their land in a way that improves the condition of rivers. Most importantly, funding via Scottish Rural Development Programme (SRDP) may be available to help land managers with the creation and management of buffer strips that are wider than two metres. This can include funding for tree planting and for fencing. The next SRDP is being developed, and it will be important to ensure that options which improve the water environment are included, that a catchment wide view is taken and land managers are encouraged to work together to deliver the improvements required.

Other sources of funding such as the Water Environment Fund and Scottish Water's Sustainable Land Management: Best Practice Incentive Scheme provide funds for projects to improve the water environment.

In order to deliver improvements in the way rivers are managed, Scottish Government, SEPA, Scottish Natural Heritage and other Government bodies will provide advice and support for land managers to help them identify the best management techniques for delivering environmental improvements whilst protecting their interests and protecting the interests of their neighbours and other users of the water environment. River basin management plans can help to prioritise these efforts.

Many land use activities are already subject to controls to ensure any likely adverse effects are minimised. Land managers are required to comply with CAR general binding rules covering the cultivation of land and the keeping of livestock. These rules are primarily designed to protect the water environment from diffuse source pollution but some will also protect the physical habitat of rivers, e.g. through the establishment of a buffer strip between the water environment and land used for agriculture or forestry. Scottish Water's Sustainable Land Management Scheme offers funding for measures such as 'naturalisation of watercourse morphology' and stock fencing.

¹⁶ The impacts upon estuaries and coastal waters are covered in section 8.

Table 3 sets out a possible hierarchy of options for improving rivers and lochs affected by land use pressures. It is intended to illustrate the type of actions which would deliver improvements in the management of rural rivers and lochs. The intention is to maximise the benefits provided by the water environment whilst minimising impacts upon agricultural or timber production. Further discussion will be required with stakeholders to define the different scenarios and proportionate approaches set out in Table 3.

Table 3: Possible cost-benefit hierarchy for delivering improvements in a river catchment

Scenario	Key objectives	Possible approach to delivering improvements
High value intensively managed agricultural land which may have problems of erosion and siltation. Regular maintenance required to control erosion and river depth. There may be flooding problems.	<ul style="list-style-type: none"> • Find mechanisms to stabilise river and reduce management requirements. • Control diffuse pollution. • Improve the wildlife value of rivers and lochs, in particular, improve and protect Natura habitats/species. • Look for opportunities to give rivers more space to provide corridors for wildlife and for public amenity. 	<ul style="list-style-type: none"> • May be considered appropriate for designation as Heavily Modified Water Body (HMWB) • Deliver compliance with General Binding Rules protecting bankside vegetation. • Look for further opportunities to intercept diffuse pollution, for example, by developing riparian woodland or the potential greening options alongside rivers/ditches. Make links with LBAPs, Forestry and woodland strategies. • Catchment-scale intervention to reduce sediment siltation and other pressures.
Moderate value managed agricultural land which may have problems of erosion and siltation. Regular maintenance required to control erosion and river depth. There may be flooding problems.	<ul style="list-style-type: none"> • Look for opportunities to give rivers more space to provide enhanced corridors for wildlife and for public amenity. • Find mechanisms to stabilise river and reduce management requirements. • Control diffuse pollution. • Improve the wildlife value of rivers and lochs to improve and protect Natura habitats/species. 	<ul style="list-style-type: none"> • Deliver compliance with General Binding Rules protecting bankside vegetation. • Look for further opportunities to intercept diffuse pollution, for example, by developing riparian woodland or locating the potential greening options alongside rivers/ditches. Make links with LBAPs, Forestry and woodland strategies. • Catchment-scale intervention to reduce sediment erosion and therefore siltation. May involve re-engineering some sections of river to ensure more sinuous and stable channels. • Look for possible opportunities to allow flooding to protect higher value land.

Scenario	Key objectives	Possible approach to delivering improvements
<p>Low value agricultural land which may have problems of erosion and siltation. There may be flooding problems.</p>	<ul style="list-style-type: none"> • Give rivers more space to provide corridor for wildlife and for public amenity. • Find mechanisms to stabilise river and reduce management requirements. • Control diffuse pollution • Improve the wildlife value of rivers and lochs, in particular improve and protect Natura habitats/species. 	<ul style="list-style-type: none"> • Deliver compliance with General Binding Rules protecting bankside vegetation. • Look for opportunities to intercept diffuse pollution, for example, by developing riparian woodland or locating set-a-side obligations alongside rivers/ditches. Make links with LBAPs, Forestry and woodland strategies. • Catchment-scale intervention to reduce sediment erosion and therefore siltation. May involve re-engineering some sections of river to ensure more sinuous and stable channels. • Look for possible opportunities to allow flooding to reduce downstream flood risk. • Look for possible opportunities to move straightened channels to gently meandering channels with wider riparian corridor. Make links with LBAPs.
<p>Older forestry with planting up to rivers.</p>	<ul style="list-style-type: none"> • Give rivers more space to provide corridor for wildlife and for public amenity. • Find mechanisms to stabilise river and reduce management requirements. • Control diffuse pollution. • Improve the wildlife value of rivers and lochs, in particular improve and protect Natura sites/species. 	<ul style="list-style-type: none"> • Deliver compliance with General Binding Rules protecting bankside vegetation. • Ensure that planting is moved back from rivers as part of the forest design of second cycle replanting to provide a riparian corridor. • Look for possible opportunities to allow flooding in areas to reduce downstream flood risk. Make links with LBAPs. • Intervene where necessary to speed up stabilisation of banks. • Look for opportunities to restore riparian and wetland habitats as part of forest design of second cycle replanting to improve riparian and wetland habitat networks. Make links with LBAPs. • Identify drainage ditches etc that are no longer needed, and block as part of forest design of second cycle replanting to reduce silt input.

Prioritising where improvements are delivered

Agricultural catchments

Efforts to tackle diffuse pollution problems are being driven by the Diffuse Pollution Management Advisory Group¹⁷ for Scotland, and are focused on a series of catchments known as diffuse pollution priority catchments. SEPA may include advice on improving the physical management of rivers as part of its communications with land managers in these priority catchments.

In order to support the adoption of appropriate methods, work is underway to develop a good understanding of methods for improving the management of rivers which are appropriate for different parts of Scotland. This work is being developed through a research and development programme coordinated by SNIFFER and involving representatives from Scottish Government, SEPA, Scottish Natural Heritage, Scottish Water and Forestry Commission Scotland. It aims to work with individual farmers in priority catchments to develop demonstration sites which illustrate how improving the condition of river and loch habitats can deliver benefits for the environment and farmers.

Area advisory groups will also identify priorities for improvement in their respective areas and develop programmes of work to deliver these priorities, working with local partners and seeking to secure multiple benefits. It is likely that area advisory groups will focus their efforts on catchments, and could use morphology data and partner data to identify areas where multiple benefits can be achieved. Area advisory group partners can then help to identify key land managers and develop projects and funding applications.

A number of catchment-scale studies will also be developed to explore how river management can be improved so as to reduce maintenance demands for land owners whilst protecting and improving the natural heritage.

Forested catchments

Forestry Commission Scotland has identified where forests have been planted up to the edge of rivers and lochs. These problems are addressed as part of the cycle of felling and replanting of forests, and through the system of licenses and grants for forestry. The Forests and Water Guidelines provide the basis upon which dense planting of conifers is avoided round rivers.

What action will be taken to deliver improvements?

The key actions are summarised in Table 4, below. The primary responsibility for managing rivers and lochs and ensuring no further deterioration lies with land managers who should manage them in a way which is environmentally sensitive and in compliance with legislation. The SEARS¹⁸ partners will be responsible for driving many of the actions described below in partnership with land managers. The work will be overseen by SEPA, in consultation with DPMAG¹⁹ and other RBMP advisory groups.

Table 4: Summary of action to improve rural water environment affected by land management

Issue	Action	Responsibility
All land management impacts	Develop a hierarchy of options for delivering improvements which take account of land values.	SEPA and land managers
	Identify priorities for action, taking account of potential wider benefits.	AAGs and land managers
	Identify options for delivering catchment-scale improvements in the water environment for inclusion in the next SRDP.	Scottish Government

¹⁷ Further information at www.sepa.org.uk/water/river_basin_planning/diffuse_pollution_mag.aspx

¹⁸ Scotland's Environment and Rural Services – see www.sears.scotland.gov.uk/

¹⁹ The Diffuse Pollution Management Advisory Group, a partnership that focuses on improving Scotland's water environment by reducing rural diffuse pollution. More information at www.sepa.org.uk/water/river_basin_planning/diffuse_pollution_mag.aspx

Damaged bank side vegetation	Compliance with CAR general binding rules for the application of fertilisers, keeping of livestock, and the cultivation of land.	Land managers
	Compliance with standards for Good Agricultural and Environmental Condition (GAEC) for bankside vegetation.	Land managers
	Provide access to the Scotland Rural Development Programme funding for fencing or planting associated with buffer strips wider than General Binding Rule obligations and other relevant options.	Scottish Government
	Explore development of Water Environment Fund, National Lottery or EU funding as part of larger scheme to deliver environmental improvements which go beyond General Binding Rule obligations.	SEPA, FCS, SNH and local authorities
	Provide access to Sustainable Land Management scheme funding in specified catchments to protect banks and naturalise watercourse morphology.	Scottish Water
	Deliver awareness raising events, demonstration sites and farm visits to provide information on how to create environmental improvements and support compliance with CAR general binding rules.	Diffuse Pollution Management Advisory Group
	Use Forestry Grant schemes to encourage improved bank-side forestry management (compliance with Forest & Water guidelines) and design (forest design plans).	Forestry Commission Scotland
	Ensure that conditions of approval of felling licences and Forest Plans protect and improve the water environment.	Forestry Commission Scotland
Deepened straightened river channel	Identify appropriate methods for sediment management taking account of land values.	SEPA
	Support identification of options for delivering improvements by developing scoping studies, catchment scale sediment audits, demonstration sites and research and development.	SEPA/Scottish and Northern Ireland Forum for Environmental Research (SNIFFER)
	Scotland Rural Development Programme funding for buffers and associated fencing or planting for buffer strips wider than General Binding Rule obligations.	Scottish Government
	Water Environment Fund, National Lottery or EU funding as part of larger scheme to deliver options for delivering improvements.	SEPA, SNH and local authorities
	If linked to a flood protection scheme, powers to secure implementation of the scheme.	Local authorities

The potential benefits of restoring the land immediately adjacent to rivers are illustrated in Figures 4 and 5. Figure 4a shows how using land up to the edge of rivers can contribute to erosion and diffuse pollution, while Figure 4b shows the potential improvements for wildlife and water quality if riparian vegetation is protected. In Figure 5a, we see how straightening and engineering of channels can contribute to sedimentation and flooding, while Figure 5b shows that managed creation of space around rivers can help to protect high value agricultural land and reduce the requirement for sediment maintenance, while offering benefits for wildlife and access.

Consultation question:

6. Can you suggest ways of improving the approach we have proposed for restoring the water environment in rural areas? In particular, what are your views of the cost-benefit hierarchy proposed in Table 3?
7. Do you agree with the actions and responsibilities suggested to improve the condition of rivers and lochs in rural areas, and can you add to these by identifying additional actions and/or responsibilities?
8. How can we encourage a voluntary approach by land managers to restore the water environment?

Figure 4a – Rural land use: pressures on riparian vegetation

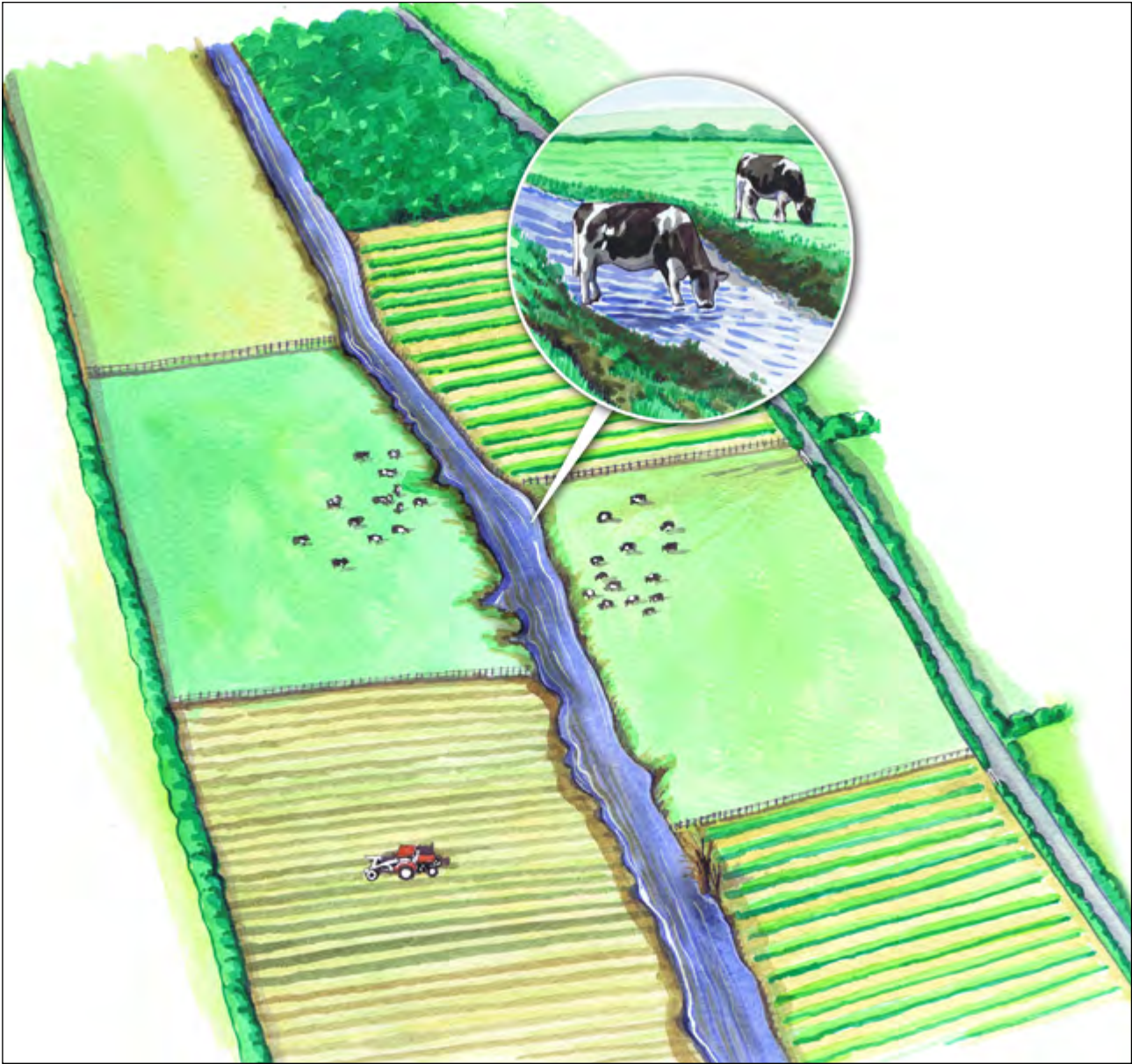


Figure 4b – Rural land use: improvements to riparian vegetation

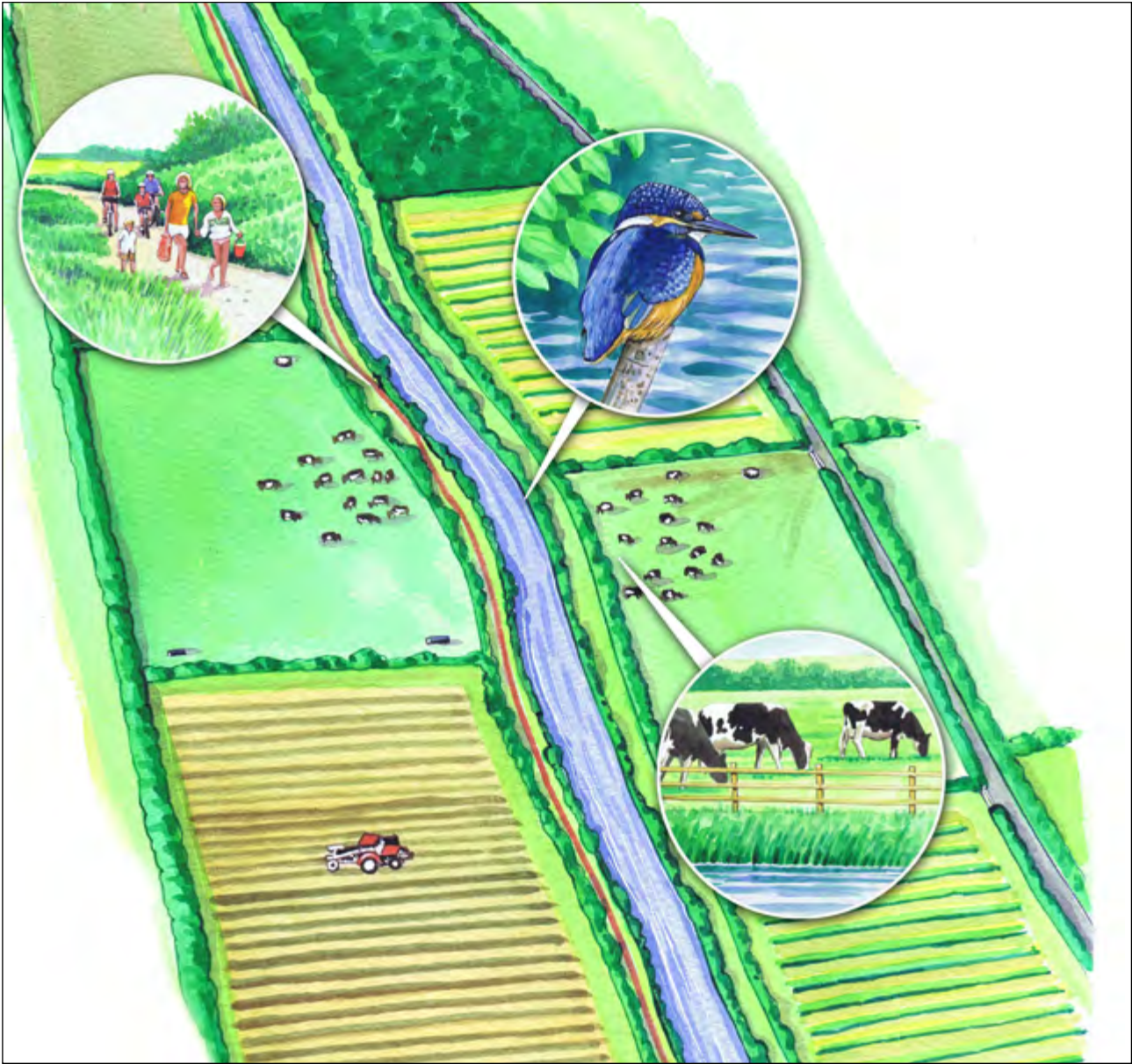


Figure 5a – Rural land use: flooding and erosion

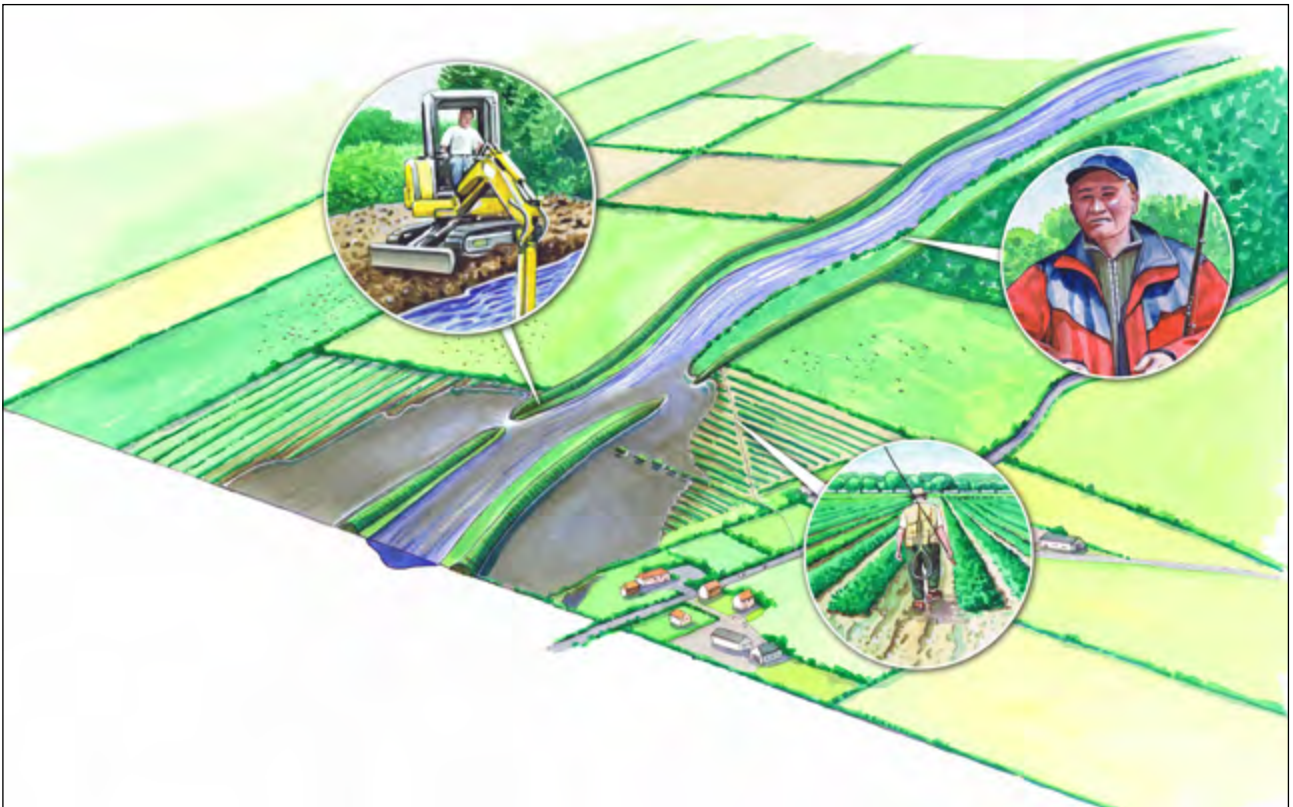
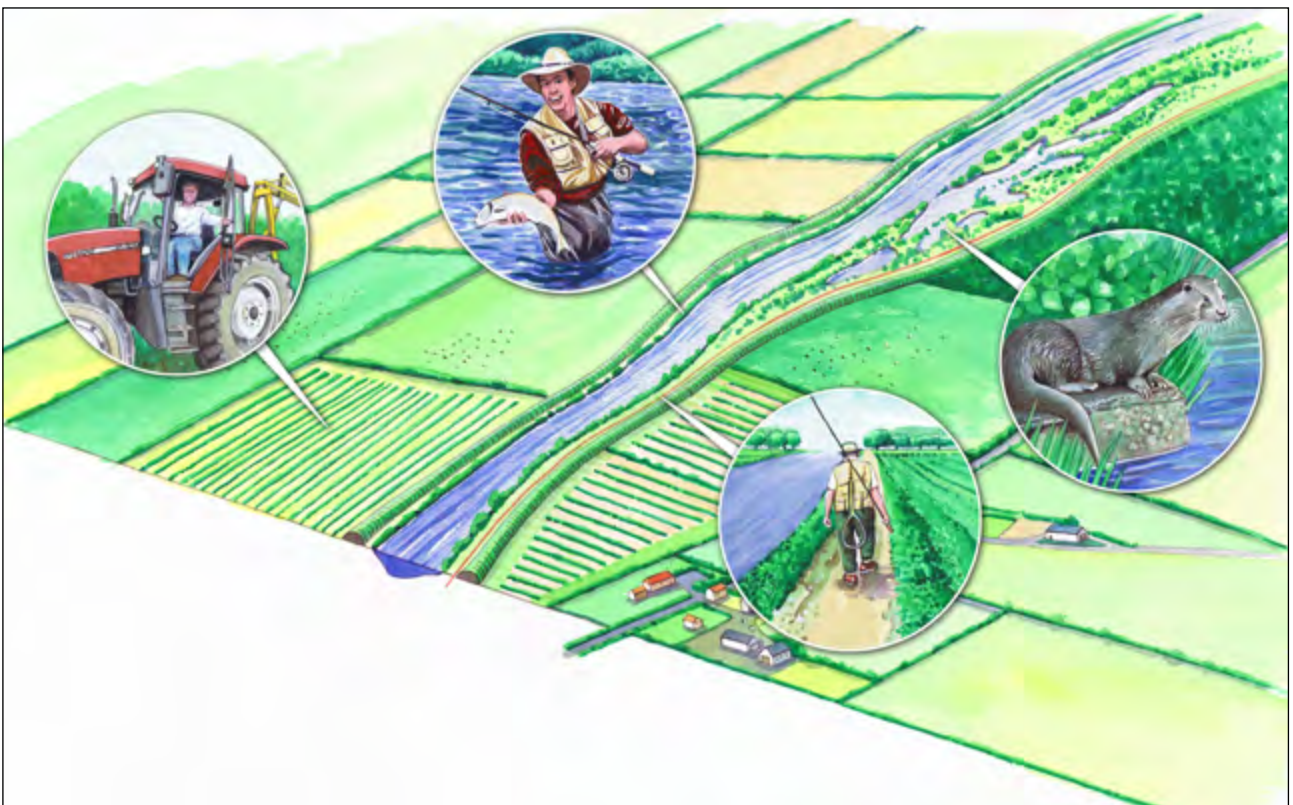


Figure 5b- Rural land use: improvements to reduce flooding and erosion



7. Improving the condition of rivers and lochs in towns and cities

Introduction

Rivers and lochs in many towns and cities provide a focus for the urban landscape. They have the potential to provide very valuable amenity and recreational opportunities, but many are neglected and underused assets. There are, therefore, very positive benefits in restoring urban rivers and enhancing the contribution that they can make to the quality of life.

The type of benefits which can be delivered by improving urban water environments include:

- improving fish passage and in-stream and riparian habitats,
- reducing flood risk;
- creating opportunities to access the natural environment, provide new open spaces for amenity and recreation, and green networks for wildlife and people;
- reducing urban water pollution by incorporating sustainable drainage schemes (SUDS) and remediating contaminated land.

Delivering these benefits can have wider socio-economic consequences as they create an attractive environment which encourages recreation, boosts physical and mental health, encourages business investment and tourism, and enhances property values.

Delivering improvements

Restoration of urban water courses is often constrained by lack of space, but there can be potential to deliver some improvement in physical condition, along with significant environmental and social benefits, sometimes using innovative approaches. Towns and cities are continually changing and it is this process of change which provides the opportunity for restoring river and loch environments. For example, there may be opportunities to remove redundant structures and buildings, and restore derelict land alongside rivers in order to improve local amenity and environment. There is also the opportunity to make large-scale improvements in the urban environment associated with major urban regeneration projects, as set out in the Scottish Government's Regeneration Strategy (2011). Indeed, because of the amenity and landscape benefits provided by rivers, their restoration is often central to urban regeneration schemes. These opportunities are recognised in the National Planning Framework (NPF2), and approaches such as the Central Scotland Green Network and proposed National Ecological Network.

Local authorities can use the land-use planning processes to deliver improvements to urban rivers, lochs and coastal waters. Strategic development plans and local development plans, including supplementary planning guidance and action plans, are produced by planning authorities with input from a wide range of stakeholders. They can identify aspirations and assist delivery of restoration.

A range of complementary land use planning measures can help to progressively improve the water environment's contribution to the quality of the urban environment:

- Development plan policies can enable protection and improvement of the urban water environment. For example, policies which require use of SUDS, require buffer strips or promote deculverting of watercourses.
- Development plan settlement strategies and statements can identify opportunities to protect and enhance the water environment, for example by leaving space around straightened channels or removal of redundant structures.
- Where development plans identify masterplans to be required for certain areas, elements to be included within masterplans should include enhancement and removal of redundant structures.
- Development plan action plans and supplementary guidance can identify RBMP restoration measures relevant to settlement strategies.
- Development management can take opportunities to deliver RBMP restoration through planning applications, including use of planning conditions and developer contributions. Where there is scope, it may be possible to investigate use of obligations to provide cumulative developer contributions to fund RBMP restoration. This approach could be strengthened if SEPA works with development management officers to identify water bodies downgraded for morphology, and are consulted if a development is close to a water body downgraded for morphology.

Delivery of many of these measures, particularly relating to developer contributions, will be contingent on supportive policies at national and local level, and clear guidance on what restoration approaches would be relevant and proportionate as part of a development.

There are also important links between restoration and local authority open space strategies or green network strategies. These strategies often require a proportion of open space in developments. If well designed, this open space can create green networks for morphological restoration, wildlife and people. Greenspace around watercourses can also contribute to sustainable urban drainage schemes (SUDS) and improve resilience to flooding. Well planned and designed development can achieve elements of all these benefits.

Finally, there are opportunities to restore aspects of urban rivers and lochs as part of watercourse maintenance work undertaken by local authorities together with their landscape management functions. Typically this involves delivering small-scale improvement:

- in the landscaping of rivers;
- by the removal of redundant structures (such as culverts) so as to reduce flood risk, with attendant benefits of improved biodiversity and reduced pollution;
- by reinstating structures with greener alternatives.

Prioritising where improvements are delivered

The potential for delivering urban river and loch restoration is largely driven by the potential opportunities created by development proposals as managed by the land-use planning system. We will seek to facilitate and influence these opportunities by:

- ensuring that development planning policies, supplementary planning guidance and open space policies recognise and support opportunities for delivery of morphological improvements;
- contributing information on morphological pressures and how these could be improved as part of responses to development plans, masterplans, development management and open space or green network strategies and plans;
- sharing geographical information systems (GIS) data and other information relating to the water environment with local authorities, to allow integrated consideration of morphological issues and development opportunities;
- identifying multiple benefit restoration opportunities, such as those piloted in the Forth and Clyde river basin planning advisory group areas²⁰

²⁰ See the Forth and Clyde Area Advisory Group webpages at www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/clyde.aspx and www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/forth.aspx for details of these pilot studies.

What action will be taken to deliver improvements?

The key actions are summarised in Table 5 below. Local authorities will have a significant role in driving forward action.

Table 5: Summary of action to improve the urban water environment

	Action	Responsibility
Development opportunities	Apply planning policies, objectives and advice notes to progressively improve the contribution made by rivers to the quality of the urban environment. These include the National Planning Framework, Scottish Planning Policies, consolidated water Planning Advice Note, circulars, Strategic and Local Development Plans.	Scottish Government and local authorities
	EU, Scottish Government and National Lottery funding provides support for delivering environmental improvements as part of urban regeneration.	Scottish Government
	Water Environment Fund provides targeted support for river restoration. Other sources of funding may be identified or sought for large scale projects.	SEPA
	Provision of technical advice on restoration of rivers and promotion of recreation and amenity use.	SEPA and SNH
	Development management provides the mechanism to improve land adjacent to rivers.	Local authorities
	Open space and greenspace strategies provide an opportunity to create space for wildlife and people adjacent to rivers.	Local authorities
	CAR regime provides an opportunity to ensure that new engineering work in rivers contribute to delivering improvements.	SEPA
River maintenance improvements	Local authority policy and guidance provides the context for progressive improvement in rivers where this is cost effective. SEPA will work with local authorities to plan and prioritise where improvements are needed.	Local authorities, SEPA
	CAR regime provides an opportunity to ensure that engineering work in rivers contributes to delivering improvements.	SEPA

The potential advantages of restoring urban rivers are illustrated in Figures 6a and 6b. The first picture shows an engineered and culverted river, which does not function as a social, economic or environmental asset for the urban area, and contributes to localised flooding. In the second picture, 'daylighting' of a culverted watercourse has been linked with regeneration and creation of open space, resulting in an improved local environment for housing, amenity, wildlife and sustainable flood management.

Consultation question:

9. Can you suggest ways of improving the approach that we have proposed for restoring the water environment in urban areas?
10. Do you agree with the actions and responsibilities suggested to improve the condition of rivers and lochs in urban areas and can you add to these by identifying additional actions and/or responsibilities?

Restoring the physical condition of the water environment will rely on links with existing policies and strategies, such as green network strategies, forest and woodland strategies, local and strategic planning policies.

11. Are there other policy links which should be highlighted in this document?
12. How can we improve our links to key policies and strategies, both in this document and in practice?
13. Do you have views on how we can work with local authorities and developers to support the delivery of improvements of urban rivers and lochs?

Figure 6a: Urban river before restoration

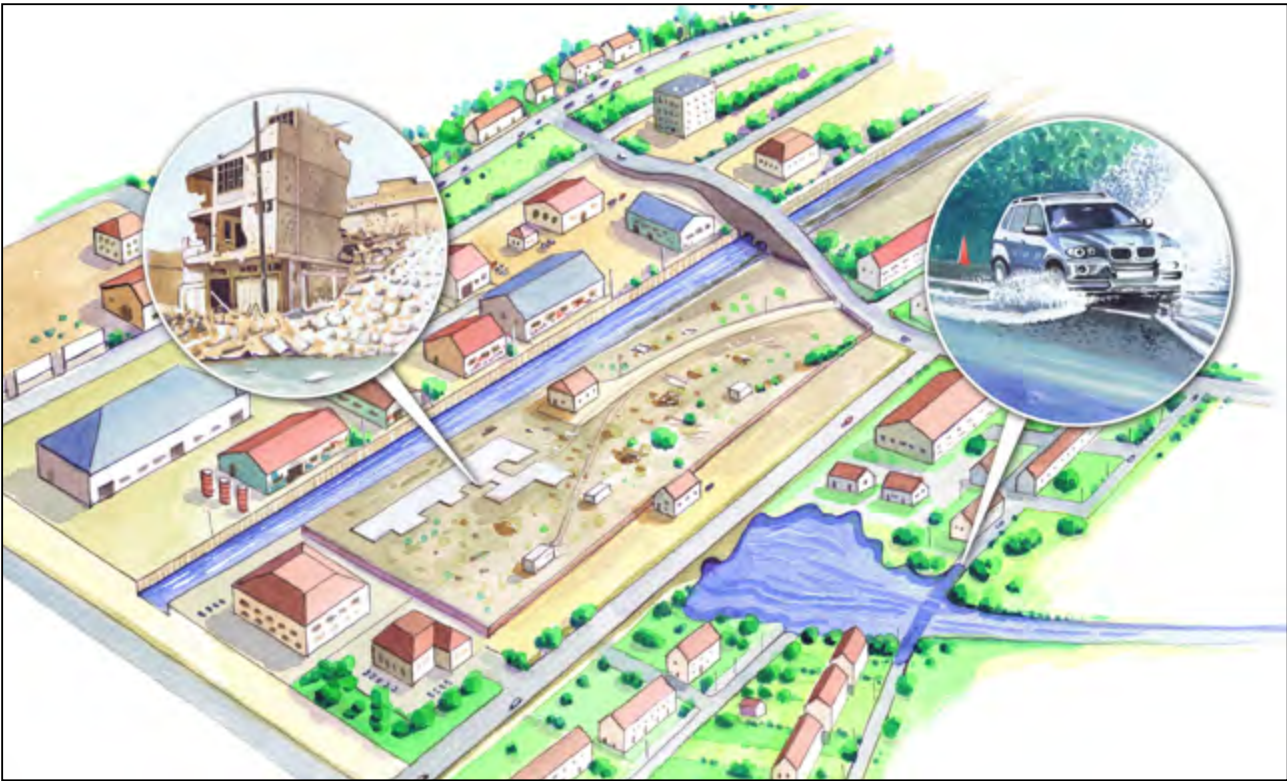
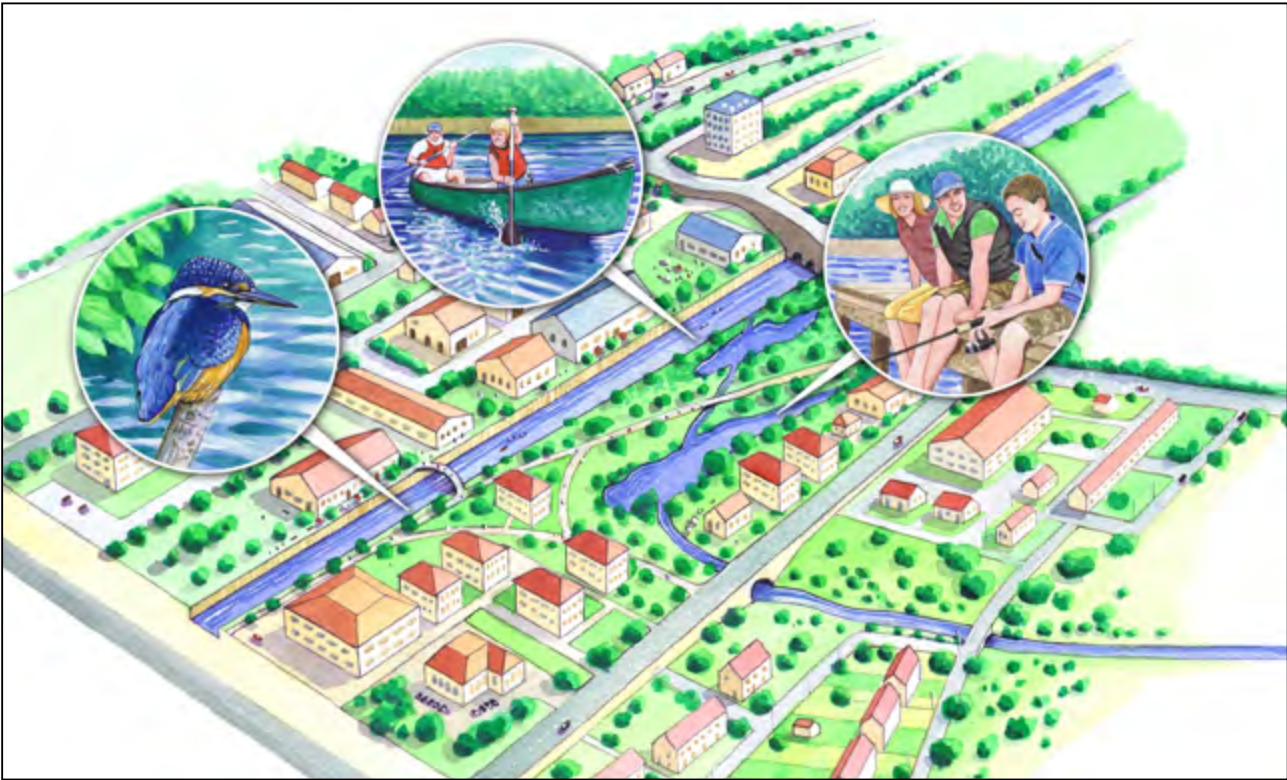


Figure 6b: Urban river after restoration



8. Improving the condition of estuaries and coasts

Introduction

Scotland's rich and biologically productive marine and coastal environment has immense economic and iconic value²¹. Scotland's estuaries and coastal waters provide food, energy sources (wind, wave and tidal power, minerals and fossil fuels), ports and harbours for shipping, tourism and recreational opportunities and sites of cultural and historical interest. The salt marshes and sea grasses of the world's oceans cover around 0.5% of the sea bed, but account for over half of the carbon storage in ocean sediments²². Coastal areas also contain distinctive and important habitats and support a diverse range of species which we need to protect, conserve and where possible enhance. Restoration of estuaries and coasts offers a number of long term benefits, such as sustainable coastal flood risk management, improved fisheries, marine habitat enhancement, economic and recreational benefits.

Around 6% of the Scottish coastline has been modified by coastal defences, and Scotland's river basin management plans have identified that around six coastal and seven estuarine water bodies are affected by issues relating to flood defence and land claim (see Figure 7). Many of the impacts to morphology in the marine environment relate to urbanisation, port and harbour development and land claim associated with past agricultural improvements.

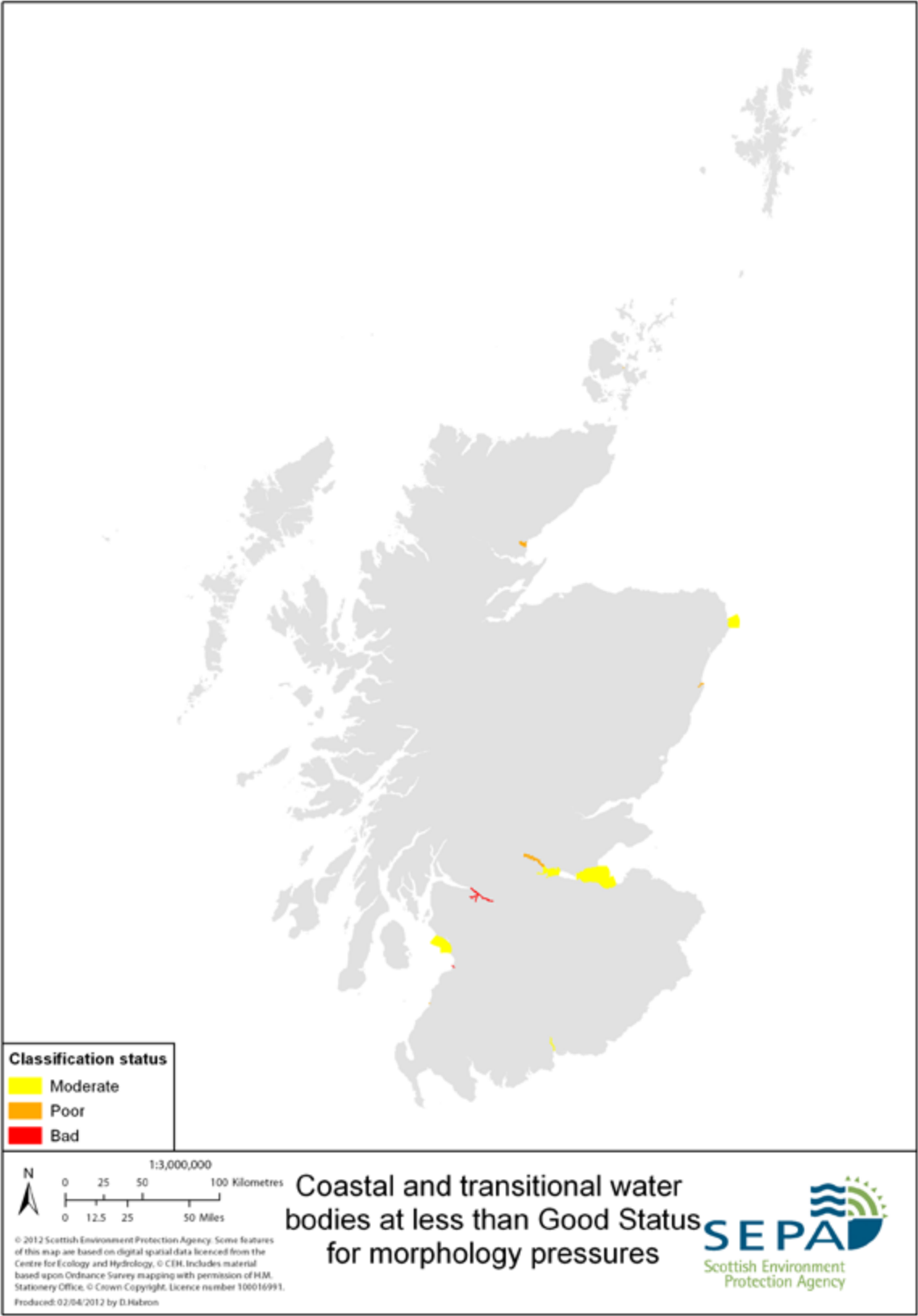
Much of this effort has been vital to Scotland's social and economic development. However, the presence of coastal defence structures, flood defence embankments and flow and sediment manipulation structures along some stretches of coast can interrupt the supply and transport of sediment. In some cases this can lead to problems of erosion along adjacent stretches of coastline, and damage to intertidal habitats and structures.

The Scottish coastline will face major pressures in the coming decades, particularly from rising sea levels and climate change, and continuing development pressures relating to urban, marina and port development, new investment in coastal and flood defence structures and renewable energy development.

²¹ See Scotland's Marine Atlas, www.scotland.gov.uk/Topics/marine/science/atlas

²² See the Blue Carbon project, www.grida.no/publications/rr/blue-carbon, which identifies opportunities for climate change adaptation and mitigation through restoration of Blue Carbon sinks.

Figure 7: Map of coastal water bodies affected by physical changes



Delivering improvements

Appropriate management may offer opportunities to enhance both biodiversity and other ecosystem services through applying sustainable management options, including:

- allowing intertidal habitats room to migrate inland with rising sea levels in order to mitigate coastal squeeze;
- managing sediment supplies by allowing erosion to contribute new sediment to the coast, and allowing natural sediment transport processes to proceed where possible, e.g. encouraging the beneficial reuse of dredged sediment to restore sediment supplies;
- maintaining or encouraging natural formation of early successional habitats where these are threatened or have disappeared, e.g. strandline management plans (see [Shetland Council](#) website for more information);
- initiating management practices that support the recovery of carbon sinks, such as salt marshes and sea grasses.

Other restoration techniques include the removal of redundant structures, no active intervention or defence abandonment where maintaining existing defences will be too costly, sand dune fencing and beach nourishment to restore eroding beaches and sediment supplies. An additional sediment supply management option is to allow erosion to contribute to new sediment in the coast and allow natural transport processes to proceed where possible

Case study – Landscape scale restoration in the upper Forth estuary

The Firth of Forth Futurescapes Project, a project led by RSPB Scotland in partnership with a number of statutory and non-statutory organisations including SEPA, is looking at opportunities for landscape scale restoration along the upper Forth estuary. In its initial phase, the project identified an area of around 600 hectares where improvements might be possible through managed realignment and habitat management. As well as improving water environment habitats, the project would contribute to achieving more sustainable management of flooding, in particular buffering the effects of sea level rise on the estuary. The project has recently received further funding.



Image: RSPB Scotland

Prioritising improvements

Under the Marine (Scotland) Act 2010, a new statutory marine planning system to manage the increasing, and often conflicting, demands on our seas will introduce for the first time, a strategic framework – a national marine plan. Regional marine plans will follow. This layered planning system will guide and direct decisions in the marine environment, providing a key mechanism by which we can identify the improvements which we want to make in the condition of coastlines. Links can also be made with local authority planning systems, and shoreline management plans.

To support this, we will highlight coastal and estuarine water bodies which are below good status (or potential) and identify where structures could be removed or modified. Additional data gathering may be required to detect changes in coastal sediments and habitats and inform adaptation strategies. It will be important to link this work with local authority responsibilities on shoreline management plans, as well as integrated coastal zone management approaches and work by coastal partnerships.

Data on coastal areas which are potentially vulnerable to flooding should be linked with information on downgraded intertidal areas, and carefully targeted investment in flood risk management could offer multiple benefits. In addition, there may be localised opportunities for restoration on privately owned land where existing flood defences and coastal protection measures have become economically unviable. SEPA will then consider areas which are potentially vulnerable to coastal flooding for managed realignment or other restoration options as part of the flood risk management approach.

Area advisory groups can play a strong role in helping to identify and prioritise such opportunities, and could work with coastal partnerships and national agencies to set up projects and seek funding for improvement of physical condition.

At a more strategic level, management should also be based on an ecosystem services approach to further enhance gains in biodiversity and other services. Links must also be made to the Marine and Fisheries Sector Action Plan in Scotland's climate change adaptation framework (Climate Change Adaptation Framework)²³.

What action will be taken to deliver improvements?

The key actions are summarised in Table 6 below. Marine Scotland and SEPA will be responsible for driving many of the actions described below.

	Action	Responsibility
Development and policy driven improvements	Planning policies, development plans, Shoreline Management Plans, Access Strategies and LBAPs can progressively improve the physical condition of coastal areas, reduce flood risk and promote biodiversity and recreational use of coasts. SEPA will work with other agencies to agree a prioritised approach to improve the physical condition of coastal water bodies.	Scottish Government and local authorities
	National marine plan and regional marine plans can set objectives to progressively improve the condition of coastal areas.	Marine Scotland
	Identification of opportunities for managed retreat and other restoration as part of Flood Risk Management Plans.	SEPA and local authorities
	Powers to require implementation of flood protection schemes can drive improvements.	Local authorities
Opportunistic improvements	SRDP funding for managing coast and creating salt marsh.	Scottish Government
	Water Environment Fund, National Lottery or EU funding as part of large prioritised scheme to deliver environmental improvements.	SEPA, SNH and Marine Scotland
	Identification of opportunities for coastal restoration, particularly where this links with multiple benefits. Development of partnership projects.	Non-governmental organisations, Coastal partnerships, AAGs
	Provision of technical advice on restoration of coastline and promotion of recreation and amenity use.	Marine Scotland, SEPA and SNH
	Marine licensing of engineering activity provides an opportunity to deliver environmental improvements.	Marine Scotland

Consultation question:

14. Can you suggest ways of improving the approach we have proposed for restoring the water environment in coastal areas?
15. Do you agree with the actions and responsibilities suggested to improve the condition coastal areas and can you add to these by identifying additional actions and/or responsibilities?

²³ <http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/adaptation/AdaptationFramework/SAP/MarineandFisheriesScotland's>

9. Restoration and flood risk management

Introduction

Fluctuating water levels are a natural function of the water environment, and continuity between a river and its floodplain is an important part of this function. This ensures the maintenance of valuable habitats such as wetlands and can reduce the risk of flooding downstream. There has, however, been substantial urban and agricultural development of flood plains, impeding this natural process. This development creates its own requirement for flood protection to manage the risk of flooding to properties and high value agricultural land.

Delivering improvements

Natural flood management includes a range of flood management techniques to reduce flood risk. It also offers opportunities to promote improvement of the morphological conditions of rivers or coasts.

- Setting flood embankments back from rivers to reduce the area which will flood in an uncontrolled way. This type of restoration is appropriate in areas of relatively high value land where the river currently has embankments close to the edge of the river channel which have a high risk of failure.
- Restoration of natural flood plain. It may involve the restoration of wetlands by blocking drainage channels and removing flood embankments or the planting of flood plain woodland. Such action would only be taken with landowner agreement, and would normally only be appropriate in relatively low value land.
- Restoration of coastal areas through natural flood management techniques such as managed realignment.

As described in Sections 6 and 8, SEPA will also work with landowners to address flooding as part of the process of delivering improvements in the condition of rivers and coast lines. There are strong links to be made with green network strategies, local authority work on flood risk management, and the use of sustainable urban drainage systems (SUDS).

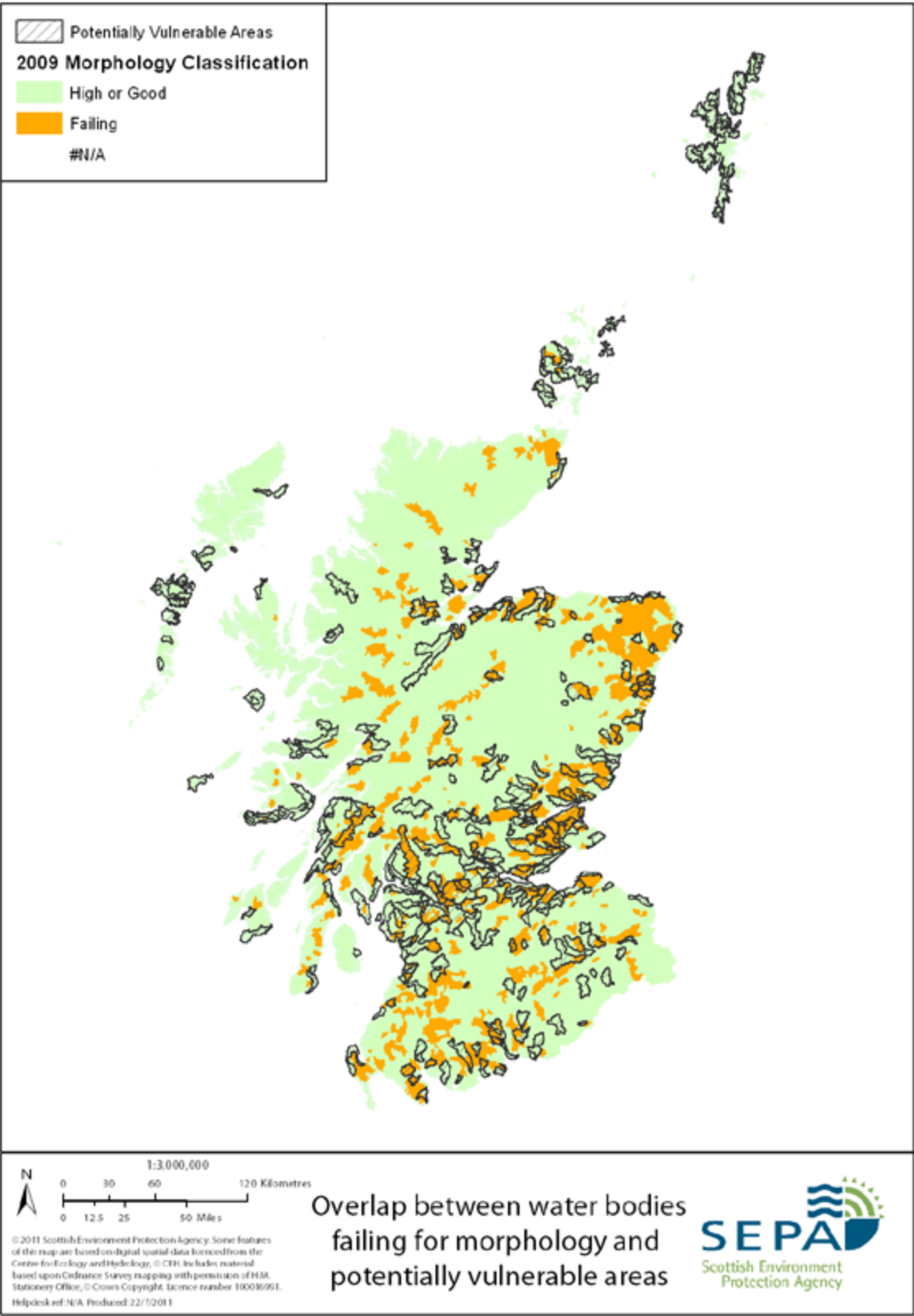
In order to develop a better understanding of natural flood management opportunities, SEPA will develop maps showing where natural flood management could make a contribution to reducing river and coastal flooding. These maps will be developed in 2013 for all catchments that have been identified as containing areas at significant flood risk and include a high level appraisal that will inform the setting of objectives and measures in SEPA's flood risk management strategies. This will include an assessment of opportunities to deliver towards WFD objectives and delivery of other environmental and social benefits. Final agreements on measures to reduce flood risk will be agreed for each six year planning cycles with local authorities and other responsible authorities in local flood risk management plans in 2016 and implemented thereafter.

Prioritising where improvements are delivered

SEPA is responsible under the Flood Risk Management (Scotland) Act 2009 for identifying areas where it considers there to be a significant flood risk. These areas are called 'potentially vulnerable areas' and are where effort to reduce flood risk will be prioritised. The process of identifying potentially vulnerable areas is not designed to pick up localised flooding experienced by farmers or other landowners.

SEPA has identified 243 areas across Scotland which are potentially vulnerable to flooding. Around 35% of these contain water bodies where restoration will be needed to achieve good ecological status (127 water bodies in total, see Figure 8). There are also significant numbers of water bodies upstream of these areas that also require restoration and this could contribute to reducing flood risk. The next stage in the flood risk management planning process is for SEPA, working in partnership with local authorities and others, to characterise catchments, urban areas and coastlines. This will include an assessment of where the creation of floodplain storage areas could help reduce flood risk. SEPA is required to complete this assessment by December 2013.

Figure 8: Map of potentially vulnerable areas linked to catchments affected by changes to physical condition



What action will be taken to deliver improvements?

The key actions are summarised in Table 7 below. SEPA and local authorities will be responsible for driving many of the actions described below.

	Action	Responsibility
Urban, rural and coastal areas affected by flooding	Flood risk management planning identifies opportunities and priorities for action.	SEPA, Scottish Water and local authorities
	Development of flood risk management schemes which minimise harm to the water environment and look for opportunities to deliver improvements.	Local authorities
	CAR regime requires that engineering work in rivers prevents deterioration in the quality of rivers and contributes to improvements.	SEPA
	Flood risk management controls will reduce flood risk.	Local authorities
	Assessment of catchment-scale solutions to problem flooding and identification of opportunities to deliver environmental benefits, including links with LBAPs and green networks.	SEPA
	Water Environment Fund provides support for proposals to reduce local flood risks whilst delivering environmental benefits.	SEPA
	Identification of opportunities for natural flood management.	Local authorities, SEPA

Consultation question:

16. Can you suggest ways of improving the approach we have proposed for reducing flood risks and delivering improvements in the condition of the water environment?
17. Do you agree with the actions and responsibilities suggested and can you add to these by identifying additional actions and/or responsibilities?

10. Implementing this plan

This plan has set out an approach to achieve improvements in the physical condition of the water environment, through partnership working, setting priorities, and the use of a carefully managed voluntary approach. As described, if undertaken at the catchment scale, improving the physical condition of the water environment can deliver a range of multiple benefits.

Delivery at a national level

SEPA will work with the identified bodies to promote and deliver restoration activity in line with the priorities outlined in the preceding sections. In order to ensure resources are effectively allocated to the greatest national priorities, SEPA will also take a broad view on whether any particular pressure should be given increased focus. A range of national bodies will be involved in delivery of this plan, and the National Advisory Group will have oversight of delivery to ensure that it is consistent and efficient. Specific advice may be sought from relevant sub-groups relating to the development and delivery of particular topics discussed. For example, because of synergies between diffuse pollution and morphology pressures, the Diffuse Pollution Management Advisory Group²⁴ may offer advice on integrated approaches for diffuse pollution and morphology pressures affecting rural rivers. The Fish and Fisheries Advisory Group²⁵ should advise on the process of delivering environmental improvements which will improve fish populations.

Delivery at a local level

Area advisory groups²⁶ have been established to help drive the local delivery of RBMP targets. These groups bring together partners including responsible authorities and key stakeholders for each area, and offer an important forum for addressing pressures on the water environment through partnership approaches. Area advisory groups are working closely with flood risk management local advisory groups, which have a statutory role in providing advice on the links between flood risk management and river basin management planning.

Area advisory groups and their members will play an important role in helping to deliver the actions identified in this plan and taking action to deliver partnership work and secure funding. Local partnership work will be vitally important in informing an integrated catchment approach, and helping to identify the extent of morphological pressures and set priorities.

It is also key to developing an approach which secures multiple benefits and engages with relevant partners and funding streams. A range of common objectives, relating to green networks, flood risk management, biodiversity, regeneration and climate change adaptation can be achieved through restoring the physical condition of the water environment. These links must be identified, emphasised and developed.

In working through these priorities, area advisory groups are well placed to consider where a range of benefits could be delivered, and to use this as a consideration in deciding where to focus their effort. Multiple benefits approaches, such as opportunity mapping piloted in the Glasgow and Clyde Valley²⁷ and Forth²⁸, will be used more widely.

Delivery at a catchment scale

This plan's vision is to support delivery of long term improvements in the way we manage catchments so that they deliver a wider range of services to support people's health and enjoyment, sustainable economic growth and wildlife. By doing so, the plan will make a contribution to delivering the three objectives defined by the Government's Land Use Strategy:

1. Land based businesses working with nature to contribute more to Scotland's prosperity.
 - Reduce the costs of managing the water environment by tackling problems at source.
 - Support land based industries and communities to maximise opportunities provided by a good water environment, e.g. whisky industry, rural businesses.

²⁴ www.sepa.org.uk/water/river_basin_planning/diffuse_pollution_mag.aspx

²⁵ www.sepa.org.uk/water/river_basin_planning/fish_and_fisheries_ag.aspx

²⁶ www.sepa.org.uk/water/river_basin_planning/area_advisory_groups.aspx

²⁷ For information see www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/clyde.aspx#pilot

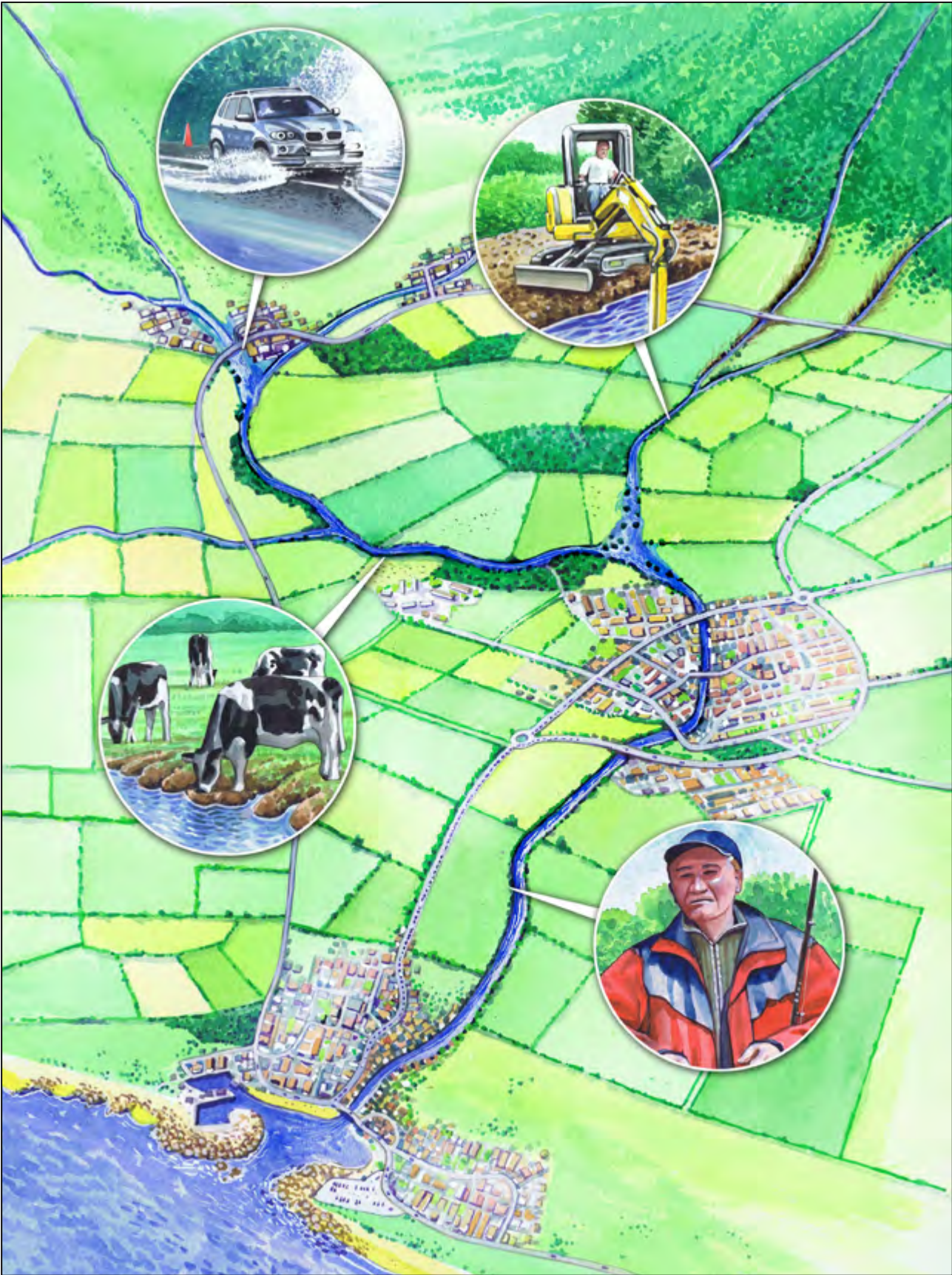
²⁸ www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/forth/forth_multiple_benefits_projec.aspx

2. Responsible stewardship of Scotland's natural resources delivering more benefits to Scotland's people.
 - Improve fisheries by improving the condition of rivers and fish passage.
 - Reduce flood risks by promoting natural flood management.
 - Development of buffer strips or green corridors along the sides of rivers which improve the wild-life value of our water environment.
3. Urban and rural communities better connected to the land, with more people enjoying the land and positively influencing land use.
 - Create green corridors along rivers which provide the potential to improve access to the countryside thereby improving the welfare of people who live in Scotland's villages, towns and cities.
 - Support the restoration of derelict land within urban areas to provide green-space for people to enjoy.
 - Contribute to integrated habitat networks, which will help to protect biodiversity, offer opportunities for amenity and deliver local biodiversity action plan and Forestry and Woodland Strategy objectives.

Illustrating the benefits which can be delivered at a catchment-scale

The following illustrations summarise the benefits of taking a catchment-scale approach to delivering physical improvements to the water environment.

Figure 9a: Physical condition of a catchment before improvement

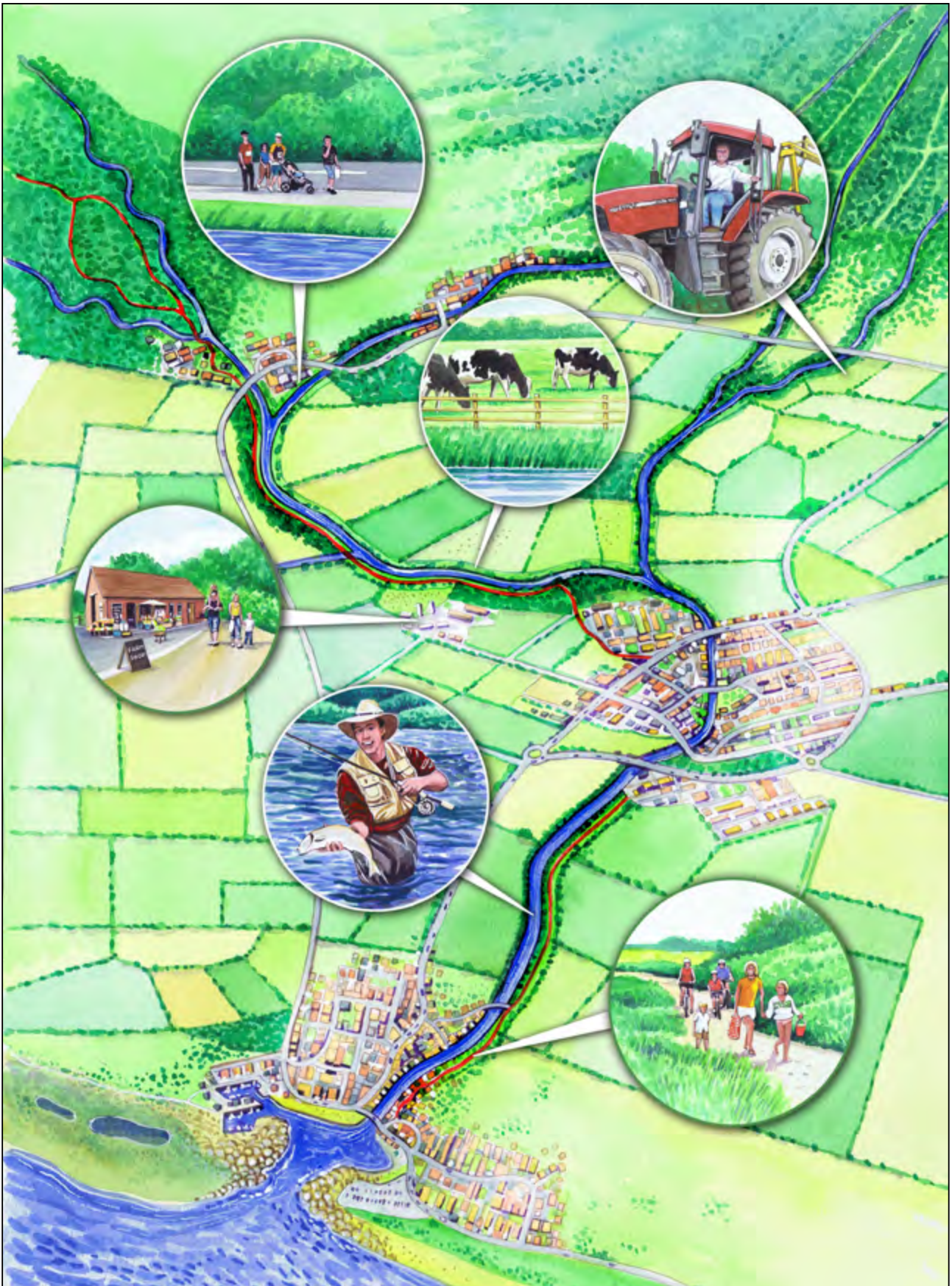


Current catchment

Figure 9a describes the current situation in a river catchment where the physical condition of rivers and wetlands result in flooding, erosion and sedimentation problems. Polluting run-off from land can not be intercepted and this causes environmental problems downstream. Fish access is restricted because of barriers. The condition of the river imposes additional maintenance costs on landowners. There are also a range of indirect impacts, such as reduced potential for amenity, access and economic development. The illustration shows that:

- Rivers draining the hills have poor bank vegetation cover and as a result the banks are rapidly eroding. The silt is carried downstream and deposited in the river once the river gradient flattens. The farmer has to regularly dig the silt out of the river.
- Fishing in the river is not good. A combination of pollution, damage to spawning beds and barriers to fish migration has compromised fish populations. Anglers are frequently disappointed and there is a progressive reduction in interest in fishing.
- Farming up to the edge of the river damages bank vegetation and does not provide a barrier to pollution passing from the land to the river. The river no longer looks attractive and it does not contribute to a diverse landscape. Pollution and damage to the river banks reduces the biodiversity value of the river affecting fish and animals such as otters and water voles.
- The tributary above the village has been straightened and drained and in some places flood embankments have been constructed. As a result river levels increase very rapidly during heavy rain and this leads to flooding of the village roads adjacent to the river.

Figure 9b: Physical condition of a catchment after improvement



Future catchment

Figure 9b shows how the management of the river catchment could be improved. This involves the expansion of woodland in particularly along the rivers. This, together with fencing the river to prevent access by stock, has allowed bankside vegetation to flourish. The result is that a green river corridor is created valuable for wildlife and which improves the appearance of the landscape. Because the banks are protected by vegetation the runoff of pollution from the land is intercepted and excessive bank erosion stops and as a result landowner maintenance costs fall. Some indirect benefits are also achieved: the additional space around the river allows the development of a path network, improving public access to the countryside and stimulating the development of rural businesses.

The illustration shows that:

- Upstream tree planting and the protection of the river banks from grazing and trampling by stock has reduced erosion and as a result the farmer does not have to remove silt from the river as frequently. This has also reduced the levels of pollution in the river downstream.
- Providing more space for rivers has allowed the construction of paths along the river. Some people are now able to cycle or walk to the beach or between the towns. There are fewer cars on the road and therefore reduced air pollution. People's quality of life is improved by easier access to the countryside.
- The removal of barriers to fish migration together action to reduce pollution and improve spawning has led to the recovery of fish populations. Anglers frequently have good catches and more people come to enjoy the river. The value of the fishery increases generating more income for landowners and local businesses.
- Fencing along the side of the river has protected the river banks. Flowers, shrubs and trees make the river a more attractive place and this enhances the landscape. A path along the river allows anglers, walkers and cyclists to have responsible access to the countryside. The farm has invested in a farm shop/café to service the increased number of people.
- The land above the village has been developed as a community woodland. The river draining the woodland as been restored with meanders and wetlands recreated and redundant flood embankments removed. Downstream, the village roads no longer flood.

Future opportunities for delivery of catchment-scale improvements

There are a number of developments which could help the delivery of this vision for delivering improvements at a catchment scale:

- An increasing focus on climate change and the recognition of carbon storage potential associated with habitats such as wetlands, peatlands and marine and coastal vegetation. This will lead to increased restoration efforts for these environments which will improve the condition of rivers, lochs and coastal zones.
- Current proposals for reform of the Common Agricultural Policy, including options for 'greening'.
- Ongoing work to develop the next SRDP. This could ensure that options to support restoration of the water environment are included, that a catchment wide view is taken and land managers are encouraged to work together to deliver green networks.
- Work by the Woodland Expansion Advisory Group on options to meet Scottish Government's woodland expansion targets. There are clear gains to be made from using native woodlands to help improve the physical habitat of our rivers and lochs.
- The development of the forthcoming National Planning Framework (NPF3) and the consolidated Water Planning Advice Note. These strategic documents will help to guide land use planning, green network development and delivery and regeneration. They have potential to secure benefits for the water environment, and support the restoration of physical damage.
- At a local authority level, ongoing work on land use planning, green network development and delivery, and regeneration. There are also important links to be made with Single Outcome Agreements and community planning.

Conclusion

This document has set out how improvements in the physical condition of the water environment can be delivered through partnership working, setting priorities, and the use of a largely voluntary approach. The principal responsibility for delivering objectives often lies with land managers themselves, who will also benefit from many of the improvements. However, there is also a strong role for the Scottish Government and its agencies in supporting actions that deliver improvements.

More widely, the water environment is vitally important to the people, economy and environment of Scotland. Scotland has a reputation for having a high quality water environment, and for a strong process for protection and improvement. This plan aims to develop our successful approach further, and to take a lead on meeting European objectives. Achieving implementation will bring many benefits for Scotland's future generations, and this investment in improving our environment will improve resilience and help to reduce future costs. This successful implementation can only be achieved through strong partnership working by the key sectors.

Consultation responses to this document will help to strengthen the partnership approach, and will maximise the opportunities to achieve multiple benefits, both in current river basin planning work, and in the development of Scotland's second river basin plans in 2015.

Consultation question:

18. We have suggested that river basin planning advisory groups can play an important role in taking a partnership approach to setting and addressing restoration priorities. What are your views on this suggestion, and how it could operate?

We have identified a number of areas where policy and funding options are developing and may offer opportunities for the future.

19. Do you agree with the opportunities that we have identified?

20. Are there other emerging policies and funding streams which could help to deliver restoration?